The Balkans Scientific Center
of the Russian Academy of Natural Sciences

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# MODERN TRENDS IN AGRICULTURAL PRODUCTION, RURAL DEVELOPMENT AGRO-ECONOMY COOPERATIVES AND ENVIRONMENTAL PROTECTION

# PROCEEDINGS

29 - 30 June 2023
Vrnjacka Banja - Serbia

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**Modern Trends In Agricultural Production, Rural Devalopment Agro-economy Cooperatives And Environmental Protection**

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# GASTROINTESTINAL HELMINTHS OF SMALL RUMINANTS IN SERBIA

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***Abstract***

*During study of gastrointestinal helminths of small ruminants in Serbia, performed from 2010 to 2020 we collected fecal samples from 470 herds in various part of Serbia. Samples were colected at monthly intervals and we examined more than 6500 faecal samples. Examination was performed using standard coprological technique. During ten years 738 sheep and goats we were examined by post-mortem examination. Determination of adult parasites and eggs of parasites were done by morphological characteristic.* During these investigations, the following GI helminths were found in sheep:*: Haemonchus contortus, Teladorsagia (Ostertagia) circumcincta, Ostertagia trifurcata, Ostertagia ostertagi, Ostertagia occidentalis, Marshallagia marshalli, Trichostrongylus axei, Trichostrongylus colubriformis, Trichostrongylus vitrinus, Nematodirus filicoliis, Nematodirus spathiger, Nematodirus abnormalis, Cooperia curticei, Cooperia oncophora, Cooperia punctata, Cooperia zurnabada, Skrjabinema ovis, Bunostomum trigonocephalum, Oesophagostomum venulosum and Chabertia ovina.* In goats, the presence has been established*Ostertagia circumcincta, O. ostertagi, Ostertagia occidentalis, Trichostrongylus axei, T. Colubriformis, T. capricola, Nematodirus spathiger, N. filicollis, Haemonchus contortus, Marshallagia marshalli, Skrjabinema ovis, Bunostomum trigonocephalum, Chabertia ovina, Oesophagostomum venulosum i Cooperia curticei. The intensity of infection and polyparasitsm was monitored in relation to the age of sheep and goats. It was found that in younger animals intensity of infection was lower than that of older animals.*

The dynamics of the first appearance of established gastrointestinal strongylid species in both populations of small ruminants was as follows: *in March in sheep faeces we have occurred eggs of Ostertagia sp., Trichostrongylus sp. and Nematodirus sp.. In May, were observed infection with Bunostomum sp. and Chabertia spp. (ovina);. During June we had first record of Skrjabinema sp.. In*

*July were established eggs of Haemonchus sp. (contortus) and Cooperia sp. finally, in October and Novembar, before withdrawing sheep from the pasture, we showed the presence of Marshallagia sp.*

***Keywords:*** *goat, sheep, gastrointestinal parasites, Serbia*

## Introduction

Breeding of small ruminants, sheep and goats, represents a significant branch of livestock production. Despite the fact that the number of sheep and goats in the social and individual sector of production varies from time to time, this branch of the economy and its improvement is given exceptional attention. The reason for this lies not only in tradition, but also in the knowledge that the breeding of small ruminants represents a significant source of income, both due to the production of wool and milk, as well as lamb and goat meat, a highly sought after item on the world market (Ivanović and Pavlović, 2015; Petrović et al., 2021, Pavlović and Ivanović, 2022).

The improvement of this production is related to solving a number of different problems, which aim primarily to increase the economy while preserving the health and well-being of the animals. The cultivation method, which has been established for centuries in small ruminants, creates a series of conditions that favor the development and maintenance of a parasitic infection (Smith, 1990; Stokić-Nikolić et.al, 2013). There are many factors that contribute to the appearance, maintenance and spread of parasitosis. Among them are: joint keeping of animals of different age categories, joint grazing of animals of different owners, keeping of large and small ruminants on the same pasture, improper use of pasture, large number of animals on pasture, favorable climatic conditions for the development and survival of preparasitic stages and transitional hosts that are necessary for the development of certain types of parasites in the external environment and therefore the infection of animals, quality of pastures, zootechnical measures that are implemented (or not implemented), etc.(Familton and McAnulty,1995; Truong and Baker,1998; Ardeleanu et al.,2007, Pavlović and Ivanović,2015,2018). The absence or inadequate implementation of parasite control measures also contributes to the prevalence of parasitic infections. The lack of enlightenment of the population, primarily livestock farmers, is one of the significant factors in the epizootiology of these diseases (Bojkovski et al.,2010).

The consequence of this is the development of a clinically manifested disease, with the death of a large number of individuals, most often among the younger categories. The fact is, however, that in most cases, parasitic infections occur subclinically, that is, "imperceptibly" to the eye of the herdsman. Negative economic effects are also present in these situations and are manifested by a decrease in animal production, i.e. a decrease in the production of wool and milk, a poorer upbringing of the young, a decrease in general body resistance, i.e. an increased susceptibility to agents of other etiologies (Angelovski and Ilijev,1971; Pavlović et al.2003,2009,2012a).

The study of biodiversity, season distribution and prevalence of gastrointestinal helminth s infection of small ruminants performed during 2010 to 2020 in all region of Serbia. In our paper we presented result of these examinations.

## MATERIAL AND METHODS

During study performed from 2010 to 2020 we collected fecal samples from 470 herds in various part of Serbia. Samples were colected at monthly intervals and we

examined more than 6500 faecal samples. Examination was performed using standard coprological technique with saturated NaCl, $ZnSO_4$ solution and sedimentation (Euzeby,1981). The samples were obtained from a different source all together as they were collected from flocks in the field, and the results support the other findings. These counts were also of value in providing some information on the egg rise.

Post mortal examination gave us insight into the types of parasites that were present in the infections. During ten years 738 sheep and goats we were examined by post-mortem examination. Total differential worm counts were done on the entire alimentary tract using the standard paristology necropsy technique described by Pavlović and Rogožarski (2017). Determination of adult parasites and eggs of parasites were done by keys given by Euzeby (1981).

## RESULTS AND DISCUSION

During these investigations, the following GI helminths were found in sheep:: *Haemonchus contortus*, *Teladorsagia* (*Ostertagia*) *circumcincta*, *Ostertagia trifurcata*, *Ostertagia ostertagi*, *Ostertagia occidentalis*, *Marshallagia marshalli*, *Trichostrongylus axei*, *Trichostrongylus colubriformis*, *Trichostrongylus vitrinus*, *Nematodirus filicoliis*, *Nematodirus spathiger*, *Nematodirus abnormalis*, *Cooperia curticei*, *Cooperia oncophora*, *Cooperia punctata*, *Cooperia zurnabada*, *Skrjabinema ovis, Bunostomum trigonocephalum*, *Oesophagostomum venulosum* and *Chabertia ovina*. In goats, the presence has been established*Ostertagia circumcincta*, *O. ostertagi*, *Ostertagia occidentalis*, *Trichostrongylus axei*, *T. Colubriformis*, *T. capricola*, *Nematodirus spathiger*, *N. filicollis*, *Haemonchus contortus*, *Marshallagia marshalli*, *Skrjabinema ovis*, *Bunostomum trigonocephalum*, *Chabertia ovina*, *Oesophagostomum venulosum* i *Cooperia curticei.* The intensity of infection and polyparasitsm was monitored in relation to the age of sheep and goats. It was found that in younger animals intensity of infection was lower than that of older animals.

The life cycles of all found helminths species are direct, requiring no intermediate hosts, which applies to all of the economically important strongylid parasites of small ruminants. In these cycles, adult female parasites in the GI tract produce eggs that are passed out with the faeces of the animal. Development and occurs within the faecal mass, the eggs embryonate and hatch into first-stage larvae (L1), which in turn moult into second-stage larvae (L2), shedding their protective cuticle in the process (1). During this time the larvae feed on bacteria. The L2 moult into third-stage larvae (L3), but retain the cuticle from the previous moult. The L3 constitute the infective stage, and these migrate onto surrounding vegetation where they become available for ingestion by grazing sheep and goats. The development, survival and transmission of the free-living stages of nematode parasites are influenced by micro-climatic factors within the faecal pellets and herbage. These include sunlight, temperature, rainfall, humidity and soil moisture (Vlassoff, 1976, 1982; Familton and McAnulty,1997).

The dynamics of the first appearance of established gastrointestinal strongylid species in both populations of small ruminants was as follows: in March we have occurred eggs of *Ostertagia* sp., *Trichostrongylus* sp. and *Nematodirus* sp.. In May, were observed infection with *Bunostomum* sp. and *Chabertia* spp. (*ovina*);. During June we had first record of *Skrjabinema sp.*. In July were established eggs of *Haemonchus sp.* (*contortus*) and

*Cooperia sp.* finally, in October and Novembar, before withdrawing sheep and goats from the pasture, we showed the presence of *Marshallagia sp*.

**Geographic distribution**

The geographical distribution of established gastrointestinal helmints was fairly uniform. Here we present average data by region. Impact of climatic conditions play important role on population dynamics and biodiversity of occured helminths species. Related seasonal dynamics and same species of parasites was observed during the investigations performed at goats and sheep breed at other Balkan countries like Montenegro, Romania, Bulgaria, Macedonia or Greek (Georgievski,1991, Zurliiski and Rusev,1990, Theodoropoulos et al.2000, Ardeleanuet al.2007). The data on harmful before and effect of parasitic infections on the sheep and goat performance undoubtedly show that in the anthelminth conditions of rearing high performance animals it is necessary to conduct the measures of prophylactic treatment (Barger et al. 1994, Chartier et al. 2000, Kaplan et al. 2004).

**North part of Serbia (Vojvodina)**

Vojvodina is situated in the northern part of Serbia in the southeast part of the Pannonia Plain, the plain that remained when the Pliocene Pannonia Sea dried out. Because of this, Vojvodina is rich in fertile loamy loess soil, covered with a layer of chernozem. The region is divided by the Danube and Tisa rivers into: Bačka in the northwest, Banat in the east and Srem in the southwest. A small part of the Mačva region is also located in Vojvodina, in the Srem District. Agriculture is a priority sector in Vojvodina. Traditionally, it has always been a significant part of the local economy and a generator of positive results, due to the abundance of fertile agricultural land which makes up 84% of its territory. Vojvodina is rich in grasslands suitable for sheep and goat grazing. Vojvodina has a moderate continental climate characterized by cold winters and warm summers, with well-distributed precipitation and short transition seasons (Pavlović et al.2017a)

Infection with helminths we occurred at 81.22% of sheep. We found eggs of next helminths genera: *Nematodirus sp.* (71.22%), *Ostertagia sp.* (69.22%), *Trichostrongylus sp.* (66.55%), *Haemonchus sp.* (64.44%), *Chabertia ovina* (60.11%), *Dictyocaulus spp.* (49.00%), *Oesophagostomum sp.* (36.77%), *Marshallagia sp.* (29.66%), *Cooperia sp.* (27.88%), *Bunostomum sp.* (22.33%) and *Skrjabinema sp.* (13,66During start of grazing season, in March in sheep faeces we have occurred eggs of *Ostertagia sp.* and *Trichostrongylus sp.* In May, were observed infection with *Nematodirus sp., .Bunostomum sp., Chabertia sp.* (*ovina*) and *Dictyocaulus sp.* During June we had first record of *Skrjabinema sp.*. In July were established eggs of *Haemonchus sp.* (*contortus*) and *Cooperia sp.* Finally, in October, before withdrawing sheep from the pasture, we showed the presence of *Marshallagia sp*. (Pavlović et al.2017a, 2019b)

**Belgrade area**

Geographical and climate data about examined area was next: Belgrade lies at the point where the river Sava merges into the Danube**,** on the slope between two alluvial planes. The river waters surround it from three sides, and that is why since ancient times it has been the guardian of river passages. Belgrade's climate exhibits influences of oceanic, humid

continental and humid subtropical zones, with four seasons and uniformly spread precipitation. The spread area of Belgrade has extremely favorable conditions for modern agricultural production (climate, agricultural land, watercourses, developed processing industry). This economic branch is of strategic importance for supplying Belgrade with food products, along with the resources that abound in the wider environment (Vojvodina and Šumadija). The Belgrade region has a significant land potential of about 322,292 hectares of agricultural land, which makes up 70% of the total territory of the City of Belgrade (Pavlović et al.2009).

Coprological, and post-mortem examination revealed the following helminth species: *Teladorsagia* (*Ostertagia*) *circumcincta* in 75,23%, *Ostertagia trifurcata* 71,53%, *O.ostertagi* 21.99%, *Trichostrongylus axei* 62,23%, *T.colubriformis* 69,57%, *T.vitrinus* 62,85%, *Nematodirus spathiger* 77,43%, *N,filicolis* 33,31%, *Haemonchus contortus* 58,95%, *Marshallagia marshalli* 27,77%, *Skrjabinema ovis* 11,31%, *Bunostomum trigonocephalum* 13,28%, *Chabertia ovina* 63.85%, *Oesophagostomum venulosum* 27.91%,*Cooperia curticei* 60.52%,*C.oncophora* 28,39% and *C.punctata* 13,28% (Pavlović and Knežević,2011, Pavlović et al.2009, 2011,2012b)

The season dynamics of the established parasites species was as follows: in March have occurred *Ostertagia spp.* and *Trichostrongylus* sp; in May, the observed infection with *Nematodirus* spp, *Bunostomum* spp. and *Chabertia ovina;* in June was the first record of *Skrjabinema* sp; in July were established eggs of *Haemonchus* spp. (*contortus*) and *Cooperia* sp. and in November showed the presence of Marshallagia sp. (Pavlovic et al.2021b).

**Central part of Serbia**

Šumadija is a geographical region in the central part of Serbia. It is administratively divided into Sumadija district, Pomoravski district, Rasina district, Podunavlje district, Moravica district and Kolubara district. The area used to be heavily covered with forests, hence the name (from *šuma* 'forest'). In the relief of Pomoravski and Rasina district a series of surfaces stands out, above which rise low island mountains and wide valleys cut into the surface. Temperature fluctuations in Šumadija, as well as in the entire southern edge of the Pannonian Basin, can be significant. it even happens that some winter day has a higher average temperature than some summer day. Geographical and climatic conditions make this region rich in pastures suitable for breeding small ruminants. They are usually kept in small herds by rural households and spend most of the year grazing (Pavlović and Ivanović,2019; Pavlovic 2022; Pavlović et al.2021a,2022b)

During our examination we established presence of *Teladorsagia* (*Ostertagia*) *circumcincta* (95,23%), *Ostertagia trifurcata* (91,53%), *O.ostertagi* (23,33%), *Ostertagia occidentalis* (21,37%), *Trichostrongylus axei* (100%), *T.colubriformis* (89,57%), *Nematodirus spathiger* (100%), *N. filicolis* (43,31%), *Haemonchus contortus* (88,95%), *Marshallagia marshalli* (23,77%), *Skrjabinema caprae* (13,28%), *Bunostomum trigonocephalum* (13,28%), *Chabertia ovina* (64,14%), *Oesophagostomum venulosum* (28,39%), *Cooperia curticei* (60.52%) and *C.punctata* (5,26%).

Season distribution of parasites was: in March: *Teladorsagia* (*Ostertagia*) *circumcincta*, *Ostertagia ostertagi*, *Trichostrongylus colubriformis*, *Nematodirus filicoliis* and *Nematodirus spathiger*; in April: *Ostertagia trifurcata,* in May: *Ostertagia occidentalis*, *Trichostrongylus axei*, *Cooperia punctata*, *Bunostomum trigonocephalum* i *Chabertia ovina*;in June: *Skrjabinema capra* and *S.ovina*; in July: *Haemonchus contortus*, *Cooperia*

*curticei* and *Oesophagostomum venulosum* and in November: *Marshallagia marshalli* (Pavlovic 2022;Pavlocic et al.2022b).

**Eastern part of Serbia**

Eastern Serbia is a mountain-basin region that stretches from the Danube and the border with Romania in the north to the Zaplanjsko-Lužnica basin and the Ruj mountain in the south, and from the border with Bulgaria in the east to the Velika valley and part of the South Morava river in the west. Eastern Serbia is characterized by a mosaic of rocks of all types and geological formations and a "chess relief" with alternating mountains and valleys. The relief is dominated by ridged mountains, separated by numerous river valleys and basins. Đerdap is the largest tunnel in Serbia and Europe (96 km). It connects the Pannonian and Wallachia-Pontic basins. It consists of a system of valleys and gorges. Eastern Serbia has a diverse climate: parochial in the valleys, moderately continental in the river valleys and mountainous on the mountains. Summers are moderately warm, winters are quite cold and windy. Kosava is the most common wind. The amount of precipitation ranges from 500 to 700 mm, and in the mountains up to 1,000 mm (Pavlovic et al.2022b).

During our examination parasites infection we occured in 65.31% and we found next parasite species: *Teladorsagia* (*Ostertagia*) *circumcincta*, *Ostertagia trifurcata*, *Ostertagia ostertagi*, *Ostertagia occidentalis*, *Trichostrongylus axei*, *Trichostrongylus colubriformis*, *Trichostrongylus vitrinus*, *Nematodirus filicoliis*, *Nematodirus spathiger*, *Nematodirus abnormalis*, *Haemonchus contortus*, *Chabertia ovina, Oesophagostomum venulosum, Cooperia curticei*, *Cooperia oncophora*, *Cooperia punctata*, *Marshallagia marshalli*, *Skrjabinema ovis* and *Bunostomum trigonocephalum*.

In March we occured *Teladorsagia* (*Ostertagia*) *circumcincta*, *Ostertagia ostertagi*, *Trichostrongylus colubriformis*, *Nematodirus filicoliis* and *Nematodirus spathiger*; in April: *Ostertagia trifurcata*in May: *Ostertagia occidentalis*, *Trichostrongylus axei*, *Cooperia punctata*, *Bunostomum trigonocephalum* i *Chabertia ovina*; in June: *Skrjabinema capra*;in July: *Haemonchus contortus*, *Cooperia curticei* and *Oesophagostomum venulosum*; and in November: *Marshallagia marshalli* (Ilić, 1991; Ilić et al.1991; Jovanović et al.1991; Nešić et al.1991;Pavlović et al.1991,2013a,)

**Western part of Serbia**

West parts of Serbia – Mačva diistrict is located in the southern edge of Pannonian basin, between the Cer and Fruška Gora Mountains. All district is located at 44º 46‘ northern latitude and 19º 41’ east longitude and is in the north-west part of Serbia. Morphologically, the distric has three natural zones. North there is a vast plain area known as centarl Mačva where lowland humus is the dominant soil type. The second morphological unit constitutes the western part of the territory which is characterized by a hilly relief - the Pocerina area, where the plain area Mačva gradually turns into a hilly area down to the Cer Mountain, where the relief and forest caused degradation and evolution of lowland soils into brown forest soil. The third morphological unit covers the southeastern part and pressure occurs in the coldest month of January,while the lowest in April. (Pavlović et al.2019a)

We revealed same parasite species: *Teladorsagia* (*Ostertagia*) *circumcincta* (95,23%), *O.trifurcata* (87,53%), *O.ostertagi* (23,33%), *Trichostrongylus colubriformis* (98.6%), *T. axei* (89,57%), *Nematodirus spathiger* (100%), *N. filicolis* (23,31%), *Haemonchus contortus* (89,95%), *Marshallagia marshalli* (23,77%), *Bunostomum trigonocephalum* (17,28%), *Chabertia ovina* (64,14%), *Oesophagostomum venulosum* (21,39%), *Cooperia curticei* (56.52%) and *C.oncophora* (9,29%).

At climate condition which are present in examined areas, the dynamics of the first occurrence of established species of gastro-intestinal strongilida was as follows: in March: *Teladorsagia* (*Ostertagia*) *circumcincta*, *Ostertagia ostertagi*, *Trichostrongylus colubriformis*, *Cooperia oncophora, Nematodirus filicoliis* and *N.spathiger*; in April: *Ostertagia trifurcata* in May:*Trichostrongylus axei*, *Bunostomum trigonocephalum* i *Chabertia ovina*; in June: *Cooperia curticei* in July: *Haemonchus contortus* and *Oesophagostomum venulosum* and in November: *Marshallagia marshalli* (Pavlovic,2017, 2023; Pavlović et al.2013a)

**South west Serbia including Stara Planina**

Those municipals include the Pešters Plateau limestone plateau in southwestern Serbia. The Pešters plateau extends at an altitude of 900 to 1200 meters above sea level. Taking over an area of about 50 km², it is the largest field in Serbia, among the highest in the Balkans and is actually a spacious field (Pešter field) of endless pastures, surrounded by the mountains Jadovnik, Zlatar, Ozren, Giljevo, Javor and Golija. Through the Pester plateau, the rivers Uvac, Vapa, Jablanica and Grabovica flow. The Pester plateau is the coldest area in Serbia. From early autumn to early spring, is exposed to the breakthroughs of cold and dry air masses, when there is a temperature inversion due to the accumulation and retention of cold air that descends from the surrounding mountains. Due to the lack of winds in the winter, the air is constantly further cooled, and practically a "cold air lake" is formed against the mountains where the temperatures are higher. Therefore, winter, keeping the snow cover, and that area got the epithet of "Serbian Siberia". The land on Pešter is mostly limestone and sprinkled with vast continuous pastures. The economy of the Pester region is mainly based on cattle and most intensive sheep breeding (Pavlovic et al.2017b)

During our examination we occured presence of *Ostertagia* at 78.93%, *Trichostrongylus* 72.80%, *Nematodirus* 65.60% *Hameonchus contortus* 58.93%, *Oesophagostomum* 48.80%, *Chabertia ovina* 42.93%, *Cooperia* 39.20%, *Marshallagia* 29.60%, *Skrjabinema* 24.26% and *Bunostomum* 13.06%. In March we have occurred *Ostertagia* and *Trichostrongylus,* in May, the observed infection with *Nematodirus, Bunostomum* and *Chabertia* (*ovina*), in June was the first record of *Skrjabinema*, in July were established eggs of *Haemonchus* (*contortus*) and *Cooperia* and in November showed the presence of *Marshallagia.*

Stara Planinais as extension of the Carpathian mountain range, separated from it by the Danube River. Mountain Stara Planina is the highest mountain in southeastern Serbia and belong to Balkan mountain range and range runs 560 km from the Vrashka Chuka Peak on the border between Bulgaria and eastern Serbia eastward through central Bulgaria to Cape Emine on the Black Sea. Stara Planina is known for its biological diversity and had a numerous grass-land area convenient from goats and sheep breeding. Goats and sheep play important role in Stara Planina area in providing animal protein for diet especially for those

people who live in the village. They are usually kept under extensive conditions and graze or brows on any land that is not being cultivated. After harvesting, the animals are turned onto wheat and barley stubble from which they obtained nourishment (Pavlovic et al.2012d)

We revealed same parasite species: *Ostertagia circumcincta* (95,23%), *O.trifurcata* (91,53%), *O.ostertagi* (23,33%), *O.occidentalis* (21,37%), *Trichostrongylus axei* (100%), *T.colubriformis* (89,57%), *Nematodirus spathiger* (100%), *N. filicolis* (43,31%), *Haemonchus contortus* (88,95%), *Marshallagia marshalli* (23,77%), *Skrjabinema caprae* (13,28%), *Bunostomum trigonocephalum* (13,28%), *Chabertia ovina* (64,14%), *Oesophagostomum venulosum* (28,39%), *Cooperia curticei* (60.52%) and *Cooperia punctata* (5,26%) (Pavlovic et al.2015) Season dinamic of occurence of parasites was same like in soth west part of Serbia.

**South part of Serbia, with emphasis to North Kosovo**

Geographical conditions in examined area favor breeding small ruminants because there were a large number of pastures suitable for grazing. The relief is characterized by plateaus, hilly land, hills, mountains, numerous mountain ranges (saddles), valleys and rivers with a number of smaller tributaries. In the northern part of the region North Kosovo, there is a ridge of the mountain Kopaonik, with the peak of Šatorica, 1,770 meters, above of the town Leposavić. The southern boundary is the river Ibar, which divides the towns of Mitrovica and North Mitrovica. On the west by Zubin Potok, the mountain ranges of Rogozna and Mokra Gora with the peak of Berim, 1,731 meters, this separates one from the other lake Gazivode. In general, the climate is continental, with cold, relatively dry winters and warm, humid summers. Summer temperatures in the mountainous areas are notably cooler, averaging about (18°C) with up to 120 days of annual snow cover in the mountains (Milanovic et al.2018)

During our examination we established presence of *Trichostrongylus* sp. (100%), *Chabertia ovina* (94.73%), *Nematodirus* sp. (68.42%), *Oesophagostomum* sp. (42.10%), *Haemonchus* sp. (36.84%), *Cooperia* sp. (19.20%), *Srjabinema* sp. (15.78%), *Marshalagia* sp. (10.52%) and *Osrtertagia* sp. (5.26%). First occurence of parasites we had afther star of grazing season, in March have occurred *Ostertagia* and *Trichostrongylus,* in May, the observed infection with *Nematodirus, Bunostomum* and *Chabertia* (*ovina*), in June was the first record of *Skrjabinema*, in July were established eggs of *Haemonchus* (*contortus*) and *Cooperia* and in November showed the presence of *Marshallagia.*(Pavlović et al.1995, Milanovic et al.2018).

**Conclusions**

Based on research in the world and in our country, diseases of parasitic etiology dominate in sheep and goats both in terms of prevalence and incidence, accompanied by significant morbidity and moderate mortality. The damage that occurs in this production is a consequence of the negative pathogenic effects of the parasite on the host organism. The consequence of this is the development of a clinically manifested disease, with the death of a large number of individuals, most often among the younger categories. The fact is, however, that in most cases, parasitic infections occur sub clinically, that is, "imperceptibly" to the eye of the herdsman. Negative economic effects are also present in these situations

and are manifested by a decrease in animal production, i.e. a decrease in the production of wool and milk, a poorer upbringing of the young, a decrease in general body resistance, i.e. an increased susceptibility to agents of other etiologies. For these reasons, it is necessary to know the biodiversity and the seasonal dynamics of the appearance of parasitic infections in order to take certain preventive measures and create comprehensive programs to control these infections (Pavlovic et al.2014, 2018, 2019a, 2023)

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