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BIOECOLOGY OF NEMATODES OF RUMINANT ANIMALS OF THE NAKHCHIVAN AUTONOMOUS REPUBLIC

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БИОЭКОЛОГИЯ НЕМАТОД ЖВАЧНЫХ ЖИВОТНЫХ НАХЧЫВАНСКОЙ АВТОНОМНОЙ РЕСПУБЛИКИ

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Abstract. The article presents the species composition, extensiveness and intensity of nematode parasitism in the gastrointestinal tract of ruminants in the Nakhchivan Autonomous Republic. The gastrointestinal system of sheep infected with nematode invasion contained 11 nematode species (*Ostertagia marshalli, O. trifurcata, O. occidentalis, O. circumcincta, O. ostertagi, Haemonchus contortus, Gongylonema Pulchrum, Trichostrongylus ovis, T. skrjabini, Nematodirus filicollis, N. spathiger*). The distribution of the identified species was extensive: *Ostertagia marshalli* (32%), *O. trifurcata* (0,4%), *O. occidentalis* (14,6%), *O. circumcincta* (26,6%), *O. ostertagi* (10,6%), *Haemonchus contortus* (9,3%), *Gongylonema pulchrum* (5,3%), *Trichostrongylus ovis* (13,3%), *T. skrjabini* (16%), *Nematodirus spathiger* (14,6%), *N. filicollis* (16%)It was noted that the most common gastrointestinal nematodes in ruminants in our republic are *Trichostrongylus ovis* (25,3) и *Trichostrongylus skrjabini* (16%).

Аннотация. Представлен видовой состав, экстенсивность и интенсивность паразитирования нематод в желудочно-кишечном тракте жвачных животных Нахчыванской АР. Исследования показали, что в желудочно-кишечном тракте инфицированных овец паразитируют 11 видов нематод (*Ostertagia marshalli, O. trifurcata, O. occidentalis, O. circumcincta, O. ostertagi, Haemonchus contortus, Gongylonema Pulchrum, Trichostrongylus ovis, T. skrjabini, Nematodirus filicollis, N. spathiger*). Распространение выявленных видов экстенсивность: *Ostertagia marshalli* (32%), *O. trifurcata* (0,4%), *O. occidentalis* (14,6%), *O. circumcincta* (26,6%), *O. ostertagi* (10,6%), *Haemonchus contortus* (9,3%), *Gongylonema pulchrum* (5,3%), *Trichostrongylus ovis* (13,3%), *T. skrjabini* (16%), *Nematodirus spathiger* (14,6%), *N. filicollis* (16%). Отмечено, что наиболее распространенными желудочно-кишечными нематодами у жвачных животных в Азербайджане являются *Trichostrongylus ovis* (25,3) и *Trichostrongylus skrjabini* (16%).

Keywords: Nakhchivan, sheep, ruminants, nematodes.

Ключевые слова: Нахчыван, овцы, жвачные животные, нематоды.

Nematodes comprise a vast group of worms whose exact number remains undetermined. Some researchers estimate their species count to be in the millions [1]. Numerous roundworms inhabit the seabed, from the waters of Antarctica to the Arctic Ocean, forming part of the benthic

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fauna. Many nematodes have adapted to freshwater habitats, while others thrive in soil. The latter, in particular, dominate the soil-dwelling fauna in terms of population density.

The bodies of these organisms vary in shape—filiform, fusiform, sausage-like, and, rarely, spherical — ranging in length from 0.08 mm to 8 meters. Free-living nematodes, which constitute the primary diversity within the class Nematoda but hold limited practical significance, are widely distributed in nature. These are typically small forms, rarely exceeding 2–3 cm in length. Some species exhibit remarkable adaptability to unfavorable environmental conditions.

Parasitic nematodes are also abundant, with over 300 known species. They infest both invertebrates and vertebrates, as well as various plant species. Many parasitic roundworms are notably larger than their free-living counterparts.

Animal husbandry, including sheep farming, is a vital sector of Azerbaijan's agricultural economy, particularly in the Nakhchivan Autonomous Republic, an integral part of the country. Parasitic nematodes (roundworms) infect ruminant livestock, significantly reducing the yield of meat, milk, leather, and wool, and in severe cases, causing mortality. Chronic gastrointestinal nematode infestations, in particular, render treatment economically unviable.

Materials and methods of the study

We conducted helminthoovoscopy using the Višniauskas method, which has proven highly effective in diagnosing gastrointestinal strongylids. To determine the distribution characteristics of helminths based on imaginal stages, we examined animals slaughtered for various ecological zone studies using helminthological dissection techniques.

To assess the level of infection in animals depending on grazing areas, we first performed helminthoovoscopic analysis on fecal, grass, and soil samples collected from the respective regions. Since distinguishing helminth eggs excreted in feces is relatively difficult, we allowed them to develop into larvae for more precise identification.

Grass samples were examined using a specially simplified version of the Baermann technique to detect larvae. Additionally, to determine the extent of helminth infections in animals based on pasture composition, we analyzed livestock grazing in different pasture areas simultaneously.

Discussion and results of the study

The list of human parasitic worms includes more than 400 species of helminths. Among them, 207 species belong to the phylum Platyhelminthes (141 species of trematodes and 63 species of cestodes), while 145 species belong to the phylum Nemathelminthes [2, pp. 56-63].

Studies conducted on sheep in Turkey have identified the species composition of gastrointestinal parasitic nematodes as follows: *Trichostrongylus axei, T. probolurus, T. colubriformis, T. vitrinus, T. skrjabini, T. capricola, T. longispicularis, Ostertagia circumcincta, O. trifurcata, O. occidentalis, Teladorsagia davtiani, Marshallagia marshalli, Haemonchus contortus, Nematodirus abnormalis, N. spathiger, N. filicollis, N. lanceolatus, N. helvetianus, Camelostrongylus mentulatus, Mecistocirrus digitatus, Cooperia oncophora, C. punctata, C. mcmasteri, Strongyloides papillosus, Bunostomum trigonocephalum, Oesopagostomum venulosum, Oe. columbianum, Gonglonema pulchrum, Chabertia ovina, Trichuris ovis* and *T. skrjabini* [3].

The distribution of ruminant animals in a specific ecological zone is associated with their role as a component of the biocenosis of that region. This principle also applies to nematodes parasitizing ruminants. If a characteristic nematode species for a particular zone is absent, it is due to the lack of a host ruminant species in that area. Conversely, the presence of ruminants in an ecological zone contributes to the spread of nematodes characteristic of that area.

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It should also be noted that disregarding environmental conditions in the distribution of nematodes is incorrect. If this were the case, all known helminth species would be capable of parasitizing any ruminant species in a given ecological zone. Moreover, helminths characteristic of different ecological zones would be evenly distributed across all regions. However, such a situation does not occur, as the spread of helminths depends on environmental factors and the presence of organisms involved in their transmission.

The presence of gastrointestinal nematodes in ruminants has been determined through studies conducted both worldwide and in our country [4-7].

To identify the nematode fauna of sheep under the conditions of the Nakhchivan Autonomous Republic, 75 sheep from different ecological and climatic regions were studied using a complete helminthological dissection method between 2024 and 2025, considering the lifestyle of the animals [5].

From March 2024 to February 2025, weekly visits were made to the slaughterhouses in Nakhchivan city, where gastrointestinal organs were collected and examined in the laboratory for the presence of nematodes. The collected organs were anatomically separated, dissected, washed, and nematodes were isolated, identified, and preserved following the classical method. To detach nematodes adhered to the mucous membranes, the organs were cleaned, washed, and incubated in +37°C physiological solution for 1-2 hours. The organs were then individually examined, and the nematodes were fixed in 70% ethanol and recorded. Subsequently, the obtained nematodes and eggs were microscopically examined for morphological identification.

For coprological analysis, fecal samples were collected from 75 sheep across different regions and analyzed using coprological examination methods. The collected material was processed in the “Biology” Laboratory of the Faculty of Natural Sciences and Agriculture at Nakhchivan State University. Out of the 75 examined sheep, 57 (76%) were found to be infected with nematodes, with a total of 2,711 individual nematodes identified. The number of parasites detected in the gastrointestinal samples ranged from a minimum of one to a maximum of 977 per animal. The study revealed that the digestive system of infected sheep harbored at least one and up to five nematode species. The results are presented in the following table (Table).

Table 1

THE NUMBER OF SHEEP INFECTED WITH ONE OR MORE NEMATODE SPECIES (%)

Number of identified species	*Infected (Number)*	*Infection extensity (%)*
1	20	26,7
2	25	33,3
3	5	6,7
4	5	6,7
5	2	2, 6
Total	*57*	*76*

The gastrointestinal system of sheep infected with nematode invasion contained 11 nematode species (*Ostertagia marshalli, O. trifurcata, O. occidentalis, O. circumcincta, O. ostertagi, Haemonchus contortus, Gongylonema Pulchrum, Trichostrongylus ovis, T. skrjabini, Nematodirus filicollis, N. spathiger*).

In the conditions of the Nakhchivan Autonomous Republic, the spread of gastrointestinal nematodes identified in sheep, depending on the months of the year, is reflected in the Table 2 below.

As seen in the table, in the Nakhchivan Autonomous Republic, the highest prevalence of gastrointestinal nematodes in grazing animals was observed in winter, spring, and autumn, while the

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lowest prevalence was in summer. This can be explained by the fact that relatively high precipitation in winter and spring causes nematode larvae that are spilled into the environment to develop quickly. In contrast, in the summer months, the intense heat in the Nakhchivan Autonomous Republic has a delaying effect on the development of nematode eggs and larvae.

Table 2

THE EFFECT OF THE SEASONS ON THE INFECTION DYNAMICS OF SHEEP

Nematode species	*Month*											
	3	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*1*	*2*
Ostertagia marshalli	3	1	2	2	1	2	2	2	2	5	1	1
O. trifurcata	-	1	-	-	-	-	-	-	1	1	-	-
O. occidentalis	2	-	2	-	-	-	-	2	1	2	1	1
O. circumcincta	4	1	2	2	2	1	1	1	1	3	-	2
O. ostertagi	1	1	-	-	-	1	1	2	1	1	-	-
Haemonchus contortus	1	1	1	-	1	2	-	-	-	1	-	-
Gongylonema pulchrum	-	-	1	-	-	-	-	2	1	-	-	-
Trichostrongylus ovis	1	3	2	2	-	2	-	-	-	-	-	-
T. skrjabini	-	2	2	2	-	3	-	3	-	-	-	1
Nematodirus filicollis	2	2	-	-	-	2	-	2	2	2	-	-
N. spathiger	1	2	-	-	-	2	1	1	2	2	-	-
Total	15	14	12	8	4	15	5	15	11	17	2	5

Conclusion

As a result of the research conducted, during the examination of 75 sheep in the Nakhchivan Autonomous Republic, gastrointestinal nematodes were identified in 57 (76%) of the animals. The prevalence of the identified species was as follows: *Ostertagia marshalli* (32%), *O. trifurcata* (0.4%), *O. occidentalis* (14.6%), *O. circumcincta* (26.6%), *O. ostertagi* (10.6%), *Haemonchus contortus* (9.3%), *Gongylonema pulchrum* (5.3%), *Trichostrongylus ovis* (13.3%), *T. skrjabini* (16%), *Nematodirus spathiger* (14.6%), and *N. filicollis* (16%). It has been noted that the most commonly encountered gastrointestinal nematodes in grazing animals in our republic were *Trichostrongylus ovis* (25.33%) and *Trichostrongylus skrjabini* (16%).

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