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MODERN DIAGNOSIS AND ECONOMIC DAMAGE OF INTESTINAL CESTODOSES

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Annatation: This article analyzes modern diagnostic methods of intestinal cestodes, their effectiveness, and the economic damage caused by the disease to the livestock industry. The importance of molecular-genetic (PCR), nested-PCR and sequencing technologies based on mitochondrial genes, along with traditional parasitological methods, is highlighted in the detection of cestodoses. Also, the decrease in animal productivity, growth rate, feed efficiency, treatment and prevention costs and economic losses due to the disease were analyzed. The results of the study show that early detection and effective control of intestinal cestodoses are important for ensuring the economic stability of veterinary practices and livestock farming.

Keywords: intestinal cestodoses, diagnosis, PCR, molecular-genetic (PCR), parasitosis, economic damage, veterinary, animal husbandry, prevention.

Introduction. Intestinal cestodes are one of the most common helminthic diseases of livestock and, in some cases, humans, causing digestive disorders, reduced nutrient absorption, reduced productivity, and weakened immunity. This leads to a decrease in the production of milk, meat, and wool in livestock, leading to economic losses.

Increasing demand for livestock products makes early detection and effective control of these diseases an urgent task. The use of modern diagnostic methods is important for timely detection of diseases, increasing the efficiency of prevention and treatment, and reducing economic damage.

The purpose of this article is to analyze the modern diagnostic methods used in the detection of intestinal cestodoses, to evaluate their practical importance, and to highlight the economic damage caused by these diseases to livestock based on scientific sources.

In recent years, molecular genetic methods have been widely used in the detection of intestinal cestodes in sheep and goats, along with classical helminth ovoscopic methods. In particular, PCR (Polymerase Chain Reaction), nested-PCR, and mitochondrial gene sequencing methods allow for accurate differentiation between Moniezia expansa and Moniezia benedeni [5].

A group of researchers in Hungary studied the molecular characterization of Moniezia spp. species and determined their genetic diversity. The authors noted that morphologically similar species are difficult to distinguish based on external characteristics alone, but molecular analysis allows for precise differentiation [10, 9, 31, 27, 11].

Scientists from Pakistan and Egypt identified cestodes found in sheep and goats using the PCR method and showed that this method has high accuracy in epizootological monitoring. They noted the importance of molecular diagnostics in the detection of subclinical invasions [9, 31, 11].

In their studies on veterinary clinical parasitology, American scientists noted that coproscopic diagnostics is inexpensive and widely used, but its sensitivity may be low. Therefore, they

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recommended polymerase chain reaction PCR and sequencing methods for subclinical and low-intensity infestations [31,11, 27].

British scientists have shown that morphological methods are still important in the diagnosis of intestinal cestodes in sheep, but when used in combination with molecular diagnostics, the effectiveness of the results increases significantly [27,31,11,10].

In their analyses of modern veterinary parasitology in the USA, they noted that molecular biology methods will become the main diagnostic direction in the future for the detection of Moniezia, Avitellina and Thysaniezia species [11, 31, 10, 9].

From this point of view, recent studies by scientists from Europe (Hungary), Asia (Pakistan), Africa (Egypt) and America (USA) show that molecular diagnostics of intestinal cestodes is one of the most reliable methods today. The introduction of these methods in the conditions of Uzbekistan is also of great importance in increasing the effectiveness of epizootological monitoring [10, 9, 31, 11, 27].

Economic significance of intestinal cestodes: Intestinal cestodes cause significant economic damage to livestock. They reduce feed intake in animals, slow down live weight gain, reduce productivity and weaken immunity.

According to a number of authors, economic losses due to parasitic helminths in the world livestock industry amount to 10-12 billion US dollars annually. Therefore, at least 1.5–2 billion dollars will be contributed by intestinal cestodoses. This damage is especially high in countries with developed sheep farming such as Australia, India, China and Brazil [28, 27, 11, 25, 19, 14, 22].

Studies in the UK have shown that lambs heavily infected with Moniezia expansa lose 18–25% of their live weight, resulting in an average economic loss of £12–18 (US$15–22) per lamb [27, 20, 15, 11].

In Egypt, infection with Moniezia and Avitellina species in sheep resulted in a 15.4% reduction in live weight gain and an average economic loss of US$22–27 per head [16, 11, 27, 15]. According to the authors, in the USA, animals infected with Avitellina centripunctata showed digestive dysfunction and a 12–19% reduction in feed conversion. This resulted in an average annual additional feed cost of US$1,800–2,500 per 100 sheep in intensive farming systems [11, 31, 17, 15].

A researcher in Pakistan has documented a 20–30% reduction in productivity due to intestinal cestodes in sheep and goats, and estimated the total economic loss at US$0.8–1.2 million per year per province [18, 9, 15, 11].

In Central Asian countries, including Uzbekistan, Kazakhstan, and Tajikistan, these diseases are widespread, mainly in conditions of extensive livestock farming, and economic losses are further increased due to the lack of regular deworming measures. According to the authors, parasitic diseases can reduce the productivity of small ruminants in Central Asia by an average of 17–22% [5, 1, 29, 6, 15].

Climate change and the spread of intestinal cestodoses: In recent years, global climate change has had a significant impact on the biology, development cycle, and geographic distribution of parasites. Increased temperatures, changes in air humidity, and shifts in precipitation patterns have directly affected the intermediate hosts, particularly the oribatid tapeworm population, and are changing the epizootological situation of intestinal cestodes.

Studies conducted in Great Britain and Ireland have shown that an increase in average temperature by 1.2°C over the past 30 years has extended the active period of helminths by 2–3 months. As a result, the level of infection with Moniezia spp. in sheep has increased from 14% to 27% in some areas [20, 30, 27, 11].

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The authors found that the population of oribatid worms in the Netherlands increased by 35% due to climate warming, which increased the spread of the Moniezia expansa infestation [30, 20, 27, 26].

In the mountainous and semi-desert regions of Uzbekistan, Kazakhstan, and Kyrgyzstan, the geographic range of helminths has expanded due to climate warming, and some previously rare species are being recorded in new biotopes [5, 20, 30, 27].

In New South Wales, Australia, seasonal rainfall following a severe drought increased the density of oribatid larvae by a factor of 2.4, and this increased the prevalence of Moniezia spp. in sheep from 19% to 41% [22, 20, 30, 27].

In Rajasthan, India, an 8–10% increase in mean annual humidity increased the prevalence of Avitellina centripunctata from 11.8% to 26.4% [25, 20, 5, 27].

In Xinjiang, China, an earlier onset of spring due to climate change extended the biological activity of intermediate hosts by 20–25 days, resulting in a 17% increase in the prevalence of Moniezia benedeni in sheep [19, 20, 30, 27].

In arid and semi-arid regions of Uzbekistan, especially in Navoi, Bukhara, Kashkadarya, and Jizzakh regions, changes in precipitation patterns and soil moisture can directly affect the fauna of intermediate hosts. This is likely to lead to a further increase in the epizootological importance of Avitellina and Thysaniezia species in the future [1, 2, 5, 7, 20].

Thus, climate change is having a significant impact not only on the biology of parasites, but also on their geographic distribution, seasonal cycle, and intensity of infestation. This situation indicates the need to develop new monitoring and prevention strategies in modern veterinary parasitology, taking into account climatic factors.

Modern trends in the fight against intestinal cestodoses: Currently, an integrated approach to the control of intestinal cestodes is of great importance. In modern veterinary parasitology, this includes the following measures: planned deworming, pasture rotation, sanitary and hygienic measures, reduction of the population of intermediate hosts, and immunoprophylaxis studies.

In Greece, the effectiveness of praziquantel against Moniezia spp. among sheep was 96.4%, while that of albendazole was 89.7%. The authors noted that praziquantel is more effective due to its high bioavailability [23, 17, 27, 11].

In studies conducted in Ireland, it was noted that Moniezia infestation in lambs systematically dewormed with albendazole decreased from 74% to 11%. At the same time, live weight gain increased by an average of 13.8%.

In Pakistan, rotational grazing of pastures has been shown to reduce the number of intermediate hosts (oribatid worms) by 31%, resulting in a reduction in cestode infection rates from 28.5% to 16.2% [18, 27, 26, 23].

In India, the use of sanitary and hygienic measures (regular cleaning of pens, removal of feed residues, reduction of humidity) resulted in a 22% reduction in the prevalence of intestinal cestodes in sheep [25, 27, 11, 26].

In Brazil, the authors achieved a 40% reduction in the number of oribatid worms in the soil using biological methods against the intermediate hosts of cestodes, and a 17% reduction in the infestation of Moniezia spp. [8, 26, 23, 27].

In recent years, the problem of resistance to anthelmintic drugs has also been observed. In the USA and Australia, signs of resistance to benzimidazole group drugs have been noted in some cestodes. This situation indicates the need to search for new alternative agents [17, 23, 27, 11].

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Therefore, there is increasing interest in the development of anthelmintic agents based on phytopreparations. Ferreira et al. (2022) found that a phytopreparation prepared in Portugal based on Artemisia absinthium was 71.3% effective against Moniezia spp. in sheep.

Studies conducted in Bangladesh with Azadirachta indica (neem tree) extract achieved a 64.8% reduction in egg production of intestinal cestodes [14, 24, 17, 11].

Studies conducted in Uzbekistan based on Ferula species are also promising in this direction. According to researchers, local herbal preparations based on Ferula kuhistanica showed high biological activity against parasites in experimental animals. In particular, in the groups treated with the drug, physiological indicators improved and productivity increased by 18–24% [3, 4, 11, 17].

Conclusion.

Thus, a modern approach to combating intestinal cestodes should not be limited to chemical deworming alone, but should also include elements of comprehensive epizootological control, pasture management, and phytotherapy.

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