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# Study of Seasonality of Infection of Cattle with Helminthosis in Guba-Khachmaz Economic Region of Azerbaijan

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**Abstract**

The article talks about the research conducted on the infection of cattle with helminthosis depending on the seasons of the year in livestock farms located in Khachmaz and Shabran regions of Guba-Khachmaz economic region. During the research, the distribution of helminths (nematodes and trematodes) parasitizing cattle in farms was studied depending on the seasons of the year.

Infection was determined during the research conducted in Khachmaz region by seasons: in spring - 28.6% with trichocephalosis from nematodes, 36.5% with strongyloidosis, 35.0% with nematodirosis, and 14.3% with fasciolosis from trematodes; in summer - 19.0% with trichocephalosis, 33.3% with strongyloidosis, 39.7% with nematodirosis, 23.8% with fasciolosis; in autumn - 35.0% with trichocephalosis, 41.3% with strongyloidosis, 23.8% with nematodirosis, 28.6% with fasciolosis; in winter-12.7% with trichocephalosis, 19.0% with strongyloidosis, 19.0% with nematodirosis, 9.5% with fasciolosis. As a result of the research conducted in Shabran region, infection was determined: in spring - 23.4% with trichocephalosis from nematodes, 29.7% with strongyloidosis, 28.1% with nematodirosis, and 12.5% with fasciolosis from trematodes: in summer - 15.6% with trichocephalosis, 28.1% with strongyloidosis, 34.4% with nematodirosis, 18.8% with fasciolosis; in autumn - 31.3% with trichocephalosis, 37.5% with strongyloidosis, 20.3% with nematodirosis, 21.9% with fasciolosis; in winter - 11.0% with trichocephalosis, 14.1% with strongyloidosis, 15.6% with nematodirosis, 6.3% with fasciolosis. The fact that the extent of infection reaches its peak in spring, summer and early autumn is explained by the fact that helminth eggs develop faster when the

weather is warm. Presence of temperature necessary for the development of helminth eggs in spring, summer, and early autumn affects positively in their development. In winter, the environmental temperature drops, the development of helminths weakens and the probability of infection decreases.

Helminths were collected and studied in animals slaughtered in slaughterhouses of Guba-Khachmaz economic region: in Khachmaz region: from the intestines of animals - 14-35 ekz. *Trichocephalus skrjabini*,, 11-24 ekz. *Nematodirus oiratianus*, 11-25 ekz. *Strongyloides papillosus*, and from the liver - 12-35 ekz. *Fasciola hepatica*; in Shabran region: from the intestines of animals - 12-22 ekz. *Trichocephalus skrjabini*, 10-18 ekz. *Nematodirus oiratianus*, 8-19 ekz. *Strongyloides papillosus*; from the liver - 7-21 ekz. *Fasciola hepatica.*

**Keywords:** livestock, farming, examination, seasons, helminthiasis, infection.

## Introduction

The state of Azerbaijan successfully implements various state programs aimed at the development of the agricultural sector, including animal husbandry, on which food security directly depends on the reliable supply of food to the population.

One of the main areas of animal husbandry is cattle breeding, and increasing the productivity of this area is one of the urgent issues in food supply. As in other areas of animal husbandry, invasion, including helminthic diseases, has a negative impact on the development of livestock. Helminthosis is widespread among cattle in different regions of the Republic. These diseases are intensively observed in young animals. The relatively weak immune system in young animals allows them to be easily infected with pathogens, including helminths. Natural and climatic conditions play an important role in the spread of infestations, and the presence of ponds around pastures is also one of the factors that positively affect the development of intermediate hosts. Such favorable conditions lead to the increase in the extent of invasive diseases and the increase in the intensity of infection of animals with parasites. Although treatment and prevention measures against parasitic diseases have been developed and applied in farms by researchers of both foreign countries and our republic, helminthiasis continues to spread among animals [2-3].

Natural and climatic conditions play an important role in the expansion of the range of distribution of helminths, affect the parasite fauna of animals and cause widespread mixed (associative) infestations. Taking into account the above, it is considered necessary to develop treatment-prophylactic measures against helminthosis with new generation drugs and apply them to farms[2, 4-5].

Therefore, the aim was to determine the prevalence rates of helminthiasis depending on the seasons of the year in individual farms (cattle) located in the territory of Guba-Khachmaz economic region.

## Material and Methods

The research work was conducted in the laboratory of the Parasitology Department of the Veterinary Scientific Research Institute based on pathological materials (fecal samples) collected from livestock farms in order to study the dynamics of helminth infection of cattle of different ages in Khachmaz and Shabran regions of Guba-Khachmaz economic region in 2021-2022. 252 pathological materials (fecal) were examined in Khachmaz region and 256 in Shabran region. In order to determine the degree of infection of animals according to the seasons of the year, were conducted coprological examinations, then the obtained results were analyzed, and clarified in which season the animals were highly infected and the extent was studied. In order to determine the intensity of infection with helminths, a dissection examination was performed on the internal organs of 12 animals after slaughtering in the slaughterhouses of each region.

## Results and Their Discussion

Fecal samples brought from farmers' livestock farms located in Khachmaz and Shabran regions of Guba-Khachmaz economic region were examined and the dynamics of infection with helminthosis was determined by season. Thus, as a result of coprological examinations carried out by season in livestock farms of Khachmaz region, infection was determined: in spring- 35.0% with trichocephalosis from nematodes in 6-9-month-old animals, 45.0% with strongyloidosis, 50.0% with nematodirosis, 20.0% with fasciolosis from trematodes, 27.3% with trichocephalosis in 10-12 month olds, 36.4% with strongyloidosis, 36.4% with nematodirosis, 13.6% with fasciolosis, 23.8% with trichocephalosis in the elderly, 28.6% with strongyloidosis, 19.0% with nematodirosis, 9.5% with fasciolosis; in summer - 25.0% with trichocephalosis, 40.0% with strongyloidosis, 55.0% with nematodirosis, 30.0% with fasciolosis in 6-9 month olds, 18.2% with trichocephalosis in 10-12 month olds, 31.8% with strongyloidosis, 41.0% with nematodirosis, 22.7% with fasciolosis, 14.3% with trichocephalosis in the elderly, 28.6% with strongyloidosis, 23.8% with nematodirosis, 19.0% with fasciolosis; in autumn - 45.0% with trichocephalosis in 6-9 month olds, 50.0% with strongyloidosis, 35.0% with nematodirosis, 35.0% with fasciolosis, 31.8% with trichocephalosis in 10-12 month olds, 41.0% with strongyloidosis, 22.7% with nematodirosis, 27.3% with fasciolosis, 28.6% with trichocephalosis in the elderly, 33.3% with strongyloidosis, 14.3% with nematodirosis, 23.8% with fasciolosis; in winter - 15.0% with trichocephalosis in 6-9 month olds, 25.0% with strongyloidosis, 30.0% with nematodirosis, 15.0% with fasciolosis, 13.6% with trichocephalosis in 10-12 month olds, 18.2% with strongyloidosis, 18.2% with nematodirosis, 9.1% with fasciolosis, 9.5% with trichocephalosis in the elderly, 14.3% with strongyloidosis, 9.5% with nematodirosis, 4.8% with fasciolosis (table1).

**Table 1.** Seasonal infection of animals of different ages with helminthosis in livestock farms of Khachmaz region (%)

| Age | Che-cked | Checked | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Trichocephalosis | | Strongyloidiasis | | Nematodirosis | | Fasciolosis | |
| | | Amo-unt | İR* (%) | Amount | İR (%) | Amount | İR (%) | Amount | İR (%) |
| Spring season | | | | | | | | | |
| 6-9 months old | 20 | 7 | 35,0 | 9 | 45,0 | 10 | 50,0 | 4 | 20,0 |
| 10-12 months old | 22 | 6 | 27,3 | 8 | 36,4 | 8 | 36,4 | 3 | 13,6 |
| The elderly | 21 | 5 | 23,8 | 6 | 28,6 | 4 | 19,0 | 2 | 9,5 |
| Total | 63 | 18 | 28,6 | 23 | 36,5 | 22 | 35,0 | 9 | 14,3 |
| Summer season | | | | | | | | | |
| 6-9 months old | 20 | 5 | 25,0 | 8 | 40,0 | 11 | 55,0 | 6 | 30,0 |
| 10-12 months old | 22 | 4 | 18,2 | 7 | 31,8 | 9 | 41,0 | 5 | 22,7 |
| The elderly | 21 | 3 | 14,3 | 6 | 28,6 | 5 | 23,8 | 4 | 19,0 |
| Total | 63 | 12 | 19,0 | 21 | 33,3 | 25 | 39,7 | 15 | 23,8 |
| Autumn season | | | | | | | | | |
| 6-9 months old | 20 | 9 | 45,0 | 10 | 50,0 | 7 | 35,0 | 7 | 35,0 |
| 10-12 months old | 22 | 7 | 31,8 | 9 | 41,0 | 5 | 22,7 | 6 | 27,3 |
| The elderly | 21 | 6 | 28,6 | 7 | 33,3 | 3 | 14,3 | 5 | 23,8 |
| Total | 63 | 22 | 35,0 | 26 | 41,3 | 15 | 23,8 | 18 | 28,6 |
| Winter season | | | | | | | | | |
| 6-9 months old | 20 | 3 | 15,0 | 5 | 25,0 | 6 | 30,0 | 3 | 15,0 |
| 10-12 months old | 22 | 3 | 13,6 | 4 | 18,2 | 4 | 18,2 | 2 | 9,1 |
| The elderly | 21 | 2 | 9,5 | 3 | 14,3 | 2 | 9,5 | 1 | 4,8 |
| Total | 63 | 8 | 12,7 | 12 | 19,0 | 12 | 19,0 | 6 | 9,5 |

**Note:** İR*- infection rate

When summarizing the results of the research conducted in Khachmaz region by season, the infection was determined: in spring - 28.6% with trichocephalosis from nematodes, 36.5% with strongyloidosis, 35.0% with nematodirosis, 14.3% with fasciolosis from trematodes, in summer - 19.0% with trichocephalosis, 33.3% with strongyloidosis, 39.7% with nematodirosis, 23.8% with fasciolosis, in autumn-35.0% with trichocephalosis, 41.3% with strongyloidosis, 23.8% with nematodirosis, 28.6% with fasciolosis, in winter - 12.7% with trichocephalosis, 19.0% with strongyloidosis, 19.0% with nematodirosis, 9.5% with fasciolosis (Diagram 1).

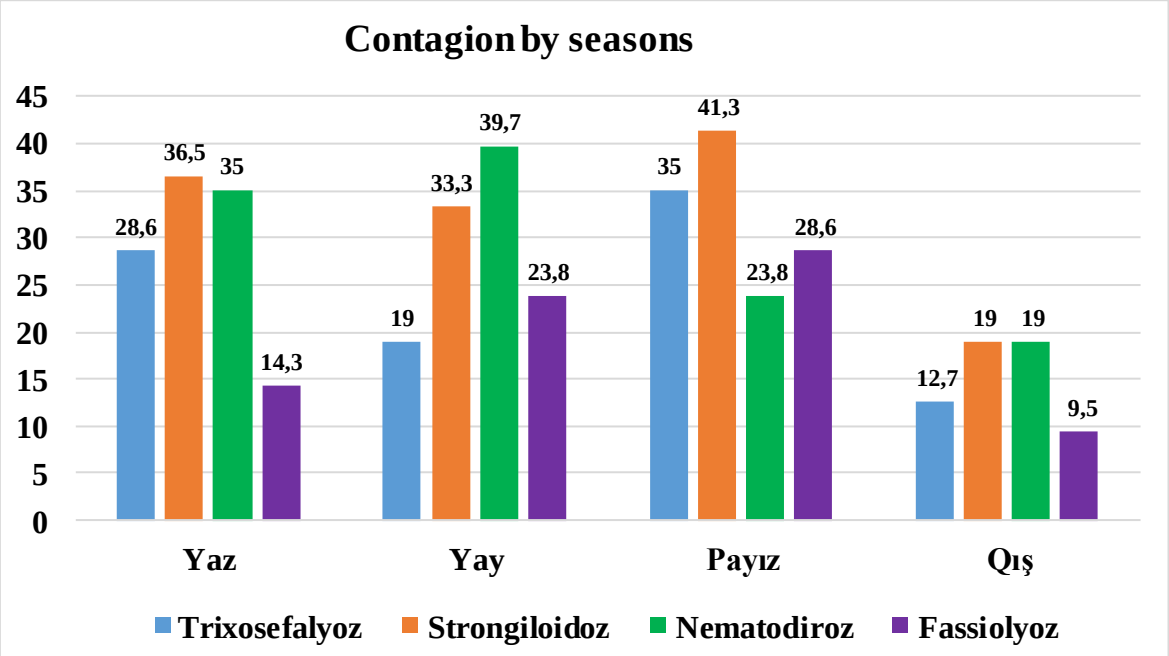


**Diagram 1.** Percentage of infection with helminths in Khachmaz region

As a result of seasonal coprological examinations in livestock farms of Shabran region, infection was not identified: in spring - 28.6% with trichocephalosis from nematodes in 6-9-month-old animals, 38.1% with strongyloidosis, 42.9% with nematodirosis, 14.3% with fasciolosis from trematodes, 22.7% with trichocephalosis in 10-12 month olds, 27.3% with strongyloidosis, 31.8% with nematodirosis, 13.6% with fasciolosis, 19.0% with trichocephalosis in the elderly, 23.8% with strongyloidosis, 9.5% with nematodirosis, 9.5% with fasciolosis; in summer - 23.8% with trichocephalosis in 6-9 month olds, 33.3% with strongyloidosis, 47.6% with nematodirosis, 23.8% with fasciolosis, 13.6% with trichocephalosis in 10-12 month olds, 27.3% with strongyloidosis, 36.4% with nematodirosis, 18.2% with fasciolosis, 9.5% with trichocephalosis in the elderly,23.8% with strongyloidosis, 19.0% with nematodirosis, 14.3% with fasciolosis; in autumn - 42.9% with trichocephalosis in 6-9 month olds, 47.6% with strongyloidosis, 33.3% with nematodirosis, 28.6% with fasciolosis, 27.3% with trichocephalosis in 10-12 month olds, 36.4% with strongyloidosis, 18.2% with nematodirosis, 18.2% with fasciolosis, 23.8% with trichocephalosis in the elderly, 28.6% with strongyloidosis, 9.5% with nematodirosis, 19.0% with fasciolosis; in winter - 14.3% with trichocephalosis in 6-9 month olds, 19.0% with strongyloidosis, 23.8% with nematodirosis, 14.3% with fasciolosis, 9.1% with trichocephalosis in 10-12 month olds, 13.6% with strongyloidosis, 18.2% with nematodirosis, 4.5% with fasciolosis, 9.5% with trichocephalosis in the elderly, 9.5% with strongyloidosis, 4.8% with nematodirosisHowever, infection with fasciolosis from helminthosis has not been determined (table 2).

When summarizing the results of the research conducted in Shabran region by season, the infection was determined: in spring - 23.4% with trichocephalosis from nematodes, 29.7% with strongyloidosis, 28.1% with nematodirosis, 12.5% of trematodes with fasciolosis; in summer - 15.6% with trichocephalosis, 28.1% with strongyloidosis, 34.4% with nematodirosis, 18.8% with fasciolosis, in autumn - 31.3% with trichocephalosis, 37.5% with strongyloidosis, 20.3% with nematodirosis, 21.9% with fasciolosis, in winter 11.0% with trichocephalosis, 14.1% with strongyloidosis, 15.6% with nematodirosis, 6.3% with fasciolosis (Diagram 2).

**Table 2.** Seasonal infection of animals of different ages with helminthosis in livestock farms of Shabran region (%)

| Age | Che-cked | Checked | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Trichocephalosis | | Strongyloidiasis | | Nematodirosis | | Fasciolosis | |
| | | Amount | İR (%) | Amount | İR (%) | Amount | İR (%) | Amount | İR(%) |
| Spring season | | | | | | | | | |
| 6-9 months old | 21 | 6 | 28,6 | 8 | 38,1 | 9 | 42,9 | 3 | 14,3 |
| 10-12 months old | 22 | 5 | 22,7 | 6 | 27,3 | 7 | 31,8 | 3 | 13,6 |
| The elderly | 21 | 4 | 19,0 | 5 | 23,8 | 2 | 9,5 | 2 | 9,5 |
| Total | 64 | 15 | 23,4 | 19 | 29,7 | 18 | 28,1 | 8 | 12,5 |
| Summer season | | | | | | | | | |
| 6-9 months old | 21 | 5 | 23,8 | 7 | 33,3 | 10 | 47,6 | 5 | 23,8 |
| 10-12 months old | 22 | 3 | 13,6 | 6 | 27,3 | 8 | 36,4 | 4 | 18,2 |
| The elderly | 21 | 2 | 9,5 | 5 | 23,8 | 4 | 19,0 | 3 | 14,3 |
| Total | 64 | 10 | 15,6 | 18 | 28,1 | 22 | 34,4 | 12 | 18,8 |
| Autumn season | | | | | | | | | |
| 6-9 months old | 21 | 9 | 42,9 | 10 | 47,6 | 7 | 33,3 | 6 | 28,6 |
| 10-12 months old | 22 | 6 | 27,3 | 8 | 36,4 | 4 | 18,2 | 4 | 18,2 |
| The elderly | 21 | 5 | 23,8 | 6 | 28,6 | 2 | 9,5 | 4 | 19,0 |
| Total | 64 | 20 | 31,3 | 24 | 37,5 | 13 | 20,3 | 14 | 21,9 |
| Winter season | | | | | | | | | |
| 6-9 months old | 21 | 3 | 14,3 | 4 | 19,0 | 5 | 23,8 | 3 | 14,3 |
| 10-12 months old | 22 | 2 | 9,1 | 3 | 13,6 | 4 | 18,2 | 1 | 4,5 |
| The elderly | 21 | 2 | 9,5 | 2 | 9,5 | 1 | 4,8 | - | - |
| Total | 64 | 7 | 11,0 | 9 | 14,1 | 10 | 15,6 | 4 | 6,3 |

During the research, along with coprological examination, helminthological dissect examination was also performed. It was collected and studied from the slaughtered animals in the meat slaughtering stations of the Guba-Khachmaz economic region: For Khachmaz region-from the intestines 14-35 ekz. *Trichocephalus skrjabini*, 11-24 ekz. *Nematodirus oiratianus,* 11-25 ekz. *Strongyloides papillosus,* and from the liver 12-35 ekz. *Fasciola hepatica;* in Shabran region-from the intestine of slaughtered animals 12-22 ekz. *Trichocephalus skrjabini*, 10-18 ekz. *Nematodirus oiratianus*, 8-19 ekz. *Strongyloides papillosus,* and from the liver 7-21 ekz. *Fasciola hepatica* (table 3).

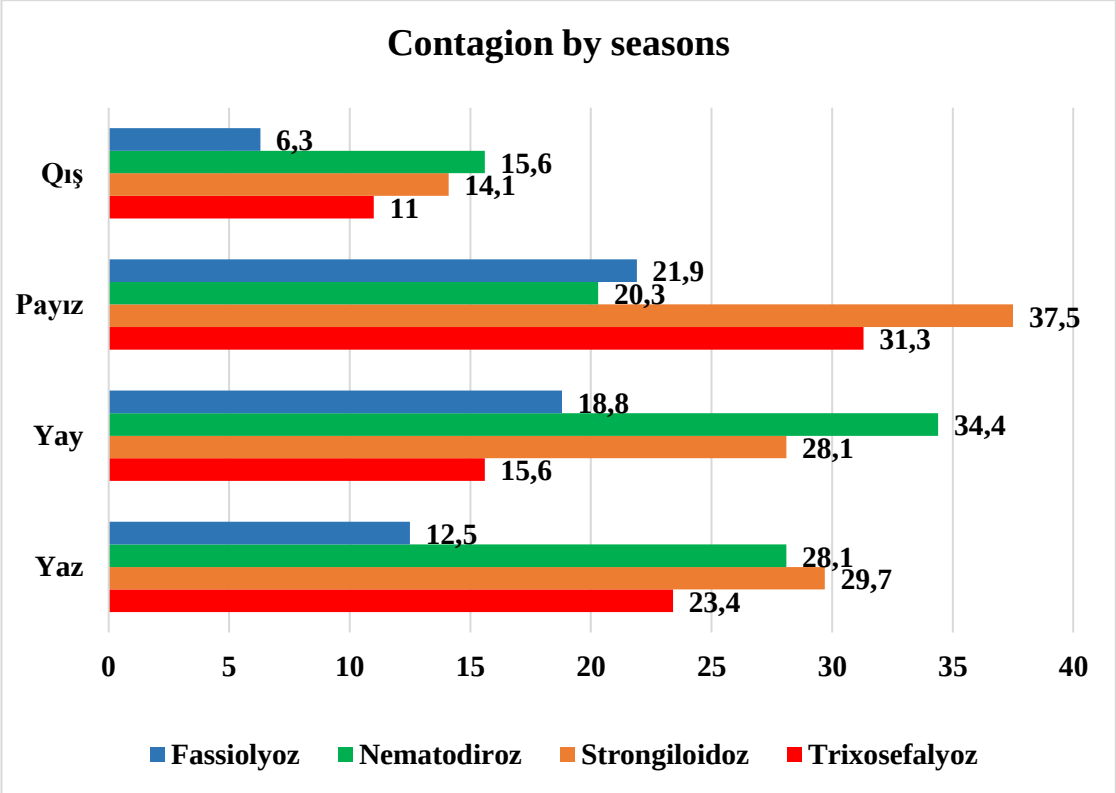


**Diagram 2.** Percentage of infection with helminths in Shabran region

**Table 3.** The results of the slit examination (ekz.)

| Regions | Checked | *Trichocephalus skrjabini (Baskakow, 1924)* | *Nematodirus oiratianus (Rajevskaja, 1929)* | *Fasciola hepatica (L.1758)* | *Strongyloides papillosus (Wedl, 1856)* |
|---|---|---|---|---|---|
| Khachmaz | 12 | 14-35 | 11-24 | 12-35 | 11-25 |
| Shabran | 12 | 12-22 | 10-18 | 7-21 | 8-19 |
| On average | 24 | 12-35 | 10-24 | 7-35 | 8-25 |

Detection of infection with gastrointestinal nematodes in all seasons of the year is directly related to high rainfall and humid climate conditions in recent years. Such favorable conditions allow helminth eggs to develop and reach the stage of invasion and infect animals. The physical and geographical conditions of the Guba-Khachmaz economic region are of particular importance in the spread of

geo- and biohelminths. Also, the constant presence of intermediate owners under favorable circumstances causes nematode and trematode infection of cattle.

Thus, the high level of infection in spring, summer and early autumn is explained by the fact that helminth eggs develop faster when the weather is warm.The presence of the temperature necessary for the development of helminth eggs in spring, summer, and autumn has a positive effect on their development.In winter, the ambient temperature drops, the development of helminths weakens and the probability of infection decreases.

## Results

1. Infection was determined during the research conducted in Khachmaz region by seasons: in spring - 28.6% with trichocephalosis from nematodes, 36.5% with strongyloidosis, 35.0% with nematodirosis, 14.3% with fasciolosis from trematodes, in summer -19.0% with trichocephalosis, 33.3% with strongyloidosis, 39.7% with nematodirosis, 23.8% with fasciolosis, in autumn - 35.0% with trichocephalosis, 41.3% with strongyloidosis, 23.8% with nematodirosis, 28.6% with fasciolosis, in winter - 12.7% with trichocephalosis, 19.0% with strongyloidosis, 19.0% with nematodirosis, 9.5% with fasciolosis.

2. As a result of the research conducted in Shabran region, infection was found: in spring - 23.4% with trichocephalosis from nematodes, 29.7% with strongyloidosis, 28.1% with nematodirosis, 12.5% with fasciolosis from trematodes, in summer - 15.6% with trichocephalosis, 28.1% with strongyloidosis, 34.4% with nematodirosis,18.8% with fasciolosis,in autumn - 31.3% with trichocephalosis, 37.5% with strongyloidosis, 20.3% with nematodirosis, 21.9% with fasciolosis,in winter - 11.0% with trichocephalosis, 14.1% with strongyloidosis,15.6% with nematodirosis, 6.3% with fasciolosis.

3. It was collected and studied from animals slaughtered in meat slaughterhouses in the Guba-Khachmaz economic region: in Khachmaz region: from intestines 14-35 ekz. *Trichocephalus skrjabini*, 11-24 ekz. *Nematodirus oiratianus*, 11-25 ekz. *Strongyloides papillosus*, and from the liver -12-35 ekz. *Fasciola hepatica;* in Shabran region: from the intestines 12-22 ekz. *Trichocephalus skrjabini*, 10-18 ekz. *Nematodirus oiratianus*, 8-19 ekz. *Strongyloides papillosus*, and from the liver 7-21 ekz. *Fasciola hepatica*.

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