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Short communication

Bovine tuberculosis in wild boar (*Sus scrofa*), red deer (*Cervus elaphus*) and cattle (*Bos taurus*) in a Mediterranean ecosystem (1992–2004)

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Abstract

During the last 12 years, an increasing frequency in condemnation of hunted red deer and wild boar carcasses due to the presence of tubercle-like lesions has been observed in Extremadura (Western Spain). Before 1993, tuberculosis was a very rare finding in hunted animals. The current tuberculosis regional prevalence in cattle approaches 0.4% after years of expensive test and slaughter campaigns. It is imperative to investigate the epidemiology of *Mycobacterium bovis* infection in red dear and wild boar in order to keep a good health status and to maintain the effectiveness of domestic species TB eradication programs. The present paper evaluates the problem in Sierra de San Pedro, estimating the prevalence of TB in wild boar and red deer, the main wild artiodactyls in the area, and domestic cattle since 1992–2004, by the use of a low-cost surveillance method based on detailed pathological inspection of hunted animal carcasses. Microbiology and molecular epidemiology studies on several *M. bovis* isolates from domestic and wild animals helped to define the interspecies

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contacts. These findings, as well as recent history of game estates management and descriptive epidemiology field work, throw light on the rise and maintenance of these epizootics.

Keywords: Bovine tuberculosis; Wild artiodactyls; Wild boar; Red deer; Mediterranean ecosystem

1. Introduction

Extremadura region, in South-West Spain, contains one of the best preserved areas of Mediterranean ecosystem in Europe. In this region, there is a long standing history of sustainable development strategies based on the exploitation of forestry, agriculture and livestock resources in the extensive areas of *dehesa* (acorn and cork oak forests) and *sierra* (Mediterranean forest), combined with the benefits derived from varied and abundant wildlife (Fernández-Llario and Mateos-Quesada, 2003; Serraino et al., 1999; Van Soolingen et al., 1994).

Activities such as hunting and ecological tourism are especially important economic activities for the region. However, over the last 12 years (1993–2005) the increasing number of red deer and wild boar carcasses condemned for the presence of tubercle-like lesions has concerned the human and animal health authorities, wildlife conservation authorities and game hunters. In addition, tuberculosis (TB) in wildlife is known to hinder the success of eradication programs in cattle (Aranaz et al., 1996; Serraino et al., 1999; Van Soolingen et al., 1994), and to be a risk to endangered species such as Iberian Lynx (*Lynx pardina*) that live in these areas and may hunt and consume infected deer or wild boar (Briones et al., 2000; Rodríguez and Delibes, 1990).

This report describes the findings of a study from Sierra de San Pedro area of Extremadura where the land-use is representative of the region. Based on the results of a low-cost surveillance method, based on detailed pathological inspection of carcasses, we describe the development of TB epidemics between 1992 and 2004, in the main wild artiodactyls species, red deer and wild boar, the involvement of *Mycobacterium bovis*, the molecular evidence of inter-species transmission, and the possible compromise of cattle test-and-slaughter campaigns which may can be the cause of this emerging disease pattern in the region.

2. Materials and methods

Sierra de San Pedro is approximately located between 39°15′–39°30′N and 6°15′–7°15′W, it is an area of semi-natural Mediterranean ecosystem (9000–10,000 km^2) to the south of the city of Cáceres (Extremadura, Western Spain). Sierra de San Pedro is considered to be one of the best hunting areas in Europe with numerous game estates, many of which also breed cattle, sheep and pigs in an extensive free ranging system, grazing in pastures with the wild artiodactyls.

Retrospective data was collected from carcass evaluation records covering the period 1992–2004. Data were collected from the Game Activities Annual Reports of the Human Health Department (Regional Government of Extremadura-JEX). Data on the cattle