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ЭНДОПАРАЗИТЫ БЛАГОРОДНОГО ОЛЕНЯ (*CERVUS ELAPHUS XANTHOPYGUS)* НА ТЕРРИТОРИИ ЗАБАЙКАЛЬСКОГО КРАЯ

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Представлены результаты (2019–2021 гг.) паразитологических исследований патологического материала от 91 особи благородного оленя (*Cervus elaphus xanthopygus*). На территории Забайкальского края зарегистрирована зараженность благородного оленя восемью видами эндопаразитов: *Protostrongylu skochi* (подотряд *Strongylata* пищеварительного тракта), *Monieziabenedeni, Trichostrongylus* spp*., Dicrocoelium lanceatum, Echinococcus granulosus larva, Cysticercus tenuicollis, Eimeria* spp. Экстенсивность инвазии составляет 86,8% (*Cysticercus tenuicollis)* и 57,1% *(Echinococcus granulosus larva),* что свидетельствует о наличии природных очагов по данным гельминтозам и их широкой распространенности. Обнаружены неспецифичные для Забайкальского края гельминты *Dicrocoelium lanceatum* в желчных протоках печени у одного из исследованных благородных оленей. Данный факт свидетельствует о наличии всех условий (промежуточных хозяев) для распространения инвазии, в том числе и на сельскохозяйственных животных. Для сохранения ветеринарно-санитарного благополучия охотничьего хозяйства в Забайкальском крае, исходя из полученных данных, сформулированы основные принципы профилактики зарегистрированных гельминтозов. Для предупреждения распространения среди диких копытных животных эхинококкоза, цистицеркозов (ларвальные цестодозы) необходима усиленная борьба с волками, лисицами и с бродячими собаками, а также обязательная систематическая дегельминтизация собак (ежеквартально), допускаемых на территорию охотохозяйств. В целях профилактики ларвальных цестодозов необходимо уничтожение внутренностей, добытых в результате охоты животных, неиспользование их в корм собакам в сыром виде. Для профилактики имагинальных гельминтозов у копытных необходимо осуществлять постоянный мониторинг гельминтоносительства. По результатам исследований составлен план противогельминтозных мероприятий. Для дегельминтизации диких животных применяют оральные антигельминтные препараты, которые размещают на подкормочных площадках в смеси с сыпучими кормами (дробленое зерно).

Ключевые слова: эндопаразиты, гельминты, благородный олень, охотничье хозяйство

ENDOPARASITES OF RED DEER (CERVUS ELAPHUS XANTHOPYGUS) IN THE TRANS-BAIKAL TERRITORY

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The paper presents the results (2019-2021) of parasitological studies of pathological material from 91 individuals of red deer (*Cervus elaphus xanthopygus*). Infestation of red deer with eight species of endoparasites has been registered in the Trans-Baikal Territory was registered: *Protostrongylus kochi*, suborder *Strongylata* of the digestive tract, *Moniezia benedeni*, *Trichostrongylus spp., Dicrocoelium lanceatum, Echinococcus granulosus larva, Cysticercus tenuicollis, Eimeria* spp. The intensity of infestation is 86.8% (*Cysticercus tenuicollis*) and 57.1% (*Echinococcus granulosus larva*), indicating the presence of natural foci on these helminths and their widespread distribution. Helminths *Dicrocoelium lanceatum* unspecific for Trans-Baikal Territory were detected in the bile ducts of the liver of one of the examined red deer. This fact indicates the presence of all conditions (the presence of intermediate hosts) for the spread of invasion, including on farm animals. To maintain the veterinary and sanitary well-being of the hunting industry in the Trans-Baikal Territory,

the main principles of prevention of registered helminth infections were formulated based on the data obtained. To prevent the spread of echinococcosis, cysticercosis (larval cestodoses) among wild ungulates, increased control of wolves, foxes and stray dogs, as well as mandatory systematic deworming of dogs (quarterly) allowed in hunting farms is necessary. In order to prevent larval cestodoses it is necessary to destroy entrails of hunted animals and not use them raw as food for dogs. To prevent imaginal helminth infestations in ungulates, continuous monitoring of helminth carriage is necessary. Based on the results of these studies, a plan of helminthic measures is drawn up. For deworming wild animals, oral anthelmintic drugs are used, which are laid out on feeding grounds mixed with loose feed (crushed grain).

Keywords: endoparasites, helminths, red deer, hunting economy

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INTRODUCTION

Game ungulates are widespread in the Trans-Baikal Territory. They play an essential role in human life. The practical importance of red deer is connected with sport hunting and with obtaining organic food and important biological substances (antlers, glands) from animals for the manufacture of medicines, skins for sewing shoes. Currently, many scientific and practical works show that wild ungulates are important and most promising hunting and recreational resources of the fauna of Russia [1, 2]. The main factors restraining the increase in the number of wild ungulates in natural conditions, as well as complicating the work of aviary breeding, are helminthiases[1] [3-7].

One of the game resources of ungulates in Transbaikalia is the red deer (Manchurian elk) (*Cervus elaphus xanthopygus*). The study of endoparasites of this animal species seems relevant from several points of view. In particular, one of the important aspects is associated with the active participation of red deer in the circulation of zoonotic helminth infections [8-11].

The need for targeted parasitological research in this direction is due to a number of reasons.

1. Conducting an inventory of parasites and studying the breadth of their spread creates an opportunity to justify and implement biotechnical measures.

2. Knowledge of the species composition, seasonal and age dynamics of helminth infestations in ecosystems allows to explain the causes of diseases and predict the population dynamics of commercial animals and justify the norms of their withdrawal.

3. The study of the parasite-host link plays an important role in preventing the threat of epizootics and deaths from "undetermined causes".

4. Deciphering the life cycles of pathogens and parasites is associated with the development of measures to control them.

5. In conditions of use of the same territory by agricultural and wild animals, a clear understanding of the parasitofauna of wild animals makes it possible to predict and prevent diseases in farm animals.

[1]Tretiakov A.M., Burdukovsky S.S., Tretiakova N.Yu. Preventive and veterinary and organizational measures to prevent infectious and parasitic diseases of game animals in the hunting grounds of the Republic of Buryatia // Actual issues of development of the agricultural sector of the Baikal region. Materials of the All-Russian (National) Scientific-Practical Conference dedicated to the Day of the Russian Science. 2020. Pp. 280-286.

6. Studies are necessary for the safety of forestry and hunting workers and other people visiting forest areas, to solve problems of epidemiology, epizootology, natural nidality of diseases and prevention of emergency situations.

For a long period, there have been no studies of the parasitofauna of ungulates in the Transbaikal Territory; previously, they have not been of a targeted and large-scale nature. Currently, there is a need to organize a system of parasitological study of wild animals, aimed at solving theoretical and applied problems of scientific research at the modern level [12].

The purpose of the study is to summarize and analyze the data on the distribution and taxonomic definition of the most important endoparasites of red deer in the Trans-Baikal Territory.

The following tasks are formulated to implement the objective:

– study the species composition of endoparasites of red deer in the Trans-Baikal Territory;

– determine the intensity of affection of red deer by different species of endoparasites;

– formulate the basic principles of prevention of parasitic diseases of red deer.

MATERIAL AND METHODS

This work was carried out in the Research Institute of Veterinary Science of Eastern Siberia - branch of the SFSCA RAS. The data obtained in the field in the areas of the Trans-Baikal Territory served as materials for the study.

A study (2019-2021) of endoparasite infestation was conducted in 91 red deer aged one to eight years in different seasons. All animals were subjected to postmortem examination, and 91 samples were examined by ovo- and larvoscopic methods.

The experimental part of the work used generally accepted parasitological methods (Darling, Fulleborn, complete helminthological autopsies (CHA) by K.I. Skryabin, Baermann's helmintholarvoskopy method).

RESULTS AND DISCUSSION

Cysticercus tenuicollis is the most widespread in the red deer population in the Trans-Baikal Territory; according to the obtained data, the rate of infestation (RI) is 86% (see the table). The main source of reindeer infestation is the wolf, the population of which has significantly increased in the last 5 years. In the studied 86 wolves *Taenia hydatigena* was found in 62 individuals, and the extensiveness of infestation was 72%. A certain role in the spread of thin-necked cysticercosis is played by lynx. Thus, according to our data, out of 28 lynx carcasses that underwent complete helminthological autopsy, eight individuals were infected with *Taenia hydatigena* (EI 28%), which is also confirmed by the studies of other authors [13, 14].

More than half of the examined red deer (57%) were affected by *Echinococcus granulosus larvae*. Echinococcus larvae were found in the lungs of animals in the form of a one-

Систематический состав эндопаразитов благородного оленя на территории Забайкальского края (n = 91)
Systematic composition of red deer endoparasites in the Trans-Baikal Territory (n = 91)

Type of parasite	Location	EI, the number of infested animals (%)
Protostrongyluskochi	Lung	23 (25,3)
Suborder *Strongylata* of the digestive tract	Intestine	15 (16,5)
Monieziabenedeni	Small intestine	3 (3,3)
Trichostrongylus spp.	Rennet stomach, large intestine	2 (2,2)
Dicrocoeliumlanceatum	Liver	1 (1,1)
Echinococcusgranulosus larva	Lung	52 (57,1)
Cysticercustenuicollis	Liver, mesentery gland	79 (86,8)
Eimeria spp.	Intestine	5 (5,5)

chamber bladder with many scolexes the size of a chicken egg; on average, one animal had 10-12 Echinococcus bladders. In our opinion, wolves and foxes are the source of Echinococcus infection in herbivores. Infection with *Echinococcus granulosus* in 98 studied wolves was 83%, or 81 individuals [15]. In the process of CHA of 10 foxes, *Echinococcus granulosus* was detected in the intestines of five animals (EI 50%). Affected animals differed markedly in fatness in a negative way from the animals free of Echinococcus larvae.

In the parasitological study of 91 red deer 23 individuals were infested with *Protostrongylus kochi* (RI 25,3%) (see the table). Seasonal dynamics of infestation of red deer with *Protostrongylus kochi* is characterized by a sharp increase of infestation in autumn months with its peak in winter and early spring periods. In spring and summer infestation of animals significantly decreases. High infestation of red deer by protostrongylids is explained by the presence of different types of waterlogged biotopes (marshes, waterlogged meadows, waterlogged forests), which are favorable habitats for intermediate hosts of the pathogen, namely land mollusks of *Eulota, Pupila, Succinea*.

Representatives of suborder *Strongylata* were found in the intestinal tract of 16.5% of the examined reindeer; in this group of helminthes, representatives of genus *Nematodirus* dominated in quantitative terms (84%).

During a complete helminthological autopsy, nematodirosis pathogens were found in the lumen of the small intestine, and their larvae in the form of parasitic nodules in the small intestine wall. The sexually mature nematodiruses began to appear in late August; their presence in the intestine was not observed in the second half of spring.

In addition to nematodiruses from the representatives of the suborder *Strongylata, Hemonchuscontortus* and *Chabertiaovina* were found in the rennet stomach and large intestine of two deer, 10 and 6% of the total number of the suborder *Strongylata*.

In 3% of the examined red deer, large ribbon helminthes were found in the small intestine with well-defined interproglottid glands in the center of the penis in the form of a stroke. Considering the morphological features, these helminths were identified as Moniezia benedeni. The low percentage of monieziosis infestation is explained by a low number of intermediate hosts of the helminth - soil mites, which require soils with high humus content.

Dicrocoelium lanceatum helminths, rarely found in the Trans-Baikal Territory, were found in the liver bile ducts of one animal. Extremely rare registration of dicrocoeliasis in the region in both farm and wild animals is explained by a low number of specific additional hosts - ants of certain genera.

In addition to the above helminths, oocysts of protozoan *Eimeria* spp. were found in the intestines of 5.5% of the examined red deer. The number of oocysts in one microscope field of view averaged 17-25, which indicates Eimeria carrier, but not immeriosis as a disease.

Based on the obtained data, the main principles of prevention of registered helminth infections were formulated. To prevent the spread among wild ungulates of echinococcosis, cysticercosis (larval cestodoses) it is necessary to strengthen the fight against wolves, foxes and stray dogs, as well as mandatory systematic deworming of dogs (quarterly) allowed on the territory of hunting farms. In order to prevent larval cestodoses, it is necessary to destroy the entrails of hunted animals and to prevent the use of such entrails as food for dogs in raw condition.

To prevent imaginal helminth infestations in ungulates, constant monitoring of helminths-carrying is necessary. Based on the results of these studies a plan of antihelmintic measures is drawn up. Oral antihelmintic preparations are used to deworm wild animals, which are put out at feeding sites in a mixture with loose feed (crushed grain).

CONCLUSIONS

1. Infestation of red deer in the Trans-Baikal Territory by eight species of different endoparasites is registered: *Protostrongylu skochi*, suborder *Strongylata* of the digestive tract, *Moniezia benedeni*, *Trichostrongylus* spp., *Dicrocoelium lanceatum*, *Echinococcus granulosus* larva, *Cysticercus tenuicollis*, *Eimeria* spp.

2. The most widespread and significant in socio-epizootological terms were *Cysticercus tenuicollis* (86.8% RI) and *Echinococcus granulosus* larva (57.1% RI), indicating the presence of natural foci on these helminths and their wide distribution.

3. In one of the examined red deer, a rare helminth species *Dicrocoelium lanceatum* in the Trans-Baikal Territory was found in the liver bile ducts. This fact indicates the presence of all conditions (presence of intermediate hosts) for infestation spreading, including agricultural animals.

4. To preserve the veterinary and sanitary well-being of the hunting industry in the Trans-Baikal Territory it is necessary to carry out a set of preventive veterinary and organizational measures that must include the regulation of wolf and fox population, scheduled preventive deworming of hunting dogs, the destruction of parenchymatous organs and intestinal raw materials from harvested animals, deworming of ungulates at biotechnical (feeding) sites.

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ИНФОРМАЦИЯ ОБ АВТОРАХ

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