UDC 636.32/.38+591.619 https://doi.org/10.15407/animbiol21.02.066

A CASE REPORT: SHEEP ENDOPARASITISM DYNAMICS UNDER SEMI-DRY CONTINENTAL CLIMATE OF KARCAG, HUNGARY

M. Tóth[1], R. Khangembam[1], R. Farkas[2], J. Oláh[1], N. Vass[1], I. Monori[3]
toth.mariann@agr.unideb.hu

[1]Doctoral School of Animal Science,
Böszörményi út. 138, Debrecen, 4032, Hungary
[2]University of Veterinary Medicine, Department of Parasitology and Zoology,
István út. 2, Budapest, 1078, Hungary
[3]University of Debrecen, Research Institute of Karcag,
Kisújszállási út. 166, Karcag, 5300, Hungary

The main aim of the study was to have a preliminary assessment of the endoparasites which are infecting sheep under semi-dry continental climate in Karcag, Hungary.

Two groups of Hungarian Merino sheep were assigned as treated (N=40) and untreated (N=20) after selecting the animals randomly. Only the Treated group was drenched two times with commercially available deworming drugs. Faecal samples were collected individually from both the groups to perform faecal egg count; body condition score and FAMACHA scores were also taken to assess body and anaemia conditions respectively. The temperature and humidity conditions were also obtained to check the optimum environmental condition that could influence the worm burden. The case study was done at the University of Debrecen Experimental Animal Farm, Karcag.

Parasitic nematodes, namely, trichostrongylid/trichostrongyles nematodes, Protostrongylus sp. and Strongylus sp. were found to be more predominant species affecting the sheep and up to some degree with the tapeworm Moniezia sp. and the coccidian, Eimeria sp. During the study period, there was no clinically significant anaemic condition and the animals were found to have fairly good body condition. Yet, the infection intensity, mainly of the trichostrongyles, was significant even after the second drenching. This may be due to the optimum environmental condition coinciding with the grazing period which increased the parasitic loads in the fields. Another possibility is the presence of resistant worm population as there is no proper assessment of the effectiveness and/or resistance of the drenching drugs commonly used in Hungary.

The study is only a preliminary report of endoparasitism of sheep under a particular Hungarian climatic condition. It is obvious that parasites, mainly of the nematodes, do occur and may be an increasing concern with time. Keeping this in mind, there is a need for a wider prevalence study and if possible, anthelmentic resistance studies of the commonly used drugs to check their efficacies.

Keywords: SHEEP, ENDOPARASITE, NEMATODES, SEMI-DRY, ENVIRONMENT

Small ruminats such as sheep and goats are extremely susceptible to endoparasites. The endoparasites that are commonly found globally in sheep and goats are: *Dictyocaulus* sp. or *Muellerius capillaris* (lung worms); and the important *Trichostronglidae* family like *Haemonchus contortus*, *Ostertagia ostertagii*, and *Trichostrongylus axei*; *Fasciola hepatica* (liver flukes); and coccidia such as *Eimeria* or *Isospora* [6]. The cost of control of this problem in sheep industry was estimated to be tens of billions of dollars globally [5]. The health condition of sheep is also affected by the climate change, which further can give rise to appearance of parasite species that might not have been significant before [1]. Climate also influences infective larval availability and subsequently the rates of infection, through direct effects on the development and survival and translation of larvae onto pasture. Parasitic infection is inevitable in grazing sheep and the control of disease is generally done commonly by the use of anthelmintic drugs, known as drenching, to suppress egg output and consequently reduce the infection pressure. The intensive farming system with shared grazing pastures also increase the parasitic load of the grazing grounds. The overuse of anthelmentics and in inappropriate dose may also give rise to resistance. The spread and increasing prevalence of anthelmintic resistance threatens the feasibility of this approach and the sustainability of parasitism control in sheep [3].

Hungary generally has a semi-dry continental climate [2] and the knowledge of animal parasitism in this conditions is quite less. As of the moment

in Hungary, there is only a few published information on endoparasitism. Only [4] reported the status of haemonchosis and the subsequent benzimidazole resistance in the south-western part of Hungary. Moreover, there are no standard treatment protocols against parasitic infections with most of the farmers are treating randomly and not according to the real infecting parasite species. Thus, there is a need to have a proper prevalence study of parasites infecting sheep industry in Hungary. The present study is a preliminary report keeping in view of this.

Materials and methods

The presented study was performed from December 2017 till October 2018 at the University of Debrecen Experimental Animal Farm, Karcag. Two groups of Hungarian Merino sheep were assigned as treated (N=40) and untreated (N=20) after selecting the animals randomly. The treated group was drenched twice, that is, in December 2017 and May 2018 using commercially available ivermectin and levamisole as per the manufacturer's instruction. Faecal samples were collected individually from both the groups along with Russell body condition score (BS) and FAMACHA (FM) during December 2017, March, May, July and October 2018. The collected faecal samples were used to perform faecal egg count (FEC) by modified McMaster technique. The BS and FM score were taken to assess body and anaemia conditions respectively. The temperature and precipitation levels were also obtained from the meteorology department. From the FEC data (not shown), we determined the infection percentage (infected animals/total×100) and the infection level (weighted infection/infected individuals). Correlation analysis between BS and FM; variance analysis for the infection level of the different parasite species, FS and BS between the two groups were performed with *MS Excel* and *SPSS 13.1*.

Results and discussion

The main infecting parasites was found to be of trichostrongylids, *Strongyloides* sp., *Protostrongylus* sp., up to some extent with *Moniezia* sp., and *Eimeria* sp. (table). The infection level varied as per the season and interpreted as light, moderate and heavy.

Table

Infection percentage and infection level between the groups

		Untreated		Treated	
		Infection, %	Infection level	Infection, %	Infection level
2017/12	*Protostrongylus*	27	light	14	light
	Trichostrongylid	70	moderate	10	light
	Strongyloides	20	moderate	–	–
	Moniezia	17	light	–	–
	Eimeria	7	light	–	–
2018/03	*Protostrongylus*	19	light	30	light
	Trichostrongylid	23	light	–	–
	Strongyloides	23	light	–	–
	Moniezia	–	–	–	–
	Eimeria	12	light	15	light
2018/05	*Protostrongylus*	19	light	–	–
	Trichostrongylid	77	moderate	10	light
	Strongyloides	15	light	10	light
	Moniezia	–	–	–	–
	Eimeria	–	–	–	–
2018/07	*Protostrongylus*	–	–	–	–
	Trichostrongylid	100	moderate	40	light
	Strongyloides	20	light	–	–
	Moniezia	–	–	–	–
	Eimeria	50	light	25	light
2018/10	*Protostrongylus*	–	–	–	–
	Trichostrongylid	62	light	36	light
	Strongyloides	23	light	18	light
	Moniezia	–	–	–	–
	Eimeria	27	light	9	light

The trichostrongylid parasites were found to occur in the highest proportion throughout the whole study period for the untreated group and even reached a 100 % infection rate in July 2018, which means all the test animals had this worm burden. Yet the infection level was moderate and did not result in any mortality. In the same group, the *Protostrongylus* sp. infection was variable and was not at all detected after the second drenching. *Strongyloides* sp. remained consistently below 25 %. In case of the treated group, the infection seemed fairly under control except for the trichostrongylids, which saw a jump in the infection rate after the second drenching just as in the other group. This rise could be due to the exposure in the pasture which might have resistant worms (fig. 1). In both the groups, *Monieszia* sp. and *Eimeria* sp. were found to be variable and of little importance as in both the groups, their infection rates are fairly low all throughout except in July 2018 for which *Eimeria* sp. recorded up to 50 % in the untreated group.

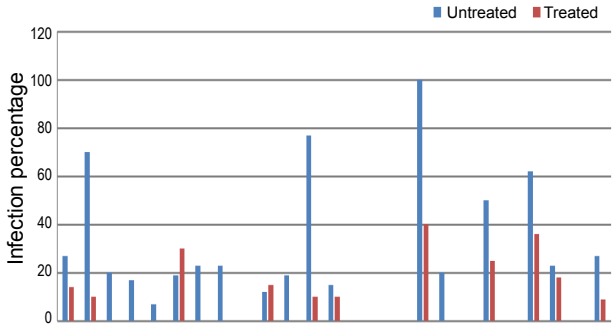

Fig. 1. Infection information of the parasites and drenching time

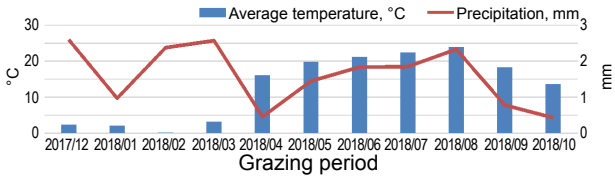

Fig. 2. Average temperature and precipitation conditions of during the study period

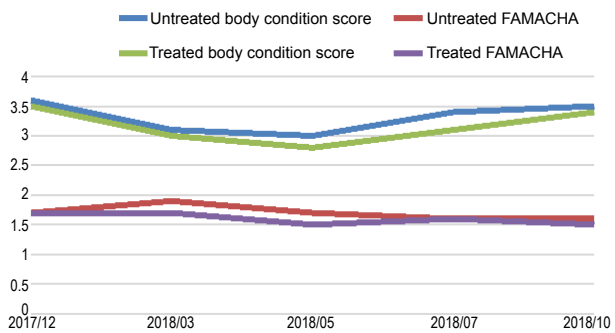

Fig. 3. Average Russell body conditional score and FAMACHA score

Between the two groups, there is a significant difference (P=5 %) for the trichostrongylid worms in December 2017, May and July 2018. Yet, it can also be seen that infection levels of the parasites was still high even after the second drenching. This may be attributed to the rising temperature and precipitation (fig. 2). This gave an optimum environment for the infective larva from the already contaminated pasture and infect the grazing animals.

There is no correlation between the BS and FM scores as well as no significant difference (P=5 %) between the two groups for both the scores as seen from fig. 3. These gave an idea that the animals were healthy and no severe anaemia was detected. Haemonchosis may be ruled out in the study as no severely anaemic animal was recorded as well as any clinical signs suspicious of *Haemonchus contortus* were never found during the study period. Nevertheless, a differential diagnosis for the trichostrongylids is necessary.

Conclusions

From this preliminary study, it can be seen that parasitic nematodes are fairly common, the main concern being the trichostrongylid nematodes. Even though the animals presented a good body conditions, the study indicated that the animals harbour these parasites and keep on contaminating the grazing grounds. This affirms that the semi-dry conditions of the study area can still support the parasites albeit in lesser degree. In addition to this, anthelmintic are given without a proper examination of the animals whether drenching is required or not, as usually done by the sheep farmers Thus, this may contribute to anthelmintic resistance in the near future.

Prospects of future research. The prospective future researches which can be done from here are:

I. a proper prevalence study of endoparasites of sheep in Hungary climate as so far there is no such published data;

II. accurate and economical differential diagnosis of the trichostrongyles is also needed for proper treatment as this group of parasite is most important;

III. resistance study commonly used drugs;

IV. pasture management and other alternative controls.

1. Dijk van J., Sargison N. D., Kenyon F., Skuce P. J. Climate change and infectious disease: helminthological challenges to farmed ruminants in temperate regions. *Animal*, 2010, vol. 4, issue 3, pp. 377–392. DOI: 10.1017/S1751731109990991.

2. Erdei F. *Information Hungary*. Countries of the World, Information Series, vol. 2. Oxford Publication, 1938.

3. Morgan E., Dijk van J. Climate and the epidemiology of gastrointestinal nematode infections of sheep in Europe. *Veterinary Parasitology*, 2012, vol. 189, issue 1, pp. 8–14. DOI: 10.1016/j.vetpar.2012.03.028.

4. Nagy G., Csivincsik Á., Sugár L., Zsolnai A. Situation of benzimidazole resistance in *Haemonchus contortus* in southwestern Hungary. *Acta Agraria Kaposváriensis*, 2017, vol. 21, issue 1, pp. 36–41. Available at: http://journal.ke.hu/index.php/aak/article/view/2144/2659

5. Roeber F., Jex A. R., Gasser R. B. Impact of gastrointestinal parasitic nematodes of sheep, and the role of advanced molecular tools for exploring epidemiology and drug resistance — an Australian perspective. *Parasites & Vectors*, 2013, vol. 6, p. 153. DOI: 10.1186/1756-3305-6-153.

6. Villarroel A. Internal parasites in sheep and goats. *Oregon State University Extension Service*, 2013. EM 9055. Available at: https://catalog.extension.oregonstate.edu/sites/catalog/files/project/pdf/em9055.pdf