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FACTORS AFFECTING BROWN HARE (*LEPUS EUROPAEUS*) HUNTING BAGS IN TUSCANY REGION (CENTRAL ITALY)

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ABSTRACT - We carried out an exploratory analysis of hare *Lepus europaeus* hunting bags (number of brown hares shot) in the nineteen Hunting Districts of Tuscany (central Italy) from 2001 to 2004, in order to identify which variables (land use and characteristics, climate and management) could affect hare harvest. Vineyards and grass in rotation with winter cereals were positively associated with the number of hares shot, whereas industrial crops (mainly sunflowers) seemed to have a negative effect,as did the density of grazing sheep. Mean annual rainfall was negatively related to the harvest but with a borderline significance. We found a positive relationship between the number of hares harvested and the percentage of protected areas managed to conserve and produce small game species, whereas private hunting estates showed a negative association. Restocking both with wild hares captured in protected areas and with farm-reared animals did not show any effect on hunting bags of hares.

Key words: Brown hare, *Lepus europaeus*, harvest, habitat variables, management, central Italy

RIASSUNTO - ***Fattori influenzanti il carniere di lepri* (Lepus europaeus) *in Toscana (Italia centrale)***. E' stata condotta una ricerca preliminare sui carnieri di lepre (dal 2001 al 2004) dei diciannove Ambiti Territoriali di Caccia della Toscana, al fine di identificare quali variabili (di tipo ambientale, climatico e gestionale) possano influire sulla resa venatoria di questa specie. Il numero di lepri abbattute dai cacciatori è risultato influenzato positivamente dalla percentuale di vigneti e di foraggiere in avvicendamento, mentre le colture industriali (principalmente rappresentate dal girasole) e la densità del bestiame ovi-caprino hanno evidenziato un effetto negativo. Anche le precipitazioni medie annuali sono risultate associate negativamente al numero di lepri abbattute, tuttavia in questo caso la variabile non ha raggiunto il livello di significatività statistica. L'abbondanza del carniere di lepre è risultato favorito dalla percentuale di territorio interessato da aree protette a fini faunistico venatori (Zone di Ripopolamento e Cattura e Zone di Rispetto Venatorio) contrariamente a quanto rilevato per gli istituti faunistici privati (Aziende faunitico venatorie e agri-turistico venatorie). Il ripopolamento, effettuato sia con lepri di cattura sia di allevamento, sembra non influire in alcun modo sulla resa venatoria di questa specie.

Parole chiave: Lepre, *Lepus europaeus,* carniere, variabili ambientali, gestione, Toscana

INTRODUCTION

The European brown hare (*Lepus europaeus*) is one of the most important small game species in Europe. Although this lagomorph remains a common farmland animal, European populations have declined since the 1960s as a consequence of agricultural intensification (Slamecka, 1991; Smith *et al*., 2005a; Tapper and Barnes, 1986).

Agricultural intensification has resulted in increased mechanization and use of chemical compounds, and in dramatic changes of landscape characteristics such as the decrease of permanent vegetation cover, the increase of field size and the reduction of habitat diversity. These factors are often blamed for the decline of hare populations in Europe (Kaluzinski and Pielowski, 1976; Slamecka *et al*., 1997; Edwards *et al*., 2000). Within-habitat diversity is thought to be particularly important for hares in a predominantly pastoral landscape (Smith *et al.,* 2004 and 2005b), providing a varied diet, year-round food availability and a patchy distribution of feeding and sheltering sites (Tapper and Barnes, 1986; Smith *et al*., 2005a; Santilli *et al*., 2004). Some authors have suggested that small-sized fields are in general favourable to hares (Meriggi and Alieri, 1989; Lewandowski and Nowakowski, 1993), but large fields can also be beneficial (Vaughan *et al*., 2003).

Furthermore changes in climate and/or predator numbers could have magnified the effect of habitat losses (Rattenborg, 1991; Vaughan *et al*., 2003; Schmidt *et al*., 2004 and 2005a). Also infective diseases such as the European brown hare syndrome (EBHVS), pseudo-tubercolosis, pasteurellosis and coccidiosis can influence population numbers and dynamics (Rattenborg, 1994; Frolich *et al*., 2003), but they seem to play a minor role compared with predation or habitat characteristics (Frolich *et al*., 1996, Frolich *et al*., 2001). The dynamics of brown hare populations seems to be resilient to hunting pressure, even if heavy (Pepìn, 1989). Complete historical series of bag records are not available for Italy, but partial information can be obtained from the game books of some private hunting estates (Fig. 1). These data confirm a generalized decline of the species which has occurred starting from the second half of the 1960s.

More recently (2001-2004), 18,496 (SD = 3,441) hares are harvested on average every year. Hunting is traditionally carried out with hounds or pointers.

Hunting bags have been extensively used to evaluate the effect of management strategies, landscape characteristics and climate (Rattenborg, 1991; Giardini *et al*., 2000; Schmidt *et al*., 2004; Vargas *et al*., 2006; Merli and Meriggi, 2006). In this paper we analyse the effect of these parameters on brown hare hunting records in Tuscany region (central Italy) from 2001 to 2004, with the aim of identifying some possible factors which might need more detailed research in order to improve conservation and management.

Hunting bags can represent a sound measure of small game population abundance (Cattadori *et al*., 2003), when harvest data and species numbers

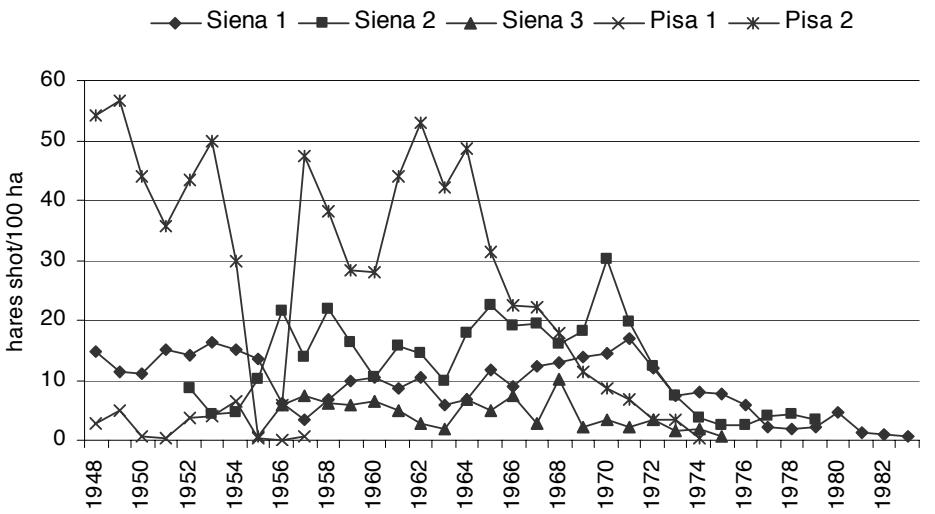

Figure 1 - Changes in hare hunting bags after World War II in 5 private hunting estates of Tuscany region (provinces of Siena and Pisa).

are correlated (Roseberry and Woolf, 1991). In our study area, harvest was not planned, no bag limit was imposed to hunters, and the hare hunting season had almost the same length all over the region, so we assumed harvest records were a useful index of hare abundance.

STUDY AREA

Tuscany (1,634,000 ha) is divided in nineteen Hunting Districts (thereafter HD). HDs are very large game management units (mean area = 108,300 ha, SD = 54,500) managed by a mixed committee formed by public administrators and delegates of hunters, farmers, and ecologist associations, often supported by wildlife technicians. Their size and habitat characteristics (Tab. 1) vary a lot both between and within them.

The main management strategy is to protect the species inside a number of areas (from 500 to 2,000 ha each) where habitat management and predator control (e.g. the red fox *Vulpes vulpes*) are carried out with different intensity. In these areas many hares are usually captured and relocated in the hunting territory at the end of the hunting season, generally in December and January. Captures are carried out using trammel nets. On average 5,096 hares (SD = 682.2) were captured and released every year from 2001 to 2004. Restocking with hand-reared hares is also popular, despite being often considered ineffective (Meriggi *et al*., 2003). On average, 3,054 (SD = 620.4) hand-reared hares were released between 2001 and 2004.

METHODS

1. Data collection

For each HD we measured the following variables (Tab. 2):

a) Percentage of land use. The data were obtained by the Italian Institute of Statistics (ISTAT) at the official web

Table 1 - Habitat characteristics of the 19 Hunting Districts (HD) of Tuscany region.

Habitat variables	Average (S.E.)	Min-max
Woodlands (%)	50.1 (13.77)	28.7 - 72.7
Cereals (%)	15.9 (1.04)	3.2 - 34.1
Industrial crops (%)	5.8 (0.43)	0.1 - 12.5
Grass in rotation (%)	6.7 (0.52)	0.5 - 16.4
Hay fields and pastures (%)	11.5 (0.71)	4.0 - 25.8
Vineyards (%)	3.8 (0.38)	0.0 - 14.8
Olive tree groves (%)	6.2 (0.50)	0.0 - 18.9
Average altitude (m a.s.l.)	318.8 (19.01)	105.0 - 788.0

sites of the Tuscany Regional Government (www.regione.toscana.it/cif/indicato/indsetto.htm#agr). Land use classes were grouped in seven categories; the forest surface included in four natural parks and urban areas was excluded.

b) Habitat heterogeneity, by means of the Shannon-Weaver's index of diversity

c) Density of cattle, sheep and goats (data obtained by ISTAT)

d) Percentage of protected areas for hares

f) Percentage of private estates

g) Hunting effort

h) Mean altitude

i) Road density

j) Mean annual rainfall and mean annual temperature (obtained by Regional Agro-meteorological Service, using data from at least 3 climatic stations for each HD).

k) Number of both hand-reared and wild hares released every year per unit of hunting area.

The harvest records for each of the 19 HDs from 2001 to 2004 were collected from the personal game registers of hunters by the Tuscany Wildlife Office (Fig. 2). HDs are active from 1996 but previous data were not available or were incomplete.

2. Data analyses

Using the variable above listed, we performed a Linear Multiple Regression Analysis (LMRA) by stepwise selection, in order to evaluate their effect on the hare bags. The independent variables were selected by the forward stepwise procedure (probability to enter = 0.25, to remove = 0.1). Variance Inflection Factors (VIF) were calculated for each predictor to detect multicollinearity (SAS, 2002). Differences between years and HDs were analysed by a two-way ANOVA (both years and HDs

analysed as categorical variables). The relationship between hare bags and the selected variables was investigated by a simple regression analysis.

Table 2 - Variables used in the analysis of hare hunting records from 2001 to 2004 (N = 20).

Variable	Description
Woodlands	idem
Cereals	Winter and spring cereals (wheat, barley, oat, maize and sorghum)
Industrial crops	Sunflower, sugar beet, soybean and colza
Grass in rotation	Grass and green fodder in rotation including grass, clover and lucerne
Hay fields and pastures	Grass areas permanently out of rotation and grazed pastures
Olive tree groves	idem
Vineyards	idem
Density of cattle	Number of cows reared per km^2
Density of sheep and goats	Number of sheep and goats reared per km^2
Mean altitude	in meters a.s.l.
Habitat heterogeneity	Shannon-Weaver Index = $-\sum(p_i \log_2 p_i)$ where p_i is the proportion of the i^{th} habitat type
Percentage of protected areas	% occupied by no-hunting areas managed for game species
Percentage of private estates	% occupied by private game estates
Hunting effort	Number of hunters per km^2
Mean annual temperature	in °C
Mean annual rainfall	in mm
Road density	km/km^2
Density of hand-reared hares	Number of hand-reared hares released per km^2
Density of wild hares	Number of wild hares captured in protected areas and released in hunting areas (km^2)

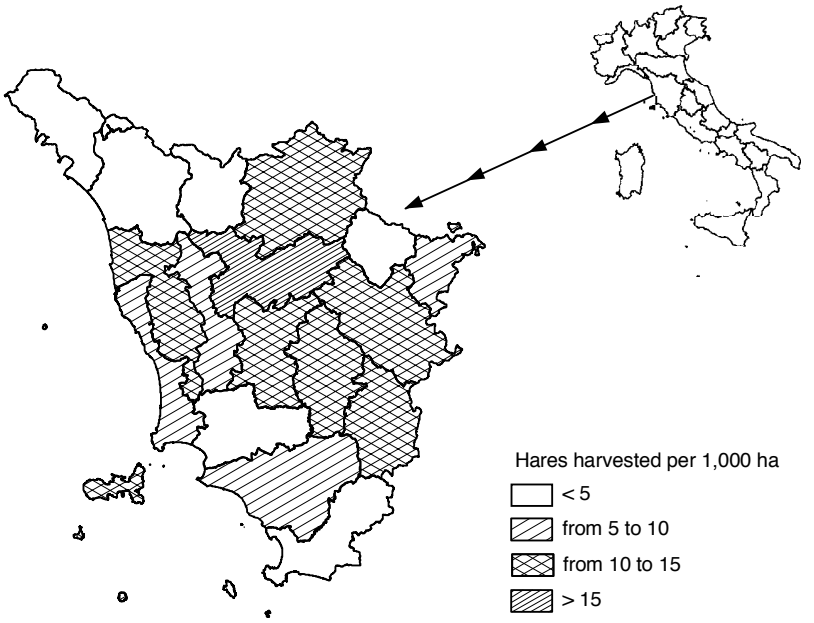

Figure 2 - The nineteen Hunting Districts of Tuscany according to four classes of hares harvest.

RESULTS

The multiple regression model explained 74.2% of the total variance of the hare harvest by the inclusion of 8 variables, 7 with significant regression coefficients (Tab. 3). Hare bags increased with the increase of rotational

Table 3 - Multiple regression model between densities of hares harvested and the variables (N=20) measured in the 19 Hunting Districts of Tuscany (Stepwise Regression Control: Probability to Enter 0.250; Probability to Leave 0.100; R-square=0.7416; N.S. = not significant).

Variables	Partial regression coefficients	S. E.	t	P
Intercept	1.14	0.32	3.62	<0.001
Year	-0.19	0.051	-3.79	<0.001
Industrial crops	-5.07	1.77	-2.87	<0.01
Grass in rotation	4.88	1.88	2.60	<0.05
Vineyards	11.73	1.77	6.64	<0.0001
Sheep and goats	-0.71	0.18	-3.84	<0.001
Protected areas	3.75	0.98	3.83	<0.001
Private hunting estates	-3.89	1.52	-2.55	<0.001
Rainfall	-0.01	0.00	-1.87	N.S.

crops, vineyards, and protected areas, whereas it decreased with the increase of industrial crops, livestock density (sheep and goats), and private hunting estates. Rainfall showed a negative relationship with hare bags but with a borderline significance (Tab. 3).
The VIF maximum value was 4.632 excluding serious multicollinearity risks.
The number of hares harvested per km^2 in 2003 was significantly lower than that recorded in the other years ($F = 3.907$, $P = 0.014$); Tab. 4). Sharp differences were also observed among HDs ($F = 11.58$, $P < 0.0001$; Fig. 3). The relationship between the hare bags and the selected variables were explained by both linear and quadratic regression models, with the exception of grass in rotation and industrial crops which were better explained by the quadratic model.

Table 4 - Mean density of hare harvest in the 4 years of the study.

Year	Mean (hares/1000 ha)	S.E.
2001	9.4	1.38
2002	9.5	0.66
2003	6.5	0.93
2004	9.7	1.77

DISCUSSION

In Tuscany, spring and summer 2003 were exceptionally dry and hot. Their mean temperatures were 1.9 °C higher than those registered in 1980-2002. Mean rainfall from May to August was reduced by 50% compared with the period 1986-2002, but intense rainfalls (with local floods) occurred in late

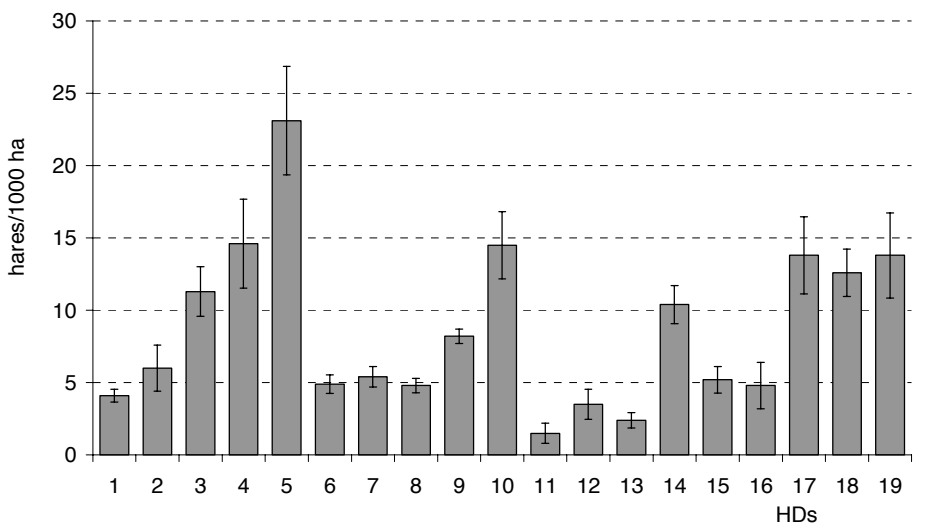

Figure 3 - Mean density (± S.E.) of hare harvest recorded in the 19 Hunting Districts (HD) of Tuscany.

summer and autumn. (Meneguzzo *et al*., 2003). These unusual weather conditions could have negatively affected hare reproduction and survival, explaining the reduction of the bags observed in that hunting season.

Summer drought can reduce hare numbers (Bresinski, 1976; Frylestam, 1979; Eiberle *et al*., 1982; Slamecka *et al*., 1997), whilst extremely wet periods increase both the energetic demand for thermoregulation, particularly in leverets, and the prevalence of diseases such as coccidiosis (Edward *et al*., 2000), pseudotubercolosis (Barre *et al*., 1978) and EBHVS (Santilli *et al*., 2004).

Since very different kinds of crops are grouped together by the Italian Institute of Statistic, the results of the present analysis about land use must be carefully interpreted. The negative effect of industrial crops (mainly sunflowers) probably depends on the fact that these crops are generally cultivated in wide monocultures. On the contrary, rotational crops are typical of more diversified agricultural landscapes, which are positively correlated to hare numbers (Tapper and Barnes, 1986).

Vineyards are probably a good habitat for hares. Cover crops, such as grasses or clovers (especially in the internal area of Tuscany, e.g. the HD 4) are often seeded between the rows of vines to prevent soil erosion and to improve soil fertility and structure. Although grass mowing can cause mortality in leverets, these areas maintain a high level of cover and forage availability all year–round, protecting animals from adverse weather and probably reducing raptor predation. However, the relationship between hares and this kind of cultivation needs further investigation, in order to understand the more effective management techniques.

The pastoral landscape is usually considered a poor habitat for hares. A fine-scale study of habitat use showed that hares avoid fields that are used by cattle (Barnes *et al*., 1983), cover rather than forage being probably the limiting factor (Smith *et al*., 2005). Sheep grazing is generally considered worse than cattle grazing because it tends to maintain a shorter homogeneous structure (Smith *et al*., 2004), so the negative association between hare yield and the density of sheep and goats is not surprising. Moreover, in Tuscany cereal stubbles are often grazed by sheep, reducing the amount of food and cover of these habitats for hares.

Since in Tuscany hare hunting is carried out without bag limits, the presence of a wide network of protected areas - managed specifically for small game species - assumes a great importance for the conservation of this species. Protected areas spread hares in hunting area naturally or by capture and relocation. Capture can cause a high level of stress and pain-related stress can probably also cause a certain degree of “muscle damage” (Paci *et al*., 2006) reducing survival after release. Furthermore, low rates of survival of wild relocated hares are observed when releases take place in low quality habitats (Meriggi *et al*., 2001). For these reasons this management technique, as well as the release of captive-bred hares, which show even lower rates of survival (Fiecther, 1988, Giovannini *et al*., 1988; Zanni *et al*., 1988; Angelici *et*

al., 1993; Riga *et al*., 1997; Meriggi *et al*., 2001), seems to have no influence on hare yield, whilst the natural spread of hares in neighbouring hunting areas seems to affect positively the final bag. The management of private estates is oriented principally to pheasant shooting (farm-reared birds) and so the capacity of spreading hares outside their borders is lower than that of protected areas.

According to our analysis, hunting pressure does not seem to influence the hunting yield. However we considered only the total density of hunters and we do not know how many hunters really shoot hares and how this practice is performed (with hounds or pointers). The kind of shooting practice could have a different impact on hare population density (Stoate and Tapper, 1993).

In our model, neither main road density nor habitat diversity, seem to affect hares harvests. HDs are very large units and probably at so large a scale habitat fragmentation and road mortality have little effect on hare populations. These kinds of variables probably need to be investigated at a smaller scale.

REFERENCES

Angelici F.M., Riga F. and Boitani L. 1993. Preliminary data on the dispersal and mortality of brown hares (*Lepus europaeus,* Pallas 1778) bred in captivity, released in province of Rome. *Suppl. Ric. Biol. Selvaggina*, XXI: 334-351.

Barnes R.F.W, Tapper S.C and Williams J. 1983. Use of pastures by brown hare. *J. Appl. Ecol*., 20: 179-185.

Barre N., Louzis C. and Tuffery G. 1978. Contribution à l'étude epidemiologique de l'infection a Yersinia pseudo-tuberculosis chez les animaux sauvages en France. *Bull. Mens. O.N.C*. Novembre: 67-82.

Bresinski W. 1983. The effect of some habitat factors on the spatial distribution of a hare population during the winter. *Acta Theriol*., 28: 435-441.

Cattadori I.M., Haydon D.T., Thirgood S.J. and Hudson P.J. 2003. Are indirect measures of abundance a useful index of population density? The case of red grouse harvesting. *Oikos*, 100 (3): 417-639.

Edwards P.J., Fletcher M.R.and Berny P. 2000. Review of the factors affecting the decline of European brown hare, *Lepus europaeus* (Pallas, 1778) and use of wildlife incident data to evaluate the significans of paraquat. *Agr. Ecosys. Environ*., 79: 95-103.

Eiberle K., Matter J.F. and Wettmann O. 1982. Zur Bestandesentwicklung des Feldhasen im Kanton Zürich. *Vierteljahrsschrift der Naturforschenden Gesellschaft* in Zürich, 127: 231-245.

Fiecther A. 1988. Survie et dipersion de lièvres importès et levrauts d'èlevage lachès. Atti del I Convegno Nazionale dei Biologi della Selvaggina. *Suppl. Ric. Biol. Selvaggina*, XIV: 233-246.

Frolich K., Meyer H.D., Pielowski Z., Ronsholt L., von Secklanzendorf S. and Stolte M. 1996. European brown hare syndrome in free-ranging hares in Poland. *J. Wild. Dis*., 32: 280-285

Frolich K., Haerer G., Bacciarini L., Janovsky M., Rudolph M. and Giacometti M. 2001. European brown hare syndrome in free-ranging European brown and mountain hares from Switzerland. *J. Wild. Dis*., 37: 803-807.

Frolich K., Wisser J., Schmüser H., Fehlberg U., Neubauer H., Grunow R., Nikolaou K., Priemer J., Thiede S., Streich W.J. and Speck S. 2003. Epizootio-logic and ecologic investigations of European brown

hares (*Lepus europaeus*) in selected populations from Schleswig- Holstein, Germany. *J. Wild. Dis*., 39: 751-761.

Frylestam B. 1979. Structure, size and dynamics of three European hare populations in southern Sweden. *Acta Theriol*., 24: 449-464.

Giardini L., Baldi A. and Nobili G. 2000. Factors affecting harvest on a Brown hare population (*Lepus europaeus*) in central Italy. *Hystrix*, 11 (2): 79-82.

Giovannini A., Trocchi V., Savigni G. and Spagnesi, M. 1988. Immissioni in un'area controllata di lepri di allevamento: analisi della capacità di adattamento all'ambiente mediante radio-tracking. Atti del I Convegno Nazionale dei Biologi della Selvaggina. *Supp. Ric. Biol. Selvaggina*, XIV: 271-299.

Kaluzinski J. and Pielowski Z. 1976. The effect of technical agriculture operations on the hare population. In: Pielowski Z. and Pucek Z. (eds), Ecology and Management of European hare population Polish Hunting Association, Warsaw, 205-211.

Lewandowski K. and Nowakowski J.J. 1993. Spatial distribution of brown hare *Lepus europaeus* populations in habitats of various types of agriculture. *Acta Theriol*., 38: 435-442.

Meneguzzo F., Maracchi G. and Menduni G. 2003. Sommario Climatico della Toscana - Anno 2003. Istituto di Biometereologia del CNR. Osservatorio del Clima. Firenze.

Meriggi A. and Alieri R. 1989. Factors affecting Brown hare density in northern Italy. *Ethol. Ecol. Evol*., 1: 255-264.

Meriggi A., Ferloni M. and Geremia R. 2001. Studio sul successo dei ripopolamenti di lepre. Greentime, Bologna, 250 pp.

Merli E. and Meriggi A. 2006. Using harvest data to predict habitat population relationship of the wild boar *Sus scrofa* in Northern Italy. *Acta Theriol*., 51 (4): 338-389.

Paci G., Bagliacca M. and Lavazza A. 2006. Stress evaluation in hares (*Lepus europaeus* Pallas) captured for traslocation. *Ital. J. Anim. Sci*., 5: 175-181.

Pépin D. 1989. Variation in survival of brown hare (*Lepus europaeus*) leverets from different farmland areas in the Paris basin. *J. Appl. Ecol*., 24: 725-734.

Rattenborg E. 1991. Climatic Influence on Fluctuations in the Danish Hare Bag 1941-1988. Kalö NERI, Internal Report.

Rattenborg E. 1994. Diseases in the hare (*Lepus euroaeus*) population in Denmark – epidemiological description and analysis of post-mortem data. The Royal Veterinary & Agricultural University, Copenaghen, Denmark 1994: 1-114.

Riga F., Boitani L., Fioramonti L., Gemma F., Laurenti A., Angelici F.M., 1997. Esiti dei ripopolamenti di Lepre europea (*Lepus europaeus*) in un'area del preappennino laziale. *Supp. Ric. Biol. Selvaggina*, XXVII: 759-767.

Roseberry J.L. and Woolf A. 1991. A comparative evaluation of techniques for analyzing white tailed deer harvest data. *Wildlife Monographs*, 117: 1-59.

Santilli F., Mazzoni della Stella R., Guerrini L., Mori L., Bisogno G. and Bagliacca M. 2004. Factors affecting brown hare (*Lepus europaeus*) production in large enclosure. *Game and Wildlife Science*, 21 (3): 471-480.

SAS Institute 2002. JMP. SAS Institute Inc., Cary, N.C.

Schimdt N., Asferg T., and Forchammer M. 2004. Long term pattern in European brown hare population dynamics in Denmark: effects of agriculture, predation and climate. *BMC Ecology*, 4:15.

Slamecka J. 1991. The influence of ecological arrangements on Brown

hare population. In: Csànyi S. and Ernhaf J. (eds.), XXth Congress of the International Union of Game Biologist, Hungary, Brno, 340-346.

Slamecka J., Hell P. and Jurcík R. 1997. Brown hare in the west Slovak lowland. *Acta cientarum Natura,* Brno, 31: 1-115.

Smith K.R., Jennings N.V., Robinson A. and Harris S. 2004. Conservation of European hares *Lepus eurpaeus* in Britain: is increasing habitat heterogenety in farmland the answer? *J. Appl. Ecol.*, 41: 1092-1102.

Smith K.R., Jennings N.V. and Harris S. 2005a. A quantitative analysis of the abundance and demography of European hares *Lepus europaeus* in relation to habitat type, intensity of agriculture and climate. *Mammal. Rev.*, 35 (1): 1-14.

Smith K. R., Jennings N.V., Tataruch F, Hacklander K. and Harris S. 2005b. Vegetation quality and habitat selection by European hares *Lepus europaeus* in a pastoral landscape. *Acta Theriol.*, 50 (3): 391-404.

Stoate C. and Tapper S.C. 1993. The impact of three hunting methods on brown hare (*Lepus europaeus*) populatios in Britain. *Gibier Faune Sauvage*, 10: 229-240.

Tapper S.C. and Barnes R.F.W. 1986. Influence of farming practice on the ecology of the Brown hare (*Lepus europaeus*). *J. Appl. Ecol.*, 23: 39-52.

Vargas J.M., Guerrero J.C., Farfàn M.A., Barbosa A.M. and Real R. 2006. Land use and environmental factors affecting red-legged partridge (*Alectoris rufa*) hunting yields in southern Spain. *Eur. J. Wild. Res.*, 52 (3): 188-199.

Vaughan N., Lucas E., Harris S. and White P.C.L. 2003. Habitat associations of European hares *Lepus europaeus* in England and Wales: implication for farmland management. *J. Appl. Ecol.*, 40: 163-175.

Zanni M. L., Benassi M.C. and Trocchi V. 1988. Esperienze di radio-tracking nella Lepre (*Lepus europaeus*): sopravvivenza, utilizzo dello spazio e preferenze ambientali di soggetti allevati. Atti del I Convegno Nazionale dei Biologi della Selvaggina. *Supp. Ric. Biol. Selvaggina*, XIV: 301-305