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UDC 619:616-094 **Research article**

Intestinal Helminth Infections in Small Ruminants: Prevalence in Northern Kazakhstan and a New Treatment Scheme

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Abstract

Background and Aim. Gastrointestinal helminth infections significantly reduce ruminant productivity. This study aimed to determine the prevalence and assess the efficacy of a new treatment regimen against sheep intestinal cestodes and nematodes in Northern Kazakhstan.

Materials and Methods. In 2024, to identify the species and infestation level of parasites, the digestive tracts of 29 sheep, aged 5-9 months, were examined by helminthological dissection, and 200 faecal samples were analysed using the Fülleborn and McMaster methods at two farms in the Tayinsha District. To test the treatment scheme, two groups (control and experimental) were formed, each containing 15 sheep. All animals had mixed infection with strongyles and *Moniezia* spp. Initially, each sheep was treated with Alvet (Nita-Farm, Russia) at the recommended dosage. Additionally, each sheep in the experimental group received 3 g of the phytobiotic Sangrovit Extra (Phytobiotics Futterzusatzstoffe, Germany) daily for 8 weeks. The treatment efficacy was measured on days 30, 60, 90, and 120 after deworming to assess the prevalence and infestation intensity of helminths.

Results. Parasitological research showed that 93.1% of sheep were infected with *Trichostrongylidae* spp., *Moniezia expansa, Trichuris ovis* and *Skrjabinema ovis*. Mixed infestations of 2 to 4 species were found in 68.8% of the sheep. The infection rates of Moniezia spp. and strongyles were 13.3% and 26.7%, respectively, 4 months after deworming in the experimental group. In comparison, these rates were 3.5 and 2.5 times lower, respectively, than in the control group.

Conclusion. Using Sangrovit Extra effectively inhibited small ruminant intestinal helminth infestation.

Keywords: Northern Kazakhstan; sheep; intestinal helminths; prevalence; infestation intensity; treatment regimen; efficacy.

Introduction

The Republic of Kazakhstan is the largest agrarian country in Central Asia. According to the National Bureau of Statistics data in February 2025, the country has a population of 18,528,336 sheep and 1.682.335 goats [1]. Particular attention should be given to sheep farming when addressing the issue of meat supply, as raising young sheep is considerably more manageable than other forms of livestock production.

Higher-quality lamb meat can be achieved by ensuring animal welfare and implementing measures to protect against economically significant infectious and parasitic diseases. Special attention should be paid to parasite infections of sheep, particularly gastrointestinal helminthiases. These diseases result in significant losses due to reduced productivity, deteriorated animal welfare, and increased treatment and prevention costs. Gastrointestinal helminths, such as species of *Haemonchus, Trichostrongylus, Moniezia, Strongyloides* and *Trichuris* genera, pose a particular threat to husbandry. These parasites are widely distributed among small ruminants worldwide, including countries with nomadic patterns similar to those in Kazakhstan [2]. For example, helminth infections are highly prevalent in sheep populations in Grenada, China, and Central Anatolia, with prevalence from 72% to 100% [3, 4].

Among helminth infections, strongyles infestations cause diseases that lead to severe anaemia in young animals. Anoplocephalata infestations may also act as a primary factor in infectious enterotoxaemia endemic outbreaks in small ruminant herds. The growing resistance of helminths to traditional anthelmintic drugs, such as albendazole and ivermectin, further complicates the issue and necessitates comprehensive treatment approaches. These strategies include the development of targeted programmes aimed at enhancing the resistance of animals to parasitic infections, beginning with the creation of new pharmaceutical treatments [5].

In this context, studying the epidemiology and control of helminth infections in Kazakhstan is strategically important because the seasonal summer pasturing and winter housing system creates specific risks for parasite transmission and potential anthelmintic resistance, which negatively impacts sheep health, welfare and economic productivity.

Such research is critical not only for improving livestock productivity and preserving animal health but also for supporting the sustainable development of the agricultural sector.

The objective of this study was to determine the prevalence of intestinal helminthiases among small ruminants in the Tayinsha District of North Kazakhstan and to evaluate a novel therapeutic model for treating mixed infestations with cestodes and nematodes.

Materials and Methods

The study was conducted in 2024 at the Amanat and Karatomar peasant farms located in the Tayinsha District. Here, the helminthological post-mortem examination of the gastrointestinal tracts from 29 slaughtered indigenous-breed sheep (14 animals from Amanat and 15 from Karatomar farms) aged between 5 and 9 months was carried out in accordance with *K.I. Skryabin* [6] Figure 1).

Figure 1 – Helminthological post-mortem examination of the sheep digestive system

To determine the actual infestation level in the sheep population, faecal samples were collected from 94 sheep at Amanat Farm and from 106 sheep at Karatomar Farm. These samples were analysed at the Professor Kadyrov Parasitology Laboratory of Seifullin Kazakh Agrotechnical Research University using the Fuelleborn and McMaster methods.

Next, the newly proposed treatment regimen for mixed infections of sheep caused by nematodes and cestodes was tested under experimental conditions. For this experiment, 30 animals co-infected with strongyles and *Moniezia* spp. were selected based on their identical pre-treatment infection rates and and randomly assigned to two groups of 15 animals.

These animals were subjected to the treatment scheme outlined in Table 1.

Table 1 – Testing trial of new treatment scheme

Group	Days 1 to 9		Day 10		11 days to 8 weeks	
	Feeding scheme	Dosage	Deworming	Dosage	Feeding scheme	Dosage
Control, n=15	-	-	Alvet**	50 mg/kg	-	-
Experimental, n=15	Sangrovit Extra*	3 g/a lamb	Alvet**	50 mg/kg	Sangrovit Extra*	3 g/a lamb

* – administered by mixing with feed, daily, in the morning, using the group method.
**– administered individually *per os* in suspension.

At both farms, the animals received a single treatment with Alvet (Nita-Farm, Russia), administered according to the dosage and methodology recommended by the manufacturer. The sheep from Karatomar Farm (control group) underwent deworming only. In contrast, the sheep from Amanat Farm (experimental group) were fed the phytobiotic Sangrovit Extra (Phytobiotics Futterzusatzstoffe, Germany) for 8 weeks, in conjunction with the deworming treatment (Table 1). During the experimental period, animals from both groups were pastured at the common pasture and received identical concentrated feed.

The treatment scheme efficacy was assessed on the 30th, 60th, 90th, and 120th days, in accordance with the guidance "Efficacy of Anthelmintics: General Requirements" (International Cooperation on Harmonization of Technical Requirements for Registration of Veterinary Medical Products, 2022) [7].

Statistical processing of the obtained results was performed using Excel (Microsoft Corp, Redmond, WA, USA). Results were considered statistically significant when $p < 0.05$.

Results and Discussion

The comprehensive post-mortem helminthological examination data are presented in Tables 2 and 3. The level of gastrointestinal helminth infestation among small ruminants in both farms exhibited a similar pattern.

Table 2 – Intestinal Helminths Identified in Small Ruminants

Species	Amanat Farm, n=14			Karatomar Farm, n=15		
	Number	Prevalence, %	Intensity (M±m)	Number	Prevalence, %	Intensity (M±m)
Trichostrongylidae spp.	12	85.7	450±50	13	86.6	400±100
Trichuris ovis	7	50.0	50±50	11	73.3	100±50
Skrjabinema ovis	1	7.1	50	3	20.0	100.0
Moniezia expansa	6	42.8	4.5±2.5	9	60.0	4.5±1.6

The species composition of the intestinal microbiome included such helminths as *Trichostrongylidae* spp., *Moniezia expansa*, *Trichuris ovis*, and *Skrjabinema ovis* (Table 2, Figures 2-6). Overall, the prevalence of intestinal helminths reached 93.1%. The highest infestation intensity was observed for *Trichostrongylidae* spp. In particular, sheep from Amanat Farm exhibited a mean intensity of 450 ± 50 strongyles, whereas those from Karatomar Farm had a mean intensity of 400 ± 100 strongyles. The infection intensity of other helminths was relatively low.

According to these results, the helminths in the sheep gastrointestinal tracts were detected as either single infestations or as part of mixed infestations involving from two to four species. Most of the examined sheep were found to have mixed helminth infections caused by *Moniezia* spp. and strongyles. The most common mixed infection, comprising *Trichostrongylidae* spp., *M. expans*a, and *T. ovis*, was detected in 24.1% of the animals. A mixed infection consisting solely of *M. expansa* and *Trichostrongylidae* spp. was identified in 17.2% of the examined sheep. *Trichostrongylidae* spp. and *T. ovis*. Single infections were detected in 20.7% of the sheep (Table 3). In total, mixed helminth infections were identified in 68.8% of the animals.

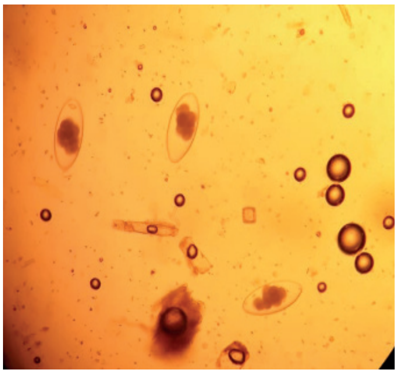

Figure 2 – *Nematodirus* spp. eggs, ×40

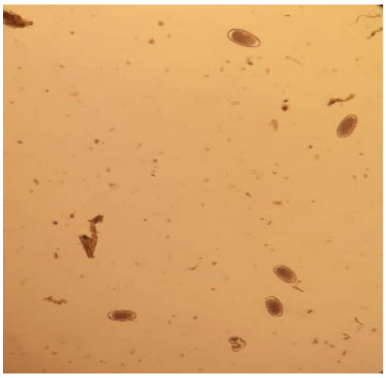

Figure 3 –Trichostrongylidae spp. eggs, ×40

Figure 4 – *Moniezia expansa*

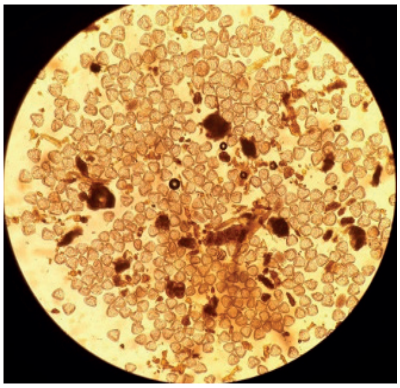

Figure 5 – *Moniezia* eggs ×40

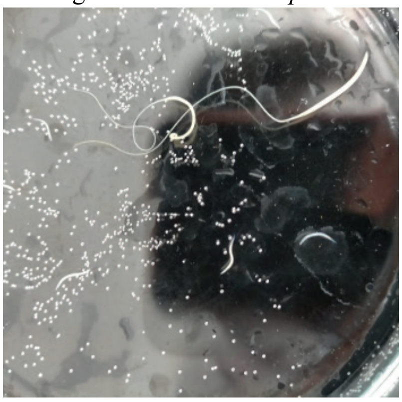

Figure 6 – *Trichuris ovis*

Figure 7 – *Trichuris ovis,* eggs×40

Table 3 – Helminth associations identified in the intestinal biocenosis of sheep (n=29)

Association Members	Number of infected animals	Proportion (%)
Single infestations:		
Trichostrongylidae spp.	4	13.8
T. ovis	2	6.9
Associations with two members:		
Trichostrongylidae spp. + *T. ovis*	4	13.8
Trichostrongylidae spp. + *M. expansa*	5	17.2
Associations with three members:		
Trichostrongylidae spp. + *M. expansa* + *T. ovis*	7	24.1
Trichostrongylidae spp. + *T. ovis* + *S. ovis*	1	3.44
An association with four members:		
Trichostrongylidae spp. + *M. expansa* + *T. ovis* + *S. ovis*	3	10.3

During the faecal sample examination, the eggs of *Moniezia spp.* and strongyles were detected in 88.0% of the sheep. The prevalence of the *Trichostrongylidae* family species was 78%. Among the strongyles, *Nematodirus* spp. showed a prevalence of 42.0%. Sole infestations caused by *Trichostrongylidae* spp. and *T. ovis* were identified in 5.5% and 2.0% of the animals, respectively. The dual infestation involving *Trichostrongylidae* spp. and *T. ovis* was observed in 11.5% of the sheep. Mixed infestations with *Trichostrongylidae* spp. and *Moniezia* spp., as well as with *T. ovis* and *Moniezia* spp., were recorded in 6.5% of the sheep. The most frequent mixed triple infestation, composed of *Trichostrongylidae* spp., *M. expansa*, and *T. ovi*s, was found in 26.3% of the sheep. A quadruple mixed infestation caused by *Trichostrongylidae* spp., *Moniezia* spp., *T. ovis*, and *S. ovis* was detected in 3.5% of the animals. Overall, mixed infestations caused by strongyles and Anoplocephalata were highly prevalent, with a prevalence of 42.8%.

The treatment regimens tested reduced and stabilised the parasitic burden in both groups of sheep. As a result of the treatment, the infestation dynamics in the experimental group significantly decreased over time (Table 4).

Table 4 – Efficacy of treatment schemes for mixed infestation of sheep with Moniezia spp. and strongyles

Infection Indicators	Experimental Days			
	30	60	90	120
Control Group, *n = 15*				
Moniezia spp.:				
Prevalence (%)	0	2 (13.3)	4 (26.7)	7 (46.7)
Trichostrongylidae spp.:				
Prevalence (%)	0	3 (20.0)	7 (46.7)	10 (66.7)
Intensity of infestation, number of eggs for 1 g faeces (*M*±*m*)	0	100±25	300±15	400±25*
Experimental Group, *n = 15*				
Moniezia spp.:				
Prevalence (%)	0	0	1 (6.7)	2 (13.3)
Trichostrongylidae spp.:				
Prevalence (%)	0	1 (6.7)	2 (13.3)	4 (26.7)
Intensity of infestation, number of eggs for 1 g faeces (*M*±*m*)	0	50	100	150±25*

* - $p < 0.05$

Four months after deworming, the prevalence of *Moniezia* spp. in the experimental group of sheep was 13.3%, and for *Trichostrongylidae* spp., it reached 26.7%. These figures were 3.5 and 2.5 times lower than those of the control group, respectively. A similar trend was observed in the intensity indicators of *Trichostrongylidae* spp. infestation. Specifically, the quantitative indicator of strongyles egg contamination in the control group of sheep was 2.6 times higher than that of the experimental group (Table 4).

The results of the study indicate a high prevalence of intestinal helminthiases in sheep of the North Kazakhstan region. Helminths of several species were detected in the gastrointestinal tract of 93.1% of slaughtered sheep. These findings are consistent with results reported in other countries. For instance, in Grenada, the prevalence of intestinal parasites among small ruminants ranges between 85% and 95%. Similarly, in the Hinggan region of China, the extent of gastrointestinal helminth infections in sheep has been recorded at 89% [3, 4].

In our study, cestodes belonging to the species *Moniezia expansa* were frequently identified. These findings are consistent with previous research conducted in Central Anatolia (Turkey), where *Moniezia* spp. infections have been reported to be widespread among sheep and have a significant negative impact on livestock productivity [5].

The increasing resistance of helminths to conventional anthelmintic drugs has become a pressing issue in many countries. For example, resistance to albendazole and ivermectin has been frequently observed [5]. Similarly, in this study, the control group that was treated solely with the conventional drug Alvet exhibited a high reinfection rate (46.7%) within 4 months, indicating the limited efficacy of conventional deworming practices.

In the experimental group, the extended use of the phytobiotic Sangrovit Extra significantly reduced the parasitic load. This phytobiotic is a plant-based feed additive designed to enhance the productivity of livestock. Its active ingredients are alkaloids extracted from the plant *Macleaya cordata*. Sangrovit Extra possesses a broad therapeutic spectrum. It exhibits anti-inflammatory properties, improves appetite and digestion in animals, increases the bioavailability of amino acids, and functions as an anti-stress agent [8].

The results obtained are consistent with international findings that demonstrate the role of phytobiotics in preventing parasitic infections. For example, studies in the Caribbean region have shown that the use of phytobiotics enhances the natural resistance of sheep and significantly improves their resilience against helminths [9]. At the same time, studies conducted in Kazakhstan have also highlighted the effectiveness of an integrated approach that combines anthelmintics with immunomodulators in combating helminth infections in small ruminants [10].

A genetic study of the Anatolian Merino sheep infected with *Moniezia* spp. has indicated that immune tolerance to helminths may be genetically regulated. This highlights the need to enhance research efforts in Kazakhstan focused on selecting and breeding sheep with traits that confer resistance to helminth infections [5].

Overall, the findings of this study confirm the importance of a comprehensive approach to treating gastrointestinal helminth infections, including the use of natural phytobiotics. The proposed treatment method can serve as an effective tool for the integrated management of parasitic diseases and improving the welfare of sheep. This approach has the potential to extend the reinfection interval, reduce veterinary expenses, and enhance the overall economic efficiency of small ruminant farming.

Conclusion

In North Kazakhstan farms, the intestinal helminth fauna of sheep consists of *Trichostrongylidae* spp., *Moniezia expansa, Trichuris ovis* and *Skrjabinema ovis*. The overall infection rate of small ruminants with intestinal helminths reaches 93.1%, with 68.8% of sheep experiencing mixed infections involving 2 to 4 species of nematodes and cestodes. The treatment scheme, which combines deworming with the phytobiotic Sangrovit Extra, reduces the prevalence of *Moniezia* spp. and *Trichostrongylidae* spp. infections by 2.5 and 3.5 times, respectively, within 4 months of treatment. This trial in which the bioactive plant additive was fed to animals infected with gastrointestinal nematodes and cestodes showed that treated animals had reduced nematode and cestode infection levels. Our results show that long feeding of Sangrovit Extra to sheep has beneficial effects on parasite burden and could be recommended to farmers for practice in controlling gastrointestinal parasite infections in Northern Kazakhstan.

Authors' Contributions

AU and AZh: The conceptualisation and design of the study, proofreading and final revision for the manuscript. BY, DS and AT: a literature review, analysis of the research results and drafting the manuscript. All authors have read and approved the final manuscript.

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