The behaviour pattern of several gastrointestinal nematode genera in sheep and cattle from bethausen, Timis County

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Abstract

Parasitic infestations are one of the most important causes for animal disease and low productivity worldwide. Gastrointestinal nematodes (i.e. Trichostrongylus,) as well as trematodes (i.e. Fasciola spp. Paramphistomum spp.), cestodes (i.e. Echinococcus spp.) and protozoa (i.e. Eimeria spp.) are all in the category of most important parasitic diseases. Studies were conducted on cattle and sheep from Bethausen village, Timis County. In cattle, the following genera were identified : Trichostrongylus, Cooperia and Ostertagia while in sheep the Trichostrongylus, Ostertagia, Chabertia, Oesophagostomum and Haemonchus genera were noticed. The present study was based on following the dynamics of the output of parasitic elements from the April 2015 until March 2016. The best represented genus was Trichostrongylus both in cattle and sheep with a prevalence of 40%, followed by Chabertia – 33%, Ostertagia – 30%, Haemonchus – 26% and Cooperia – 15%. The maximum EPG was achieved in October and the minimum EPG was achieved in the months of January and February.

Introduction

Parasitic infestations are one of the main causes of animal sickness and low productivity worldwide.

Parasitism is currently at a high point in farms and households on a global level, despite many financial efforts directed towards control and prophylactic campaigns,. According to recent research, the most significant damage is caused by pulmonary and gastrointestinal helminthosis. However, it can be stated that these diseases ‘’don't kill the animal but destroy the farm”(5,6,23).

The fact that the parasites usually have a subclinical evolution (a phenomenon encountered especially in temperate areas) in any temporary and/or permanent system of pasturing leads to a decrease in the zootechnical performance.Several parasitic diseases can be mentioned in this context: cryptosporidiosis, neosporosis, hydatidosis, fasciolosis, paramphistomosis and trichostrongylosis. (4, 10, 11, 17, 18)

Thus, it causes considerable economical loss, due to the reduction of the growth rate, the reduction of food conversion rate, the reduction of the milk and meat production leading to the beginning of a subproductivity syndrome.The economic losses are due to expenses implied by treatments although for some of them the possibility of vaccination exists (19, 20).

The economic influence of a subclinical evolution of the parasitosis can be rightly appreciated only by taking into account all the elements, which are related to the pasture contamination and to the receptivity of the animals.

The aim of this research was to investigate the parasitic spectrum, especially the gastrointestinal nematodes, in a medium-sized village in Timis County, over a one-year period, starting in April 2015 and ending in March 2016.

Materials and methods

The research took place in Bethausen Village , Timis County. Bethausen Village is situated in the North-East of Timis County , on the right side of the Bega river, 26 km away from the town of Lugoj and 20 km away from the town Faget. Bethausen is situated in the centre and it is

surrounded by nearby villages as follows: Leucușești village in the East, Cutina Village in the West, Cliciova and Nevrincea villages in the South and Cladova village in the North.

The village has a surface of 9027 hectares, of which 4764 ha are tillable, 1265 ha are forests, 2066 ha pastures, 425 ha hays and orchards, 139 ha waters, 178 ha of roads and railways, 136 ha of country yards and buildings and 54 ha of non-productive fields. It is situated on both parts of Bega (26).

Cattle and sheep are frequently found on the pasture, which has its own source of water (a well with concrete gutters). The grass carpet had the following floristic composition: spontaneous species of perennial Gramineae *(Poa spp., Festuca spp., Dactylis spp., Bromus spp., Phleum pratense*) with small areas of leguminous plants (*Trifolium repens, Lotus corniculatus*) and other plants from the spontaneous flora.

Between 50 of 150 gr of freshly eliminated faeces were collected or taken directly from the rectum of the individuals .(4 cattle and 15 sheep)subjected to study. The samples were packed in plastic bags and refrigerated until processing.

The samples were transported to the Parasitic Diseases laboratory of FVM Timisoara and they were processed according to the following methods:

- Willis - to enhance de type of parasitism;
- McMaster - in order to find out the amount of parasites (EPG) in each individual from the experiment;
- Euzeby - to quantify the pulmonary parasites in ruminants(2,3,6,7).
- Larvae cultures.

Only three genera were noticed in cattle: *Ostertagia, Cooperia* and *Trichostrongylus*. The behaviour of the three-gastrointestinal nematodes was different according to season .

It can be seen that, during the spring months, the *Cooperia* genus was best represented in April-39.62% and May-37.14%. The weakest prevalence was registered during winter months: 16.12% in January and 14.58% in February. The *Ostertagia* genus had the highest prevalence in summer months.

The population peak was reached in July (51.45%) and the lowest numbers were recorded in December (26.92%).

On the other hand, the *Trichostrongylus* genus seems to feel better in the winter months when the rate is higher than 45%, peaking in December- 52.57%. The lowest values were observed in summertime in July (13.60%).

In Sweden, *Dimander* (8) highlights the presence of 14 species of gastrointestinal nematodes but the weight was held by 2 species: *Ostertagia ostertagi* and *Cooperia oncophora.*Five genders of gastrointestinal nematodes were identified in sheep after reading the larval cultures: *Haemonchus, Ostertagia, Trichostrongylus, Chabertia* şi *Oesophagostomum*.

It can easily be noticed that the *Haemonchus* genus has a relatively even distribution throughout the study period except for the winter months when its prevalence dropped, reaching values of zero in February. In addition, this genus has had the weakest infrapopulation representation.

In an increasing order followed the *Oesophagostomum* genus which had a slightly increasing trend throughout the entire period, especially during winter months with a peak (20%) in February.

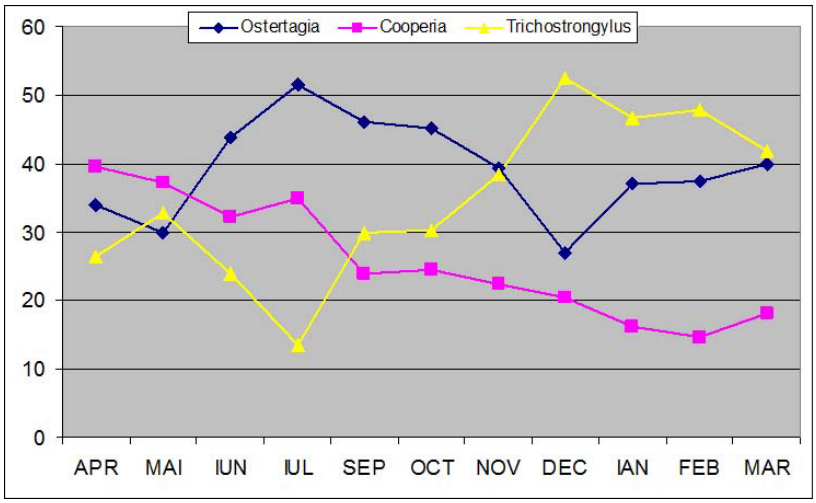

Fig.1 The behaviour of the Trichostrongylus genera in the bovine host according to seasons

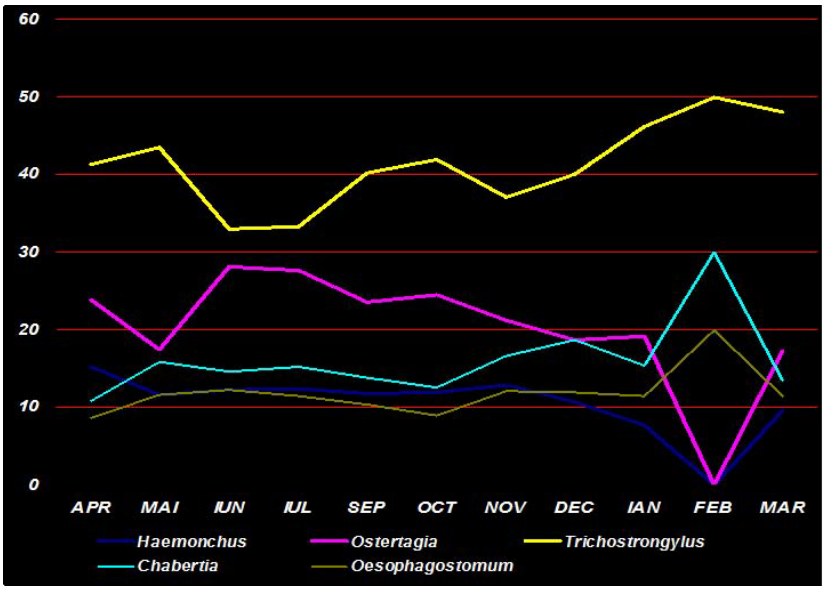

Fig. 2 The behaviour of gastrointestinal nematodes genera in the sheep host according to seasons

The genus *Chabertia* occupied third place. It had a behaviour similar to the genus *Oesophagostomum,* with a population peak in winter months when it reached 30%.

On the next position, we placed the genus *Ostertagia* that had its population peak in June-July. However, the population suffered a drastic decline up to 0% in February. Probably this drop of various *Trichostrongylus* infrapopulations is due to the hypobiosis phenomenon but also to aging of individuals that form the population. In addition, as a consequence of the "spring-rise" or "peri-parturient rise" phenomenon seen in the hypobiotic species (such as *Haemonchus* and *Ostertagia),*

the populations recover in spring, thus contributing to the pollution of pastures with parasitic elements.

The most representative genus was *Trichostrongylus, which* had a relatively constant prevalence, often situated around 40%, regardless of the season. It has to be pointed out that in the case of species which do not use the hypobiosis phenomenon as a survival strategy, the infrapopulations were larger. However, this population rise is in fact due to the lowering of the individuals' number of the species which use hypobiosis.

The results of such coproscopic investigations are subjected to a number of variables such as: the moment of day in which the samples were collected (knowing that several species of helmints lay more eggs in the morning and others do this in the evening), the age of helmints (those who are elderly do not eliminate eggs), the abundance of female nematodes in the structure of the infrapopulation, their fertility, the pathogeny of the species, the quality of the host's immune response, the grazing seasons, the host's age, the consistency of faeces, etc. (9,15,22)

The study conducted by *Odoi* et all. (21) in Kenya has highlighted the presence of five genera of gastrointestinal nematodes: *Trichostrongylus* (42,0%), *Haemonchus* (35,8%), *Cooperia* (5,5%), *Strongyloides* (12,0%) and *Oesophagostomum* (4,7%). If in the case of *Trichostrongylus* the results were similar to ours, in the case of *Haemonchus* we noticed only 1/3 of the population reported in Kenya. Similar was the case of *Oesophagostomum.* In addition, we noted the presence of *Ostertagia* and *Chabertia* and the lack of *Strongyloides* and *Cooperia.*

However, in a study conducted in Venezuela by *Morales* et all. (16) they reported the presence of more gastrointestinal nematode genera, and the presence of more species: *Haemonchus, Trichostrongylus, Cooperia, Skrjabinema, Bunostomum, Oesophagostomum* and *Trichocephalus*.

In the American state of Nebraska, Colwell et all. (1) have observed that 99% of the gastrointestinal nematodes presents in lambs had only two representatives: *Ostertagia ostertagi* and *Nematodirus helvetianus*.

Theodoropoulos et al. (25) observed that in some arid regions of Greece, egg production through faeces increased rapidly in the summer months (June to August). In India, Shing et al. (24) had similar results to ours, with a low OPG in January-February and one that grew from July to peak in September

The research conducted in Pakistan on several sheep flocks by *Jan* et all. (14) has demonstrated a higher prevalence of parasitism with certain gastrointestinal nematodes in males compared to females: *Trichostrongylus spp*. – 12,5%/0%, *Haemonchus contortus* – 13,5%/11,5%, *Chabertia ovina* – 5,5%/1,5% while other nematodes were signaled only in females: *Ostertagia circumcincta* – 7,5%, *Oesophagostomum columbianum* – 10,5%.

In Romania, in the sheep from the western and Northwestern parts of the Timis County, *Indre* et all. (12) identified the following species of gastrointestinal nematodes, listed in a decreasing order: *Trichostrongylus* – 37%, *Chabertia* – 33%, *Ostertagia* – 30%, *Bunostomum* – 27%, *Haemonchus* – 26%, respectively *Cooperia* – 15%. The linear distribution of these parasites was as previously known with slight differences in what regards location: *Trichostrongylus colubriformis* – 75% in the duodenum, 87,5% in the jejunum and ileum, respectively 12,5% in the colon; *Nematodirus filicollis* – 42,85% in the duodenum and 85,71% in the jejunum and ileum or in the case of *Trichocephalus ovis* – 11,11% in the jejunum and ileum, 66,66% in the colon, respectively 88,88% in the cecum (13).

Conclusions

The coproscopic investigation made during cattle monitoring in Bethausen showed parasitism with only three genera of gastrointestinal nematodes: *Ostertagia, Trichostrongylus, Chabertia*.

Five parasitic genera were identified in sheep: *Haemonchus, Ostertagia, Trichostrongylus*, *Chabertia* and *Oesophagostomum.*

In both cattle and sheep, the biggest output of parasitic elements was seen in October.

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