

Helminths of Perissodactyla of Karakalpakstan

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Abstract: *The article presents the results of studies on the species composition of helminthes of odd-toed ungulate animals of Karakalpakstan. As a result of the research, 60 species of helminthes were recorded in horses, and in donkeys - 49 belonging to the classes Trematoda, Cestoda and Nematoda. The results showed that 98.3% of the species, of the total registered helminthes, found in horses and 80.3% in donkeys. Endoparasites are localized in various vital organs of the odd-toed ungulate animals. Were identified the most pathogenic species for odd-toed ungulate animals and species of epidemiological significance.*

Keywords: helminthes, Perissodactyla, extensiveness and intensity of invasion, Karakalpakstan

1. Introduction

Helminthes are widespread among domestic and wild animals in the conditions of Uzbekistan and cause significant damage to the national economy [11]. With helminthes infections, along with a decrease in body weight, milk yields, hair growth, reproductive qualities, and the genetic potential of animals, a sharp decrease in the sanitary quality of products is also observed [1]. In sick animals, resistance is reduced and, in some cases, disruptions of immunity are observed after vaccination against infectious diseases.

Despite the successes achieved in the fight against the most important parasitic diseases of small animals, the latter still cause significant economic losses. The damage is due to the lag in the growth and development of the newborn young, reducing the fatness, performance of work horses, and milk productivity of mares and often death of animals.

The effectiveness of measures aimed at combating helminthes infections, to a certain extent, is associated with a deep and comprehensive study of helminthes fauna, epizootology, pathogenesis, therapy and prevention of diseases.

Currently, these issues in the conditions of Karakalpakstan have not been studied enough [4, 6, 8]. In this regard, the study of the species diversity of parasitic worms and the distribution of the main odd-toed ungulate animal's helminthes infections in different regions of Karakalpakstan is of theoretical and practical interest.

2. Materials and Methods

The collection of material was carried out in 2016-2019 on the territory of the Republic of Karakalpakstan. In order to clarify the helminthofauna of not cloven-hoofed animals, helminthological dissections [9] of 29 horses and 38 donkeys from different regions were carried out. In addition, 47 and 56 separate organs from horses and donkeys were investigated by the method of incomplete helminthological autopsies.

323 samples (189 horses and 134 donkeys) were examined by helminthocaprological (ovoscopy and larvoscopy) methods. Helminthes eggs in the faeces of animals were detected using successive washes, forced sedimentation according to Kotelnikov and Khrenov, Fulleborn, and simple flotation. Nematode larvae were detected by methods of Berman-Orlov, Popova, Vaid, Shcherbovich, Shilnikov, Polyakov, by cultivation in a thermostat.

Detected trematodes and cestodes were fixed in 70-degree alcohol, and nematodes - in the Barbagallo fluid. Species identification of parasites was carried out using the horse parasite determinants [5] taking into account the latest additions made by domestic and foreign researchers. At necropsy, the intensity of invasion was determined and the isolated parasites were systematized.

3. Research Results

As a result of the analysis of our own research, 60 species of helminthes belonging to 29 genera, 15 families and 8 orders were registered in horses, and 49 species belonging to 27 genera, 14 families and 8 orders were registered in donkeys. All of them belong to the three classes Trematoda, Cestoda and Nematoda (table). Studies have shown that 98.3% of the species, of the total number of helminthes (from 61 species), are found in horses and 80.3% in donkeys.

Table: The taxonomic structure of the causative agents of helminthiasis of the perissodactyla of Karakalpakstan

Class	Order	Family	Number of species	
			Horse	Donkey
Trematoda	<i>Fasciolida</i>	<i>Fasciolidae</i>	1	1
	<i>Schistosomatida</i>	<i>Schistosomatidae</i>	1	1
Cestoda	<i>Cyclophyllidea</i>	<i>Taeniidae</i>	2	1
		<i>Anaplocephalidae</i>	3	3
Nematoda	<i>Rhabditida</i>	<i>Srtongyloididae</i>	1	1
		<i>Trichonematidae</i>	31	24
		<i>Trichostrongylidae</i>	1	-
	<i>Strongylida</i>	<i>Strongylidae</i>	8	6
	<i>Pseudaliida</i>	<i>Dictyocaulidae</i>	1	1
	<i>Ascaridida</i>	<i>Ascarididae</i>	1	1
		<i>Oxyuridae</i>	1	1
		<i>Cosmocercidae</i>	1	1
	<i>Spirurida</i>	<i>Setariidae</i>	1	-
		<i>Onchocercidae</i>	3	3
		<i>Habronematidae</i>	4	4
		<i>Spiruridae</i>	-	1
Total :			60	49

Nematodes (53 and 43 species) are widely represented in horses and donkeys, slightly - cestodes (5 and 4) and trematodes (2 and 2), respectively. In some cases, in one animal, parasitizing from 2 to 15 species of helminthes was noted with a maximum invasion intensity of up to 10 thousand specimens.

From the class of trematodes, a high infestation of odd-toed ungulate animals falls on *Fasciola gigantica* species (in horses — 22.2% with an intensity of invasion up to 89 specimens, in donkeys — 17.3% and 68 specimens) and *Schistosoma turkestanicum* (in horses — 28.2% and 2745 copies, donkeys - 23.6% and 1783 copies.).

In the class of cestodes, the highest extensiveness and intensity of infection was found in *Anoplocephala magna*, *A.perfoliata* (in horses, 18.6% and 241 copies, in donkeys - 15.5% and 180 copies).

From the nematode class, the Trichonematidae and Strongylidae families are distinguished by a large variety. The extensiveness of the infection of the not cloven-hoofed animal's representatives of these families reaches 100%. Installed high infection of animals with *Cylicocyclus nassat* (in horses - 95.3% and 19873 copies, in donkeys - 59, 3% and 11985 copies.), *Delafondia vulgaris* (in horses - 92.3% and 936 copies, in donkeys - 56.4% and 597 copies.), *Alfortia edentates* (in horses - 78.4% and 156 copies., in donkeys - 63.7% and 128 copies.), *Strongylus equines* (63.7% and 327 copies., in donkeys - 54.2 % and 286 copies.).

Extensiveness and intensity of invasion by 7 species (*Trichonema aegyptiacum*, *Trichonema alveatum*, *Trichonema calicatum*, *Trichonema longibursatum*, *Cylicocyclus radiatum*, *Cylicocyclus elongatum*, *Cylicodontophorus bicoronatum*) turned out to be on average (24.7-47.5% and 250-2100 copies).

In the remaining species of the Trichonematidae and Strongylidae families, the extensiveness and intensity of invasion were 2.7–9.3% and 10–300 copies.

High extensiveness and intensity of invasion by certain nematode species from other families was noted. *Setaria equine* (Setariidae) was found in 68% of the examined animals with an intensity of invasion up to 158 ind., *Parascaris equorum* (Ascarididae) - in 36.5% and 128 ind., *Oxyuris equi* (Oxyuridae) - 28.4% and 532 ind, *Probstmayria vivipara* (Cosmocercidae) - in 23.1% and 1895 copies.

Helminthes in a horse are found in the digestive tract (52 species), in the liver (2), in blood vessels (1), in the lungs (2), in the abdominal cavity (1), in serous integuments of parenchymatous organs (1), cervical ligaments, tendons of the limbs and in the subcutaneous tissue (2). The main places of localization of helminthes in donkeys - thin and thick intestine. Helminthes are also found in the stomach, liver, lung (trachea, bronchi), ligaments, and subcutaneous tissue.

Among the parasitic worms of horses 45 species of geohelminths and 15 - biohelminths, and donkeys 36 and 13, respectively. All geohelminths were nematodes, biohelminths are represented by species belonging to trematodes (2), cestodes (5), and nematodes (9). Biohelminths are divided into the following groups: developing in arthropods, mammals, and mollusks.

It should be noted that the biology of *Probstmayria vivipara* belongs to the group of helminthes, which do not obey the Leukart rule [7] and, therefore, can develop and reproduce in vertebrate animals without going outside, i.e. by endocycle [2, 5].

As it is known, asymmetry is one of the most characteristic features of the living cover of the Earth. It is also characteristic of the structure of the biosphere as a whole [12]. Asymmetry is clearly manifested in the structure of systematic groups of animals, which is convincingly shown in the work of V.G. Heptner [3]. It is clearly visible in the structure of the helminthofaunistic complexes of any region of the earth.

The results of the conducted studies show that the number of helminth species in the suborders registered in the of odd-toed ungulate animals, ranges from one to 40. This allows you to select the dominant, subdominant and small sub-orders.

Of the number of registered helminths in of odd-toed ungulate animals 40 species (62%) includes the suborder Strongylata. The following places are occupied by the suborders Spirurata and Filariata, comprising 5 species (16%), *Anoplocephalata*- 3 species (5%), and the remaining 8 orders - 11 species (17%).

Of the identified helminthes, the most pathogenic are *Strongylus equinus*, *Alfortia edentatus*, *Delafondia vulgaris*, *Parasaris equorum*, *Oxyuris equi*, *Setaria equina*, and nematodes of the genus *Trichonema*, which are consistent with the data of other authors [6, 8].

A number of types of helminths parasitizing in of odd-toed ungulate animals, and have epidemiological significance (*Fasciola gigantica*, *Schistosoma turkestanicum*, *Echinococcus granulosus*, *Taenia hydatigena*) [10, 11].

The struggle with not cloven-hoofed animal's helminth infections is difficult because of the difficulties of intravital diagnostics, carrying out treatments and the associated impression of the apparent well-being of the livestock, the high cost of drugs, and in some cases underestimation of animal owners of the significance of the parasitic situation. These arguments complicate the epizootic situation on not cloven-hoofed animalshelminthes, contribute to an increase in the population of pathogens in the environment, in the body of the final owners and, accordingly, infection of susceptible animals.

4. Conclusion

As a result of the analysis of our own research, 60 species of helminthes belonging to 29 genera, 15 families and 8 orders were registered in horses, and 49 species belonging to 27 genera, 14 families and 8 orders were registered in donkeys. However, the study of the helminthofauna of odd-toed ungulate animals of Karakalpakstan cannot be considered exhausted. This requires the conduct of comprehensive studies of parasitic helminthes of these groups of animals throughout the territory in the context of the current ecological background, monitoring the epizootic process and specific measures for the prevention of invasive diseases of small animals.

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