

MONIEZIAIS OF RUMINANT IN SERBIA – PRELIMINARY OBSERVATIONS

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Abstract

Moniezia is a global parasite disease of ruminants. It is caused by *Moniezia expansa* and *Moniezia benedini*. As all tapeworms, *Moniezia* spp has an indirect life cycle with ruminants as final hosts, and oribatid mites (also called "moss mites" and "beetle mites") as intermediate hosts. The oribatid mites ingest the eggs, which hatch in their gut and develop to cysticercoids in the body cavity of the mites. They are infective for the final hosts. These thugs inhabit the small intestine of the host and clinical presentation is most common in young animals. There are disorders of profuse diarrhea, intestinal convulsions and obstruction, bloated abdomen, cachexia and death. Research on the prevalence of moniezia in ruminants has not been done in Serbia for more than fifty years. In our work, we presented the results of a preliminary examination of the prevalence of moniezia in certain regions of Serbia in large and small ruminants in the last ten years. *Moniezia benedini* is a common tapeworm of cattle in Serbia and depending on the region, the prevalence is 3 to 5%. *Moniezia expansa* is more frequent in sheep and goats and occurred in 11 to 23% of examined animals. Diagnosis is based on fecal examination for the presence of gravid segments (proglottids) or of eggs with a characteristic morphology. In the treatment of the disease, the most commonly used preparations are bezamidazole, niclosamide, and combination of praziquantel and levamisole.

Key words: sheep, goat, cattle, *Moniezia expansa*, *Moniezia benedini*

The parasitic fauna of ruminants is rich and diverse. Among them, the largest percentage is made up of nematodes (gastrointestinal and lung parasites), while plathelminths make up only 20% of the total number. In addition, tapeworms are represented in adult form only by one genus from the family Anoplocephalidae, the family Moniezia and the species *Moniezia expansa*, *M.benedini*, *M. autumnalis* and *M. Baeri* (Soulsby E.J.L,1977, Roberts R.L.. et al.2005, Mehlhorn H., 2008)

cattle and *M. expansa* in cattle and sheep (Denegri G., et al.1998, Guo A., 2017)

As all tapeworms, *Moniezia* spp has an indirect life cycle, where ruminants is final hosts, and oribatid mites as intermediate hosts (Denegri G.,1993). In transmissio of *Moniezia* occurs during the summer, and parasite burdens increase into the late summer and fall, when parts of adult parasites may be shed in the feces (Ardeleanu D. et al.2017). The young are more likely to have heavy infection than are older animals (Guo A.,2017).

The grazing semi-intensive breeding allows ruminants constant contact with tintermedial hosts (oribatids, mollusks, etc.) and eggs and larval forms of parasites, so that there is numerous animals that is infected with at least one parasitic species (Kenyon F. et al.2007, Bersissa et al.2011, Pavlovic I. and Ivanović S.,2019).

Research on the prevalence of endoparasites, especially tapeworms, in ruminants has not been done in Serbia for more than fifty years (Babić B.P.,1965,Aleksić S.D.,1986,Marušić S.,1988). Then they were partially continued at the beginning of the nineties of the last century, but due to all the events in these areas, they were interrupted (Pavlović I. et al.1991, 1995, 2003, 2007).

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Moniezia species occur in ruminants in most parts of the world, *M. benedini* primarily in

Finally, in the last ten years (from 2011 to 2020), continuous research on the ruminant parasite fauna in Serbia has started again, and here we present the results of that research with emphases on the prevalence of moniezias in large and small ruminants.

MATERIAL AND METHOD

Our research was systematically carried out in the all regions of Serbian in the period from 2011 to 2020. Examination were performed in all areas where small and large ruminants are raised in semi-intensive breeding. Biodiversity of parasites, their prevalence and seasonal distribution, as well as economic indicators of the harmful effects of parasites, were monitored (Pavlović I., et al.2009).

In this period, more than 350 herds of sheep (approximately 5,500 animals), 270 herds of goats (approximately 3,100 animals) and 90 herds of cattle (approximately 800 animals) were examined. In this period, approximately 9000 samples of sheep, goat and cattle feces were examined. Coprological examinations were performed in all herds using standard coprological methods (Euzebyn J.,1981, Pavlović I., Rogožarski D.2017). Examinations we performed with Carl Zeiss AxioLab A1 microscope with the AxioCam 105 Color microscope camera and Zen Lite software.

At same time more than 750 animals were examined postmortem (either on the slaughter line or after death).

Determination of eggs and adult parasites we performed by morphological characteristic by key given by Euzeb J. (1981) and Anderson R.C.(2000).

RESULTS AND DISCUSSION

During our examination *Moniezia benedeni* is a common tapeworm of cattle in Serbia and depending on the region, the prevalence is 3 to 5%. Most prevalent are in northern part of Serbia (Vojvodina) where the prevalence ranges from 3-19%, while in the south of Serbia the prevalence ranges from 1 to 3 percent. The most endangered are lowland pastures, where the largest number of transitional hosts - oribatids - are found.

Moniezia expansa is more frequent in sheep and goats and occurred in 11 to 23% of examined animals. It is mostly found in central Serbia, where the population of sheep and goats is present in the largest number (Petrović P.M., et al.2021, Pavlović I.,Ivanović S.,2022)... *M.benedeni* were occurred in less than 1% (Pavlović I.,Kulišić Z., 2007).

Adult *Moniezia* belong to the largest parasitic tapeworms of livestock (Soulsby E.J.L., 1977). They can reach up to 10 m in length. *Moniezia expansa* can be up to 1.5 cm wide, *M.benedeni* up to 2,5 cm (Mehlhorn H., 2008) The head (scolex) measures about 0.8 cm and has 4 prominent suckers but no hooks. The main body (or *strobila*) has hundreds and up to thousands of segments (called *proglottids*). The segments are much broader than long. As in all tapeworms, each segment has its own reproductive organs of both sexes (i.e. they are hermaphroditic) and excretory cells known as flame cells (*protonephridia*). The reproductive organs in each segment have a common opening called the genital pore. In young segments all these organs are still rudimentary. They develop progressively, which increases the size of the segment as it is pushed towards the tail (Soulsby E.J.L.1977).

Mature gravid segments are full of eggs (several thousands) and detach from the strobila (i.e. the chain of segments) to be shed outside the host with its feces. Otherwise, as other tapeworms, they have neither a digestive tube, nor a circulatory or respiratory systems. They don't need them because each segment absorbs what it needs directly through its tegument. Individual gravid segments in the feces are visible by the naked eye (Pavlović I.,and Rogožarski D.,2017)

Gravid segments containing the eggs are shed out and release the eggs only outside the host. The eggs are sticky and adhere to the vegetation or soil particles. Depending on the species and the region they can survive for months in the environment and some may survive cold winters, but they are very sensitive to desiccation. The oribatid mites ingest the eggs, which hatch in their gut and develop to cysticercoids in the body cavity of the mites (Denegri G.,1993) They are infective for the final hosts. Cysticercoids can survive for months inside the mites, which on their turn have a live span of up to 18 months (Akrami M.A.,et al.,2007)

The final host becomes infected after ingesting contaminated mites while grazing. The mites are digested and release the cysticercoids that attach to the inner surface of the small intestine using a strong muscular suckers on their head and develop to adult tapeworms within a several weeks, depending on the worm species and the final host. The adult worms live for up to 18 months inside their final host. *Moniezia* infections are rather benign for adult livestock and usually do not cause clinical signs.

The pathogenic effect of parasite is manifested by mechanical and toxic action

directly affecting the resorptive capacity of the intestine.

Due to the presence of parasites, partial intestinal obturation occurs, followed by intussusception, volvulus and sometimes intestinal rupture. Low-intensity infection is asymptomatic. High-intensity infections (especially in lambs and kids) are accompanied by digestive tract dysfunction, profuse diarrhea, intestinal convulsions and obstructions, distended abdomen, cachexia and death. In cattle, camels and wild ruminants, the infection proceeds with less pronounced symptoms (Pavlović I., *et al.* 2012, 2013, 2015, 2017).

Based on our experience, we recommend preimaginal deworming therapy in the spring (April, early May) - prevention of clinical manifestations of the disease and contamination of pastures with a large number of eggs. In case of new infections, deworming is repeated 30-40 days after the first one. Measures for the reduction of transitional hosts in the pasture - practically impossible (Truong P.N., Bake, D., 1998, Skipp R.A., *et al.*, 2000) In the treatment of diseases, preparations based on bezamidazole, niclosamide and combinations of levamisole and preziquantel are most often used (Southworth J., *et al.*, 1996, Ivanović S., Pavlović I., 2015, Petrović P.M., *et al.* 2021, Pavlović I., Ivanović S., 2022)

CONCLUSIONS

Prevalence of moniezias in Serbia in large and small ruminants in the last ten years shown that *Moniezia benedeni* is a common tapeworm of cattle in Serbia and depending on the region, the prevalence is 3 to 5%. *Moniezia expansa* is more frequent in sheep and goats and occurred in 11 to 23% of examined animals. The pathogenic effect of parasites is manifested by mechanical and toxic action directly affecting the resorptive capacity of the intestine.

Given that these are only preliminary studies, we are of the opinion that more attention should be paid to the study of the prevalence of moniezias in small and large ruminants in Serbia, as well as the development of control measures.

ACKNOWLEDGMENTS

The study was funded by the Serbian Ministry of Education, Science and Technological Development (Contract No 451- 03-68/2022- 14/200030).

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