

**A two-year (2010-2011) survey on the causes of mortality  
in farmed game hares (*Lepus europeus*)**

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**ABSTRACT:** In this study, the biggest game hare farm in Veneto Region (Venice province) was monitored for two years (2010-2011) in order to investigate on the causes of mortality. To this aim, all dead hares with a good condition score were necropsied. Data on mortality were recorded on the basis of the following categories: newborn kits, suckling kits, growing hares, sub-adult and reproducing hares. Total mortality of born hares was not significantly different (38.7% on average) between the two years. Mortality was highest in kits during lactation (22.9% on average), followed by hares during growth (9.7% on average). The major cause of mortality in younger hares was enteric diseases, whereas the older hares were affected mainly by respiratory diseases and traumas. In reproducing hares, respiratory diseases and ulcerative pododermatitis were the most frequently detected pathological conditions.

Key words: Farmed game hare, Mortality, Enteric diseases.

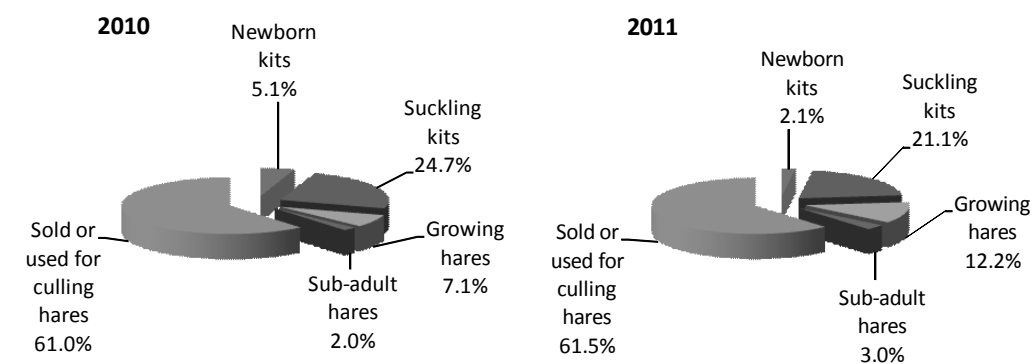
**INTRODUCTION** – Since the 1960s, a decline in the populations of game hares (*Lepus europaeus*; Pallas, 1778) due to the intensification of agriculture, diseases, climate change and increased number of predators, has been observed in a number of European countries. In order to restore local populations of this species and to limit the import of animals from other countries, the captive breeding of hares have been started in Italy (Spagnesi and Trocchi, 1992). Difficulties in profitably rearing this wild animal have been significant and still today the success is far to be achieved. Among several farming systems, that in open-air cages has been showed the most suitable, especially for the maintenance of good health conditions of animals. Since the restricted and peculiar market, this activity has not expanded enough and rarely has stimulated the scientific community. As a consequence, knowledge about game hares farming and their pathology is still lacking. Therefore, in this study the causes of mortality of farmed game hares were investigated in the biggest farm in Veneto Region during 2010 and 2011.

**MATERIALS AND METHODS** – The farm was located within the Venice province and reared 318 reproducing hare pairs, with a production of about 2,000 animals/year. Animals were kept outside in roofed cages and were vaccinated against staphylococcosis, pasteurellosis and European Brown Hare Syndrome with autogenous vaccines produced by IZSLER. Mortality of hares was recorded from January 2010 to

December 2011. Animals were grouped into the following categories: newborn kits (until the 2<sup>nd</sup> day of age), lactating kits (3-25 d of age), growing hares (26-60 d of age); sub-adult (from 61 d of age until selling) and reproducing hares (animals kept for reproduction, including from the 1<sup>st</sup> of January sub-adults hares kept for culling). All dead animals with a good condition score were subjected to necropsy. Laboratory analyses (*i.e.* histological, parasitological, bacteriological and virological exams) were also performed to confirm the diagnosis.

**RESULTS AND CONCLUSIONS** – During the surveyed period, total mortality was significantly high, with about 39% of born hares died in both years (Figure 1). The highest mortality rates were recorded in suckling kits (22.9% on average), followed by growing hares (9.7% on average), newborn kits (3.6% on average) and sub-adult hares (2.5% on average). The 24.7% and 15.4% of reproducing hares died during 2010 and 2011, respectively.

**Figure 1** – Mortality (% of born hares) of game hares during 2010 and 2011



Newborn kits: mortality in newborn kits was attributable mainly to traumas, parental cannibalisms, low vitality and freezing, during winter months.

Suckling kits: most common diseases in suckling kits were enteric diseases (75.5%), followed by hunger (11.3%), respiratory diseases (3.4%) and traumas (7.2%). Hares affected by enteric diseases showed diarrhoea with catarrhal or catarrhal-hemorrhagic entero-tiflitis. *Clostridium perfringens* and *Escherichia coli* were the most commonly isolated bacteria from these cases. Unlike free-living hares (Spagnesi and Trocchi, 1992), bacterial enteric diseases seem to be a common health problem in young captively-bred hares (Ducluzeau, 1975; Dabard, 1979; Spagnesi and Trocchi, 1992; Miragoli, 2007).

Growing hares: enteric diseases represented 74.9% of the causes of mortality in growing hares. Besides enteritis, coprostitis was observed in 19.2% of diseased hares. Abdominal distension with caecal impaction and gaseous watery content in stomach and intestine were frequently seen. Mucous colon content, splenomegaly, bladder distension and *ab ingestis* pneumonia were rarely detected. These pathological findings are consistent with those reported by Griffiths (1993) and Whitwell (1991, 1994) in Leporine Dysautonomia of free-living hares and in Epizootic Rabbit Enteropathy.

Sub-adult hares: predominant diseases of sub-adult hares were in the respiratory tract (38.9%), followed by traumas (34%). Lesions consisted of fibrino-purulent pleuropneumonia, mainly apical and bilateral. The aetiological agent associated with

these lesions was always *Pasteurella multocida*. Traumas were caused by incorrect handling from the farmer or by sudden and vigorous movements of the hares.

Reproducing hares: whilst pathology of all the categories of animals was similar between the two years, two main differences were observed in reproducing hares. Respiratory diseases, similar to those described for sub-adult hares, affected the 25.4% of dead reproducing hares in 2010 and the 44.1% in 2011. Ulcerative pododermatitis were detected in the 32.2% of the specimens in 2010 and in the 5.4% in 2011. Besides metatarsal ulcerations, multifocal visceral purulent lesions such as renal and splenic abscesses, thrombo-embolic pneumonia and/or fibrinous pleuritis were also observed associated to pododermatitis. These lesions were caused by *Staphylococcus aureus* and in more chronic cases, AA-amyloid was observed histologically in sections of liver, kidneys and spleen stained with Congo red. Generalized AA-Amyloidosis has been reported in free-living hares affected by chronic inflammation (Geisel and Linke, 1988) and in farmed reproducing rabbit kidneys (Marcato *et al.*, 2003). The different frequency of pododermatitis detected in the two years could be due to the different therapy used to control the disease and to the different vaccine protocol used against *S. aureus*. The detection of a higher number of cases of pneumonia during 2011 compared to 2010 could be attributed to unfavourable weather conditions.

Findings obtained in this study confirm that game hare farming is difficult to manage successfully and that losses due to mortality could be significant. Most of the diseases detected may be attributable to the farming system and not only to a specific aetiological agent. In future, further studies are needed in order to improve the farming technique of game hares and the knowledge regarding their diseases.

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*The Authors wish to thank the owner of the farm, Mr. Giacinto Rigo, for his availability, collaboration and help.*

