

PREVALENCE OF GASTROINTESTINAL HELMINTHS IN CALVES IN WESTERN SERBIA

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This study was undertaken to estimate the prevalence of gastrointestinal helminths in calves in western Serbia. Throughout 2011 faecal samples were collected from 600 calves aged up to 180 days, samples were examined with the flotation method and a modified McMaster technique. The parasitizing helminth species were identified and the level of infection compared between different age groups.

As many as 64.17% animals were found to be infected. The following parasite species were diagnosed: Moniezia spp. (3.17%), Toxocara vitulorum (35.00%), Strongyloides papillosus (34.50%), gastrointestinal strongyles (4.50%) and Trichuris discolor (2.17%).

The majority of calves were infected with two, fewer with three or one helminth species, and the smallest number of calves harboured four parasite species.

The prevalence of established helminth infections varied depending on the calves' age.

Key words: calves, gastrointestinal helminths, Western Serbia

INTRODUCTION

Cattle breeding in Serbia is economically important. At the end of 2011 there were a total of 936,570 cattle and 541,789 cows and pregnant heifers in the country. Although there was a small decrease in the numbers in comparison to the previous year, 0.2% and 3.4%, respectively, the number of cattle slightly rose in Western Serbia. In order to intensify and render cattle breeding economical it is necessary to take into consideration every part of production. One of the essential stages is adequate calf raising, which is continually being threatened by parasitic infections (Lepojev *et al.*, 1978; Baldock, 1988; Batteli *et al.*, 1988; Mtei, 1989; Sadaterashvili and Chitiashvili, 1989; Urquhart, 1990; Stancampiano *et al.*, 2007; Stanković, 2007, Aleksic, 2012).

Gastrointestinal parasites of calves, mainly helminths, may lead to clinical and subclinical parasitism. Helminths adversely affect animal health and cause enormous economic losses to animal husbandry. In addition, gastrointestinal helminths in calves lead to reduced growth rate, constantly hampering the

development of livestock industry (Bilal *et al.*, 2009; Rehman *et al.*, 2009). Therefore, in developing countries it is important to control them through better management, and extensive knowledge of prevalence of these parasites is a prerequisite for obtaining satisfactory results.

Due to the fact that detailed investigation into helminth infections in calves in Western Serbia have not been performed yet, and that it is a region where the number of cattle is on the increase, the aim of this research was to give insight into the prevalence and intensity of gastrointestinal helminth infections in calves of various ages in parts of Western Serbia.

MATERIAL AND METHODS

In the period from May to October 2011 a total of 600 calves were assessed. The selection of sample areas was based on the concentration of livestock, where calf breeding took place in small stables, usually in poor hygienic conditions (calves bred on pasture and temporarily indoors).

All calves were divided into four age groups: 1-30, 31-60, 61-120 and 121 to 180-day-old.

Faecal samples were collected directly from the rectum of each individual, put into PVC bags, labelled and refrigerated at 4°C until assessment in the laboratory. Coporological examinations were undertaken by sedimentation and floatation method with saturated sodium chloride solution (Soulsby, 1982).

The identification of helminth species was done according to the key provided by Mehlhorn *et al.*, 1986.

The intensity of infection was assessed quantitatively by a modified McMaster technique (Soulsby, 1982) and expressed as numbers of cestode or nematode eggs per gram of faeces (EPG). Animals with less than 500 EPG were classified as having light infections, whilst those with more than 500 were considered to have suffered from heavy infections.

The data obtained were analyzed by t-test, ANOVA and chi-square test. Confidence level was held at 95% and $p < 0.05$ was set for significance.

RESULTS

The result of coporological examination was positive in 385 out of 600 calves, which means that 64.17% were infected with helminths.

The following parasite species were recognised as the causative agents of gastrointestinal infection: *Moniezia* spp., *Toxocara vitulorum*, *Strongyloides papillosus*, gastrointestinal strongyles (GIS) and *Trichuris discolor* (Table 1).

With the exception of *Toxocara vitulorum*, which in some cases leads to serious infections (EPG > 500), all other helminths caused moderate to light infections (EPG < 500).

Table 1. Prevalence and intensity of helminth infection of the digestive tract of calves

Parasite	Prevalence (out of 600)		EPG		
	No	%	Mean	SE	Range
<i>Moniezia</i> spp.	19	3.17	14	1.8	0-65
<i>Toxocara vitulorum</i>	210	35.00	150	23.4	0-530
<i>Strongyloides papillosus</i>	207	34.50	105	28.2	0-270
GIS	27	4.50	57	8.2	0-310
<i>Trichuris discolor</i>	13	2.17	30	2.7	0-150

Prevalence of helminth infections of the digestive system in calves of different ages

Calves aged up to 30 days

Parasitological techniques confirmed the presence of intestinal helminths in ten percent (60/600) of the calves in the youngest group (Figure 1).

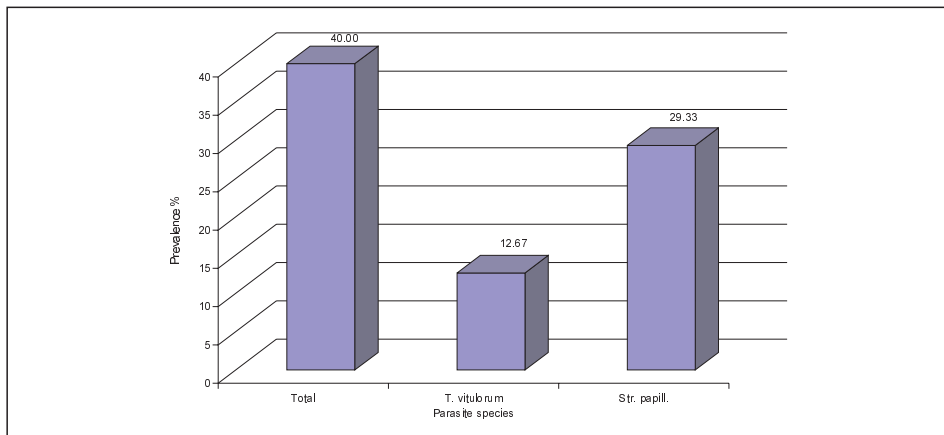


Figure 1. Prevalence of gastrointestinal parasitic infections in calves aged up to 30 days

Faecal egg counts in all cases were low. The only helminth species were *Strongyloides papillosus* (44/150) and *Toxocara vitulorum* (19/150), the later being significantly less prevalent ($p < 0.05$).

Calves aged from 31 to 60 days

In this group of animals coprological findings were positive in 73 calves (Figure 2). The only two parasite species that contributed to the infection remained *Toxocara vitulorum* (61/150) and *Strongyloides papillosus* (59/150), with little difference in distribution.

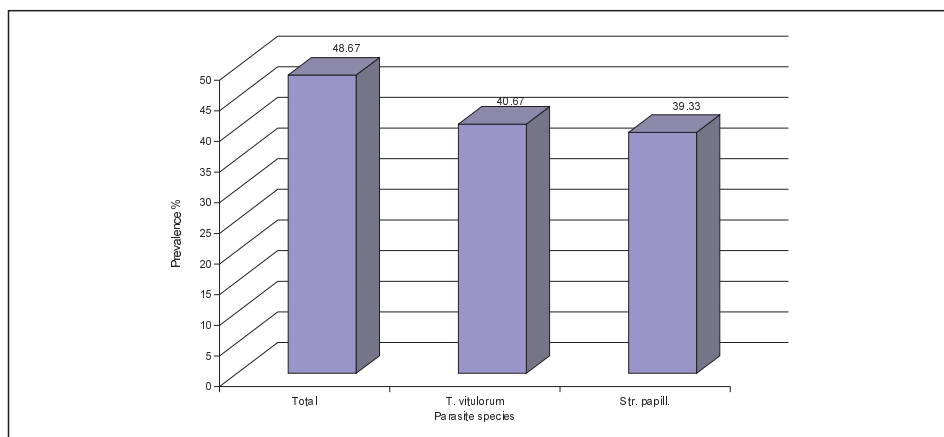


Figure 2. Prevalence of gastrointestinal parasitic infection in 31-60-day-old calves

Calves aged from 61 to 120 days

In two-to-four-month-old calves the results of coprological examinations were positive in 122 out of 150 (Figure 3).

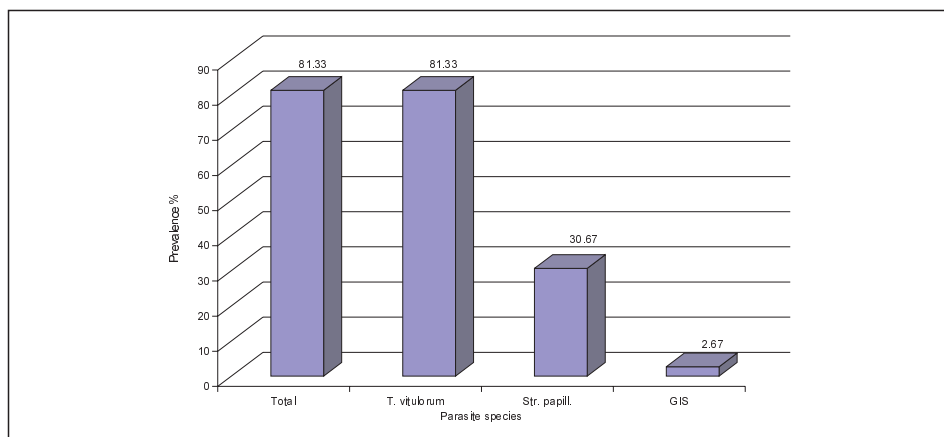


Figure 3. Prevalence of gastrointestinal parasitic infection in 61-120-day-old calves

The most prevalent was the infection with *Toxocara vitulorum* (122/150), followed by *Strongyloides papillosus* (46/150), and significantly less ($p < 0.05$) with GIS (4/150). The difference in the prevalence was significant between all parasite species.

Calves aged from 121 to 180 days

The prevalence of helminth infections of the digestive tract of calves was highest in the oldest group, being as high as 87.33% (Figure 4). The most prevalent helminth was *Strongyloides papillosus* (58/150), found in significantly more animals than any other one. It was followed by strongyles (23/150), *Moniezia* spp. (19/150), *Trichuris discolor* (13/150) and *Toxocara vitulorum* (8/150).

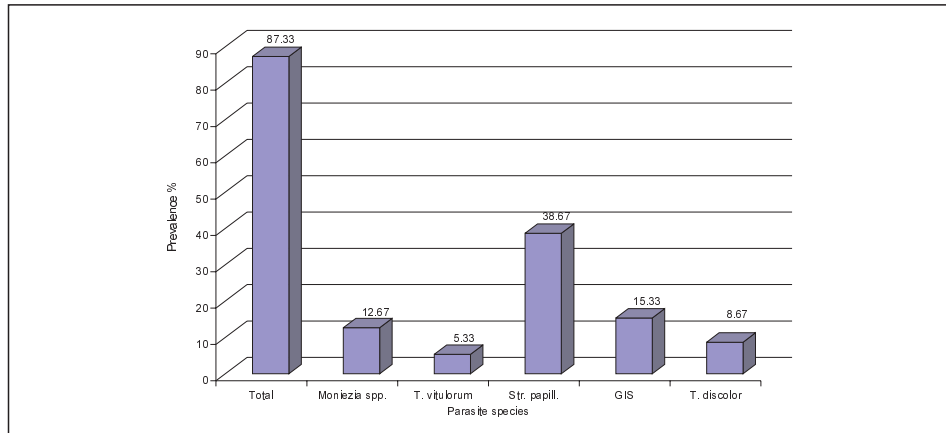


Figure 4. Prevalence of gastrointestinal parasitic infections in 121-180-day-old calves

Prevalence of infection with helminth species/groups in the digestive tract of calves of various age groups

In the group aged up to 30 days helminth infections occurred in 40.0% calves, in 31-60-day old in 48.67%, in the age group of 61-120 days in 81.33% animals, and in the oldest group in 87.33%. The prevalence of infection rose significantly in animals over the age of two months in comparison to the younger ones.

Tapeworms, *Moniezia* spp., were found for the first time in the oldest group of calves, more than four months old, in a fairly low number of animals (12.67%).

The prevalence of *Toxocara vitulorum* showed increasing tendencies in calves which were up to four months old, being established in 12.67%, 40.67% and 81.33% in each age group, but a sharp decrease in the percentage of infected animals in the oldest group (5.33%) took over. The number of infected animals in the two-to-four-month-old group was significantly ($p > 0.05$) higher (81.33%) than in any other. *Toxocara vitulorum* eggs were first determined at the age of 22 days.

Strongyloidosis was confirmed as a rather widespread parasitic infection of calves in the research area. *Strongyloides papillosus* eggs were first found as early as at the age of 19 days. The prevalence of the infection did not show significant variations between different age groups: roughly one third of faecal samples contained strongyloides eggs (29.33%, 39.33% and 30.67% in 1-30, 31-

60 and 61-120-day-old calves, respectively), with the exception of those of the four-month-old animals and older, where the occurrence of eggs halved (15.33%).

The youngest animal passing strongyle eggs was 67 days old. In two to four-month-old calves the infection was present in significantly less ($p < 0.05$) animals (2.67%) than in the oldest group (15.33%).

Only in calves aged from 121 to 180 days was trichurosis diagnosed coprologically and the number of infected animals was rather low (8.67%).

The numbers of helminth species/groups involved in the infection of calves ranged from one to four. Infection with one type of parasite was found in 75, but, in contrast, poliparasitism was diagnosed in 311 calves. The vast majority of animals was infected with two helminth species, significantly more than with one or three ($p > 0.05$), while only few calves were infected with four different helminth groups (Figure 5).

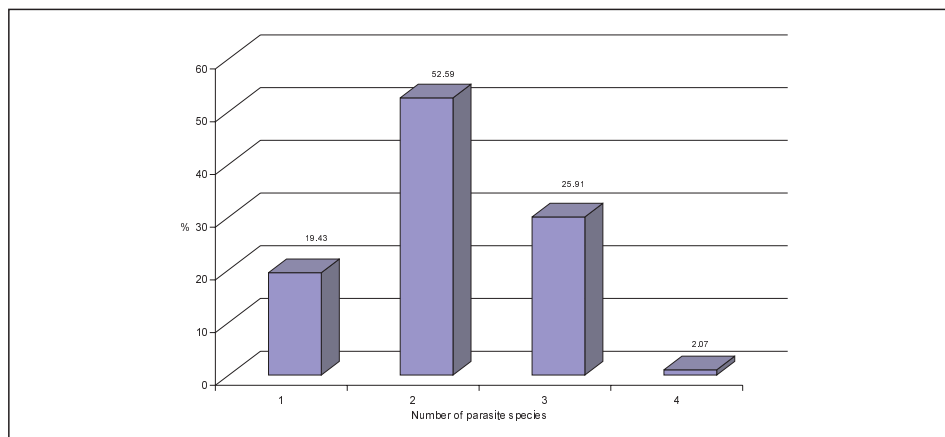


Figure 5. Number of parasite species in infected calves

DISCUSSION

The results of the current research have revealed widespread helminth infection in calves in Western Serbia.

To distribution and spread of helminthoses in animals is influenced by breeding conditions. In the current study, the high intensity of infection was closely correlated with animals in poor body condition.

The occurrence of *Moniezia* spp. in the definite host is associated with the ingestion of oribatid mites infected with cysticercoids (Xiao and Herd, 1992; Sissay *et al.*, 2008). The infection is of considerable economic and pathogenic significance to ruminants, which is well described (Stancampiano *et al.*, 2007; Stanković, 2007, Taylor *et al.*, 2007; Aleksic, 2012). In the current study, the intensity of tapeworm infection was associated with poor body condition. Data on *Moniezia* infection in cattle of certain age is scarce, but the current study showed

that this tapeworm infection was detected in animals older than four months, which is quite expected having in mind the prepatent period of the parasites and the fact that newborn calves do not feed on pastures.

Toxocarosis is one of the most important parasitic infections in calves, resulting especially from its pathogenic impact (Harding and Threlfall, 1989; Mtei 1989; Sadaterashvili and Chitiashvili, 1989; Toparлак *et al.*, 1989; Berghen *et al.*, 1990; Damnjanovic *et al.*, 1995; Stancampiano *et al.*, 2007; Stanković, 2007). In our study *Toxocara vitulorum* was the most prevalent helminth species, with a high percentage of animals carrying heavy infection.

Most strongyles are pathogenic to their hosts leading, besides other disorders, to anaemia, gastroenteritis and depressed growth rates and mortality (Stancampiano *et al.*, 2007; Stanković, 2007). In the current study, high strongyles EPG were closely associated with animals in poor body condition. Moreover, the study showed that in older animals both the prevalence and strongyle EPG counts were higher than in younger ones.

Breeding conditions slightly influenced the prevalence of strongyloidosis in calves (Toplica, 1987; Batteli *et al.*, 1988; Sadaterashvili and Chitiashvili, 1989; Berghen *et al.*, 1990; Stancampiano *et al.*, 2007; Stanković, 2007). Small increase in strongyloides EPG were found in the group temporary breeding on pastures, but in total the worm burdens were quite similar in all other animals.

Temporary breeding on pastures in the presence of cattle of all age categories, creates favourite conditions for the development and survival of pre-parasitic forms and their intermediate hosts outdoors, which enables the infection of calves with gastrointestinal strongyles, *Moniezia* spp. and *Trichuris discolor* (Lepojev *et al.* 1978; Baldock, 1988; Marusic 1988; Harding and Threlfall 1989; Sadaterashvili and Chitiashvili 1989; Berghen *et al.*, 1990; Urquhart, 1990; Stancampiano *et al.*, 2007; Stanković, 2007; Aleksic, 2012).

It is necessary to point out that the prevalence of gastrointestinal helminthoses in calves, especially of toxocarosis, is, apart from the cohabitation of animals of various age categories, strongly influenced by inadequate antiparasitic treatments and poor zoohygienic conditions. Thus, these may influence the development and survival of pre-parasitic stages in the environment and facilitate the infection (Lepojev *et al.*, 1978; Toplica, 1987; Batteli *et al.*, 1988; Sadaterashvili and Chitiashvili, 1989; Damnjanovic, 1994; Stancampiano *et al.*, 2007; Stanković, 2007; Aleksic, 2012).

The occurrence of the diagnosed gastrointestinal helminth infections was associated with several risk factors. For this reason, it seems essential that appropriate continuous education to farmers be provided, and adequate control and prevention strategies be implemented. Faecal egg count test should be performed on regular basis to control the possible development of resistance to antiparasitics.

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PREVALENCIJA GASTROINTESTINALNIH HELMINATA KOD TELADI U ZAPADNOJ SRBIJI

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SADRŽAJ

Studija je sprovedena sa ciljem da se utvrdi prevalencija gastrointestinalnih helminata kod teladi u zapadnom delu Srbije. Tokom 2011. godine prikupljeni su uzorci fecesa ukupno 600 teladi starosti do 180 dana. Uzorci su pregledani metodom flotacije i modifikovanom metodom po McMasteru. Determinisane su vrste helminata i određena je prevalencija infekcije kod teladi različite starosti.

Rezultati ispitivanja pokazali su da je infekcija helmintima bila prisutna kod 64,17% pregledanih životinja. Ustanovljene su sledeće vrste helminata: *Moniezia* spp. (3,17%), *Toxocara vitulorum* (35,00%), *Strongyloides papillosus* (34,50%), želudačnocrevne strongilide (4,50%) i *Trichuris discolor* (2,17%).

Većina teladi istovremeno je bila inficirana dvema vrstama, zatim sa tri i jednom vrstom helminta, dok je kod samo nekoliko životinja bilo ustanovljeno prisustvo četiri vrste ili grupe helminata.

Prevalencija infekcija helmintima razlikovala se kod teladi različite starosti.

