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Impact of zoonotic helminths of domestic carnivores and ruminants on biodiversity in Azerbaijan, their epizootological and epidemiological significance

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Abstract
38 of the helminths found in domestic carnivores and ruminants are zoonotic helminths that parasitize animals and humans. 6 types of these helminths are trematodes, 13 are cestodes, 1 are acanthocephalus, and 18 are nematodes. Zoonotic helminths cause serious damage to livestock, fishing, poultry, and pig farms economically, causing a decrease in the productivity of ruminant domestic animals on all indicators and hindering the purchase of ecologically clean meat products from animals. Among the zoonotic helminths, *Echinococcus granulosus, Taenia hydatigena, Multiceps multiceps, Trichinella spiralis* in the larval stage infect ruminant domestic animals and cause economic damage to livestock. In the adult stage, they cause serious complications in human health and are of epizootological and epidemiological importance from the veterinary and medical point of view. Therefore, it is appropriate to prepare preventive measures against zoonotic helminths. Appropriate preventive measures prepared in the direction of reducing the impact of negative factors on biodiversity (all species of domestic animals) will have a positive effect on the health of ruminant domestic animals, and will create a foundation for increasing the quantity and quality of ecologically clean animal husbandry products obtained from them. In addition, the preventive measures implemented in this direction are important for the protection of people's health.

Keywords: Stray dog, domestic cats, large and small horned animals, zoonotic helminths, epizootology, epidemiology

Introduction
Improving the well-being of the population, providing them with safe and ecologically clean food products, protecting and sustainable use of biodiversity has always been the focus of attention and reflected in these State Programs. Therefore, it is important to increase the number of animals and protect them from various infectious and invasive diseases for the development of animal husbandry, which is one of the main areas of agriculture. One of the main issues is the development of measures to combat parasitic diseases caused by dangerous helminths, which cause serious economic damage to farms.

Zoonotic diseases, which are widespread among people, cause serious consequences for their health.

Despite this, zoonotic helminths of domestic carnivorous and ruminant domestic animals and the factors influencing their widespread distribution have not been identified in the territory of Azerbaijan. Only the species composition of the helminth fauna of these animals was studied by a number of researchers [1, 2, 3].

In this sense, the identification of zoonotic helminths of domestic carnivores and ruminants, the factors affecting their spread, is relevant for the modern era and is of great practical importance. Domestic carnivores, which are the main hosts, carriers and spreaders of helminths that are widespread in the areas, play a key role in the creation of parasitic pollution from an ecological point of view by spreading the eggs of dangerous helminths in the environment. Since these animals are not dependent on environmental conditions, they are the main "source of infection" in the infection of domestic animals with dangerous helminths in all seasons of the year.

Zoonotic helminths spread among domestic carnivorous and ruminant domestic animals, which are included in farms and private farms, cause economic damage to livestock, causing serious obstacles to the purchase of ecologically clean food products from them.

These animals are more dangerous than other animals in the spread of zoonotic helminths: they create parasitic pollution in the environment from an ecological point of view, they are of epizootological and epidemiological importance.

The spread of zoonotic helminths and the creation of parasitic foci are dangerous in synanthropic foci.

During zoonosis (helminthozoonosis), growth and development of baby animals slows down, productivity decreases, and even mass deaths occur. In animals infected with echinococcus, the quality of meat, milk, wool and meat products deteriorates significantly [4, 5].

Infection of ruminant domestic animals with zoonotic helminths is very high, in most cases it is 40-45%.

Zoonotic helminths cause helminthozoonoses (echinococcosis, dirofilariosis, trichinellosis, toxacarosis) in humans. In people infected with echinococcosis, there is usually a 30% mortality rate during surgery [6, 7, 8].

Taking these into account, it was considered appropriate to determine the serious effects of zoonotic helminths of domesticated carnivores and ruminants on biodiversity (all types of domestic animals), the factors influencing their spread, and the preparation of preventive measures against their spread.

Materials and methodology

For this purpose, fecal samples of domestic carnivores and ruminants were collected from private and farmer large residental areas of Azerbaijan, their surroundings and various feeding places and studied by Fülliborn and Berman methods. Detected trematodes, cestodes and acanthocephals were fixed in 70% alcohol, and nematodes were fixed in 4% formalin. For the determination of the type composition of the discovered trematodes and cestodes, preparations stained with aluminous carmine were used. For the determination of nematodes, they were placed in a mixture of lactic acid with a glycerol ratio of 1: 1. MBI-6 and 20x40 Olympus microscopes were used during determination of helminth species.

Conclusion and discussion

During the conducted studies, 38 zoonotic species that seriously affect biodiversity (all species of domestic animals) in domestic carnivorous and ruminant domestic animals were identified. 6 types of these helminths are trematodes, 13 types are cestodes, 1 type is acanthocephalus, and 18 types are nematodes. According to the life cycle, 26 types of these helminths are biohelminths, and 12 types are geohelminths (Table).

Table 1: Zoonotic helminths detected in domestic carnivores and ruminants in Azerbaijan (according to personal and literature data)

Name of animals / The type of helminth	Goat	Sheep	Camel	bovine animals	Buffalo	Zebu	Domestic pig	House cat	Dog	Horse	waterfowl	Fishes	Human
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Trematodes													
Ech.perfoliatus							+	+	+		+		+
E.melis								+	+				+
Alaria alata							+	+	+		+		+
Fasciola hepatica	+	+		+	+	+	+			+			+
F.gigantica	+	+		+	+	+	+			+			+
D.lanceatum	+	+	+	+	+	+	+		+	+			+
Cestodes													
Diphyllobothrium latum								+				+	+
Dipylidium caninum							+	+	+				+
Spirometra erinacei-europei								+	+				+
Taeniarhynchus saginatus				+	+	+							+
Taenia solium (larvae)	+	+	+	+			+	+	+				+
T.hydatigena	+	+	+	+	+			+	+				+
T.ovis	+	+	+					+	+				+
Multiceps multiceps	+	+	+	+					+	+			+
Hydatigera taeniaeformis								+	+				+
Echinococcus granulosus	+	+	+	+	+		+	+	+				+
Alveococcus multilocularis		+		+			+	+	+				+
Mesocestoides lineatus								+	+				+
M.corti									+				+
Acanthocephals													
Macracanthorhynchus Catulinus									+				+
Nematodes													
Thominx aerophilus								+	+				+
T.georgicus								+	+				+
Trichostrongylus axei	+	+	+	+	+	+							+
Tr.colubriformis	+	+	+	+	+	+							+
Tr.skrjabini	+	+	+	+	+	+							+
Ostertagia circumcincta	+	+	+	+	+	+							+
O.ostertagi	+	+	+	+	+	+							+
Metastrongylus salmi							+						+
Trichinella spiralis						+	+	+	+	+			+
Ancylostoma caninum								+	+				+

Uncinaria stenocephala								+	+				+
Toxascaris leonina								+	+				+
Toxocara canis								+	+	+			+
T.mystax								+					+
Crenosoma vulpis								+	+				+
Ascarops strongylina				+			+		+				+
Gongylonema pulchrum	+	+		+	+	+	+	+	+				+
Dirofilaria repens								+	+				+
Total: 38	14	15	11	16	12	11	13	24	27	6	2	1	38

As can be seen from the table, goat - 14, sheep - 15, camel - 11, cattle - 16, buffalo - 12, zebu - 11, domestic pigs - 13, domestic cat - 24, dogs - 27, horse - 6, waterfowl - 2, fish - 1, and humans are infected with 38 zoonotic species.

Among zoonotic helminths, *Echinococcus granulosus, Taenia hydatigena, Multiceps multiceps, Trichinella spiralis* parasitize in larval and adult stages. In the larval stage, they infect ruminant domestic animals, causing economic damage to animal husbandry, and in the adult stage, they cause serious consequences for human health. Therefore, these helminths are of epizootological and epidemiological importance [9, 10, 11].

Taking into account the important epizootological and epidemiological importance of zoonotic helminths of domestic carnivores and ruminants (biodiversity - impact on the health of all types of domestic animals and people), it is necessary and appropriate to develop and implement the following preventive measures against them: for the prevention of zoonoses, first of all, contamination of the environment with helminth eggs and larvae should be prevented; intermediate hosts that ensure the circulation of dangerous helminths in nature, between humans and ruminant pets, must be fought, and the connection between them (circulation chain) must be broken. Infected internal organs of ruminant domestic animals should not be thrown into the environment, slaughterhouses should be canceled in places without veterinary supervision; stray dogs and cats must be prevented from entering livestock farms; ruminant domestic animals should not be allowed to graze in marshy pastures and drink water from ponds with snails. The veterinary-sanitary conditions in the stables should be improved and deworming should be carried out constantly. It is important for people to strictly follow sanitary and hygiene rules.

Appropriate preventive measures prepared in the direction of reducing the impact of negative factors on biodiversity (all species of domestic animals) will have a positive effect on the health of ruminant domestic animals, and will create a foundation for increasing the quantity and quality of ecologically clean animal husbandry products obtained from them.

In addition, the preventive measures implemented in this direction are important for the protection of people's health.

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