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РЕСПУБЛИКИ КАЗАХСТАН

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**THE LEVEL OF HELMINTHS INVASION
OF DIGESTIVE TRACT OF CATTLE AND SAIGAS
IN WEST KAZAKHSTAN REGION**

Abstract. Helminth fauna commonness at cattle and saigas was noticed in West Kazakhstan region. The results of helminthooscopic researches of animals' excrements by Fulleborn have shown that cattle and saigas are infested with Trichostrongylidae family (Strongylata suborder) strongyloides of digestive tract from Nematodirus, Ostertagia, Cooperia, Haemonchus, Trichostrongylus, Marshallagia genus, and also with Moniezia genus cestodes. Invasion extensiveness of cattle with digestive tract strongyloides was 31,3% on the average, and moniesia - 16,4%. Invasion extensiveness of saigas was 88,8% and 7,4%, respectively. Besides, similarity of seasonal and age dynamics of digestive tract strongyloides was observed at cattle and saigas. In winter, invasion extensiveness of animals decreases, and the peak of invasion falls on summer period. Thus, animals during the whole year is infested with digestive tract strongyloides. Invasiveness decreases with age of animals. Contacts of saigas and cattle in pasturable territories bring to the commonness of helminths composition. Saigas are natural tank and constant source of helminths invasion for domestic ruminants in West Kazakhstan region. Therefore, when planning treatment-and-prophylactic actions against helminthoses it is necessary to consider this factor.

Key words: cattle, saigas, helminthoses, invasion extensiveness, seasonal and age dynamics, West Kazakhstan region.

Introduction. Cattle breeding in West Kazakhstan region is one of the leading branches of livestock production. However, extensive economic damage is caused to it by helminthic diseases. The data on specific composition of helminths, epizootology, seasonal and age dynamics in different regions is necessary for the development of fight measures against cattle helminthoses. K.I. Skryabin has for the first time conducted researches on studying of helminth fauna of cattle in the territory of Kazakhstan. [1]. He and his students organized over 30 helminthological expeditions which have collected the big material characterizing specific composition of cattle helminths. New data on cattle helminths fauna in Kazakhstan was obtained by G.I. Dikov, etc. [2]. Cattle helminth fauna in Kazakhstan was studied by K.I. Skryabin, R.S. Schultz [1], S.N. Boev, etc. [3], E.I. Pryadko [4], B.M. Shonov [5], K.M. Erbolatov [6], V.S. Petrov [7], M.Zh. Suleymenov [8], V.T. Ramazanov [9] and others. 35 types of helminths from trematode, cestode and nematode classes were registered at cattle in the territory of West Kazakhstan. For last years, specific composition of cattle helminths could undergo considerably changes owing to various factors. One of such factors is wild animals living in the territory of West Kazakhstan region. The most numerous of them are saigas.

Saiga (lat. Saiga tatarica) - is an artiodactyl mammal from antelope subfamily. It is rather small artiodactyl animal, length of body is 110-146 cm, height in withers is 60-79 cm, weight is 23-40 kg, extended trunk on thin, rather short legs.

According to "Kazakhstan Today Media Group (2015), the number of saigas in 2014 has reached about 260 thousand individuals relating to Saiga tatarica tatarica subspecies and living in Russia and three areas of Kazakhstan [10,11,12]. By data of K.K. Baytursinov [13] it was determined that natural seasonal migrations of saigas make one of ecological features of their adaptations. Seasonal location on natural zones is distinctly expressed at animals. Saiga herds during migration are grazed generally on the same pastures as sheep. However, saigas constantly replace sites of pastures.

Commonness of saiga and domestic sheep parasites is 50-100%. However, a part of these parasites is more specific to saiga, such as *A.centripunctata*, *S.ovis* and *N.gazellae*. Undoubtedly, saiga plays a significant role in the distribution and infection of pets. On the contrary, sheep are more intensively infested with taenia *E.granulosus* and *T.hydatigena*. Dogs play active role in the distribution of these parasites. Invasion extensiveness of saigas with these cysts during researches were rather high. The third group of parasites is nematodes which invasive elements are adapted to life in dry landscapes. They are *Marshallagia* and *Nematodirus* nematodes. Both groups of animals to the same extent participate in the circulation of these parasites in nature. But depending on the number of populations, density of pasture load by wild and domestic hoofed animals, the role of separate group of the specified nematodes in distribution can strongly vary.

A.G. Bannikov [14] notes that 55 species of endoparasites and about 10 ectoparasites were revealed in Caspian Sea region and in Kazakhstan at saigas. They are species of parasitic protozoa, cestodes, nematodes. The coefficient of helminths commonness of farm animals and saigas in Kazakhstan makes 67-84,7%; analogous situation was noted in Caspian Sea region.

According to M.Yu. Treus [15], etc. the structure of saigas helminth fauna in Askania-Nova includes 6 types of strongylidae – digestive tract helminths and 1 species of cestode (*Moniezia expansa*). Interesting observations on the formation of parasite fauna of saiga herd were made here.

Contacts of wild and domestic ruminants in pasturable territories bring to the composition commonness of helminths that is found at autopsy and scatological researches. It is known that wild hoofed animals are subject to various parasitic diseases which often terminate in a lethal outcome or loss of valuable trade qualities that causes extensive economic damage and reduces prestige of national parks and reserves. Although adult animals can be less infected than young growth, they are an important source of invasion distribution and promote developing of epizooty. The threat of invasion transfer from wild to domestic animals and to human is possible at wide expansion of parasitic diseases. Various measures of fight against parasitic diseases of farm and wild animals were proposed, including control of livestock number, destruction of corpses of animals, change of pastures, rational placement of biotechnical objects and other veterinary sanitary and general economy actions [16].

Comparisons of saigas and sheep helminth fauna were given in literature. However, there are no data on comparison of helminth fauna of saigas and cattle. There are no researches of seasonal and age dynamics of cattle and saigas invasion with helminths in comparative aspect.

The purpose of our researches is to determine specific structure, invasion degree, seasonal and age dynamics of main helminthoses of digestive tract in an organism of cattle and saigas in conditions of West Kazakhstan region.

Materials and methods. The work was performed within AP05136002 project on the subject "Development of measures of fight against main helminthoses of cattle in steppe, semi-desert and desert zones of West Kazakhstan region depending on weather conditions".

Invasion of cattle was defined in country farms in steppe, semi-desert and desert zones of West Kazakhstan region. Invasion of saigas was determined in the Center of preservation of biodiversity of wild animals, Zhangir Khan West Kazakhstan Agrarian Technical University located in the territory of Taskalinsky area of West Kazakhstan region where saigas are kept in captivity [17, 18]. Species composition, invasiveness degree, seasonal and age dynamics of main helminthoses of digestive tract of animals were studied. For this purpose, samples of excrements of cattle and saigas were taken. Researches of excrements were conducted by Fulleborn in the laboratory of research institute of biotechnology and environmental management at Zhangir Khan West Kazakhstan Agrarian Technical University. Scatolo-

gical researches of 319 samples of excrements from cattle and from 28 species of saigas were done. Calculation of helminths eggs amount in 1 gram of excrements was carried out with the use of VIGIS calculating camera. [19]. Samples of excrements at animals were taken in the morning, per rectum. Helminthoscopic and larvaoscopic methods of excrements research were used for studying of seasonal dynamics of contamination of cattle and saigas with main types of digestive tract helminths. Researches were conducted quarterly, during different seasons. Invasiveness of various age groups of cattle and saigas was studied - below one year, 1-3 years, 4-5 years, 6-9 years, 10 years and more. The genus of helminths was determined by invasive larvae by P.A. Polyakov [20]. Excrements of animals were kept in the thermostat at the temperature of 25-30°C in Petri dishes within 7 days for larvae cultivation. Excrements were daily humidified and aerated. The method of helminthological autopsy by K.I. Skryabin was used to determine species composition of digestive tract helminths of saigas [21]. For this purpose, helminthological research of fore stomachs, maw and intestines of five killed saigas were done. The contents of bodies were washed out 2-3 times, the deposit was poured out in sacks of mill gas. The sacks were tied and rinsed in water before complete cessation of dregs separation. Then, the content was studied by parts by means of microscope in Petri dish; selection of helminths was made by brush or microscopic needle. Identification of helminths was carried out by determinants of K.I. Skryabin, N.P. Shikhobalova, R.S. Schultz, etc. "Determinant of parasitic nematodes. V.3 Strongylata" [22]. Parenchymatous organs (liver and lungs) were investigated for studying of larvae echinococcosis dynamics.

Results of researches and their discussion. As a result of the conducted researches it was determined that cattle was infested with digestive tract strongyloides of Trichostrongylidae family (Strongylata suborder) from Nematodirus, Ostertagia, Cooperia, Haemonchus, Trichostrongylus genuses. Invasion extensiveness of animals with strongyloides has averaged 31,3%, and invasion intensity - $98,8 \pm 8,9$ eggs in 1 gram of excrements (table 1). Cattle was infested with cestodes from Moniezia genus, M. benedeni species. Invasion extensiveness of animals with moniezia has averaged 16,4%, and invasion intensity - $114,5 \pm 10,4$ eggs in 1 gram of excrements.

Table 1 – Infectiousness of cattle digestive tract helminths according to excrement researches

#	Helminths	Animals studied	Animals infected	Invasion extensiveness, %	Average amount of eggs in 1 gram of excrements, specimen
1	Strongylata	319	100	31,3	$98,8 \pm 8,9$
2	M. benedeni.	319	52	16,4	$114,5 \pm 10,4$

Helminthoscopic researches of excrements from saigas have shown that animals were infested with digestive tract strongyloides from Trichostrongylidae family (Strongylata suborder), Nematodirus, Ostertagia, Marshallagia, Trichostrongylus genuses and also with cestodes from Moniezia genus, Moniezia expansa species.

Invasion extensiveness of saigas with strongyloides has averaged 88,8%, and invasion intensity - $152,4 \pm 13,8$ eggs in 1 gram of excrements (table 2). Invasion extensiveness of animals with moniezia has averaged 7,4%, and invasion intensity - $76,2 \pm 6,9$ eggs in 1 gram of excrements.

Table 2 – Infectiousness of saigas with digestive tract helminths according to excrement researches

#	Helminths	Animals studied	Animals infected	Invasion extensiveness, %	Average amount of eggs in 1 gram of excrements, specimen
1	Strongylata	28	16	57,1	$152,4 \pm 13,8$
2	M. expansa	28	2	7,4	$76,2 \pm 6,9$

The analysis of the received results of helminthological autopsy of digestive tract of five saigas has shown that all animals were infested with helminths from Nematoda class. Existence of 5 types of helminths relating to 5 genuses of Nematodirus spathiger was noticed (invasion extensiveness – 80%, invasion intensity – $35,2 \pm 3,2$ specimen), Ostertagia ostertagi (invasion extensiveness – 40%, invasion intensity – $18,2 \pm 1,6$ specimen), Trichostrongylus colubriformis (invasion extensiveness – 60%, invasion

intensity - $12,8 \pm 1,1$ specimen), *Marshallagia marshalli* (invasion extensiveness – 80%, invasion intensity – $17,3 \pm 1,5$ specimen), *Haemonchus contortus* (invasion extensiveness – 20%, invasion intensity - $11,8 \pm 1,07$). Invasion extensiveness has averaged 56%, and invasion intensity - $19,1 \pm 1,7$. All found parasites are geohelminths (table 3, figure 1).

The difference of invasion extensiveness with helminths at saigas between data of candling and autopsy is insignificant. Therefore, it is possible to be based on the data of candling.

By the results of researches, seasonal dynamics of digestive tract strongyloides in an organism of cattle in West Kazakhstan region varies considerably. In winter, invasion extensiveness of animals has decreased to 22,1%. During the spring period, cattle infectiousness was 24,6%. In summer – 40,2%, and in autumn – 38,7%. Average per year, invasion extensiveness of animals has averaged 31,4%. The peak of invasion falls on summer period, and minimum - on winter (table 4). Thus, cattle during the whole year is infested with digestive tract strongyloides.

Table 3 – Infectiousness of saigas with digestive tract helminths according to helminthological autopsy

#	Type of helminths	Animals studied	Animals infected	Invasion extensiveness, %	Invasion intensity, specimen
1	<i>N. spathiger</i> (Railliet, 1896)	5	4	80	$35,2 \pm 3,2$
2	<i>O. ostertagi</i> (Stiles, 1892)	5	2	40	$18,2 \pm 1,6$
3	<i>T. colubriformis</i> (Giles, 1892)	5	3	60	$12,8 \pm 1,1$
4	<i>M. marshalli</i> (Ransom, 1907)	5	4	80	$17,3 \pm 1,5$
5	<i>H. contortus</i> (Rudolphi, 1803)	5	1	20	$11,8 \pm 1,07$
	Average			56	$19,1 \pm 1,7$

Table 4 – Seasonal dynamics of digestive tract strongyloides at cattle in West Kazakhstan region

Season	Animals studied	Animals infected	Invasion extensiveness, %
Spring	318	78	24,6
Summer	320	128	40,2
Autumn	321	120	38,7
Winter	319	70	22,1
Average			31,4

Helminthoscopic researches of excrements from cattle have shown that invasion extensiveness with digestive tract strongyloides of animals decreases with age. At young growth of cattle aged below one year it has made 27,4%, at the age of 1-3 years - 51,2%, at cattle at the age of 4-5 years - 32,7%, at animals at the age of 6-9 years - 22,5%, 10 years and more - 19,2%. Invasion extensiveness has averaged 30,6% (table 5).

Table 5 – Age dynamics of cattle invasiveness with digestive tract strongyloides

Age of animals	Animals studied	Animals infected	Invasion extensiveness, %
Below one year	58	13	27,4
1-3 years	43	22	51,2
4-5 years	85	26	32,7
6-9 years	71	16	22,5
More than 10 years	66	19	19,2
In total	323	96	
On average:			30,6

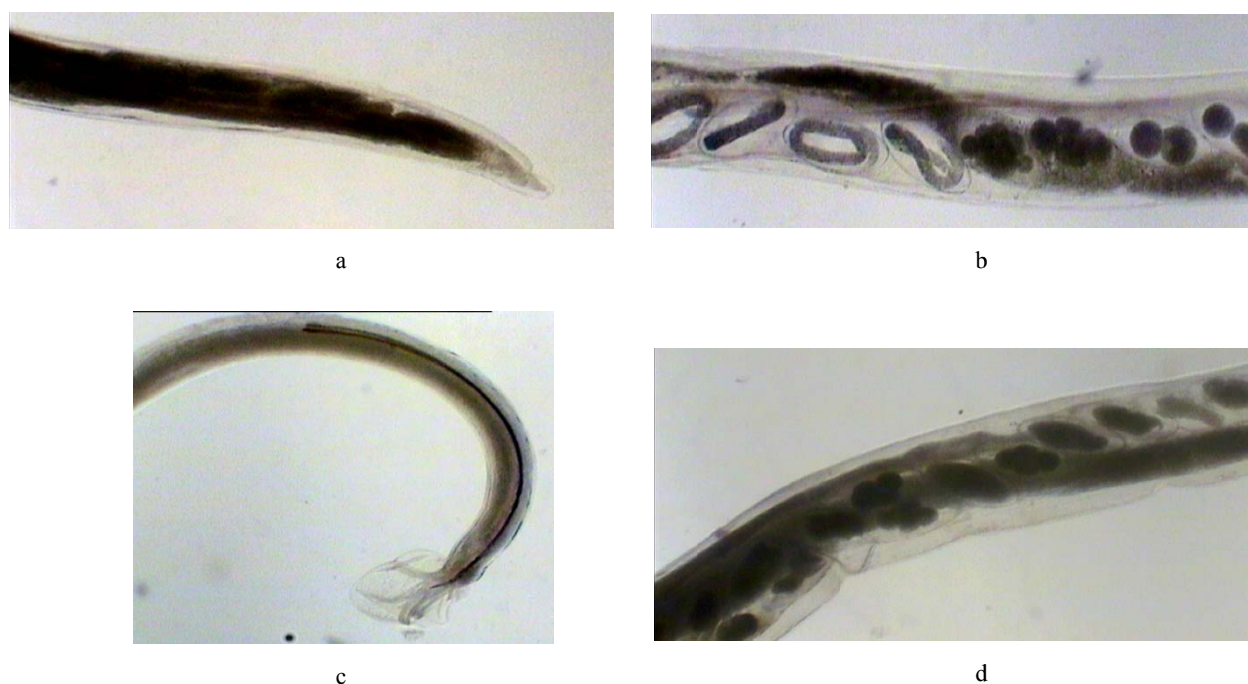


Figure 1 – *Nematodirus spathiger*: a - tail end of female, b - female with eggs of different stage of development, c - tail end of male, d - vulva area of female. Increased by 60 times. Original. Author's photo.

Studied seasonal dynamics of saigas' invasiveness. The researches results are presented in table 6. During the spring period, invasiveness of saigas was 49,7%. In summer – 77,6%, and in autumn – 51,4%. In winter, invasion extensiveness of animals has decreased to 48,5%. Average per year, invasion extensiveness of animals has averaged 56,8%. The peak of invasion falls on the summer period, and minimum - on winter. Thus, saigas are infected with digestive tract strongyloides during the whole year.

Table 6 – Seasonal dynamics of digestive tract strongyloides at saigas in West Kazakhstan region

Season	Animals studied	Animals infected	Invasion extensiveness, %
Spring	28	14	49,7
Summer	32	25	77,6
Autumn	32	16	51,4
Winter	31	15	48,5
Average			56,8

Helminthoscopic researches of excrements from saigas have shown that invasion extensiveness with digestive tract strongyloides of animals decreases with age. At young growth of saigas aged about one year it has made 71,4%, at the age of 1-3 years - 58,5%, more than 4 years - 41,1%. Invasion extensiveness has averaged 57,0% (table 7).

Table 7 – Age dynamics of invasiveness of saigas with digestive tract strongyloides

Age of animals	Animals studied	Animals infected	Invasion extensiveness, %
Below one year	14	10	71,4
1-3 years	8	4	58,5
More than 4 years	6	2	41,1
In total	28	16	
On average:			57,0

Conclusion. Thus, cattle, and saigas in West Kazakhstan region is infested with helminths from Trichostrongylidae family (Strongylata suborder) of genus, but with different invasion extensiveness. From figures 2 and 3 it is visible that cattle and saigas have similar seasonal and age invasion dynamics. That is cattle and saigas are infested during all seasons of year with digestive tract strongyloides. Invasiveness of animals decreases with age. Saigas are natural tank and constant source of helminths invasion in West Kazakhstan region. Therefore, when planning treatment-and-prophylactic actions against helminthoses of domestic ruminants it is necessary to consider this factor.

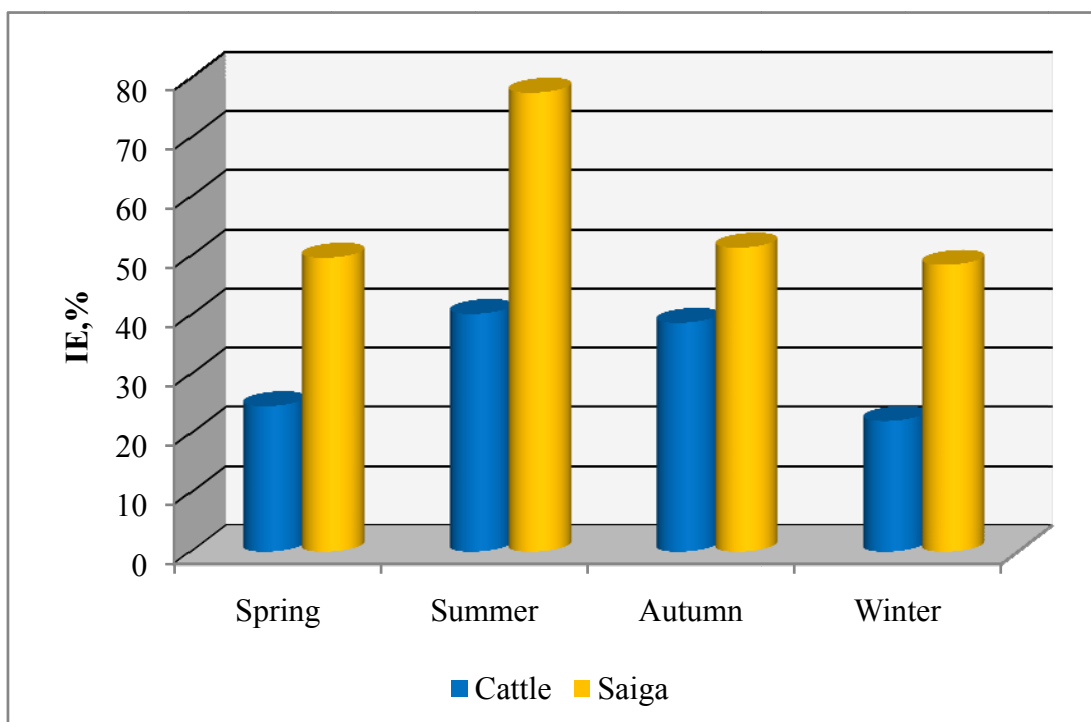


Figure 2 – Seasonal dynamics of invasion extensiveness with digestive tract strongyloides of cattle and saigas

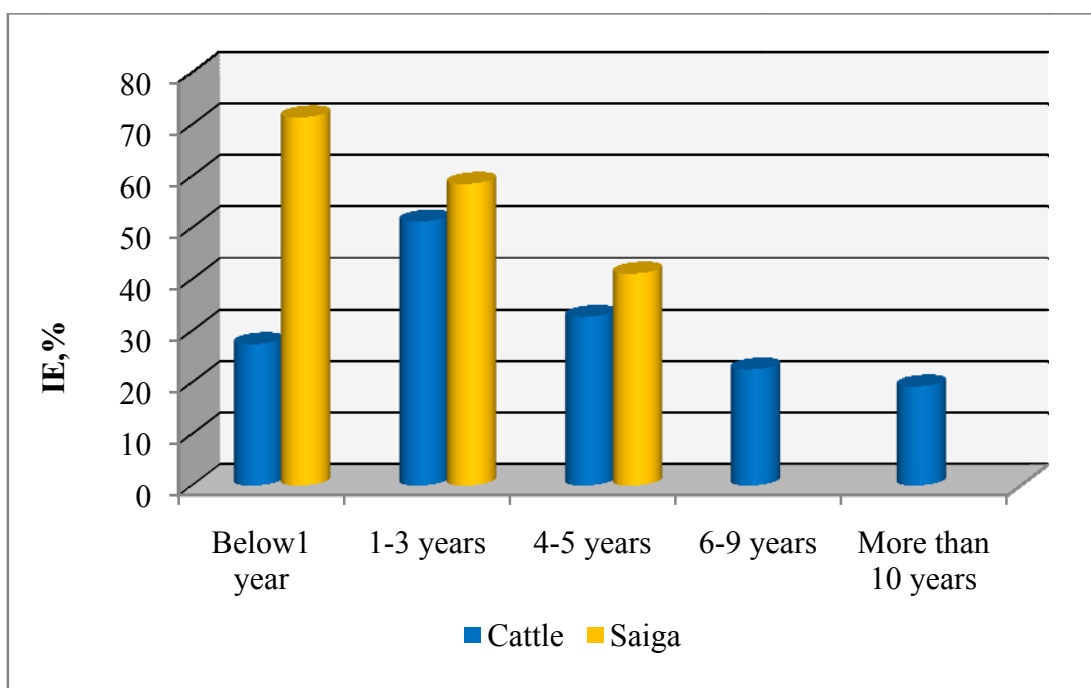


Figure 3 – Age dynamics of invasion extensiveness of digestive tract strongyloides of cattle and saigas

Conclusions.

1. Commonness of helminth fauna at cattle and saigas was noted in West Kazakhstan region.
2. All animal are infested with helminths from Nematoda class.
3. Nematodes from Nematodirus, Ostertagia, Marshallagia, Trichostrongylus, Cooperia, Haemonchus genuses and cestodes from Moniezia genus were found in cattle and saigas.
4. Invasion extensiveness with digestive tract strongyloides at cattle is 31,3%, at saigas - 57,1%.
5. Invasion extensiveness with moniezia at cattle is 16,4%, at saigas - 7,4%.
6. Cattle and saigas during all seasons of year are infested with digestive tract strongyloides.
7. Invasiveness of animals decreases with age.

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ИНВАЗИРОВАННОСТЬ ГЕЛЬМИНТАМИ ПИЩЕВАРИТЕЛЬНОГО ТРАКТА КРУПНОГО РОГАТОГО СКОТА И САЙГАКОВ В ЗАПАДНО-КАЗАХСТАНСКОЙ ОБЛАСТИ

Аннотация. В Западно-Казахстанской области у крупного рогатого скота и сайгаков отмечена общность гельминтофауны. Результаты гельминтоовоскопических исследований фекалий животных по Фюллеборну показали, что крупный рогатый скот и сайгаки инвазированы стронгилятами пищеварительного тракта семейства Trichostrongylidae (подотряд Strongylata) из родов Nematodirus, Ostertagia, Cooperia, Haemonchus, Trichostrongylus, Marshallagia, а так же цестодами из рода Moniezia. Экстенсивность инвазии крупного рогатого скота стронгилятами пищеварительного тракта в среднем составила 31,3%, а мониезиями - 16,4%. Экстенсивность инвазии сайгаков 88,8% и 7,4%, соответственно. Кроме того, у крупного рогатого скота и сайгаков наблюдается схожесть сезонной и возрастной динамики стронгилят пищеварительного тракта. Зимой экстенсивность инвазии животных снижается, а пик инвазии приходится на летний период. Таким образом, животные в течение всего года инвазированы стронгилятами пищеварительного тракта. С возрастом животных инвазированность снижается. Контакты сайгаков и крупного рогатого скота на пастбищных территориях приводят к общности состава гельминтов. Сайгаки являются природным резервуаром и постоянным источником инвазии гельминтами для домашних жвачных в Западно-Казахстанской области. Поэтому при планировании лечебно-профилактических мероприятий против гельминтозов необходимо учитывать этот фактор.

Ключевые слова: крупный рогатый скот, сайгаки, гельминтозы, экстенсивность инвазии, сезонная и возрастная динамика, Западно-Казахстанская область.

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БАТЫС ҚАЗАҚСТАН ОБЛЫСЫНДАҒЫ ІРІ ҚАРА МАЛЫ МЕН АҚБӨКЕНДЕРДІҢ АЗЫҚ ҚОРЫТУ ТРАКТИСІНІҢ ГЕЛЬМИНТТЕРІМЕН ИНВАЗИЯЛАНУЫ

Аннотация. Батыс Қазақстан облысында ірі қара малы мен ақбөкендерде гельминтофаунаның кездесуі ортақ байқалған. Жануарлардың нәжісін Фюллеборн әдісі бойынша гельминтоовоскопиялық зерттеу кезінде ірі қара малы мен ақбөкендер Trichostrongylidae (Strongylata түптармағы) тұқымдасының Nematodirus, Ostertagia, Cooperia, Haemonchus, Trichostrongylus, Marshallagia туыстарымен, сонымен қатар цестодтар қатарынан Moniezia туысымен зарарланған. Жануарлардың азық қорыту трактісінің стронгиляттарымен зарарлану экстенсивтілігі орташа 31,3% құраса, ал монезиямен - 16,4% құрады. Ақбөкендерде инвазия экстенсивтілігі сәйкесінше 88,8% және 7,4%. Бұған қоса, азық қорыту трактісі стронгиляттарының маусымдық және жастық дамуы ірі қара малы мен ақбөкендерде ұқсас екені байқалады. Қысқы кезеңде инвазия экстенсивтілігі азайып, жазғы кезеңде көбейеді. Сол себепті жануарлар жыл бойы азық қорыту трактісі стронгиляттарымен зарарланады. Жануарлардың жасы артқан сайын инвазиямен зарарлану көрсеткіші азаяды. Ірі қара малы мен ақбөкендерде жайылымдық аумақтарда ортақ болуы гельминттердің ортақтығына алып келеді. Ақбөкендер Батыс Қазақстан облысында гельминттердің табиғи резервуары және үнемі таратушы көзі болып табылады. Сондықтанда емдік-алдын алу шараларын жоспарлағанда осы факторды ескеру қажет.

Түйін сөздер: ірі қара малы, киіктер, гельминтоздар, инвазия экстенсивтілігі, маусымдық және жастық дамуы, Батыс Қазақстан облысы.

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