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Regulating Factors the Number of the Population of Nematodes in Digestive System of Ruminants

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Abstract: ***The distribution of the nematode population in the digestive system of ruminants is not constant and varies depending on a number of exogenous and endogenous factors. In ruminants of Uzbekistan, 79 species of nematodes were found, including 62 geohelminths and 17 biohelminths. As intermediate hosts in biohelminths, the class of insects is presented. The nature of the distribution of the nematode population in space, bearing in mind their abundance in the external environment and the organism of the respective hosts, is directly dependent on the action of the contributing and limiting factors.***

1. Introduction

In our republic, animal husbandry is one of the most important branches of agriculture. Its products occupy a special place among consumer goods. And one of the negative factors hindering the development of the sphere is nematodosis, a serious disease affecting farm animals. This disease dramatically reduces the productivity of domestic and wild animals, makes them vulnerable to various infections, and in some cases can cause their death.

In the territory of Uzbekistan, 137 species of helminthes were found in the organs of wild and domestic ruminants and their belonging to 2 orders and 3 families was established (Azimov et al., 2015). In the gastrointestinal tract of these animals, more than 40 species of nematodes from the family of trichostrongilids are combed off (Kuchboev et al., 2016). Traditionally, trichostrongides are considered to be nematodes laying eggs, and infectious elements from the host's body are released into the external environment along with animal excrement. The larval stage of development proceeds inside the eggs. Further development of eggs and larvae will depend on environmental conditions, especially air temperature, humidity and oxygen concentration. One of the specific features of parasites is the impact on them of environmental factors of the first and second order (Pavlovsky, 1934), or they can be formed according to the "double biotope law" (Tokobayev, 1976). The mechanisms of interaction between the organism of the host of the parasite and its habitat are quite different; this issue is widely discussed by the scientific community. The hypothesis that the parasite lives in two environments, in fact, is the starting point of the ecological trend in parasitology.

In most cases, it is the definitive host that is the main factor in the spread of helminths in nature. In this case, the owner himself in some special way "finds" and swallows the invasive elements (eggs and larvae) of helminths. In this regard, the study of the mechanisms of the transfer of helminths into the host organism is of great preventive value.

K. Kennedy (1978) in his research studied in detail the population ecology of the body of parasites. At the same time, he reveals the "parasite-host" relations from the standpoint of the impact of the host and environmental factors on the quantitative composition of the parasites and their population structure.

All materials presented in the literature are devoted to the determination of the mechanisms of control of the population of parasites and their interaction with the host. Based on the specifics of the work, the focus is on the factors influencing the formation of the helminth fauna of the gastrointestinal tract of ruminants and ultimately on their movement between the main and intermediate host.

The purpose of this work is to study the factors and mechanisms that contribute to the regulation of the number of parasite nematodes in the digestive system of ruminants.

2. Materials and methods

Helminthological material from ruminants was collected in the period 2017-2019 in various farms and at slaughter points in Tashkent, Namangan, Samarkand, Kashkadarya, Navoiy and Bukhara regions. Gastrointestinal tracts from 833 sheep, 548 goats, 5327 heads of cattle, 13 heads of camels, and 4 heads of Bukhara deer were studied using the method of helminthological dissections. In addition, carpological studies of ruminant feces were carried out according to the methods of Berman-Orlov and sequential washing. Research covered 537 heads of small, 126 - cattle and 178 heads of wild ruminants. Cameral processing of the material was carried out on the basis of the Institute of Zoology, Uzbekistan.

3. Results

According to the results of the study and literature data, 79 nematode species are found in the digestive system of ruminants (table), including: 66 species were found in sheep, 49 species in goats, 44 species in cattle, 28 - in camels and Bukhara deer - 8.

Of these, 17 turned out to be biohelminths (representatives of the order Spirurida), the remaining species are geohelminths. At the same time, it was established that representatives of the insect class (two-winged) actively participate in the life cycle of biohelminth nematodes as an intermediate host.

Table: Systematic affiliation of nematodes in the digestive system of ruminants in Uzbekistan

Order	Family	Genus	Species
Trichocephalida	Trichocephalidae	TrichocephalidaeBaird, 1853	3
Strongylida	Ancylostomatidae	*Bunostomum*Railliet, 1902	2
	Chabertiidae	*Chabertia*Railliet et Henry, 1909	1
		*Oesophagostomum*Molin, 1861	4
	Trichostrongylidae	*Trichostrongylus*Looss, 1905	7
		*Grosspiculagia*Sarwar, 1956	3
		*Haemonchus*Cobb, 1898	2
		*Marshallagia*Orloff, 1933	9
		Nematodirus Ransom, 1907	15
		*Orloffia*Drozdz, 1965	4
		Ostertagia Ransom, 1907	6
		*Teladorsagia*Anreeva et Satubaldin, 1954	3
Oxyurida	Syphaciidae	*Skrjabinema*Werestschagin, 1926	2
Ascaridida	Ascarididae	*Ascaris* L., 1758	1
Spirurida	Gongylonematidae	*Gongylonema*Molin, 1857	2
	Habronematidae	*Parabronema*Baylis, 1921	1
	Spiroceridae	*Physocephalus*Diesing, 1861	1
	Onchocercidae	*Onchocerca*Diesing, 1841	1
		Skrfabinodera (GnedinaetVsevolodov, 1947)	1
		*Dipetalonema*Diesing, 1861	1
	Setariidae	*Setaria*Viborg, 1795	3
	Thelaziidae	*Thelazia* Bosc, 1891	5
	Stephanofilariidae	*Stephanofilaria*Ihle et Ihle-Landenberg, 1933	2
	Total:		79

In the work of M. Tokobaev (1976), on the development of helminths and the ways of their transfer to the definitive hosts, a biological classification of these organisms is proposed - mammalian parasites and divided into 8 biological groups. Based on these classifications, we identified 62 species of nematodes (78.5%) belong to group II , where the invasive elements (eggs, lichen) of helminths lead a free life mainly in plants, in the soil and other places, and infection occurs when ingestion of invasive elements through food or water. 17 species of nematodes (21.5%) are assigned to the VIII biological group, where the invasive larvae of helminths develop in the body of some species of diptera and are transmitted to the definitive host through these insects.

The effect of various factors on the above groups of helminths and the ways of their circulation on the organism of the definitive host are presented in the following diagram (Fig.).

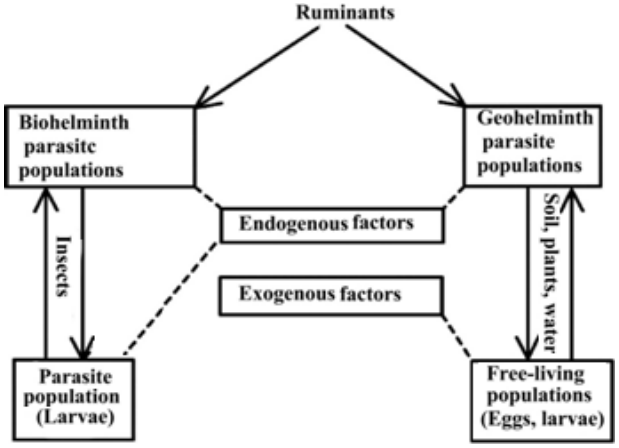

Figure: Factors on the development of a parasite population in the digestive system of ruminants

As can be seen from the scheme, the stages of development of helminths occur under the influence of endogenous and exogenous factors. According to the literature, the endogenous factors include the reaction of the host, the immunological incompatibility of the parasite and the host, and the change in the behavior of ruminants as a reaction to the parasitic effect. Exogenous factors include: physical factors (ambient air temperature, salinity and ionic composition of the aquatic environment, movement of solar energy, air and aquatic environment); geographical factors (climatic and microclimatic conditions, diurnal and seasonal cycles of environmental change); behavioral adaptation to environmental factors, the role of acclimatization of ruminants in spatial orientation and the formation and change of fauna. In the formation of the system “parasite-host” the role of the listed factors is very important.

Based on the results obtained, the following measures should be taken to reduce the number ofparasites in the digestive system of ruminants and the prevention of nematodoses.

In the prevention of biohelminthoses a special place is occupied by such measures as the destruction of the main, intermediate and additional hosts of helminth pathogens, i.e. biohelmints, elimination of the paths of invasive elements (eggs, larvae) worming from one to another host. In a word, the spread of helminth infections can be stopped by breaking the “chain” or “ring” of helminth development in any link or part.

And to combat geohelminthic infections, taking into account the conditions for the development and breeding of vectors in the external environment, preventive measures should be taken, such as replacing grazing places, keeping animals separately by age, periodically cleaning the environment

(stable, pen and other livestock facilities) from helminth eggs and larvae.

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