Biodiversity of Helminths of Sheep Breed in Vojvodina (Northern Serbia)

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ABSTRACT

Vojvodina is situated in the northern part of Serbia. The region is divided into: Bačka in the northwest, Banat in the east and Srem in the southwest. A small part of the Mačva region is also located in Vojvodina, in the Srem District. Vojvodina is abundant with numerous grasslands suitable for sheep grazing. The present study was conducted in 90 sheep flocks from the territory of Vojvodina in the period of March 2014 to January 2015, using into consideration the biodiversity and sesonal occurance and prevalence of isolated parasites. Fecal samples were examined by using qualitative and quantitative coprological methods. Infection we occurred at 81.22% of sheep. We found eggs of *Nematodirus sp.* (71.22%), *Ostertagia sp.* (69.22%), *Trichostrongylus sp.* (66.55%), *Haemonchus sp.* (64.44%), *Chabertia ovina* (60.11%), *Dictyocaulus spp.* (49.00%), *Oesophagostomum sp.*(36.77%), *Dicrocelium dendriticum* (34.66%), *Marshallagia sp.* (29.66%), *Cooperia sp.* (27.88%), *Moniezia sp.* (26.77%), *Bunostomum sp.* (22.33%) and *Skrjabinema sp.* (13,66%).

Key words: *helminths, sheep, Vojvodina, Serbia*

INTRODUCTION

Vojvodina is situated in the northern part of Serbia in the southeast part of the Pannonia Plain, the plain that remained when the Pliocene Pannonia Sea dried out. Because of this, Vojvodina is rich in fertile loamy loess soil, covered with a layer of chernozem. The region is divided by the Danube and Tisa rivers into: Bačka in the northwest, Banat in the east and Srem in the southwest. A small part of the Mačva region is also located in Vojvodina, in the Srem District. Agriculture is a priority sector in Vojvodina. Traditionally, it has always been a significant part of the local economy and a generator of positive results, due to the abundance of fertile agricultural land which makes up 84% of its territory (Ognjenović, 2008). Vojvodina is rich in grasslands suitable for sheep grazing.

Pasture breeding make possible contact within eggs, larvae stages and intermediate host of parasites (Vlassoff, 1982) However, in this breeding system, it is virtually impossible to avoid infections of different types of helminths that contaminate pastures (Hubert *et al.*,1979). Those induce that there are no one sheep without parasites (Denev and Kostov, 1984; Vlassoff *et al.*, 2001; Torina *et al.*, 2004; Ardeleanu *et al.*, 2007). This is particularly present in the semi-intensive sheep production which is a common way of breeding sheep worldwide (Cabaret *et al.*, 2002; Agyei 2003, Bersissa *et al.*, 2011). At the same time, parasitic infections, in addition to harmful effects of sheep, affect the reduction of their production results determine less milk yield, reduced growth and poor quality of wool (Pavlović *et al.* 2003, 2009).

Parasitological examination of sheep in Vojvodina, and Serbia in total, were sporadically performed and the aim of our examination was to established species, rate of infection and seasonal dynamic of helminths at sheep flocks in Vojvodina.

MATERIALS AND METHODS

Vojvodina is situated in the northern quarter of Serbia, The region is divided into: Bačka in the northwest, Banat in the east and Srem in the southwest.Vojvodina is abundant with numerous grasslands suitable for sheep grazing.

The present study was conducted in 90 sheep flocks from the all territory of Vojvodina in the period from March 2014 to January 2015, using into consideration the biodiversity and the sesonal occurance and the prevalence of isolated gastrointestinal parasites. During study we collected fecal samples at monthly intervals during grazing season. Grazing sheep of both sexes (320 males and 580 females, for a total of 900) were randomly chosen. There were 610 adults (one-year-old and above) and 290 lambs.

Examination was performed using standard coprological technique with saturated NaCl solution and sedimentation *(*Euzeby, 1981). Eggs Per Gram count (EPG) and degree of infection we assessed by McMaster technique where EPC of 50-700 eggs we treated like low rate of infection, from 700 to 1100 like moderate and up 1100 like high (Šibalić and Cvetković, 1980). Identification of eggs of parasites were done by keys given by Euzeby (1981).

The data obtained were analyzed using Chi-square test and in all the analyses, the confidence level was held at 95%.

RESULTS AND DISCUSION

Infection with helminths was occurred at 81.22% of sheep (731/900). We found eggs of next helminths genera: *Nematodirus sp.* (71.22%), *Ostertagia sp.* (69.22%), *Trichostrongylus sp.* (66.55%), *Haemonchus sp.* (64.44%), *Chabertia ovina* (60.11%), *Dictyocaulus spp.* (49.00%), *Oesophagostomum sp.* (36.77%), *Marshallagia sp.* (29.66%), *Cooperia sp.* (27.88%), *Bunostomum sp.* (22.33%) and *Skrjabinema sp.* (13,66%). At same time we established eggs of fluke *Dicrocelium dendriticum* (34.66%) and tapeworm *Moniezia sp.* (26.77%). Results we represented in figure 1.

Sheep of both sexes were similarly arranged according to the number of nematode genera identified ($p>0.05$), whereas distribution of individuals was highly dependent of their age ($p<0.001$). On a total of 731 infected sheep, 242 was young and 489 adult animals.

The intensity of infection and polyparasitsm was monitored in relation to the age of sheep. It was found that in younger animals intensity of infection was lower than that of older animals. Our findings

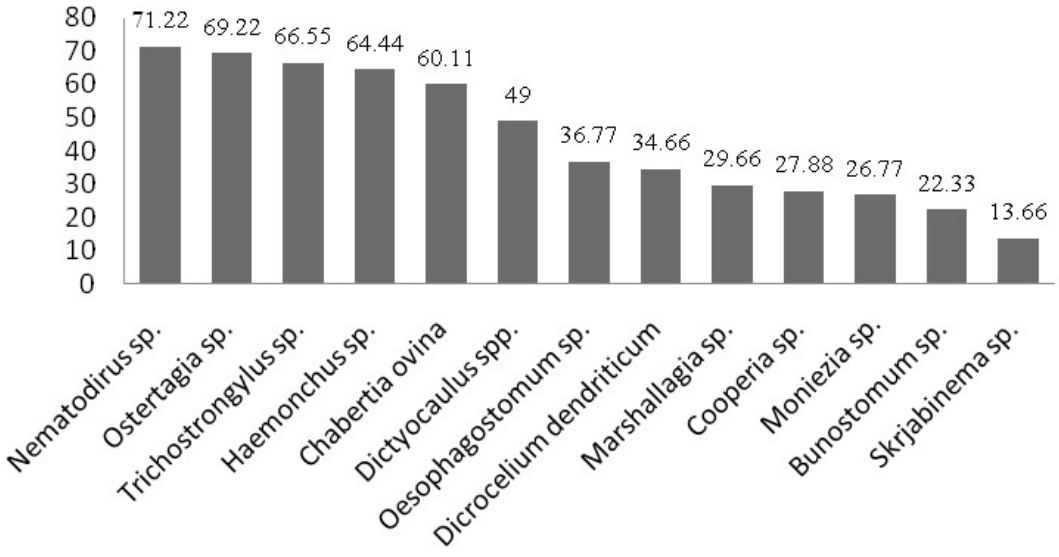

Fig. 1. Intensity of infection with ocuured helminths genera

confirmed the results of numerous studies that reported that the higher prevalence of infection was observed in adult animals rather than in youngs. This could be the result of longer exposition of adult sheep to the parasite eggs and larvae during several grazing seasons. Adult animals usually were infected with more parasites species than young and presented potential source of infection and contaminant of pastures.

The climate condition had a strong influence on the dynamics of the first occurrence of established species of parasites. Vojvodina has a moderate continental climate characterized by cold winters and warm summers, with well-distributed precipitation and short transition seasons. In Vojvodina, four winds blow. The strongest wind is the "hair" that occurs due to air currents from the southern parts of Russia towards the Mediterranean Sea, it reaches the Danube valley and passes through the Djerdap Gorge. It is a cold and strong wind that can cause great damage: drains the land, and and raisers and transport live sand in Peshtar in Banat. "Severac" is a cold wind which in winter sharply wipes the plain, "South" is a warm wind, while the "Western" is the most common and brings rain or snow. Vojvodina has relatively small amounts of precipitations. They are mostly on the Fruska Gora (more than 750 mm on average) and on the mountains of Vrsac, then in the western backyard (650 to 750 mm). An average of 550 to 650 mm of water is recorded annually. The least amount of rain has in North Baja and eastern Banat. Vojvodina has a moderate continental climate: its eastern part is more closely associated with continental and western marine influences (Ognjenović, 2008).

During start of grazing season, in March, at the start of the grazing season, faeces eggs of *Ostertagia sp.* and *Trichostrongylus sp.* In May, were observed infection with *Nematodirus sp., .Bunostomum sp., Chabertia sp.* (*ovina*) and *Dictyocaulus sp.* During June we had first record of *Skrjabinema sp.*, *Dicrocelium dendriticum* and *Moniezia sp.* In July were established eggs of *Haemonchus sp.* (*contortus*) and *Cooperia sp.* Finally, in October, before withdrawing sheep from the pasture, we showed the presence of *Marshallagia sp*. Similar values were obtained during the study of the effects of climatic conditions on the occurrence of parasites in other countries with developed sheep farming (Cvetković *et al.*, 1970; Theodoropoulos *et al.*, 2000; Torina *et al.*, 2004; Kenyona *et al.*, 2009).

Semi-intensive sheep production is a tradition in the Vojvodina. Some parts of Vojvodina are abundant in grasslands, especially in the Banat region, where sheep grazing is mainly semi-intesive. The rational use of pastures in the period of March-October makes the sheep production sustainable with and low input in this period of the year. Inadequate pasture management contributes to raise the prevalence of nematode infection. At the beginning of our research, conducted in March, the degree of infection with gastrointestinal strongilidae was 83.33%, after which he soon reached a level of 100% in the same way and moved to the end of follow-up period. The distribution of parasites of the genera *Nematodirus, Ostertagia* and *Trichostrongylus* was reached during the monitoring period almost the maximum level. Presence of lungworms and tapeworms were in direct corelation with distribution of intermediate hosts.

We have come to these conclusions during the studies of season dynamic of GI parasites in small ruminants conducted in warious areas in Serbia in the next couple of years (Jovanović *et al.*1991; Vujić *et al.,* 1991; Pavlović and Knežević, 2011; Pavlović *et al.*,1991, 1995, 2009b, 2011, 2013, 2015). Similar values were obtained during the study of the influence of climatic conditions on the occurrence of parasites in other countries with developed sheep farming (Ilijev,1974;Hubert *et al.,* 1979; Denev and Kostov, 1984; Georgijevski, 1984; Vlassoff *et al.*, 2001; Cabaret *et al.*, 2002; Agyei, 2003; Torina *et al.*, 2004; Ardeleanu *et al.*, 2007; Bersissa *et al.*, 2011).

CONCLUSION

Our results suggest that infections with helminths present significant problem of sheep in Vojvodina. The infective rate of each of these parasites showed that the most of its followed the same general pattern, having a peak in the spring and an other in the autumn, separate by a trough during the hot dry summer period when the infection rate was low. At the same time, parasitic infections, in addition to harmful effects of sheep, affect the reduction of their production results - less milk yield, reduced growth and poor quality of wool. Therefore, regular parasitological control

of the herd should be carried out before discharge into pasture and during pasture and to perform regular dehelmintization of the herd.

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