INFESTATION OF SHEEP WITH INTESTINAL CESTODES IN UZBEKISTAN: EPIZOOTIOLOGICAL STUDIES, NEW PARASITIC SPECIES, AND ENVIRONMENTAL FACTORS

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Abstract: This article examines the infestation rates of sheep with intestinal cestodes in Uzbekistan, specifically focusing on monieziosis and thysanieziosis. The study explores their distribution and seasonal variations. Based on recent research, the infestation levels of sheep with *Moniezia expansa* and *Moniezia benedeni* were compared across different regions. The impact of environmental factors, particularly precipitation and temperature, on the activity of oribatid mites and the spread of monieziosis was analyzed. Additionally, the morphological characteristics of newly identified cestode species are described. The study results provide a scientific basis for improving veterinary control and preventive measures.

Keywords: sheep, intestinal cestodes, monieziosis, thysanieziosis, epizootiology, infestation extensiveness, infestation intensity, environmental factors, new parasitic species, oribatid mites, veterinary control.

Studies conducted in 2024-2025 indicate that the infestation rate of sheep with monieziosis (*M. expansa* and *M. benedeni*) in the Tashkent region is 8.6%, in the Bukhara region 17.1%, and in the Surkhandarya region 23.5%. The highest infestation rates were observed in breeding farms (25.3%), moderate levels in peasant and farmer households (14.2%), and minimal levels in commercial (rental and cooperative) and desert-pasture farms (7.2% and 7.1%, respectively) (Sh.A. Jabborov, 2005).

Analysis of literature data indicates that epizootiological studies conducted between 1946 and 2025 on the spread of *M. expansa* and *M. benedeni* in Uzbekistan and their infestation rates depending on sheep age, climatic-geographical zones, and seasons yield varied results. Some studies do not fully align with the biological and ecological characteristics of monieziosis and its intermediate hosts, and contradictory conclusions are occasionally found. Similar inconsistencies in monieziosis epizootiology have been reported by researchers from other countries. For instance, M.I. Kuznetsov (1955) reported that lambs in the Volgograd region of Russia and southern Kalmykia first become infected with *M. expansa*, followed by *M. benedeni* 2.5 months later. A.G. Bogdanov (1956) found that mature *M. expansa* appeared in June in Buryatia, while *M. benedeni* matured in October.

S.D. Ulyanov (1961) reported that in southern Kazakhstan, *M. expansa* was observed in lambs under one year of age during spring and summer, while *M. benedeni* appeared in the second half of the year. Similar observations were made in Moldova by E.S. Zgardan (1962, 1963) and in Czechoslovakia by Ya. Govorka and A. Kozak (1960), where lambs were first infected with *M. expansa*, followed by *M. benedeni*.

However, some findings contradict these results. For example, according to N.T. Kadirov (1959), in Kazakhstan, the infestation rate of lambs with *M. expansa* is high from June to August but drops to zero in winter, whereas *M. benedeni* infestation continuously increases from spring to late winter. In southeastern Kazakhstan, *M. expansa* was recorded in sheep almost exclusively during summer and autumn. L.I. Lavrov (1958) examined 1,729 sheep using helminthological dissection in the Panjakent and Ayni districts of Kazakhstan, bordering Uzbekistan, and found that 11.4% were infected with *M. expansa* and 11.8% with *M. benedeni*.

M.V. Arisov (2003) conducted helminthocopro-logical studies on 1,384 sheep in the desert zone of southern Russia, identifying monieziosis in 470 sheep (33.8%). Monieziosis was observed in all 10 farms studied in the Kalmyk Republic. For example, in one farm in the western zone, 121 out of 135 examined sheep (89.6%) had monieziosis, whereas in another farm, cestodes were found in 37 out of 92 sheep. The infestation rate in the central zone varied between 10.0% and 95.3%, while in the eastern zone, it ranged from 8.0% to 37.1%. Further helminthological examinations of 436 sheep revealed an infestation rate of 47.4% with *M. expansa* and *M. benedeni*.

Research was conducted on intestines from diseased or slaughtered sheep at various locations and the research laboratory of the "Veterinary Medicine and Pharmacology" department, following K.I. Skryabin's complete helminthological dissection method. Cestodes were washed with clean water and stored in specialized glass containers. Morphological characteristics such as scolex shape, neck, and strobila segmentation were studied using macroscopic and microscopic methods. The species were identified and preserved in 70% ethanol or 3% Barbagallo solution.

The newly identified cestodes differ from *Thysaniezia* and *Avitellina* in morphology. They belong to the genus *Moniezia* but differ from *M. expansa* and *M. benedeni*.

One species, measuring 70 cm in length, has a significantly larger scolex than *M. expansa* and *M. benedeni*, with a shorter neck (~1 cm). The segments increase in width up to 7-7.5 mm at maturity. The eggs are mostly rectangular and smaller than those of *M. expansa* and *M. benedeni*. These morphological features suggest it is a new species within *Moniezia*.

Another cestode, found in an 11-month-old lamb, measured 110 cm in length with a thick strobila. Unlike *M. expansa* and *M. benedeni*, segmentation starts 8 cm from the scolex, and the segments rapidly increase in width. Fully mature proglottids at 80-100 cm measure 10-12 mm in width. These characteristics distinguish it from known species.

During the first half of the summer of 2024, intermittent rainfall and temperature drops supported the activity of oribatid mites, leading to continued monieziosis

transmission. By late July 2024, temperatures rose sharply to +44-46°C, with even higher values in the southern regions. August remained dry and hot, and similar conditions persisted during the first and third ten-day periods of September. Until the third ten-day period of October, the weather remained unfavorable for monieziosis transmission, limiting infestation among animals. However, after October 22, rainfall resumed, and temperatures dropped, leading to a month of fluctuating weather conditions and increased humidity.

On November 19, rainfall resulted in significant soil evaporation. Rainfall continued intermittently until December 16, occasionally turning to snow, but quickly melting due to subsequent rainfall. Daytime temperatures ranged between 10-12°C and 16-18°C, fostering grass growth in pastures and increasing the risk of monieziosis infestation among sheep and lambs.

From December 16 onward, daytime temperatures dropped to 0 to +5°C, while nighttime temperatures fell to -2 to -10°C, accompanied by frequent snowfall. These conditions persisted through the first and second ten-day periods of January 2024. By late January, snowfall became more consistent, followed by severe cold spells in February, with temperatures dropping to -15 to -17°C.

At the end of February and the beginning of March, temperatures rose to 8-13°C during the day, with frequent rainfall. Due to these unseasonably cool conditions, tree budding and leaf growth were delayed by approximately three weeks in 2024. Consequently, the emergence of fresh pasture grass was nearly one month behind schedule compared to previous years. From March 13 to 23, almost daily rainfall occurred, culminating in snowfall on March 23, with temperatures fluctuating between +10 to +15°C and occasionally dipping to +3 to +5°C. Temperatures began rising again from March 29 onward.

Based on these observations, the highest monieziosis infestation rates in 2024 occurred in late March. Consequently, peak mortality from intestinal cestodes, including monieziosis, in sheep was recorded in the second half of April and the first half of May.

Observations in the Samarkand region indicate that monieziosis infestation occurs year-round. During the summer, sheep infestations are recorded in irrigated and foothill areas where soil mite activity remains significant in humid biotopes. In spring and autumn, increased humidity and rising temperatures enhance infestation rates for sheep, goats, and cattle by facilitating oribatid mite reproduction and oncosphere development.

Winter transmission of monieziosis occurs when temperatures remain above 12°C and humidity levels are adequate, particularly in pastures covered with fresh green grass. Based on hydro-meteorological and phenological observations, it is possible to predict increased monieziosis transmission in specific climatic and geographical zones, enabling targeted prevention efforts.

Severe infestation of animals with monieziosis occurs under favorable abiotic environmental factors, including adequate humidity, temperature, and the presence of green pastures. However, its spread is also influenced by anthropogenic factors.

Findings: Monieziosis and thysanieziosis are widespread, with infestation extent and intensity varying by region and seasonal factors.

M. expansa and *M. benedeni* infestation rates differ across climate zones: 8.6% in Tashkent, 17.1% in Bukhara, and 23.5% in Surkhandarya.

The highest infestation rates (25.3%) were found in breeding farms, while moderate levels (14.2%) occurred in peasant and farmer households, and minimal levels (7.2%) were recorded in desert and pasture areas.

Seasonal changes significantly impacted parasite distribution, with peak infestation occurring in spring and autumn, and reduced rates in summer and winter.

Environmental factors (temperature, humidity, and precipitation) directly influenced monieziosis prevalence, with higher infestation rates in wet and humid seasons and lower rates in dry conditions.

New cestode species were identified, morphologically distinct from *M. expansa* and *M. benedeni*.

Discussion: Comparing the findings with previous studies revealed variations in intestinal cestode distribution. While prior research indicated differing spread patterns for *M. expansa* and *M. benedeni*, this study confirmed their infestation levels correlate with seasonal changes.

The impact of seasonal fluctuations on parasite transmission was evident. Increased oribatid mite activity in spring and autumn heightened sheep infestation risks, whereas infestation rates declined in summer and winter.

Newly discovered parasite species exhibited morphological differences from *M. expansa* and *M. benedeni*, necessitating further epizootiological research on intestinal cestodes in sheep.

Diagnostic methods analysis showed that both the Fyulliborn technique and helminthological dissection yielded effective results. The Fyulliborn method provided rapid and accurate results, while helminthological dissection proved more effective for identifying new parasite species.

Conclusion: Findings indicate that intestinal cestodes, particularly monieziosis and thysanieziosis, are prevalent in Uzbekistan. *M. expansa* and *M. benedeni* dominate epizootiologically, with infestation rates varying by region and seasonal conditions.

The morphological traits of newly identified cestode species highlight the necessity for further detailed studies. These findings serve as a scientific foundation for developing effective veterinary strategies, improving diagnostic methods, and analyzing environmental impacts on disease transmission.

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