Journal of Advanced Zoology

ISSN: 0253-7214

*Volume **44** Issue **S-0 Year 2023** Page **1989:2002***

Species Composition and Distribution of Helminths in Cattle in the Landscapes of Uzbekistan

S.D. Dadayev

Tashkent State Pedagogical University named after Nizami, Tashkent, Uzbekistan

Email: s_dadaev@mail.ru.

Article History

Received: 13 June 2023
Revised: 12 September 2023
Accepted:21 September 2023

Abstract

The article highlights the fauna and landscape-geographical features of helminths of cattle in the conditions of Uzbekistan. Based on many years of our own research and analysis of literature data, 71 species of helminths were identified in cattle of Uzbekistan, of which 12 species belong to the class - Cestoda, 12 - to the class of Trematoda and 47 species to the class - Nematoda. Of the 71 species of helminths identified in cattle of the Republic, 1 species (Stephanofilaria assamensis) was noted by us for the first time in the CIS and 11 species (Moniezia alba, Trichocephalus globulosa, Bunostomum trigonocephalum, Camelostrongylus mentulatus, Cooperia punctate, C. pectinata, Grosspiculagia occidentalis, Nematodirus abnormalis, N. spathiger, Stephanofilaria assamensis, Thelazia skrjabini) in Uzbekistan.

Among the identified parasitic worms of cattle in Uzbekistan, 36 species develop in a direct way, i.e. they develop without the participation of intermediate hosts. The remaining 35 species of helminths develop with the participation of intermediate and additional hosts. Their intermediate and additional hosts are freshwater and land mollusks, grasshoppers, ants, diptera, oribatid mites, predatory mammals, and humans. Also, it was determined that of the 71 species of helminths Paramphistomum ichikawai, Taeniarhynchus saginatus, Trichocephalus globulosa, Aonchotheca bovis, Thelazia rhodesi, Th. gulosa, Th. skrjabini, Th. petrovi, Onchocerca lienalis, Stephanofilaria stilesi and S. assamensis parasitize only cattle.

Under the conditions of Uzbekistan, the total infection of cattle with helminths is 94.3%. At the same time, in some regions of Uzbekistan, infection of cattle with trematodes ranges from -34.0 to 66.6%, cestodes from 17.6 to 45.1% and nematodes from 70.0 to 93.5.

The widespread helminthiases of cattle that adversely affect their productivity are monieziosis, larval teniidosis, fascioliasis, paramphistomidiasis, trichuriasis, haemonchosis, parabronemosis, thelaziosis, stephanofilariasis and other helminthiases..

Keywords: *fauna, helminth, cestodes, trematodes, nematodes, factor, circulation, biocenosis, plain, foothill-mountain, prevention*

1. Introduction

Actuality of the topic. An increase in the number of livestock and an increase in the milk and meat productivity of animals is often hindered by various parasitic diseases, including helminthiases, which still continue to cause enormous economic damage to the national

economy of the country (they reduce the productivity of animals and often cause their death). In addition, some helminthiases (bovis cysticercosis, echinococcosis) are helminthoses and pose a constant danger of infecting people.

The most important condition for the successful fight against parasitic diseases is the use of a complex of biological, veterinary and zootechnical measures based on the current instructions, but taking into account the regional characteristics of the spread of certain invasions and the biology of pathogens.

Therefore, knowledge of the fauna and bioecological features of parasitic worms in specific regions is not only of deep theoretical interest, but is of great practical importance, being the basis for the development of measures to combat and prevent numerous parasitic diseases that drastically reduce the productivity of animals in the livestock sector.
The helminth fauna of productive animals, including cattle, is widespread in various countries and regions of the world. In the conditions of the former USSR, a lot of work has been done to establish the species composition of helminths of productive animals, including cattle [1,2,3,4,5,6,7,8,9,10,11,12,13,14 and etc].

These researchers established the species composition of helminths of productive animals, including cattle in certain geographical areas of Russia, the Caucasus, Central Asia and Kazakhstan, as well as the dynamics of their development depending on the age of the owner and the season of the year, and other issues related to treatment and prevention. activities. The results of these studies to some extent satisfied the needs of specialists of that period and contributed to the implementation of therapeutic and preventive measures available for veterinary practice. However, due to the economic reforms of recent years, global warming and a number of other factors, the helminth fauna, among other biological objects, continues to change in a number of regions.

In the conditions of Uzbekistan, many scientists also conducted studies on the study of fauna, distribution, ecology of helminths and epizootology of the main helminthiases in cattle [15,16,17,18,19,20,21,22,23,24,25,26,27 ,28,29,30 etc.].
Despite numerous studies and publications on the helminths of cattle in Uzbekistan (a significant part of which was collected by the author), these materials need additional analysis and generalization.
Based on this, the study of the fauna of helminths of cattle in various conditions of Uzbekistan is of great theoretical and practical importance.

The aim of the study. The purpose of this study is to summarize and analyze the results of our many years of research and literature data on the fauna, distribution and ecological features of helminths in cattle in various regions of Uzbekistan.

2. Materials And Research Methods

The present work is based on the materials of field and experimental studies conducted over many years (1978-2021) in the laboratory of parasitology of the Institute of Zoology of the Academy of Sciences of the Republic of Uzbekistan and at the Department of Zoology and Anatomy of the Tashkent State Pedagogical University named after Nizami.
The degree of infection of cattle with helminths was established by complete and incomplete helminthological dissections of animals, as well as their individual organs, according to the method of K.I. Scriabin [31]. More than 550 heads of cattle were examined by the method of complete helminthological dissections. In addition, to study the epizootology of the causative

agents of the main helminthiases by the method of complete and incomplete helminthological dissections, about 10615 sets of individual organs of cattle were also studied at meat processing plants and slaughter sites of various livestock farms of the republic.
To detect sexually mature stephanophilaria and their larvae, deep scrapings of the affected skin areas (350 samples) from cattle were made after hair removal using known methods [32].

In a number of specialized livestock farms and industrial complexes of the republic, the lifetime infection of cattle with cestodes, trematodes, and nematodes was established by the results of ovoscopic and larvoscopic examination of fecal samples using known methods [33]. At the same time, faeces from 1835 heads of cattle of different ages were studied.
Helminthological material from cattle was collected in five regions of Uzbekistan: North-Eastern (Tashkent, Syrdarya, Jizzakh regions), Eastern (Fergana, Andijan, Namangan), Central (Bukhara, Navoi regions), (Southern (Surkhandarya, Kashkadarya regions), Northwestern (Khorezm region, Republic of Karakalpakstan). At the same time, animals were studied at meat processing plants and slaughterhouses in Andijan, Namangan, Fergana, Samarkand, Jizzakh, Syrdarya, Tashkent, Bukhara, Navoi, Kashkadarya, Surkhandarya, Khorezm regions and Republic of Karakalpakstan The study of morphology and identification of parasites were carried out on temporary and permanent preparations in accordance with the determinants and descriptions given in the works of domestic and foreign researchers [34,35,36,37].

3. Results And Its Discussion

According to the results of our long-term research and analysis of literature data, 71 species of helminths were registered in cattle in the vast territory of Uzbekistan, of which 12 species belong to the class - Cestoda, 12 - to the class Trematoda and 47 species to the class - Nematoda (Table 1).

Table 1

Sjpecies of helminths	Cattle
Cestoda	
1. *Moniezia expansa* (Rudolphi, 1810)	+
2. *M. benedeni* (Moniez, 1879)	+
3. *M. autumnalia* Kuznetsov,1967	+
4. *M. alba* (Perroncito,1879)	+
5.*Avitellina centripunctata* (Rivolta,1874)	+
6. Thysaniezia giardi (Moniez, 1879)	+
7. *Taenia hvdatigena* (Pallas, 1766)(=*Cysticercus tenuicollis*)	+
8. *Taeniarhynchus saginatus (Goeze, 1782) larvae*	+
9. *Multiceps multiceps* (Leske, 1780) (=Coenurus cerebralis)	+
10. *M. skrjabini* (Popov, 1937) (= Coenurus skrjabini)	+
11. *Echinococcus granulosus* (Batsch, 1786) larvae	+
12. *Alveococcus multilocularis* (Leukart, 1863) larvae	+
Trematoda	
13. *Fasciola hepatica* L., 1758	+
14. *F. giganitica* (Cobbold, 1856)	+
15. *F. indica*Varma, 1953	+
16. *Dicrocoelium dendriticum*(Rudolphi, 1819)	+

17. *Eurytrema pancreaticum(*Jonson, 1889)	+
18. *E. coelomaticum* (Giard et Billet, 1891)	+
19. *Paramphistomum ichikawai*Fukui, 1922	+
20. *Calicophoron calicophorum*(Fisschoeder, 1901)	+
21. *C. erschowi*Davydova, 1959	+
22. Liorchis scotiae (Willmott, 1950)	+
23. *Gastrothylax cruminifer*(Creplin, 1847)	+
24. *Schistosoma turkestanicum* (Skrjabin, 1913)	+
Nematoda	
25. *Trichocephalus ovis*Abildgaard, 1795	+
26. *T. skrjabini*(Baskakov, 1924)	+
27. *T. globulosa* Linstow, 1901	+
28. *Aonchotheca bovis* (Scinyder, 1906)	+
29. *Strongyloides papillosus*(Wedl, 1856)	+
30. *Bunostomum trigonocephalum*(Rudolphi, 1808)	+
31. *B. phlebotomum*(Railliet, 1900)	+
32. *Chabertia ovina* (Fabricius, 1788)	+
33. *Oesophagostomum venulosum*(Rudolphi, 1809)	+
34. *O. columbianum*Curtice, 1890	+
35. *O. radiatum*(Rudolphi, 1808)	+
36. *O. asperum* (Railliet et Henry, 1909)	+
37. *Dictyocaulus viviparus*(Bloch, 1782)	+
38. *Trichostrongylus axei* (Cobbold, 1879)	+
39. *T. colubriformis*(Giles, 1892)	+
40. *T. vitrinus*Looss, 1905)	+
41. *Camelostrongylus mentulatus* (Railliet et Henry, 1909)	+
42. *Cooperia oncophora* (Railliet, 1896)	+
43. *C. zurnabada* Antipin, 1931	+
44. *C. punctata* (Linstow, 1906)	+
45. *C. pectinata* Ransom, 1907	+
46. *Grosspiculagia occidentalis* Ransom, 1907	+
47. *Haemonchus contortus* (Rudolphi, 1803)	+
48. *H. placei* (Place, 1893)	+
49. *Marshallagia marshalli* Ransom, 1907	+
50. *M. mongolica*Schumakovitsch, 1938	+
51. *Nematodirus filicollis* (Rudolphi, 1802)	+
52. *N. abnormalis* May, 1920	+
53. *N. helvetianus* May, 1920	+
54. *N. oiratianus*Rajewskaja, 1929	+
55. *N. spathiger* (Railliet, 1896)	+
56. *Ostertagia ostertagi* (Stiles, 1892)	+
57. *Skrjabiangia lyrata* (Sjoberg, 1926)	+
58. *Teladorsagia trifurcata* (Ransom, 1907)	+
59. *T. circumcincta* (Stadelmann, 1894)	+
60. *Skrjabinema ovis* (Skrjabin, 1915)	+
61. *Gongylonema pulchrum*Molin, 1857	+
62. *Parabronema skrjabini*Rassowska, 1924	+
63. *Onchocerca lienalis* (Stiles, 1892)	+

64. *O. gutturosa* Neumann, 1910	+
65. *Setaria labiatopapillosa* (Alessandrini, 1848)	+
66. Stephanofilaria stilesi Chitwood, 1934	+
67. S. assamensis Pande, 1936	+
68. *Thelazia gulosa* Railliet et Henry, 1910	+
69. *Th. rhodesi* (Desmarest, 1827)	+
70. *Th. skrjabini* Erschow, 1928	+
71. *Th. petrovi* Tuchmanianz et Schachurina, 1962	+
Total:	**71**

As can be seen from the above materials, most types of helminths belong to the class of nematodes. We are inclined to explain the species diversity of cattle nematodes in Uzbekistan by the evolutionary adaptation of nematodes to various environmental conditions, which contribute to the development of parasites in all phases of their life cycles.
The ecological relationships of nematodes with definitive, intermediate, and additional hosts ultimately ensure the stable functioning of the "parasite-host" system and the circulation of invasion in nature. The circulation of these nematodes is carried out on the basis of trophic and topical connections with the members of biogeocenoses.

Of the 71 species of helminths identified in cattle of the Republic, 1 species (Stephanofilaria assamensis) was noted by us for the first time in the CIS and 11 species (*Moniezia alba, Trichocephalus globulosa, Bunostomum trigonocephalum, Camelostrongylus mentulatus, Cooperia punctate, C. pectinata, Grosspiculagia occidentalis, Nematodirus abnormalis , N. spathiger, Stephanofilaria assamensis, Thelazia skrjabini*) in Uzbekistan.
Among the identified parasitic worms of cattle in Uzbekistan, 36 species develop in a direct way, i.e. they develop without the participation of intermediate hosts. The remaining 35 species of helminths develop with the participation of intermediate and additional hosts. Their intermediate and additional hosts are freshwater and land mollusks, grasshoppers, ants, diptera, oribatid mites, predatory mammals, and humans. Also, it was determined that of the 71 species of helminths *Paramphistomum ichikawai, Taeniarhynchus saginatus, Trichocephalus globulosa, Aonchotheca bovis, Thelazia rhodesi, Th. gulosa, Th. skrjabini, Th. petrovi, Onchocerca lienalis, Stephanofilaria stilesi* and *S. assamensis* parasitize only cattle.

Under the conditions of Uzbekistan, the total infection of cattle with helminths is 94.3%. At the same time, in some regions of Uzbekistan, infection of cattle with trematodes ranges from -34.0 to 66.6%, cestodes from 17.6 to 45.1% and nematodes from 70.0 to 93.5.
For the existence of helminths as a full-fledged component of biocenoses and for maintaining the invasive element of parasitic worms in nature, two important regulatory mechanisms are essential - the “susceptibility” of invertebrate animals-intermediate (additional) hosts to the causative agent of invasion and the effectiveness of its "transmission" to the final hosts-vertebrate animals. Intermediate hosts, by virtue of their own mobility, contribute to the spread of the parasite in space and, thanks to the ecological links that exist between them and the final hosts, contribute to its penetration into the body of the latter [38].

It is known that animals become infected with helminths mainly on pastures, the ecological conditions of which contribute to the emergence and circulation of pathogens of invasions. Uzbekistan also occupies a vast territory with pronounced landscape and geographical zones, which, of course, influence the formation of helminth fauna complexes.

The degree of distribution of helminths of ungulates, including cattle of Uzbekistan, is directly dependent on the climatic and geographical conditions of pasture areas and external factors (temperature, humidity, etc.) that inhibit or contribute to the development and preservation of invasive elements in the environment.

The ecological features of farm animals, including cattle, the nature of their distribution and anthropogenic factors, of course, affect the formation of the helminth fauna.

The nature of the helminth fauna of animals in certain geographical areas is determined by natural conditions [39].

E.N. Pavlovsky [40] wrote about the links between disease foci and geographic landscapes, about the possibility of their formation in natural conditions under the influence of anthropogenic factors.

V.A. Dogel [41] noted that differences in the parasite fauna of animals in individual landscapes are determined by a complex of climatic conditions, the presence or absence of intermediate hosts, the composition of soil, water, and so on.

A.V. Fedyushin [42] stated that the composition and distribution of helminths are directly affected by geographic and zonal factors, and indirectly, through the hosts, by "patterns of the zoogeographical order." In different parts of the geographic range of the host, the composition of its helminth fauna can be completely different.
The degree of distribution of helminths of productive animals, including cattle of Uzbekistan, is directly dependent on the climatic and geographical conditions of pasture areas and external factors (temperature, humidity, etc.) that inhibit or contribute to the development and preservation of invasive elements in the environment . The most important environmental factors affecting the qualitative and quantitative composition of helminths include latitudinal zonality and vertical zonality.

Consequently, the extraordinary diversity of the natural and climatic conditions of Uzbekistan, of course, leaves its mark on the formation and distribution of the fauna of helminths of ungulates, including cattle, as well as on their circulation in the biogeocenoses of this region.
Considering the structure of the fauna of helminthes of cattle, depending on the landscape and climatic conditions, we distinguish two helminth fauna complexes - plain and foothill-mountain (Table 2).

Table 2. Distribution of helminths in cattle across the landscapes of Uzbekistan

Species of helminths	Landscape	
	Plain	foothill mountain
1. Moniezia benedenii	++	+
2. M. expansa	++	+
3. M. autumnalia	+	+
4. M. alba	-	+
5. Avitellina centripunctata	++	+

6. Thysaniezia giardi	++	+
7. Taenia hvdatigena (larvae)	++	++
8. Taeniarhynchus saginatus (larvae)	++	++
9. Multiceps multiceps (larvae)	+	+
10. M. skrjabini (larvae)	+	+
11. Echinococcus granulosus (larvae)	++	++
12. Alveococcus multilocularis (larvae)	+	+
13. Fasciola hepatica	++	+
14. F. gigantica	++	+
15. F. indica	-	+
16. Eurytrema pancreaticum	+	+
17. E. coelomaticum	-	+
18. Paramphistomum ichikawai	+	+
19. Calicophoron calicophorum	++	++
20. C. erschowi	++	+
21. Liorchis scotiae	+	+
22. Gastrothylax cruminifera	++	+
23. Dicrocoelium dendriticum	+	++
24. Schistosomaturkestanicum	++	-
25. Trichocephalus ovis	+	++
26. T. skrjabini	++	++
27. T. globulosa	-	+
28. Aonchotheca bovis	+	+
29. Strongyloides papillosus	+	+
30. Bunostomum trigonocephalum	+	++
31. B. phlebotomum	+	++
32. Chabertia ovina	+	++
33. Oesophagostomum venulosum	++	++
34. O. radiatum	+	++
35. O. columbianum	+	+

36. O. asperum	+	-
37. Dictyocaulus viviparus	-	+
38. Trichostrongylus axei	+	++
39. T. colubriformis	+	++
40. T. vitrines	+	++
41. Camelostrongylus mentulatus	+	-
42. Cooperia oncophora	++	+
43. C. punctate	+	+
44. C. pectinata	+	+
45. C. zurnabada	+	+
46. Grosspiculagia occidentalis	+	++
47. Haemonchus placei	++	+
48. H. contortus	++	++
49. Marshallagia marashalli	++	++
50. M. mongolica	++	+
51. Nematodirus helvetianus	+	++
52. N. abnormalis	+	++
53. Nematodirus filicollis	-	+
54. N. spathiger	++	++
55. N. oiratianus	++	++
56. Ostertagia ostertagi	++	+
57. Skrjabinagia lyrata	-	+
58. Teladorsagia circumcincta	+	++
59. T. trifurcata	+	+
60. Skrjabinema ovis	++	+
61. Gongylonema pulchrum	++	++
62. Parabronema skrjabini	++	+
63. Thelazia rhodesi	++	+
64. Thelazia gulosa	++	+
65. Th. skrjabini	+	++

66. Th. petrovi	+	-
67. Onchocerca lienalis	+	+
68. O. gutturosa	++	-
69. Setaria labiatopapillosa	++	++
70. Stephanofilaria stilesi	++	++
71. S. assamensis	+	+
Всего	64	66

Note: ++ characteristic; + meet insignificantly; - not marked.

An analysis of the geographical distribution of species and supraspecific taxa of helminthes of cattle in Uzbekistan indicates a high commonality of faunistic complexes of parasitic worms in animal plains and foothill-mountain zones. However, the faunal complexes of helminths and the biological groups of these landscapes differ significantly.
Most of the territory of Uzbekistan is a zone of plains (Kyzylkum desert, Ustyurt plateau, Karshi, Surkhan-Sherabad, Jizzakh steppes), which has long served as a valuable pasture for transhumance. Insects that play the role of intermediate hosts of helminths are widely represented in this territory.
The plain complex covers significant areas of irrigated agriculture, where the main agricultural and fodder crops are grown. In this complex, the overwhelming number of dairy, meat-and-dairy and meat cattle is concentrated.

The plain complex also includes river valleys richer in herbage. Studies have shown that the helminth fauna of cattle of the plains is represented by 64 species (Table 2), consisting of trematodes, cestodes, and nematodes. We are inclined to associate the richness of the helminth fauna of the plain complex with various elements of landscapes with their inhabitants participating in the circulation of parasitic worms. It should be noted that in the desert and semi-desert, mainly nematodes develop directly without the participation of an intermediate host. In the river valleys, trematodes are widely represented, in the development of which freshwater mollusks take part, as well as nematodes, in the life cycles of which numerous species of dipterous insects participate.

The main core of the hemitofaunistic complex of cattle in the plain zone of Uzbekistan is 31 species *(Moniezia expansa, M. benedeni, Avitellina centripunctata, Thysaniezia giardia, Taenia hvdatigena (larvae), Taeniarhynchus saginatus (larvae), Echinococcus granulosus (larvae), Fasciola hepatica, F. gigantica, Calicophoron calicophorum, C. erschowi, Gastrothylax cruminifera, Schistosoma turkestanicum, Trichocephalus skrjabini, Oesophagostomum venulosum, Cooperia oncophora, Haemonchus contortus, H. placei, Marshallagia marashalli, M. mongolica, Nematodirus spathiger, N. oiratianus, Ostertagia ostertagi, Skrjabinema ovis, Gongylonema pulchrum, Parabronema skrjabini, Thelazia rhodesi, Th. gulosa, Onchocerca gutturosa, Setaria labiatopapillosa, Stephanofilaria stilesi.*
There are no helminths from the class of cestodes - *Moniezia alba*, from the class of trematodes - *Fasciola indica, Eurytrema coelomaticum* and from the class of nematodes - *Trichocephalus globulosa, Dictyocaulus viviparus, Nematodirus filicollis, Skrjabinagia lyrata,* registered in the foothill-mountain complex. Here, mainly dry-resistant nematodes of the suborder Strongylate, Trichocephelate, Spirurate, etc.

It should be noted that one of the leading factors determining the formation of biocenoses, including helmitofaunistic complexes, in the plain zone of the republic is human economic activity. It is known that in recent decades the republic has carried out a grandiose work on the development and watering of lands, large reservoirs are being created, and the irrigation network is expanding. All this changes the appearance of biocenoses, which affects the formation of the fauna of helminths in cattle, i.e. the historically established host-parasite systems are disrupted. As a result, there is a change in the qualitative and quantitative composition of helminths. The dominance of some groups of helminths and the disappearance of others is noted.

Thus, with the commissioning of the South Surkhan reservoir in the south of Uzbekistan, the Amu-Bukhara canal in the Bukhara and Navoi regions, the development and watering of the Hungry Steppe in the northeastern part of the republic, conditions were created for the development of various invertebrates, in particular, freshwater mollusks (Lymnaea, Planorbis, Gyraulus, Anisis, etc.) and dipteran insects (Musca, Lyperozia, Stamoxus, Aedes, etc.), the associated helminths of the genera Fasciola, Calicophoron, Gastrothylax, Liorchis, Schistosoma, Parabronema, Setaria, Stehanofilaria, Onchocerca, etc.) that caused epizootic outbreaks of trematodosis and nematodosis among susceptible animals [43].
The foothill-mountain zone occupies 24.5% of the territory of Uzbekistan, and these zones, as pastures, significantly exceed the plain ones in terms of productivity. The main place here is occupied by herbs. These are excellent pastures for all kinds of farm animals. In the foothill-mountain zone, with its significantly indented relief, high humidity and lush vegetation, animal husbandry is developed, mainly meat and dairy and meat and wool (cattle, sheep of fat-tailed and meat-wool breeds, goats, horses).

As can be seen from the above, the natural and economic conditions and the system of animal husbandry in the foothill-mountain ecosystems of Uzbekistan are specific, which certainly affects the formation of both the fauna of the animal world and its helminths.
The helminth fauna of cattle in the foothill-mountain landscape of Uzbekistan is represented by 66 species. The main core of the complex is 26 species (*Taenia hvdatigena (larvae), Taeniarhynchus saginatus (larvae), Echinococcus granulosus (larvae), Dicrocoelium dendriticum, Trichocephalus ovis, T. skrjabini, Bunostomum trigonocephalum, B. phlebotomum, Chabertia ovina, Oesophagostomum venulosum, O. radiatum, Trichostrongylus axei, T. colubriformis, T. vitrines, Grosspiculagia occidentalis, Haemonchus contortus, Marshallagia marashalli, Nematodirus helvetianus, N. abnormalis, N. spathiger, N. oiratianus, Teladorsagia circumcincta, Gongylonema pulchrum, Thelazia skrjabini, Setaria labiatopapillosa, Stephanofilaria stilesi).*
Cestodes of *Echinococcus granulosus* (larvae) and *Taenia hvdatigena* (larvae) are widely distributed here, for which cattle acts as an intermediate host. Mature forms of these worms are parasites of the small intestine of carnivores. Of the representatives of trematodes, it should be noted the distribution of *Dicrocoelium dendriticum*, which develops with the participation of terrestrial mollusks and ants.

In the foothill-mountain landscape, nematodes are quite widely represented in cattle, mainly moisture-loving species from the group *Trichocephalus, Chabertia, Bunostomum, Oesophagostomum, Trichostrongylus, Nematodirus* and others.
The richness of the fauna of helminths of cattle of the foothill-mountain complex is due to the great diversity of landscapes, vegetation, wildlife and its high density. Consequently, there are favorable conditions for the development of terrestrial molluscs, intermediate hosts of

dicrocelia, oribatid mites, intermediate hosts of anoplocephalates, carnivorous and agricultural animals, definitive and intermediate hosts of teniate.
Of the total number of helmites, 60 species were noted in cattle of both the plain and foothill-mountain complexes. This indicates a high degree of adaptation of most helminth species to various environmental conditions.

The distribution and interchange between parasitic worms and various animal species is influenced by the transhumance system of livestock grazing.
The presented materials clearly demonstrate the role of landscape diversity, taking into account their inhabitants (invertebrates and vertebrates), in the formation of the helminth fauna of cattle in Uzbekistan.
Consequently, the extraordinary diversity of the natural and climatic conditions of Uzbekistan, of course, leaves its mark on the formation and distribution of the fauna of helminths of cattle, as well as on their circulation in the biogeocenoses of this region.
The basis for protecting animals from helminthiases is a set of sanitary and hygienic measures to improve the external environment from pathogens of invasions, which must be carried out both on pastures and directly in livestock buildings. At the same time, a mandatory combination of pasture prophylaxis with deworming of animals is necessary. It is also necessary to pay special attention to the protection of the environment from pathogens of helminthic diseases in specific areas of the Republic.

The widespread helminthiases of cattle in Uzbekistan that negatively affect their productivity are monieziosis, larval teniidosis, fascioliasis, paramphistomidiasis, trichuriasis, haemonchosis, parabronemiasis, telaziosis, stephanofilariasis and other helminthiases.

4. Conclusion

Thus, as a result of studying a huge amount of factual material and analyzing literature data, the species composition of helminths of cattle in various biocenoses of Uzbekistan has been established. Based on many years of our own research and analysis of literature data, 71 species of helminths were identified in cattle of Uzbekistan, 71 species of helminths were identified in Uzbekistan, of which 12 species belong to the Cestoda class, 12 to the Trematoda class and 47 species to the Nematoda class. Of the 71 species of helminths identified in cattle of the Republic, 1 species (Stephanofilaria assamensis) was noted by us for the first time in the CIS and 11 species (*Moniezia alba, Trichocephalus globulosa, Bunostomum trigonocephalum, Camelostrongylus mentulatus, Cooperia punctate, C. pectinata, Grosspiculagia occidentalis, Nematodirus abnormalis, N. spathiger, Stephanofilaria assamensis, Thelazia skrjabini*) in Uzbekistan.

Among the identified parasitic worms of cattle in Uzbekistan, 36 species develop in a direct way, i.e. they develop without the participation of intermediate hosts. The remaining 35 species of helminths develop with the participation of intermediate and additional hosts. Their intermediate and additional hosts are freshwater and land mollusks, grasshoppers, ants, diptera, oribatid mites, predatory mammals, and humans. Also, it was determined that of the 71 species of helminths *Paramphistomum ichikawai, Taeniarhynchus saginatus, Trichocephalus globulosa, Aonchotheca bovis, Thelazia rhodesi, Th. gulosa, Th. skrjabini, Th. petrovi, Onchocerca lienalis, Stephanofilaria stilesi* and *S. assamensis* parasitize only cattle.
Under the conditions of Uzbekistan, the total infection of cattle with helminths is 94.3%. At the same time, in some regions of Uzbekistan, infection of cattle with trematodes ranges from -34.0 to 66.6%, cestodes from 17.6 to 45.1% and nematodes from 70.0 to 93.5.

The presented materials clearly demonstrate the role of landscape diversity, taking into account their inhabitants (invertebrates and vertebrates), in the formation of the helminth fauna of cattle in Uzbekistan.

Consequently, the extraordinary diversity of the natural and climatic conditions of Uzbekistan, of course, leaves its mark on the formation and distribution of the fauna of helminths of cattle, as well as on their circulation in the biogeocenoses of this region. However, the data obtained are not sufficient for a final judgment about the fauna, ecology, especially the biological characteristics of helminths in cattle. All this requires further comprehensive studies of helminths in cattle, as well as the development of methods and means for regulating the population of pathogenic species of parasites.

5. References

1. Skryabin K.I., Shults R.S. Helminthiases of cattle and its young. – Moscow: Selkhozgiz, 1937.–723 p.
2. Asadov S.M. Helminth fauna of ruminants of the USSR and its ecological and geographical analysis. – Baku, 1960. – 511 p.
3. Boev S.N. etc. Helminths of hoofed animals of Kazakhstan. Alma-Ata: Ed. AN Kaz SSR, 1962.-T. 1. – 377 pp.
4. Boev S.N. etc. Helminths of hoofed animals of Kazakhstan. Alma-Ata: Ed. AN Kaz SSR, 1963.-T. 2. – 536 pp.
5. Shumakovich E.E., Sosipatrov G.V. Prevention of helminthiases under various conditions of keeping cattle. M., J. Veterinary, 1965., – No. – Pp. 62-63.
6. Kuznetsov M.I. Anoplocephalatosis in ruminants. M.: Kolos, – 1972. –158 p.
7. Toktouchikova M.G. Helminth fauna of cattle in Kyrgyzstan. Helminthol. research. In Kyrgyzstan, Frunze: Ilim, 1975. –Pp. 63-75.
8. Mukhamadiev S.A. Helminths of cattle of the USSR: Abstract of the thesis. dis. … Dr. Biol. Sciences. - Baku, 1986. – 36 p.
9. Shchekoturov V.L. Materials for the study of strongylatoses of the digestive tract of cattle // Tez. report sci.-prod. conf. - Gorky, 1988. – Pp. 71-72.
10. Abuladze K.I. and other Parasitology and invasion diseases of agricultural animals. A textbook for students of universities in the specialty “Veterinary”. M., 1990. – 97 p.
11. Fedorchenko N.G. Therapy of cattle with chronic paramphistomatiasis. Dis. cand. vet. Sciences. Moscow, 1996. – 166 p.
12. Akbaev M.Sh., Vodyanov A.A. and other Parasitology and invasion diseases of animals. Textbook for students of universities in the specialty “Veterinary”. M., KOLOS, 2000. – 743 p.
13. Shakirov A.B. Helminths and helminthiases of cattle in the Kyrgyz Republic and measures to combat them: Abstract of the thesis. dis. … Dr. vet. Sciences. – M., 2005. – 46 p.
14. Kryazhev A.L., Nikitin V.F. Species composition of helminths in cattle in the North-West region of Russia on the example of the Volgograd region. Moscow city, 2014. – Pp. 15-18.
15. Skryabin K.I. On the characteristics of the helminth fauna of domestic animals of Turkestan. – Yuriev, 1916.
16. Shakhurina E.A., Tukhmanyants A.A. On the issue of the helminth fauna of cattle in the Mirzachul district of the Tashkent region. // DAN UzSSR, No. 5, 1960. – Pp. 63-66.
17. Gekhtin V.I. Helminth fauna of cattle and biology of giant fasciola in the conditions of the Karakalpak ASSR: Abstract of the thesis. cand. diss... – Tashkent, 1967. –22 p.

18. Gekhtin V.I., Rakhimkarieva A.Kh. About helminths of cattle of the Ferghana Valley. // Mat. scientific conf. society of helminthologists Uzb. – Tashkent, 1968. – Pp. 41-42.
19. Sultanov M.A., Gekhtin V.I., Azimov D.A., Dadaev S. About helminthes of cattle in the Kashkadarya region. Ed. "Fan", Uzbek. biol. zhur. No. 1.,1975. – Pp.52-54.
20. Sultanov M.A., Azimov D.A., Gekhtin V.I., Muminov P.A. Helminths of domestic mammals of Uzbekistan. Tashkent: Fan, 1975. – 184 p.
21. Dadaev S.D. Ecological and geographical features of helminths of domestic ungulates in the south of Uzbekistan: Abstract of the thesis. …cand. biol. Sciences. – M., 1978. – 24 p.
22. Matchanov N.M., Dadaev S., Azimov D.A., Zimin Yu.M., Gekhtin V.I. Helminths of agricultural animals // Ecology of animal parasites of the north-east of Uzbekistan. – Tashkent, 1984. –Pp. 37-57.
23. Dadaev S. On the helminths of cattle in the south-west of Uzbekistan. Ed. “Science”, Uzbek. biol. journal. No. 6., 1985. – Pp. 33-36.
24. Matchanov N.M., Dadaev S.D., Kabilov T.K., Siddikov B.Kh. Helminths of animals of desert biocenoses of Uzbekistan. – Tashkent: Science, 1989. – 104 p.
25. Dadaev S., Ulugova S. On the distribution of helminths in cattle in various biocenoses of the Tashkent oasis. // Uzbek. biol. magazine No. 2, 1989. – Pp.65-66.
26. Dadaev S.D. Vertebrate helminths of the suborder Ruminantia Scopoli, 1777 of the fauna of Uzbekistan: Abstract of the thesis. diss ... dok.sci. – Tashkent, 1997. – 56 p.
27. Azimov D.A., Dadaev S.D., Akramova F.D., Saparov K.A. Helminths of ruminants of Uzbekistan. – Tashkent: Science, 2015. – 224 p.
28. Goyipova M.E. Helminths of large horned animals of the Zarafshan Valley: fauna, distribution and ecology: Veter. science. Doctor of Philosophy (PhD) diss. autoref. – Samarkand, 2019. – 46 p.
29. Zayniev S., Dadaev S. About the fauna of cattle helminths of the Kashkadarya oasis mountain and sub-mountain region and their distribution. Proceedings of the 4th Republican scientific-practical conference “Zoological science of Uzbekistan: current problems and development prospects”. – Tashkent: Science publishing house of the UzR SA. 2022. – Pp. 118-121.
30. Shakarboev E.B., Jumamuratov J.E. Level of infection of pets with helminths in Khorezm region. Proceedings of the 4th Republican scientific-practical conference “Zoological science of Uzbekistan: current problems and development prospects”. – Tashkent: Science publishing house of the UzR SA. 2022. – Pp. 164-167.
31. Skryabin K.I. Methods of complete helminthological dissections of vertebrates, including humans. – M. – L.: Publishing House of the 1st Moscow State University, 1928. – 45 p.
32. Ivashkin V.M. Stefafilariasis of the skin of the inner surfaces of the auricles of cattle. // Prob. parasitol. – Kyiv: Naukova Dumka, 1969. – No. 2. – Pp. 23-24.
33. Kotelnikov G.A. Helminthological studies of animals and the environment. – M.: Spike, 1984. – Pp. 3-4.
34. Shults R.S., Gvozdev E.V. Fundamentals of general helminthology. Morphology, systematics, phylogeny of helminths. – M., Science, 1970, volume 1. – 492 p.
35. Ivashkin V.M., Kontrimavichus V.L., Nazarova N.S. Methods for collecting and studying helminths of terrestrial mammals. – M., Science, 1971. – 124 p.
36. Ivashkin V.M., Mukhamadiev S.A. Key to helminths in cattle. – M., Science, 1981. – 259 p.
37. Anderson R. C. Nematode Parasites of Vertebrates: Their Development and Transmission. – New York: CABI, 2000. – 672 p.
38. Kennedy K. Ecological parasitology. M.: Mir, 1978. – 230 p.

39. Skryabin K.I. To the fauna of parasitic worms of the deserts and steppes of Turkestan. – Tashkent, 1924. Vol. 2. – Pp. 78-91.
40. Pavlovsky E.N. Conditions and factors of becoming a parasite host in the process of evolution. Zool. Jour., Vol. 25. – 322 p.
41. Dogel V.A. Course of general parasitology. – L.: Uchpedgiz, 1947. – 372 p.
42. Fedyushin A.V. Geographic and zonal factors in the spread of helminths. Zool. Jour. – M., 1948. – Vol. 27. – Issue. 6. – Pp. 481-486.
43. Azimov D.A. Ecological bases of environmental protection from helminths. Abstracts conf. "Protection of the fauna of Uzbekistan and measures to increase the number of rare and endangered species of animals". – T.: Science, 1975. – Pp.45-48.