Biodiversity of Intestinal Parasites in Domestic Mountain Horses on Stara Planina

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Abstract
The domestic mountain horse is an autochthonous breed of horse that originated in the Balkans, which, with the support of the fund for the protection of genetic resources, began to restore the population of this breed, primarily in the area of Stara Planina. Intestinal parasite tests were performed on domestic mountain horses in three separate pastures on Stara Planina. A total of 124 horses from three herds were tested In Izatovac we 44 tested horses, in Boljev Dol 30 and in Borovsko polje 50 horses. All the horses were kept in a semi-free system on mountain pastures - during the day they were in pastures, moving freely in a space of several kilometers around the farm, only to be closed during the night due to the danger of wolves, usually in the same facilities with sheep, goats and cows. The diet was based exclusively on pasture. All horses were clinically healthy, in solid condition, which was at its best in early summer, when the grass was at its most lush. For coprological diagnostics, sedimentation and flotation methods with a saturated solution of NaCl and ZnSO4 were used in parallel. The Clayton-Lane method was used to count parasite eggs. Identification of parasite eggs was done on the basis of morphometric characteristics. Based on the results of the examination, the following parasites were found: *Trichostrongylus axei* in 66.67%, *Strongylus edentatus* in 83.33%, and *Parascaris equorum*.33.33%.

Keywords: domestic mountain horse, helminths, Serbia, Stara Planina

1. Introduction

The domestic mountain horse is an autochthonous breed of horse that originated in the Balkans, which ensured the survival of people in the hilly and mountainous area for centuries. It was used for work as draft and pack animal, for riding, often for feeding people. Mountain horses were among the first to disappear in the mountainous areas of the Balkans, so ten years ago, with the support of the fund for the protection of genetic resources, the restoration of the population of this breed began, primarily in the area of Stara Planina. Today, on the pastures of Stara Planina, you can find a few hundred head of this breed, which are reared in the traditional way, in a semi-free housing system [1-5]. According to these authors, all mountain horses from the territory of the former Yugoslavia are described as descendants of two progenitors: the Tarpan (*Equus gmelini Antonius*) and the Przewalski (*Equus Przewalskii*). Its characteristics are similar to horses bred in Bosnia and Herzegovina, Bulgaria, Macedonia, Montenegro and Romania. The differences are small and are due to differences in diet and behaviour in relation to the area they live in [6].
Endoparasite infections of horses represent a serious health problem and the cause of significant economic losses in horse breeding. They are primarily reflected in numerous diseases and losses that cannot initially be directly linked to parasitic infections, such as weaker feed

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conversion of infected animals, growth retardation, weaker condition, as well as a decrease in resistance to the causative agents of infectious and other diseases [7-10].

In order to better understand the biodiversity of endoparasites in domestic mountain horses kept freely on mountain pastures, the biodiversity of endoparasites in the population of domestic mountain horses on Stara Planina was examined.

2. Materials and methods

A total of 124 horses from three herds were tested In Izatovac we 44 tested horses, in Boljev Dol 30 and in Borovsko polje 50 horses. All the horses were kept in a semi-free system on mountain pastures - during the day they were in pastures, moving freely in a space of several kilometres around the farm, only to be closed during the night due to the danger of wolves, usually in the same facilities with sheep, goats and cows. Horses diet was based exclusively on pasture, which was abundant in the spring, but became increasingly scarce in the middle of the summer due to the drought. They had water at their disposal continuously - in the spring at natural watering places (mountain streams), and in times of drought, when the streams dried up, water was brought in cisterns and poured into appropriate troughs.

For coprological diagnostics we collected fresh faeces samples were collected from the ground, immediately after defecation. Examinations were performed by sedimentation and flotation methods with a saturated solution of NaCl and ZnSO4. The Clayton-Lane method was used to count parasite eggs. The level of infection was defined according to Upjohn et al. [5] as none, mild (<500 egg per gram (EPG)), moderate (500–1000 EPG) and high (>1000 EPG). The determination of the parasite eggs was performed according to its morphological characteristics [11,12].

3. Results and discussion

During our examination at horses at all location were found: *Strongylus edentatus, Parascaris equorum* and *Trichostrongylus axei.* At the horse from Izatovac *S.edentatus* was found in 83.33%, *T. axei* in 66.67% and. *P. equorum* in 33.33%. At the horse from Boljev Dol *S. edentatus* was found in 89.83%, *T. axei* in 77.67% and. *P. equorum* in 39.33%. At the horse from Borovsko polje *S. edentatus* was found in 97.33%, *T. axei* in 59.67% and. *P. equorum* in 41.33%. The intensity of infection with all found types of parasites was mild (<500 egg per gram (EPG).

P. equorum was mainly present in younger categories of horses with a large number of foals. Other species were similarly distribution which not strongly depended of ages. The intensity of infection was medium – the highest in strongyloidiasis and parascariasis.

The presence of strongyles is the biggest problem in horses in Serbia [13-16]. Larvae of *Strongylus edentatus* penetrate the wall of the large intestine, actively migrate between the sheets of the mesentery and reach the parietal sheet of the peritoneum. The acute form occurs in foals and can be fatal in a few days. Characteristic symptoms are general toxaemia, fever, apathy, anorexia, jaundice and oliguria. The foal shows ataxia, the back is hunched, breathing is difficult. In the chronic form, these signs are less pronounced [16]. In some cases, the larvae can reach the kidneys, spleen, testicles and other organs, where they cause degenerative changes. At the end of development, the larvae return to the wall of the large intestine, from where after a month they leave the lumen of the intestine [10].

Trichostrongylus axei is a type of parasite that is much more common in ruminants than in horses. It is primarily a clinical problem in horses that graze on the same pasture with ruminants or horses that use pastures after ruminants. The life cycle of this parasite is similar to that of strongyles. Animals infected with these nematodes often develop natural resistance gradually and can recover spontaneously [12,17]. Such resistant animals do not show symptoms of the disease if they become infected again, but they still excrete eggs in their faeces that pollute the environment and are a source of infection. Grazing horses ingest infectious larvae, which develop in the lining of the stomach and the crypts of the small intestine, and then reach the lumen of the small intestine as adults. It was found in horses in Europe, in the Middle East and in the United States [17-20].

Parascaris equorum is high prevalent in the world and has a great importance in the pathology of the horse [17,21]. Clinical symptoms are most pronounced in foals, while in adult horses the infection is mostly subclinical. At the beginning of

the disease, short-term diarrhoea appears, then cough and nasal discharge, short-term increase in temperature, and sometimes nervous symptoms. After ten days, the signs of bronchopneumonia disappear [22]. When adult parasites are found in the small intestine, chronic signs of digestive tract disorders appear. Faeces are watery with a hint of mucus, sometimes accompanied by constipation, colic attacks, intestinal flatulence, etc. The coat is bristly, dull and coarse. In foals, pallor of mucous membranes, poor growth or weight loss with an increase in abdominal girth are observed [19].

During our examination all observed horses were clinically healthy, with no visible symptoms of the disease, regardless of the type of parasites identified and the intensity of the infection. Physical condition was uniform, somewhat weaker physical condition in some animals was attributed to their older age.

4. Conclusions

The key factors that influence the diversity and prevalence of certain types of parasites in domestic mountain horses are: the absence of planned control of endoparasites in the horse population, keeping horses in a semi-free system on infected pastures, in cohabitation with other types of animals, inadequate diagnostics and therapy with partial deworming, which does not include all animals in the herd, thus maintaining reservoirs of infection for other animals, as well as non-compliance with biosecurity measures when introducing newly acquired individuals into the herd.

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