BIO Web of Conferences **140**, 03020 (2024) https://doi.org/10.1051/bioconf/202414003020
SDEA2024

Identification of prevalence and degree of infection of paramphistomatosis of cattle according to the age: case of districts of the Republic of Karakalpakstan

Aynura Bazarbayeva* and *Azat* Kalenderov

Samarkand State University of Veterinary Medicine, Animal Husbandry and Biotechnology, Nukus Branch, Nukus, Uzbekistan

Abstract. According to our research, the ecological situation in Karakalpakstan has gotten worse recently. This includes the Aral Sea tragedy, the drying up of many lakes due to droughts, the loss of most of the natural gastrotilax foci, as well as other paramphistomata like P.ichikawae and rare cases of L.scotiae. The purpose of this study was to assess the prevalence of paramphistomatosis in cattle across different districts of the Republic of Karakalpakstan and to evaluate the infection's impact based on the animals' age. Research was conducted in the districts of Tortkul, Amudarya, Ellikkala, and Beruni. Methods included helmintoovoscopic examination of dung samples from 478 cattle and comprehensive helminthological dissection of 40 cattle. Results indicated an average infection rate of 3.9%, with the highest prevalence in Amudarya district (5.5%) and the lowest in Tortkul district (3.3%). Age-wise, infection rates were 3.5% in calves (6-12 months), 3.7% in young cattle (1-2 years), and 2.5% in older cattle (2 years and older). The study concluded that paramphistomatosis is a significant issue in Karakalpakstan, with notable age and regional variations. The Amudarya district, with more natural freshwater mollusc biotopes, exhibited a higher prevalence, suggesting a correlation between mollusc populations and infection rates.

1 Introduction

Paramphistomatoses stomach of cattle, sheep-goats and other species of ruminants – in the intestinal system (stomach, duodenum, large stomach, stomach, partial stomach), Paramphistomata Skrjabin et Schulz, 1937 Fischoeder Paramphistomatidae of the youngest order, Calicophoron Nasmark of the 1901 family, 1937 and Liorchis Velichko, 1960 descendants and Gastrothylacidae Stiles et Goldberger, Gastrothylax Poirler of the 1910 family, a disease caused by parasitizing of the trematoda of the 1883 generation being clinically, the animal's weight loss, anemia, appetite disorders, depletion, digestive organ dysfunction, it is characterized by the formation of tumors in different parts of the body,

* Corresponding author: ayunabazarbaeva91@gmail.com

lagging animals behind growth-development, a sharp decrease in productivity and the death of strongly damaged calves [1-5].

However, young trematodes move backward to continue their maturation, sexual reproduction, and parasitic lifestyle in animals spared from the effects of acute discharge. They migrate to the anterior compartment of the digestive organs (the large abdomen and the partial thoracic abdomen), where they parasitize the mucous membranes of the host animals. Adult parasites that have not had enough time to fully develop to this stage can cause the disease to progress chronically. If the parasite load in this stream is excessively high, the illness is regarded as highly dangerous. The primary host of the parasite, a biohelminth, is ruminants; the intermediate host is a family of freshwater mollusks called Planorbidae. The prepatent stage lasts for 3.5–4 months, the invasive larva is adolescents, and the parasitism phase lasts for 2-3 years.

According to the aforementioned information, 5 trematode species—P. ichikawai, C. calicophorum, C.erschowi, L. scotiae, and G. crumenifer - are known to be associated with the disorders paramphistomatosis, calicophorosis, liorhosis, and gastrotilyaxosis. The common names paramphistamoses K.I. Scriabin and R.S. are used for a variety of disorders.corresponds to Schulz's nomenclature, or the order in which helminths are named.

Unlike other trematodes, the causative agents of paramphistamoses are trematodes that belong to the families Paramphistomatidae and Gastrothylacidae. These trematodes precisely parasitize the bodies of cattle and have unique body structures and other physical morphological traits.

In particular, the paramphistomata's body is formed like a pear, ovoid, cylindrical, and other shapes, and their layers of skin and muscle are well developed. The body length of Calicophoron and Liorchis ranges from 5 to 20 mm, and it thickens from front to rear. The gastrotelax body is elongated in form. There is only one sucker on the back of each of them.

Invasive diseases are frequent among domestic animals, poultry, and livestock in veterinary practice. Current therapies include prevention, treatment, and fightback, as well as maintaining the health of unhealthy farms and shielding people from zooanthroponoses brought on by numerous parasites [6-10]. In light of this, we carried out our investigation into the frequency of paramphistomatoses and the age-dependent assessment of damage severity in animals. It is stated that the paramphistomatoses found in the Republic of Karakalpakstan are found in watery environments. In these areas, practically everybody of water—lakes, springs, irrigation wells, rice fields—serves as a biotope for the intermediate hosts—mollusks in the Planorbidae family—that harbor the viruses. These molluscs are infested with the larvae of various paramphistomatosis pathogens from diseased animals.

According to an examination of academic publications devoted to the study of gastrointestinal trematodes, or paramphistomatosis, this condition is among the most prevalent and deadly helminth infections worldwide. The scientific community is aware of over 100 of their species [11-14]. Certain parts of our republic have not received any investigation at all, despite the fact that scientists have examined them and established their position in the systematics of helminths.

Our study is to determine the degree of damage corresponding to the age of the animal and the incidence of paramphistomatosis in cattle in selected districts of the Republic of Karakalpakstan.

2 Methods of the research

Research topics include cattle farms in different Republic of Karakalpakstan districts, water sources within the farms, naturally occurring freshwater mollusc biotopes, farm animals of varying ages, dung samples collected from the animals, livers from cattle that were forcedly killed due to illness, and organized organs like the stomach and intestines.

Our research conducted in the Republic of Karakalpakstan was conducted in Tortkul, Amudarya, Ellikkala and Beruni districts of the Republic.

The nature, soil structure, climate, soil salinity, and water supply of the researched regions and districts are characterized by their own characteristics, and these factors affect the distribution of helminths, including paramphistomata, and the epizootology of the diseases they cause.

he researches were carried out mainly by the method of helmintoovoscopy, which is accepted in helminthology, and the method of complete helminthological dissection of internal organs of animals - udder, duodenum, large and small stomachs of K.I. Skryabin (1928).

The procedure for sequentially washing dung samples was modified as follows: instead of using regular Petri item bottles as advised, a clear precipitate that was left over after the sequential washing process was completed was examined under a microscope in a special 8 by 15 cm glass chamber with a circumference limited to paraffin + conifol.

The chyme, duodenum, and mucous membranes of the animal are lightly scraped in a separate container, repeatedly cleaned, and the obtained material is transferred to a Petri dish using a magnifying glass, or in some cases, MBS-1, in order to maximally find and identify paramphistomata in the young, larval stage. We used a microscope to make sure. This task enables the identification and counting of extremely immature paramphistomata larvae, up to 1 mm in size, at the beginning of the preimaginal development stage. The identification of adult paramphistomata species was accomplished through standard processing of the animal's big and net bellies.

A total of 478 head of cattle were examined by means of helmintoovoscopic, i.e. sedimentation-based serial washing of dung samples. 120 of them belong to Tortkul district, 110 to Amudarya district, 132 to Ellikkala district, and 116 to Beruni district.

This method was used to check the extent of paramphistomatosis in cattle of different ages in the above four districts.

Furthermore, an investigation was carried out to ascertain the extensive infection (IZ) of cattle containing the pathogens responsible for paramphistomatous illness. In this study, 40 cattle heads from the four districts mentioned above—ten from each district—were dissected using a process known as comprehensive helminthological dissection, which involved removing the stomach, duodenum, large, and small stomachs, among other organs. The total number of paramphistomata, the number of individual species, the species composition, and the lowest, maximum, and average amounts of each were all quantified and documented from the helminthological material that was obtained from them.

In our study, we used K. I. Skryabin's TGI approach to analyze the gastrointestinal tracts of 40 cow heads from the four regions mentioned above in order to identify the genera and species to which the cattle paramphistomata belong. The helminths under examination underwent specific treatment, macroscopical examination, and microscopic examination. In this instance, the helminthological material—paramphistomates—was gathered in designated containers and kept in a particular solution (Berbagallo liquid, which is a mixture of 0.89% sodium chloride and 3% formalin solution). The paramphistomates were then arranged in different Petri dishes according to their respective types.

3 Results

Each detected type of paramphistomata is tagged and placed in its own container at the conclusion of the investigation. The date, day, month, year, address, owner of the cattle, breed, age, and sex of the cattle under examination are all listed on the labels. Other information includes the type of helminths, their quantity, and the cattle's developmental stage (juveniles and adults). Table 3 presents the results of the investigation.

The study's findings showed that paramphistomates were present in 3.3% of cattle in the Tortkul area, 5.5% in the Amudaryo district, 3.8% in the Ellikkala district, and 3.4% in the Beruni district when they underwent helmintoovoscopic examination. Thus, an average of 16% of cattle in the aforementioned four areas had paramphistomatosis, based on the results of helminthoscopy (Table 1).

Table 1. Distribution of cattle paramphistomatosis in some districts of the Republic of Karakalpakstan (results of helmintoovoscopic examination)

Districts	Checked cattle head count	Extens damage	
		head	percentage
Tortkul	120	4	3.3
Amudaryo	110	6	5.5
Ellikqala	132	5	3.8
Beruniy	116	4	3.4
Total	478	19	16

Consequently, 4 of the 120 cattle examined in the Tortkul district were found to be extensively infected with the paramystomatosis causative agent; six of the 110 cattle in the Amudaryo district were found to be extensively infected with the causative agent; five of the 132 cattle examined in the Ellikkala district were found to be extensively infected with the causative agent; and four of the 116 cattle examined in the Beruniy district were found to be extensively infected with the causative agent. It is evident that of four districts, the Amudarya district had a greater prevalence of the paramphistomatosis-causing agents than the other three districts.

Variations in paramphistomatosis according to animal age, as determined by helmintoovoscopy results: 3 heads out of 80 heads of cattle ranging in age from 6 to 12 years old that were examined in the four districts where the study was conducted had extensive infection with their causative agents (EZ), or 3.5%; 3 heads out of 80 heads ranging in age from 1 to 2 years old that were examined had extensive infection with their causative agent (EZ), or 3.7%; and 2 heads out of 79 cattle of older age that had their causative agent examined revealed that the extent of damage (EZ) with shooters is 2 heads, or 2.5%. Table 2 displays the findings of the investigation.

Table 2. Infection of cattle of different ages with paramphistomatosis in some districts of the Republic of Karakalpakstan (results of helmintoovoscopic examination)

Cattle groups by age	Checked cattle head count	Extens damage	
		head	percentage
Calves (6-12 months)	85	3	3.5
Young cattle (1-2 years old)	80	3	3.7
Adult cattle (age 2 and older)	79	2	2.5
Total	244	8	9.7

Therefore, the total extent of damage to paramphistomatous infections in 6–12 month-old calves, 1-2 year-old cattle, and 2-year-old and older animals in the investigated regions was 9.7%.

The results of a study done on 40 cattle heads in four regions to identify the genera and species that cattle paramphistomata belong to are displayed in the following table.

Table 3. In some districts of the Republic of Karakalpakstan, cattle are extensively infected with various paramphistomates (P.ichikawae, L.scotiae) (according to the results of stomach-intestinal Complete helminthological cracking)

Districts	Checked cattle head count	Common damage (P.ichikawae, L.scotiae)				
		EZ		IZ		
		head	percentage	min	Max	Average
To'rtkul	10	1	10	59	826	413
Amudaryo	10	2	20	101	1010	505
Ellikqala	10	1	10	71	568	284
Beruniy	10	1	10	91	1092	546
Overall	40	5	50	322	3496	1748

According to the results of a study conducted using the helminthological method in districts where cattle were infested with several paramphistomates, Paramphistomata (Szidat, 1936) was identified to parasitize two species of the 1937 junior family, Skrjabin et Schulz. These include the trematodes of the species Paramphistomum ichikawai Fukui, 1922, the Paraphistomatidae Fischoeder, and the Liorchis scotiae of the family 1901 (Willmott, 1950).

According to the research results, 5 out of 40 cattle, or 50% of the total, had substantial paramphistomatosis infection when their relevant organs were investigated using the helminthological approach. The districts reported that this occurred in the following ways: n Tortkul district, 1 head of cattle was extensively infected (EZ), 10%, the number of parasites according to IZ was a minimum of 59 copies, a maximum of 826 copies, an average of 413 copies, in Amudarya district, 2 cattle were extensively infected (EZ) is 20%, the number of parasites according to IZ is minimum 101 copies, maximum 1010 copies, average 505 copies, 1 head of cattle is extensively infected (EZ) in Ellikkala district, 10%, according to IZ the number of parasites is minimum 71 copies, maximum 568 copies, average 284 copies, and in Beruni district 1 head of cattle is extensively infected (EZ), 10%, the number of parasites according to IZ is minimum 91 copies, maximum 1092 copies, average 546 copies.

The table indicates that the paramphistomatous disease-causing agents, P.ichikawae and L. scotiae, are infrequent in the Republic of Karakalpakstan.

4 Conclusion

1. P. ichikawae and L. scotiae were found to meet an average of 3.9% in the work, which examined the decline in the ecological situation in the Republic of Karakalpakstan's territory, including the loss of the majority of the natural foci of gastrotilax as a result of the drying up of many Aral Sea lakes due to drought.

2. In the conditions of the Republic of Karakalpakstan, the prevalence of paramphistomatous disease in cattle and the degree of damage according to the age of the animal are 3.5% in calves (6-12 months old), 3.7% in young cattle (1-2 years old), and 3.7% in older cattle (2 young and older) 2.5% has been proven in studies.

3. Research on the prevalence of paramphistomatous illnesses in cattle throughout the Republic of Karakalpakstan's districts revealed that it was 3.3% in the Tortkul district, 5.5% in the Amudarya district, 3.8% in the Ellikqla district, and 3.4% in the Beruni district. Studies have shown that the Amudarya district has a larger frequency of natural biotopes of freshwater molluscs than the other districts. These molluscs are the intermediate hosts of paramphistomatosis.

References

1. B.S. Salimov, A.S. Daminov and K.K. Urokov, *Trematodoses of Farm Animals and Poultry Manual* (Samarkand, 2016) 219.
2. Sh.D. Avezimbetov, Bioecological and epizootological characteristics of cattle and sheep trematodes of the Republic of Karakalpakstan *Dissertation paper* (Samarkand, Samarkand Agricultural Institute, 2007) 157.
3. B. Khoshimov and B.S. Salimov, Zooveterinary, **4,** 20 (2009)
4. B.S. Salimov, Kh.E. Otaboev and B. Khashimov, Vet. Biotechnol. Nat. Acad. Agr. Sci. Ukraine Inst. Vet. Med. Bull., **22,** 530-3 (2013)
5. E.B. Shakarboev, F.A. Akramova and A.A. Azimov, *Trematodes: Parasites of Vertebrates in Uzbekistan* (Tashkent: Chinor ENK, 2012)
6. E. Ergashev and T. Abdurakhmanov, *Helminth Diseases of Cattle* (Tashkent, 1992)
7. M.A. Sultanov, D.A. Azimov, V.I. Gekhtin and P.A. Muminov, *Helminth of Domestic Mammals of Uzbekistan* (Tashkent: FAN, 1975)
8. A.S. Daminov, B. Khoshimov and K. Orokov, Zoovet. J., **12,** 23-4 (2008)
9. P.S. Hakberdiyev and Sh.Kh. Kurbanov, *Practical and Laboratory Training in Parasitology Manual* (Tashkent, 2015)
10. B. Bakirov et al, *Animal Diseases Information* (Samarkand, 2017) 486-487.
11. Sh.M. Ruziev, Epizootology of gastrotelaxosis in cattle and development of measures to combat it in the conditions of the Republic of Karakalpakstan *Dissertation paper* (SamKHI, Samarkand, 1970) 20.
12. D.A. Azimov et al., *Recommendations on Measures to Combat Trematodosis of Farm Animals and Poultry* (Tashkent, 2006) 5-45.
13. D.A. Azimov, S. Dadaev, F.D. Akramova and K.A. Saparov, *Helminths in Uzbekistan* (Tashkent: FAN, 2015) 222.
14. M.T. Kaypanov, Seasonal dynamics of cattle helminthosis in the Republic of Karakalpakstan, *Proceedings of the Scientific-Practical Conference "Scientific Achievements and Prospects for Agricultural Development* (Samarkand, 2005) 134-135.