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FACTORS AFFECTING BROWN HARE (*Lepus europaeus* PALLAS) PRODUCTION IN FENCED AREAS IN ITALY

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Abstract:
Survival after releasing of brown hares (*Lepus Europaeus* Pallas) reared in captivity seems to be very low. The first mortality factor is predation by carnivorous mammals. Fitness of this kind of animals is very poor as a consequence of the rearing system (cages) (Angelici et al., 1993; Giovannini et al., 1988; Meriggi et al., 2001; Riga et al., 1997; Zanni et al., 1988). For this reason we considered semi-natural breeding as an alternative method to produce hares for restocking and reintroduction.
Results of 5 years semi-natural brown hare rearing project are reported.
The production of 25 fences was monitored from 1999 to 2003. The size of fences varied from 11,258 sq. m (min.) to 66,168 sq. m (max) with an avarage of 33,932 sq. m (s.d. 12,847).
Annually wild hares preventively captured in protected areas were introduced in fences in January. Generally 2 adult male and 3 adult females were introduced in each fence. Hares produced were captured in October-December using trammel nets and released in others low-density protected-areas.
Fenced areas were cultivated with crops, which were not harvested at ripening.
Every fence was surveyed with GPS instrument and data were elaborated with GIS software (Arcview®). The following environmental characteristics were considered: surface, incidence of woodland, bush-land, cereals (winter-wheat, oat or barley), grasslands (alfalfa, clovers and/or *melilotus*), spring-crops (sorghum, corn, millet, kale), meadows (meadows and stubble), undersowing, mixed hay-fields, vine-yards or olive-yards, number of fields per ha, number of different crops, Shannon index, average slope and exposition. We determined also the soil structure in every fence by ground-texture analysis.
Regression analysis (simple and multiple, followed by the stepwise selection of significants) was carried out on the number of hares produced in the fences in relationship to the environmental characteristic.
Totally, from 1999 to 2003, 675 hares were produced (hares captured less hare introduced) with a balance of 165, 4 % between hares introduced and hares captured. The best result was observed in 2003 with 215 hares produced (balance of 430% between hares introduced and hares captured, 21.5 hares produced per fence with an average of 6.14 hares produced per ha). The worst result was observed in 2001 with 98 hares produced (balance of 104.3% between hares introduced and hares captured, 5,16 hares produced per fence with an average of 1.45 hares produced per ha).
Surveying mortality in so large fences resulted very difficult: 159 death hares were found (15% mortality) and necroscopy was possible only in 19 of them (the most important mortality factor was referred to E.B.H.S., 68%).
Linear regression analysis showed that the following environmental factors had a negative effect on the hares production: woodland (r^2 0.118, P=0002), bush-land (r^2 0.065, P=0.029), average slope (r^2 0.098, P=0.016), clay content of soil (percentage) (r^2 0.188 P<0.001). Mixed hay-fields (r^2 0.368, P<0.001) and undersowed cereals (r^2 0.241, P<0.001) seems to affect positively the hare production. Others positive factors resulted: fence-size (r^2 0.075, P=0.018), Shannon index (r^2 0.093, P=0.05), number of "small-fields" per ha (r^2 0.193, P=0.004), number of vegetable species cultivated (r^2 0.212, P=0.002) and sand content of soil (r^2 0.180, P<0.001).
Stepwise analysis selected mixed hay-fields as significant positive factors and woodlands and, strangely, wine/olive yards as significant negative factors. Furthermore sandy soils seem affect positively the hares production.
Woodlands were found as negative variables also in studies on wild populations (Schropfer & Nyenhuis, 1982; Rosa et al., 1991). Brown hare is in fact an open-space specie and generally avoids the wooded surfaces which offer few food resources. Soil structure affect soil moisture which affects soil temperature and high humidity and low temperature should favour illness such as EBHS (Spagnesi & Trocchi, 1993) (Lavazza & Capucci 1996).
The strong positive effect of mixed hay-fields should depend by the high number of vegetables species which they contain. Our mix contained *Graminaceouses*, *Leguminouses*, *Crucifers* and *Composites*, so that availability of food resources should have been high and constant for long periods. Probably also undersowing has similar effect. Environmental heterogeneity is known to be a crucial factor which affects hare density (Barnes & Tapper, 1983). Hares are better sustained by mixed farming systems which provide them with a diversity of crops at different growth stages (Tapper & Barnes, 1986).

We conclude that semi-natural breeding, in conjunction with habitat improvement programs, should be a valuable game management practice for restocking and reintroducing hares in areas characterised by low densities or absence of this specie.
The success of this kind of breeding seems to be linked to the same environmental variables: woodlands and clay content seems to be a negative effect while mixed hay-fields, undersowing, sandy soils and crop diversity positively affect production. For this reason the results of the present experience should be used also for the improvement of the open areas habitats. This kind of system should be also suitable to produce threatened species of hares such as *Lepus corsicanus* De Winton, which was recently considered as different specie from *Lepus europaeus* Pallas (Trocchi et al., 1991).

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THE CROCODILE FARMING INDUSTRY IN ZAMBIA

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Abstract:
The crocodile farming industry commenced in 1980 and has progressed into both a conservation and socio-economic industry. Since its inception Government has provided critical support to the development of the industry on account of its immense biodiversity conservation value and socio-economic potential. The existing policy and legal framework is supportive to the industry. Government has continued to provide a favourable environment for dialoguing with the industry. Collection of wild eggs and capture of breeding stock has continued at minimal fees of about US$ 0.50 per egg of the Nile crocodile and US$ 70 per Nile crocodile. Presently, there are 8 farm units across the country. Investment and management practices on the units have improved significantly resulting in increased production levels of both the skins and meat. The industry has now established a local market for the crocodile meat. The industry produces about 32 tons of meat and 13 000 skins annually. The major markets for the produce are Singapore, Japan and South Africa. Dependence on the wild stock for eggs is expected to decline following the increase in the number of eggs harvested on the farms. The annual number of eggs incubated from the wild is 22 745 with a hatchling percentage of 79.5% whilst the annual number of eggs incubated from the farm breeding stock is 34 291 with a hatchling percentage of 81.9%. Currently, there are 2 333 breeding crocodiles on the farms with a male: female ratio of 1:8. The establishment of the industry has improved the economic value and thus the conservation status of the wild crocodile population. The industry is considered environmentally friendly as it allows for the protection of the wild population whilst allowing limited utilisation of wild specimens through the collection of eggs and capture of breeding stock. The