COMPLEX STUDY OF THE EPIZOOTIC, PATHOANATOMICAL CHARACTERISTICS, AND INTERMEDIATE HOST MOLLUSKS OF FASCIOLIASIS AND DICROCOELIOSIS IN CATTLE IN KARAKALPAKSTAN

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Abstract: *This article presents the results of studies conducted on the prevalence, invasion intensity, age, and geographical dynamics of fascioliasis and dicrocoeliosis in cattle in Karakalpakstan, as well as methods for their diagnosis and treatment. The initial stages of the research began in 1962–1966 when A.N. Nazarov studied the epizootic characteristics of fascioliasis in various zones of Samarkand region. In subsequent studies, the livers of 530 cattle were examined using a complete helminthological dissection method, identifying pathogens of fascioliasis and dicrocoeliosis, including Fasciola hepatica, Fasciola gigantica, Dicrocoelium lanceatum, and other species. The study considered the extensiveness and intensity of fascioliasis invasion across different bioecological conditions, seasonal dynamics, and age groups. The article also discusses the pathoanatomical changes associated with fascioliasis and dicrocoeliosis, the condition of the bile ducts, and the role of intermediate host mollusks based on scientific evidence. Based on the research findings, scientifically grounded recommendations for rapid diagnosis, preventive measures, and treatment plans have been proposed. This study holds significant relevance for improving the quality of cattle meat products and enhancing local veterinary practices.*

Keywords: *fascioliasis, dicrocoeliosis, cattle, epizootology, pathology, intermediate host, Lymnaea truncatula, invasion intensity, bioecology, cattle breeding.*

INTRODUCTION

The epizootic characteristics of fascioliasis in cattle were first systematically studied by A.N. Nazarov in the Urgut, Khatirchi (foothill-mountain zone), and Payariq (irrigated zone) districts of Samarkand region between 1962 and 1966. According to his research, cases of cattle fascioliasis were reported in veterinary records across all regions of Uzbekistan and the Republic of Karakalpakstan at that time. However, in recent years, many helminthic diseases, including fascioliasis, are no longer reflected in veterinary reports.

During the study, the livers of 530 cattle were examined using the full helminthological dissection method, revealing Fasciola parasites in 59.8% of cases. The average invasion intensity was 42.5 fascioles per animal, with only 9.8% of them belonging to F. gigantica. In both zones, the prevalence of fascioliasis was observed in 70.4% of calves under one year old, 66.2% of two-year-old cattle, and 57.9% of adult cattle. The disease was slightly more prevalent in irrigated zones than in foothill-mountain zones. Juvenile fascioles were detected throughout the year, and Fasciola eggs were first found in fecal samples of newborn calves in June in irrigated zones and in July in foothill-mountain zones.

According to Iraqi researchers, the seasonal analysis of fascioliasis in sheep revealed the following infection rates: in autumn, the invasion extensiveness was 14.4%; in winter, 12.3%; in spring, 13.0%; and in summer, 7.6%.

In the Irkutsk region of the Russian Federation, fascioliasis is widespread among cattle in all areas except for the northern districts. The average invasion extensiveness in the region was found to be 23.5%, while the invasion intensity averaged 25.0 specimens per head. The highest invasion extensiveness was observed in cattle aged 8-12 years, reaching 61.0%, whereas in calves and young heifers under one year old, it was 7.6%. Seasonal analysis of invasion extensiveness indicated that the highest rates occurred in autumn and winter.

Methods Section: The clinical signs of mixed-course fascioliasis depend on whether the acute or chronic course predominates. If the acute form prevails, the disease is severe, and its clinical symptoms resemble those of acute fascioliasis. If the chronic form is dominant, symptoms characteristic of chronic fascioliasis gradually appear. In cases of mixed-course fascioliasis, high mortality rates in sheep are frequently observed.

Pathoanatomical Changes: In sheep that died from the acute form of fascioliasis, the liver enlarged 2-3 times its normal size, became congested with blood, and turned brown. The liver surface was uneven and covered with a fatty fibrinous layer. Ulcers of various sizes and young Fasciola specimens were present. The liver tissue became firm, developed cirrhosis, and was difficult to cut. The cross-sections showed fibrin deposits and Fasciola of different sizes. The liver glands were also significantly enlarged, and bile was found in the gallbladder and bile ducts. In the abdominal cavity, up to several liters of light yellow or yellowish serum accumulated. These pathoanatomical changes were observed in the central and southern regions of Uzbekistan.

Results Section: To determine the presence of trematode pathogens in deceased and slaughtered animals, their internal organs were examined using the complete and incomplete helminthological dissection methods developed by Acad. K.I. Skryabin.

Examination of the Liver for Fascioliasis, Dicrocoeliasis, and Orientobilharziasis Using the Complete Helminthological Dissection Method

The liver of deceased or slaughtered animals is completely removed from the body for examination. Attention is paid to its size, color, capsule integrity, parenchyma density (consistency), condition of the bile ducts, as well as the size of the gallbladder and lymph nodes. The gallbladder is separated and cut open in a special plastic dish, then washed. After determining the amount of bile, it is sequentially washed several times in clean water (every 8-10 minutes). Once the bile becomes clear, trematodes are separated from it, and the clarified sediment is filtered through gauze and examined under a microscope for parasite eggs (causative agents of fascioliasis and dicrocoeliasis).

Next, the liver is placed in a large plastic container, cut into several pieces along the bile ducts (at 38-40ºC), and left for up to an hour. To prevent the water from cooling down, the top layer is poured off and replaced with warm water. During this time, adult Fasciola and Dicrocoelium from the bile ducts, as well as Orientobilharzia and young Fasciola from the liver parenchyma, partially separate into the water. The liver pieces are then squeezed and washed by hand (wearing rubber gloves) and transferred to another container. In this container, the liver is cut into smaller pieces, each of which is partially crushed in water and removed.

The upper layer of the material in both containers is transferred to separate dishes, while the remaining middle portion is carefully poured off. This washing process is repeated every 10 minutes until the sediment becomes clear. The clarified sediment is poured in small amounts into Petri dishes, mixed with clean water, and trematodes are manually separated. The number, species, and developmental stage of the trematodes are identified separately and then combined. The list also includes trematodes found in the gallbladder. The upper part of the mixture and the sediment are separately examined for young trematodes.

Observations have shown that very small young Fasciola and Dicrocoelium specimens tend to float to the water's surface. If left for an extended period, they may settle at the bottom of the mixture. Based on this, an additional step was introduced into the complete helminthological dissection method for animal liver, originally developed by Academician K.I. Skryabin (Salimov, Kupriyanova, 1978).

Data obtained from the first dissection cut do not fully meet analytical requirements. Therefore, this method can be included in the incomplete helminthological dissection approach for liver examination.

Discussion: From the above information, it is evident that through a complete helminthological dissection method, the secondary causative agent of fascioliasis, Fasciola hepatica, and the causative agent of dicrocoeliosis, Dicrocoelium lanceatum, were not

detected in the liver of any of the 1,164 cattle and sheep from 9 districts. This raises the question: if F. hepatica larvae are not found in the definitive host's organism, what is the source that enables their development in the intermediate host, Lymnaea truncatula? Likewise, how are the eggs of D. lanceatum, which were not found in the bile ducts of cattle, detected in their fecal samples?

In 2005, professors Z.I. Izzatullaev and B.S. Salimov conducted malacological studies in the Republic of Karakalpakstan. They recorded the presence of the following aquatic and terrestrial pulmonate gastropod mollusks in the studied districts:

I. Aquatic Mollusks:

1. Lymnaea auricularia (L.)
2. L. bactriana Hutton
3. L. subdisjuncta Nev
4. L. fontinalis (Studer)
5. Costatella acuta (Drap)
6. Anisus ladacensis (Nev)
7. A. convexiusculus (Hutton)
8. A. albus (Müll.)
9. A. labiatus (Benson)
10. A. albopersicus (Germ.)

II. Terrestrial Mollusks:

1. Oxyloma elegans (Risso)
2. Ox. sarsi (Esmark)
3. Vallonia pulchella (Müller)
4. Deroceras laeve (Müller)

From the listed mollusks, it is evident that among the aquatic species, the intermediate host of F. hepatica, L. truncatula, was absent. Similarly, among the terrestrial mollusks, the known intermediate hosts of D. lanceatum in Uzbekistan, such as Xeropicta candacharica, X. krynickii, Bradybaena phaeozona, B. plectotropis, and Subzebrinus albiplicatus, were not recorded. Consequently, based on the bioecological characteristics of these parasites, the formation of F. hepatica and D. lanceatum as local species in the Karakalpakstan region and their role in the spread of fascioliasis and dicrocoeliosis are unlikely.

Among gastropod mollusks (class Gastropoda) living in aquatic environments, pulmonate (Pulmonata) species from the Lymnaeidae family are widely distributed in Uzbekistan. It has been established that:

- Lymnaea truncatula and L. thiesseae serve as intermediate hosts of Fasciola hepatica.
- L. bactriana, L. subdisjuncta, and L. impura serve as intermediate hosts of F. gigantica.

•L. auricularia is an intermediate host of both F. gigantica and Orientobilharzia turkestanica.

•From the Planorbidae family, Anisus ladacensis and Planorbis tangitarensis serve as intermediate hosts of paramphistomes.

Since L. auricularia has been identified as an intermediate host of fascioliasis in Karakalpakstan, it is necessary to examine this mollusk in more detail.

Lymnaea (Radix) auricularia (L., 1758)

The shell of L. auricularia is pale yellowish, ear- or ear-cone-shaped, thin, fragile, and has 3–4 slowly growing whorls. The tangential line is concave and indented. The last whorl is significantly expanded, occupying almost the entire shell. The whorl ridges are weakly developed and have a pear-shaped bulge. The aperture is very large, wide, and flat, with the umbilicus completely covered by the columellar margin of the aperture.

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