

# A slaughterhouse study on prevalence of sheep liver helminths in region of Sarajevo

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## Summary

The aim of this study was to determine the prevalence of trematodes and cestodes in slaughtered sheep from the region of Sarajevo. The study was carried out on a total of 699 indigenous sheep of pramenka breed, of various sex and age. After parasitological section, visual examination and palpation of the liver, the prevalence rate of *Fasciola hepatica*, *Dicrocoelium dendriticum*, hydatid cysts of *Echinococcus granulosus* and *Cisticercus tenuicollis* was 54.2%, 74.1%, 22.6% and 12.5%, respectively. The results of this research indicate that the infestation with these parasitic species and larval forms in slaughtered sheep are present at a high level, which has a great health and economic importance in the region of Sarajevo.

**Key words:** prevalence, helminths, liver, sheep

## Introduction

The trematodes *Fasciola hepatica* and *Dicrocoelium dendriticum* (liver flukes) are the most common helminthic parasites in Bosnia and Herzegovina (Zuko, 1998). Most of mammals are definitive hosts for these parasites, among which sheep are the most important ones. They can also occasionally affect humans (Mas-Coma, 2005). The universal presence of suitable species of snails (*Lymnaea truncatula*, *Ena obscura*, *Zebrina detrita* etc.) explains the permanent possibilities of liver flukes infestation. These parasites specifically target the liver, where they reside and graze on the mucosa of the bile ducts and hepatic parenchyma resulting in massive tissue damage (Jubb et al., 2008).

*Echinococcosis* or *hydatidosis* is zoonotic disease caused by *Echinococcus granulosus*. Dogs and other canids are typical hosts, while ungulates, including sheep, goats, pigs

and horses, are intermediate hosts in which hydatid cysts occur. The most common sites of cysts are liver and lungs, rarely kidneys, spleen, brain and heart. The disease is widespread throughout the world and our country is among the endangered ones (Šibalić et al., 1990).

*Cysticercus tenuicollis* is the larval stage of canine tapeworm *Taenia hydatigena*, which passes in the liver of the ruminant, especially in sheep. Migration of larvae in the liver parenchyma cause hemorrhagic-fibrotic lesion and peritonitis, so cysticercosis is a serious and often fatal parasitic disease (Urquhart et al., 1996).

The economic losses due to these parasitic diseases are caused by mortality, morbidity, reduced growth rate and production, condemnation of liver and the expense of control measures. The annual general losses due to fasciolosis were estimated at over 3.2 billion USD (Mas-Coma,

2005).

## Material and methods

The study was conducted from March to December 2009. Samples were collected from 699 indigenous sheep of pramenka breed, of various sex and age. All the sheep originated from four different localities in Sarajevo region and were managed on semi-intensive system. Localities were as far from Sarajevo as follows: A – 23 km southwest, B – 94 km northeast, C – 43 km east and D – southeast. These investigations were performed during veterinary inspection of slaughtered sheep. The liver of each animal was cut in 1 cm<sup>3</sup> pieces and put into 2 liters of 0.9 tepid NaCl solution for 60 minutes, and then liver pieces were squeezed to enable parasites to come out from bile ducts into the solution. After that, liver pieces were removed and the solution was filtered using plastic sieve (Akkaya et al., 2006). Gall bladder was washed to screen

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out mature flukes. Parasites on the sieve surface and from the gall bladder were counted and then were identified by their morphological characteristics (Urquhart et al., 1996; Čanković et al., 1998). Livers were examined for the presence and number of larvae of *Echinococcus granulosus* and *Taenia hydatigena* macroscopically based on gross appearance. Sterility and fertility of the hydatid cysts were determined in the laboratory of the Department of parasitology and parasitic diseases at Veterinary faculty in Sarajevo.

### Results and discussion

The prevalence of *Fasciola hepatica*, *Dicrocoelium dendriticum*, hydatid cysts and *Cisticercus tenuicollis* in sheep is presented and shown in tables 1. and 2. The occurrence of *Fasciola hepatica* was 54.2% (379/699) in all slaughtered sheep. The highest percentage was recorded at locality D (82.5%) and the lowest at locality B (15.9%). *Dicrocoelium dendriticum* was found in 518 of 699 slaughtered sheep (74.1%) and the prevalence rates vary from 47.1% (A) to 90.6% (B). The medium level of liver flukes infestation was registered in most of examined localities.

In post-mortem examination of all sheep livers, hydatid cysts were found in 158 (22.6%) and *Cisticercus tenuicollis* in 88 (12.5%). Hydatid cysts were calcified in 67 cases, 57 were sterile and 36 were fertile (22.8%). Cysts were not encountered in the sheep livers at locality B. The intensity of infestation ranged from low to medium level.

The prevalence rates with *Fasciola hepatica* and *Dicrocoelium dendriticum* in slaughtered sheep from six regions of mountain and lowland parts of Bosnia and Herzegovina in previous study were changing from 12% - 90% (Čanković et al., 1979; Rozman Milka et al., 1985; Nevjestić et al., 1988; Zuko, 1998), which coin-

Table 1. The prevalence (%) of *Fasciola hepatica* and *Dicrocoelium dendriticum* in slaughtered sheep

Tablica 1. Prevalencija (%) parazita *Fasciola hepatica* i *Dicrocoelium dendriticum* u zaklanih ovaca

Locality Lokalitet	Total extensity / Ukupno			<i>Fasciola hepatica</i>		<i>Dicrocoelium dendriticum</i>	
	N	I	%	I	%	I	%
A	106	72	67.9	36	33.9	50	47.1
B	107	97	90.6	17	15.9	97	90.6
C	354	271	76.5	217	61.3	254	71.7
D	132	121	91.6	109	82.5	117	88.6
TOTAL UKUPNO	699	561	80.2	379	54.2	518	74.1

N - number of examined sheep livers / broj pretraženih ovčjih jetara; I - number of infested sheep livers / broj infestiranih ovčjih jetara; % - percent of infested sheep livers / postotak infestiranih ovčjih jetara

Table 2. The prevalence (%) of hydatid cyst and *Cisticercus tenuicollis* in slaughtered sheep

Tablica 2. Prevalencija (%) hidatidnih cista i *Cisticercus tenuicollis* u zaklanih ovaca

Locality Lokalitet	Total extensity / Ukupno			Hydatid cyst / Hidatidna cista		<i>Cisticercus tenuicollis</i>	
	N	I	%	I	%	I	%
A	106	7	6.6	2	1.8	6	5.6
B	107	21	19.6	-	-	21	19.6
C	354	171	48.3	133	37.6	49	13.8
D	132	53	40.1	23	17.4	12	9.1
TOTAL UKUPNO	699	252	36.0	158	22.6	88	12.5

N - number of examined sheep livers / broj pretraženih ovčjih jetara; I - number of infested sheep livers / broj infestiranih ovčjih jetara; % - percent of infested sheep livers / postotak infestiranih ovčjih jetara

cides with our results.

However, the results obtained by Muratović et al. (2004) in slaughtered sheep infested with *Dicrocoelium dendriticum* (53,25%) were slightly lower than our. Bjelica (1964) and Čanković et al. (1979) have found lower percent of infested sheep with *Cisticercus tenuicollis* in comparison with our findings. These authors also have registered prevalence rate of hydatid cysts from 30% - 100%. According to the research from 2004 (Alić et al., 2004), the percentage of infested sheep with cysts of *Echinococcus granulosus* was lower (16.92%), which is probably the result of the increasing number of stray dogs.

A significant variation between our results and the results of other authors are probably the consequence of differences in management system, ecological and climatic differences between the localities and unsystematic implementation of control measures.

### Conclusion

The results of this survey indicate that *Fasciola hepatica*, *Dicrocoelium dendriticum*, hydatid cysts and *Cisticercus tenuicollis* in slaughtered sheep are present at a significant level which has a special significance, not only in Sarajevo region, but also throughout our country, where sheep production is of particular importance. *Dicrocoelium dendriticum* was the most common

## Istraživanje prevalencije helminata jetre ovaca u klaoničkim objektima sa područja Sarajeva

### Sažetak

Svrha ovog istraživanja je bila odrediti prevalenciju heminata jetre zaklanih ovaca na području Sarajeva. Istraživanje je provedeno na ukupno 699 domaćih ovaca pasmine pramenka, različitog spola i starosti. Nakon parazitološke sekcije, vizualnog pregleda i palpacije jetre, učestalost pojave velikog metilja *Fasciola hepatica*, malog metilja *Dicrocoelium dendriticum*, hidatidnih cista *Echinococcus granulosus* i ikrice *Cisticercus tenuicollis* je bila 54,2%, 74,1%, 22,6% i 12,5%. Rezultati ovog istraživanja ukazuju da je infestiranost ovim parazitskim vrstama trematoda i razvojnim oblicima cestoda kod zaklanih ovaca prisutna u visokom stupnju, što je od velike važnosti za zdravlje ljudi

**Ključne riječi:** prevalencija, helminti, jetra, ovce

## Untersuchung in den Schlachthöfen über die Prävalenz der Schafsleber Helminthen auf dem Sarajevo-Gebiet

### Zusammenfassung

Das Ziel dieser Untersuchung war, die Prävalenz der Leberhelminthen bei geschlachteten Schafen auf dem Sarajevo-Gebiet zu bestimmen. Die Untersuchung wurde auf 699 einheimischen Schafen, Rasse „Pramenka“, verschiedenen Geschlechtes und Alters durchgeführt. Nach der parasitologischen Sektion, visueller Untersuchung und Leberpalpation, war die Prävalenzrate des großen Leberegels *Fasciola hepatica*, des kleinen Leberegels *Dicrocoelium dendriticum*, der Echinokok-Hidatidenzyste *Echinococcus granulosus* und dünnhälsiger Finne *Cisticercus tenuicollis* 54,2 %, 74,1 %, 22,6 % und 12,5 %. Die Resultate zeigen, dass das Angestecktsein mit diesen Trematodenparasiten und Entwicklungsformen von Cestoden bei geschlachteten Schafen hoch vertreten ist, was für die Menschengesundheit wichtig ist.

**Schlüsselwörter:** Prävalenz, Helminthen, Leber, Schafe

## Ricerca di prevalenza degli elminti di pecore nell'area di Sarajevo (ricerca fatta in macelleria)

### Sommario

Lo scopo di questa ricerca era determinare la prevalenza degli elminti di pecore macellate nell'area di Sarajevo. La ricerca è stata fatta su 699 pecore domestiche, appartenenti al tipo pramenka, di età e di sesso diversi. Dopo la sezione parasitologica, l'esame visuale e la palpazione di fegato, le percentuali di prevalenza di grande *Fasciola hepatica* e piccolo *Dicrocoelium dendriticum*, della ciste idatidea dell'echinococco *Echinococcus granulosus* e di *Cisticercus tenuicollis* erano come segue: il 54,2%, il 74,1%, il 22,6% e il 12,5%. I risultati di questa ricerca rivelano uno stato di contagio tramite questi tipi parassitari di trematodi e le forme di sviluppo di cestodi, presenti nelle pecore macellate in una percentuale alta, e questa è una cosa molto importante per la salute umana.

**Parole chiave:** prevalenza, elminti, fegato, pecore

parasite species that leads to high liver condemnation rates in slaughtered sheep. The results also indicate that sheep have an important role in the continuation of the *Echinococcus granulosus* and *Taenia hydatigena* life cycles in the studied area. The presented survey can help to express the advantage of meat inspections record, to monitor the status of fasciolosis, dicrocoeliosis and echinococcosis as zoonotic diseases.

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