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Short communication

Silvopastoralism and autochthonous equine livestock: Analysis of the infection by endoparasites

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ABSTRACT

Two groups of autochthonous Pura Raza Galega (PRG) horses, one comprising 483 animals under a silvopasturing regime, and the other comprising 72 PRG horses managed in farms, were used to analyse the effect of silvopasture on infection by endoparasites. Results were considered according to the age and the sex of the horses. Faecal samples were individually collected from each animal and analysed by the coprological flotation, sedimentation and migration techniques. Coprocultures were also done to identify the main strongylid genera affecting the horses.

Eggs from the gastrointestinal nematoda *Parascaris equorum*, strongyles and *Oxyuris equi* were the only endoparasites observed in the faeces of the horses. Larvae of *Trichonema* and *Cyalocephalus* spp. (small strongyles) and *Strongylus* and *Triodontophorus* (large strongyles) were identified in the coprocultures.

The silvopasturing horses had the highest prevalence of the helminth parasites. The percentage of horses passing ascarid eggs was significantly higher in pasturing horses younger than 3 years. The prevalence of strongyles was statistically greater in the oldest grazing equines. Mares reached the highest prevalence of helminth egg output. Our results showed that native horses kept under silvopasture had the highest prevalence of the ascarids, strongyles and oxyurids, possibly due to their exposure to contaminated grazing areas, lack of appropriate feeding and control of their health status. We conclude that silvopasture increases the presence of infection by gastrointestinal nematoda in wild horses, especially by strongyles. Suitable measures to control parasitic diseases affecting horses in silvopasture should be considered in those systems.

1. Introduction

Silvopastoralism is an agroforestry management focused on the production of livestock and tree products in one integrated pasture system. These are inherently sustainable systems increasing biological diversity, protecting water quality, reducing soil erosion and improving the water-holding capacity of the soil. Another important benefit is that livestock grazing is a biological weed control, thus decreasing the need for herbicides (Sharrow, 1999). Other benefits include natural insect control, opportunities for recreational activities like hunting and birdwatching and enhanced aesthetics and property values (McAdam, 2004).

In the past 5 years, this land-management strategy has become very important in areas where coniferous trees exist. Currently, these systems primarily involve cattle, goats or sheep. Other potential livestock choices include

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horses, turkeys, chicken and ostriches. The horses are raised to provide income through sales and subsidies (Husak and Grado, 2002). It remains very clear that livestock need to be inspected for parasites because of the effect on their health status. The valuable effect of horses grazing over the unwanted vegetation can be severely reduced when equines are parasitised.

The autochthonous breeds seem the most appropriate ones for grazing under a silvopastoral system due to their natural adaptation ability. Indigenous livestock breeds have been during the past decades at the centre of public interest as a part of total biodiversity preservation strategy. Furthermore, these are important breeds with regard to ensuring genetic variability, essential for food production in the future. However, wider public interest is directed towards re-activating old breeds in order to preserve tradition, traditional culinary, rural environment, pasture and other areas.

The silvopasturing animals have a greater possibility of infection caused by several parasites (Franciso et al., 2007), and infection caused by endoparasites such as helminths is one of the most important factors affecting horses worldwide (Hung et al., 1999; Pereira and Vianna, 2006).

This study aimed to analyse the endoparasitic infections affecting the digestive tracts of equines and their prevalence in NW Spain. For this purpose, faecal samples from 555 indigenous Pura Raza Galega (PRG) horses were taken and examined for the presence of endoparasites. Two groups of horses were used to obtain additional information on the influence of silvopasture on infection: one group comprising 483 animals under a silvopasturing regime and the other comprising 72 managed PRG horses. Results were also analysed according to age and sex of the horses.

2. Materials and methods

2.1. Area of study

From December 2007 to April 2008, a coprological survey was carried out in autochthonous PRG horses in NW Spain (42°20′–43°45′N, 6°49′–8°00′W). Collection of samples during this period guaranteed that the horses had been dewormed at least 6 weeks earlier.

The current study was conducted in several farms located at different sites interspersed within this area, and the distance among the farms is approximately 20–100 km.

2.2. Experimental design

Two groups of native horses were used: one comprising 483 animals under silvopasture belonging to 18 farms, with an average of 27 animals (range: 1–105 animals). Another group comprised 72 horses managed in 8 farms, with an average of 9 animals each (range: 1–35 animals), which are maintained outdoors and are only brought into the paddocks at night. These horses routinely graze on domestic pastures, and are supplemented with grain and roughage when necessary. Chemotherapy is only done once a year (in September).

The PRGs under silvopasture are mainly maintained outdoors where they graze freely on natural pastures characterised by annual grass species, and supplementation is never provided by their owners. These animals often received insufficient feeding and veterinary attention. They are used to reduce unwanted vegetation, and very few economic benefits can be achieved by meat production. Most mares foal between May and June. The number of PRGs under a management other than silvopasture is less because of its low economical value. Deworming is seldom applied.

Table 1 reflects the distribution of the faecal samples in relation to their age, sex and housing. All the animals in each group were managed in the similar fashion.

The average number of horses per hectare is approximately two in the silvopasturing group and one in the managed group.

The most common annual grass species in pastures are *Dactylis glomerata* and *Trifolium repens*. In silvopastures, they are *Agrostis capillaries*, *D. glomerata*, *Ulex galii*, *Erica mackaiana* and *Juncus effusus*.

It is noteworthy that, in these pastures, machines are used to plough, sow the annual grass species and enhance their growth and development. This agrarian labour implies that land is turned out. Nevertheless, the places under silvopasture are not often worked, mainly due to the difficulty in introducing machinery in these locations.

2.3. Coprological techniques

Individual faecal samples were collected directly from the rectum of the horses and analysed by using coprological methods. Five grams of each faecal sample were processed (in duplicate) by flotation, sedimentation and migratory techniques (MAFF, 1986), with a sensitivity of 10 eggs per gram of faeces. The counts of nematode eggs were provided as counts of eggs per gram (EPG).

The laboratory technician conducting the microscopic analysis was blinded to the study design of the selection of the stool specimens.

Because it is not possible to morphologically distinguish strongyle eggs of different species, faecal samples are cultured for 10–14 days at 20–25 °C to allow for the development of L3s, which may be collected by means of the Baermann procedure (Osterman et al., 1999; Kuzmina et al., 2006) and identified according to the methods by Lichtenfels (1975) and Lichtenfels et al. (1997).

2.4. Statistical analysis

The descriptive parameters for the shedding of eggs in the faeces were the EPG quartiles 1, 2 and 3. All tests were done using SPSS for Windows (14.1; SPSS Inc., Chicago, IL, USA). Considering that egg shedding is not normally distributed, statistical analysis was done by means of the non-parametric Kruskal–Wallis and Mann–Whitney U two-sided tests ($\alpha = 0.05$), and significant differences were considered when $p < 0.05$.

Prevalences were expressed as percentage and 95% confidence interval (CI) and analysed using the Chi-square (χ^2) test.