

A STUDY ON LUNGWORMS OCCURRENCE IN FARM-BRED SHEEP FROM NORTH BOHEMIA (CZECH REPUBLIC)*

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The rate of occurrence of lungworms in domestic sheep (*Ovis aries*) was determined. Samples of faeces were collected from two groups (15 ewes and 15 rams) of Romanov sheep bred on a north Bohemian farm since December 2009 till February 2011. The most frequent were the larvae of *Muellerius capillaris* (average prevalence 8.75% in ewes and 39% in rams). Larvae of the species *Protostrongylus rufescens* and *Dictyocaulus filaria* were detected just sporadically (6.67 and 6.46%, respectively), while *Cystocaulus ocreatus* was not found at all.

protostrongylidosis; *Muellerius capillaris*; rams; ewes; prevalence

INTRODUCTION

Gastrointestinal parasitism is an important animal health issue in grazing ruminants worldwide. In sheep in temperate area, gastrointestinal nematodes (GINs) are a major cause of disease. In the Czech Republic, *Trichostrongylus* spp. is considered one of the most important nematodes (Kudrnáčová et al., 2012). Also lungworms (Nematoda, Metastrongyloidea) are widespread parasites in sheep. These parasites influence the health state, production, and economic situation in the herd of sheep. Lungworms cause serious diseases that lead to death in young animals, but they may also reside in the lungs with just a little apparent effect on the host (Jones et al., 1997). Protostrongylidosis can cause severe economic loss as a result of the reduced productive capacities of the domestic animals and wildlife (Thomson et al., 2000; Kutz et al., 2001; Jenkins et al., 2005, 2007) as well as a consequence of the large financial investment in therapy (protostrongylids are often refractory to treatment due to tissue predilection) and prevention (Rehbein, Visser, 2002; Papadopoulos et al., 2004; Jenkins et al., 2005; Rodriguez et al., 2006).

The main of this study was to find out the prevalence and larval output of protostrongylids in a sheep flock from north Bohemia and to identify the surveyed species.

MATERIAL AND METHODS

From December 2009 to February 2011 lungworms occurrence in a flock of pasture bred Romanov sheep from north Bohemian upland village was observed. Thirty animals were chosen and divided into 2 groups: 15 rams (about 1 year old) and 15 adult ewes. Sheep faeces were collected monthly individually from each animal. The samples of faeces were cultivated by Baermann technique (Ueno, Gonçalves, 1998) to the first stage of larvae (L1). This L1s were determined and counted under microscope. Prevalence, average, minimum, and maximum for each group of parasites in sheep were calculated (MS Excel). Correlation between temperature during the studied period and prevalence of parasites was observed by linear regression.

RESULTS

During laboratory examinations it was confirmed that the most usual, the most frequent representative and cause of lungworm infection in sheep strains were *Muellerius capillaris* larvae (average prevalence 8.75% in ewes and 39% in rams). On the other hand, there were found only minimal numbers of larvae of the species *Protostrongylus rufescens* and

* Supported by the Ministry of Agriculture of the Czech Republic, Project No. QI111A199.

Table 1. Prevalence, maximum, minimum, and average of lungworms in sheep between December 2009 and February 2011

Date	Genus	Ewes				Rams			
		%	max.	min.	average	%	max.	min.	average
1.12.2009	<i>Muellerius</i>	6.67	466.7	0	31.11	0	0	0	0
1.1.2010	<i>Muellerius</i>	0	0	0	0	0	0	0	0
	<i>Protostrongylus</i>	6.67	13.16	0	0.88	0	0	0	0
1.2.2010	<i>Muellerius</i>	0	0	0	0	46.67	9 384	0	1 315.7
1.3.2010	<i>Muellerius</i>	6.67	60.98	0	4.07	25	256.1	0	36.07
1.4.2010	<i>Muellerius</i>	0	0	0	0	46.67	6 394	0	1 324.3
5.5.2010	<i>Muellerius</i>	0	0	0	0	6.67	9.09	0	0.61
6.6.2010	<i>Muellerius</i>	0	0	0	0	0	0	0	0
	<i>Dictyocaulus</i>	6.25	10.1	0	0.63	0	0	0	0
7.7.2010	<i>Muellerius</i>	12.5	65.22	0	4.78	0	0	0	0
10.8.2010	<i>Muellerius</i>	0	0	0	0	0	0	0	0
	<i>Dictyocaulus</i>	6.67	10.75	0	0.72	0	0	0	0
9.9.2010	<i>Muellerius</i>	0	0	0	0	60	12 095	0	1 248.6
7.10.2010	<i>Muellerius</i>	0	0	0	0	33.33	2 783	0	80
2.11.2010	<i>Muellerius</i>	13.33	1 043	0	70.18	80	11 740	0	3007
2.12.2010	<i>Muellerius</i>	0	0	0	0	46.67	4 639	0	944.92
13.1.2011	<i>Muellerius</i>	6.67	31.92	0	2.13	20	74.07	0	10.62
17.2.2011	<i>Muellerius</i>	6.67	28.57	0	1.9	25	238.8	0	34.79

Dictyocaulus filaria, while *Cystocaulus ocreatus* was not found at all.

The most common occurrence and prevalence of *Muellerius capillaris* was registered in the examined group of rams. *Protostrongylus rufescens* larvae were found only once in the group of ewes, with very low prevalence (6.67%). *Dictyocaulus filaria* larvae were found twice in the ewes, again with very low prevalence (6.46%) (Table 1).

Correlation between temperature and prevalence of *M. capillaris* in the group of rams was expressed by negative linear regression: with increasing temperature prevalence of *M. capillaris* was decreasing.

DISCUSSION

In our study, major lungworm appeared to be *Muellerius capillaris* with the highest prevalence in rams (39%), in ewes its occurrence was only 8.75%. Percentages of *Dictyocaulus filaria* and *Protostrongylus* spp. were 6.46% and 6.67%, respectively. Unfortunately, we did not find relevant information on lungworms in Czech studies, therefore, results from other European studies were applied for comparison. Some of these results were similar: in Italy, Poglajen et al. (1978) recorded 50% prevalence of *Muellerius capillaris*, but they found more of *Cystocaulus ocreatus* (26.86%), *Dictyocaulus filaria* (18.62%), and *Protostrongylus*

spp. (12.35%) than in our research; in Polish and Netherlandian goats *Muellerius capillaris* was the only lung nematode species found (Borgstede, Derksen, 1996) and the highest prevalence in the former was 100% in adult goats, in kids maximum prevalence was 80% (Borecka, Gawor, 1999). The last study was performed in north-western Spain, where *M. capillaris* was found as the most frequent (97.9%), whereas only 13 animals were infected by *Neostromylus linearis* (5.4%) (López et al., 2011).

Different results on lungworms in sheep came from a German study, where the most often recorded lungworms were *Cystocaulus ocreatus* (74.6%) and *Muellerius capillaris* (72.9%), followed by *Neostromylus linearis* (57.6%), *Dictyocaulus filaria* (50.8%), *Protostrongylus brevispiculum* (37.3%), and *P. rufescens* (28.8%) (Rehbein et al., 1998).

During the studied period sheep were in contact with wild mouflons (*Ovis musimon*). Transmission of lungworms from deer to sheep has already been described (Grafnér et al., 1969). Possibility of cross-infection from mouflons to sheep in our country concerns only *Muellerius capillaris* and *Protostrongylus rufescens*. *P. rufescens* occurs sporadically, being a typical parasite in mouflons (Chroust, Forejtek, 2010b). We identified this species only once and this fact possibly led to our result. However, mouflons were not included in the research, therefore, we cannot confirm the transmission definitely. Although *Dictyocaulus*

filaria parasitizing in mouflons and sheep has been reported elsewhere in roe deer (Hugonnet et al., 1980), in wild deer it does not occur currently in the Czech Republic (Chroust, Forejtek, 2010a). We do not assume cross-infection from mouflons to sheep. It is not entirely clear, how the infection occurred.

Correlation between temperature and prevalence of *M. capillaris* in a group of rams was similar to results from north-western Spain. In this study percentage of sheep that passed *M. capillaris* infection during low temperatures (November, March) was greater than during high temperature months (May–September) (Diezbanos et al., 1994). In our conditions, *M. capillaris* was established mostly in rams in the periods February–May 2010 and September 2010–February 2011. In ewes the parasites were established in lower values and only sporadically during the periods.

Age of animals and farming methods could have possible influence on the development of a parasitic infection. Rams had a higher prevalence of lungworm in our study. They were younger than the ewes and were bred on pasture. Similar result can be found, for example, in the study from the Netherlands (Borgsteede, Dercksen, 1996).

CONCLUSION

In contrast to the results from other European studies, the present study did not prove a high prevalence of lungforms in sheep of the studied flock in the Czech Republic. *Muellerius capillaris* had the highest prevalence. Similar situation can be observed in other surrounding countries. *M. capillaris* can be considered the most common species of lungworms in small ruminants in Europe.

Factors influencing the occurrence of lungworms are numerous – temperatures during the year, age of animals, breeding methods, transmission from wild animals, etc. It is important for the breeders of small ruminants to take these effects into account. Necessary recommendations are to protect sheep flocks from the access of wild animals, compile a de-worming system with respect to the season and age of the animals, and –last but not least – to perform regular preventive examinations of faeces.

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Received for publication on July 23, 2012
Accepted for publication on January 7, 2013

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