N E W S
OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
SERIES OF AGRICULTURAL SCIENCES
ISSN 2224-526X
Volume 6, Number 54 (2019), 5 – 12 **https://doi.org/10.32014/2019.2224-526X.70**

UDK 616-036.22

A. Balgimbayeva, G. Shabdarbaeva, L. Zhanteliyeva, A. Ibazhanova, D. Khussainov

Kazakh National Agrarian University, Almaty, Kazakhstan.
E-mail: shgs52@mail.ru, laura.zhanteli.@kaznau.kz, sema.serikova@mail.ru, doctor-vet@mail.ru

DIAGNOSTICS AND TREATMENT OF DIOCTOPHYMOSIS IN DOGS

Abstract. This article includes materials on the rare disease in domestic and wild carnivores, dioctophimosis, caused by a helminth from the group of aphasmidia nematodes, *Dioctophyme renale*, which is parasitic in the kidneys, recently registered in veterinary clinics in Almaty. The disease has important social significance - a person is susceptible to it, the infection of which occurs when raw fish is eaten. In Almaty, according to the statistics of veterinary clinics in recent years (2018-2019), 17 cases of dioctophimosis in dogs have been registered, that is up to 0.3% of the number of dogs examined for helminthiases. The appearance of this disease, which is relatively new for our region, can have a significant impact on the epizootiological and epidemiological situation. The results of in vivo laboratory diagnosis of dioctophimosis in dogs by ovoscopic methods are presented, with the provision of microphotos of the parasite eggs; methods of instrumental diagnostics - ultrasound examination (ultrasound) of the kidneys with the provision of photos proving the presence of a parasite in the renal pelvis. Since the only treatment for dioctophimosis is surgery and extraction of dioctophyma from the affected organ (kidney), our own original materials are presented for a step by step surgical intervention to extract helminth from the kidneys of dogs and treat animals. The condition of the operated animals is satisfactory, the prognosis for surgery is favorable.

Key words: dogs, carnivores, helminths, helminthiases, monitoring, nematodes, epizootiological and epidemiological situation, hematuria, dioctophimosis, ultrasound, OIE, WHO, invasive material, urine, feces, kidneys, surgical treatment.

Relevance of research. Dioctophimosis (code according to ICD-10 - B83.9) is a helminthiasis disease of silver-black foxes, dogs, jackals, marten and other carnivores, as well as humans when eating raw fish. The disease is characterized by damage to the kidneys, renal pelvis, ureters, bladder, abdominal cavity, sometimes the liver, blood vessels and heart; manifested by intoxication of the body, uremic phenomena, bloody urine. The literature describes cases of human infection with dioctophyma and rarely cattle. The disease relates to the group of helminthiases caused by aphasmidia nematodes [1, 2].

The systematic position of the dioctophimosis pathogen [1]:
Class -
Subclass -
Order -
Suborder -
Superfamily -
Family -
Genus -
Specie -

The Dioctophyme renale pathogen, is a nematode referring to the Dioctophymidae family, the only specie of the Dioctophyme. D. renale genus, represents sexual dimorphism and is considered the largest nematode, which infects the domestic animals, males can reach a length of 40 cm, and females can reach up to 100 cm [3]. The female has the rounded tail end, its vulva opens at the level of the initial part of the esophagus. The male has the tail end, which ends with a bell-shaped bursa, from which a spicule protrudes. The papillary tubercles in the form of two circles are around the mouth of the helminth [2].

Reproduction occurs by discharging eggs of 0.077 - 0.083x0.046 - 0.047 mm, brown, with lids at the poles. The egg shell consists of three layers: the outer, inner and vitelline membrane. The surface of the egg is dotted with small impressions like pockets. Eggs are secreted into the environment with the urine of a sick animal [2].

Dioctophyma are biohelminths. The pathogen development takes place with the participation of two hosts: definitive and intermediate hosts.

Definitive hosts: The main definitive hosts are ermines and canids. However, this nematode has been reported in pigs, cats, horses, cattle and other mammals such as wild cat, cheetah, coati, focid densification, mongoose rat [4]; and about 24 cases have been reported in humans [5], therefore, it is considered a zoonotic disease.

Intermediate hosts: *Branchiobdella* or *Lumbriculus* oligochaetes.

Additional and reservoir hosts: fish (sabrefish, perch, barbel, mackerel, spike, shovel, pike, catfish, gambusia and some other cyprinids), in the body of which helminth larvae are encapsulated, remaining viable for a long time [2].

Sexually mature females, localized in a sick animal in the renal pelvis, ureters, and bladder, lay eggs, which are excreted with the urine into the external environment. Eggs, which fall into the water, are developed within 25 to 30 days. They form larvae, which reach 0.28 - 0.31 mm in length.

The eggs with developed larvae are swallowed together with detritus by the first intermediate hosts - oligochaetes of the *Branchiobdella* or *Lumbriculus* genus. In the intestine of the oligochaetes, larva emerges from the egg and migrates into the abdominal blood vessel, where it grows and develops. After 45-60 days, depending on the water temperature, the first molt occurs and the larva turns into the second stage, reaching 0.885-1.181 mm in length. After 3.5 - 4 months the larva molts for a second time and turns into a third-stage larva, reaching 6.905 - 8.018 mm in length. At this stage of larval development, young males and females are formed.

Oligochaetes infected by invasive larvae are eaten by fish, the second intermediate hosts (sicklefish, perch, barbel, shemaya, ship, shovelnose sturgeon, pike, catfish, gambusia and some other cyprinids) [2].

The further development of the third stage larva occurs only in the organism of the definitive host, where it can enter together with the oligochaetes or with infected fish. Larvae of dioctofimide, once entered in the intestines of the final host (carnivores or humans), penetrate its wall, enter the body cavity and migrate through the body, reaching the renal pelvis. At this time, the larvae molt twice. The life cycle of dioctofimide is completed in 8.5 - 9 months.

The lifespan of a nematode in the organism of a definitive host is up to 3–5 years [2].

Epizootological data. Locally, dioctophimosis of carnivores is found in areas of Transcaucasia, Central Asia, Kazakhstan, the Far East, Karelia and Siberia in large river basins. Dioctophimosis is registered in far abroad countries: Italy, Austria, Germany, Holland, France, England, Japan, North and South America [2]. For example, infection of dogs in some areas of North America reaches up to 37%, in Kazakhstan it ranges from 1 to 9% [6]. This parasite has a worldwide distribution, however, most reports have been received from South-East Asia [7.8].

Epidemiology. Human dioctophimosis is registered in many countries of the world: Argentina, Paraguay, Brazil, the USA, a number of European countries, Iran, South Vietnam, China, Japan. In the CIS countries, it is more often found in Tajikistan, Uzbekistan, Kazakhstan, isolated cases are registered in Leningrad and Arkhangelsk regions. Since annelids (intermediate hosts of Dioctophyme renale) live on the wet coasts of water bodies, endemic foci are confined to river valleys and lakes [6].

Symptoms and pathogenesis. Mostly sexually mature helminths are localized in animals in the kidneys and less often in the abdominal cavity. But, before getting there, nematodes migrate from the stomach of a mammal, where they get with fish or oligochaetes. They invade the muscle layer of the stomach wall, causing a hematoma. Then they migrate to the body cavity and are closer to the liver. Penetrate into its parenchyma, and then into the renal pelvis. As a result, its wall is greatly stretched and thinned, the kidney atrophies. Sometimes the nematode enters the urethra. All this leads to significant violations of these organs and painful phenomena of the whole organism. An animal or a human does not have appetite, vomiting, general exhaustion, and an oppressed state appear. A muddy, bloody liquid accumulates inside the renal pelvis, its smell resembles that of urine. The mucous membrane of the renal

pelvis becomes grayish-white or yellowish in color. In places of degenerated areas, the lime salt are deposited in the form of multiple lumps [2,6].

Pathological changes in the human body at the onset of the disease are associated with the migration of larvae into the abdominal cavity and into the liver, which is accompanied by hemorrhages, serous-fibrinous inflammation of the mesentery, venous congestion in the liver, and the formation of granulomas and scars at the sites of damage. During parasitization of adult helminths in the human renal pelvis, the kidney parenchyma is destroyed step by step, and the capsule is preserved only. The right cavity, directly adjacent to the duodenum, from which the parasite larvae migrate, is more often affected [6, 9].

The most characteristic symptoms of the disease are renal colic, pyuria, hematuria, oliguria and anuria. Often there are complaints of pain in the lumbar region, which spread throughout the abdomen.

Complications in humans are renal coma [6.10].

In fish, Dioctophyme renale larvae reach 6.9 - 8.2 mm in length and 0.19 - 0.2 mm in width. They are localized in the internal organs: in the intestinal wall, on the peritoneum, mesentery, in the gonads, a connective tissue capsule is formed around them.

Diagnosis. To make a diagnosis during life, urine is examined for the parasite eggs and an ultrasound examination of the kidneys (ultrasound) is performed. Posthumously, disease is diagnosed on the basis of an autopsy of animals and finding a nematode in the kidney, less commonly in other organs [2].

When examining the fish, encapsulated larvae are found in the intestine, mesentery, and gonads [2].

Treatment. The only treatment at this time is surgery and extraction of Dioctophyme renale from the affected organ. There is evidence of attempts to treat animals with ivomek, praziquantel, levomizole, etc. [2, 6, 11].

Prevention of the disease is to identify dysfunctional water bodies and prohibit to feed the animals with raw fish. In areas unfavorable due to dioctophimosis, dogs are not allowed to sites of catching and cutting fish. The diet of fur-bearing animals excludes the raw fresh fish caught in reservoirs unsuccessful due to this invasion. They explanatory work is conducted among fisheries workers and among the population on the prevention of dioctophimosis [12,13,14,15,16].

The epidemiological and epidemiological situation with many helminthiases of carnivores, especially in zoonotic helminthiases in Kazakhstan and in neighboring countries, should be improved. In the world, especially in tropical and subtropical countries, the epidemiological and epidemiological situation regarding zoonotic helminthiases is very problematic. For example, according to the classification of the Office International des Epizooties (OIE), some helminthiases, in particular echinococcosis, which is spread among population and productive animals by the carnivorous, are included in the list of the most common diseases and in many countries are included in national programs to eliminate the disease. The annual costs for treating patients and losses in animal husbandry are amounted to USD 3 bln. Kazakhstan is among the regions permanently unfavorable for echinococcosis. World experience shows that establishing the incidence of helminth infections in animals allows us to assess the degree of threat to humans. According to the World Health Organization (WHO), every year a quarter of the population (more than 1.4 billion people) is infected with parasites, the most significant group of which is helminths. Nematodoses are the most common of the helminthiases [17].

Kazakhstan also has a difficult epidemiological and epidemiological situation regarding zoonotic helminthiases. From the State report on the situation in Kazakhstan, it follows that the epidemiological situation with parasitosis in the country poses a threat to public health. About 20,000 cases of parasitosis are recorded annually in Kazakhstan, the intensive incidence rate is on average about 24.2 per 100 thousand people. A number of researchers (Kereyev Ya.M., 2010; Shalmenov M.Sh., 2005; Akshulakov S.K., 2002; Amireyev S.A., 2002; Shabdarbayeva G.S., Abdibekova A.M., Shapiyeva Zh.Zh., 2012; Lider L.A., 2009; Shabdarbayeva G.S. et al., 2016) note a large infection of carnivores and humans with zoonotic helminthiases [18-23].

In Kazakhstan, a number of scientists performed researches related to monitoring of helminthiases of carnivorous zoonotic helminthiases. 11 species of helminths from different systematic groups were registered in the studied carnivorous. From the class of trematodes, only 1 species was noted - *Opistorhis felineus*; from the cestode class 4 species: *Multiceps multiceps, Dipilidium caninum, Echinococcus granulosus, Alveococcus multilocularis*; from the class of nematodes of 6 species: *Dioctophyme renale, Toxocara canis, Toxascaris leonina, Ancylostoma caninum, Trichocephalus vulpis, Dirofilaria immitis.*

The greatest invasion in carnivores was noted by various nematodes, in particular, the species *Toxascaris leonina* that amounted to 28.9% of the total number of infected animals. A rather high infection was observed in carnivorous with toxocariasis: 22.4%. Significant invasion was also noted by the species from the cestodes *Dipilidium caninum*, which is 13.8%. All the above types of helminths are dangerous in human infection and can cause significant damage to his health. The remaining helminths, including dioctophimosis (*Dioctophyme renale*) are presented in isolated cases - from 0.7% to 5.8%. The average helminth infection in the studied dogs was 79.6% [24]. Based on the monitoring results, recommendations were suggested on the control of zoonotic helminthiases and on methods for detecting larval stages of helminths in fish [25, 26].

In connection with the increase in the number of livestock, the types of their diseases are also increasing today. Since invasive diseases occur in all types of domestic animals, they cause enormous damage to the national economy. Many invasive diseases, in particular parasitic diseases lead to mass death of animals [27].

Results. The studies were carried out in Almaty clinics. 17 cases of a rare helminthiasis nematode disease - dioctophimosis in dogs were registered during 2018-2019.

During the anamnesis, the nature of nutrition of the dogs was ascertained whether the animals were fed with raw fish or not. If so, where was the fish come or purchased from?

Clinical examination was carried out using methods of animal thermometry, focusing on the nature of urination: difficult or not; urination frequency; pain during urination; color and texture of urine.

Then, several portions of urine were obtained from dogs, and urine was centrifuged at 1000 rpm within 1 minute. The supernatant was carefully drained, the suspension remaining at the bottom of the centrifuge tube was pipetted by portions on a glass slide and viewed under a microscope at 10 × 40 magnification. Characteristic Dioctophyme renale eggs were found (figure 1). The preliminary clinical diagnosis in all cases was confirmed by intravital urine examination.

During ultrasound examination of the kidneys (ultrasound) contours of 1 or 2 helminths were found in the renal pelvis in dogs. The phenomena of kidney atrophy from squeezing of tissues by a parasite and coagulated helminth in the renal pelvis were observed (figures 2–4).

Having established a positive diagnosis and location of helminths, surgical treatment of dioctophimosis was performed. The progress of operation to extract Dioctophyme renale from the kidney is shown in figures 5–16.

At first, the type of anesthesia for the animal was determined. The need and dosage of anesthesia were calculated and given according to the weight of the animal. Next, the access points to the kidney were determined, the incision site was planned, the incision site was treated with aseptic antimicrobial agents, and the abdominal wall was incised. Then, reaching the kidney, suction of fluid collected around the kidney as a result of the inflammatory process was performed.

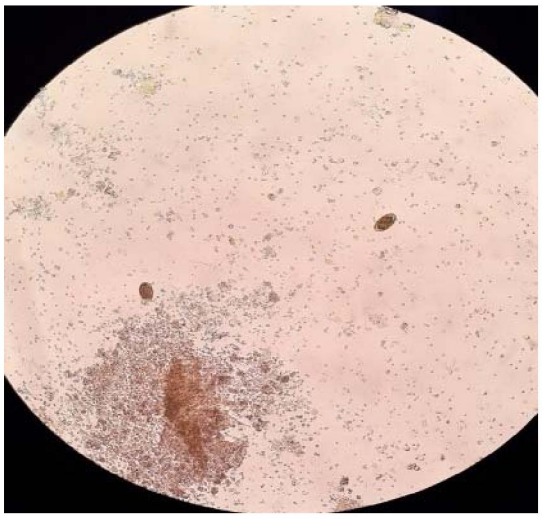

Figure 1 – Dioctophyme renale eggs at 10x40

Figure 2 – Dog's kidney ultrasound Results

magnification

Figure 3 – Dioctophyme renale in the dog's kidney pelvis

Figure 4 – Dog's kidneys ultrasound examination results

Figure 5 –
Incision of the abdominal wall

Figure 6 – Suction of fluid
from the tissues around the kidney

Figure 7 –
Incision of the kidney wall

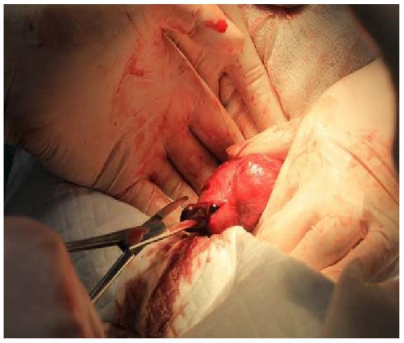

Figure 8 – Capturing helminth
with forceps

Figure 9 – Removing helminth
from the kidney

Figure 10 – Helminth extracted
from the dog's kidney

Figure 11– *Dioctophyme renale*
from the dog's kidney

Figure 12 – Female and
male of *Dioctophyme renale*

Figure 13 – Measurement
of *Dioctophyme renale*

from the dog's kidney

Figure 14 – Head end of *Dioctophyme renale*

Figure 15 – Suture on the wall of the abdominal cavity after surgery

Figure 16 – Postoperative anesthesia in a dog

A small incision was made in the kidney wall, the forceps were carefully inserted into the incision, the helminth was fixed, and removed carefully through the incision using the twisting method (figures 5–9).

The extracted helminths were identified by genus and species, measured, museum preparations were prepared from them, which replenished the parasitological museum of the department.

The condition of the patients after the surgery was satisfactory in all cases, there was no temperature reaction, the food was taken with pleasure, the wound healed by primary intention. Urination is not difficult, the kidneys regained their function.

Conclusion. Taking into account the geographical location of Almaty, the lack of large rivers around the metropolis with the above species composition of fish, it becomes clear why there is a very small infection of carnivorous with dioctophimosis. Cases of infection of the dog with dioctophimosis in our clinical practice are apparently imported cases. But infection of carnivores and humans from invasive fish imported from regions unsuccessful for this disease is not excluded.

А. И. Балгимбаева, Г. С. Шабдарбаева,
Л. О. Жантелиева, А. С. Ибажанова, Д. М. Хусаинов

Қазақ ұлттық аграрлық университеті, Алматы, Қазақстан

ИТТЕРДІҢ ДИОКТОФИМОЗЫН БАЛАУ ЖӘНЕ ЕМДЕУ

Аннотация. Мақалада соңғы уақытта Алматы қаласының ветеринариялық клиникаларында тіркелген, үй және жабайы етқоректі жануарлардың сирек кездесетін ауруы – диоктофимоз, бүйректерде паразит-телетін афазмидиялық нематод тобының гельминті тудыратын Dioctophyme renale бойынша материалдар ұсынылған. Аурудың маңызды әлеуметтік мәні бар - адам оған сезімтал, инфекция шикі балық жеген кезде пайда болады. Алматыда соңғы жылдардағы (2018-2019) ветеринарлық клиникалардың статистикасына сәйкес иттерде диоктофимоздың 17 жағдайы тіркелді, бұл гельминтозға тексерілгендердің 0,3% құрайды. Біздің аймақ үшін салыстырмалы түрде жаңа пайда болған бұл аурудың пайда болуы эпизоотологиялық және эпидемиологиялық жағдайға айтарлықтай әсер етуі мүмкін. Иттердегі диоктофимозды тірі кезіндегі зертханалық диагностикасының нәтижелері, паразит жұмыртқаларының микрофотографиясын ұсына отырып, овоскопиялық әдістермен; аспаптық диагностика әдістерімен – бүйректі ультрадыбыстық зерттеу (УДЗ), бүйректің лоханкасында паразиттің болуын дәлелдейтін фотосуреттерді қолдана отырып ұсынылған. Диоктофимозды емдеудің жалғыз әдісі хирургиялық араласу және зақымданған мүшелерден (бүйректен) диоктофимдерді алу болып табылатындықтан, иттерді бүйректен гельминтті алу және жануарларды емдеу мақсатында кезең-кезеңмен оперативтік араласу бойынша өзіндік бірегей материалдар келтірілген. Операциядан өткен жануарлардың жағдайы қанағаттанарлық, операциядан өткен кездегі болжам қолайлы.

Түйін сөздер: иттер, ет қоректілер, гельминттер, гельминтоздар, мониторинг, нематодтар, эпизоотологиялық-эпидемиологиялық жағдай, гематурия, диоктофимоз, УДЗ, ХЭБ, ДДҰ, инвазирленген материал, несеп, нәжіс, бүйрек, операциялық емдеу.

А. И. Балгимбаева, Г. С. Шабдарбаева,
Л. О. Жантелиева, А. С. Ибажанова, Д. М. Хусаинов

Казахский национальный аграрный университет, Алматы, Казахстан

ДИАГНОСТИКА И ЛЕЧЕНИЕ ДИОКТОФИМОЗА СОБАК

Аннотация . В статье представлены материалы по зарегистрированным в последнее время в ветеринарных клиниках г. Алматы редком заболевании домашних и диких плотоядных – диоктофимозе, вызываемом гельминтом из группы афазмидиевых нематод - *Dioctophyme renale,* паразитирующего в почках. Заболевание имеет важное социальное значение – к нему восприимчив человек, заражение которого происходит при употреблении в пищу сырой рыбы. В условиях г.Алматы по статистическим данным ветеринарных клиник за последние годы (2018-2019 гг.) зарегистрировано 17 случаев диоктофимоза у собак, что составляет до 0,3% от числа исследованных по поводу гельминтозов. Появление данного, относительно нового для нашего региона заболевания, может оказать значительное влияние на эпизоотолого-эпидемиологическую обстановку. Представлены результаты прижизненной лабораторной диагностики диоктофимоза у собак овоскопическими методами, с предоставлением микрофотографий яиц паразита; методами инструментальной диагностики – ультразвуковым исследованием (УЗИ) почек с предоставлением фотографий, доказывающих наличие паразита в лоханке почки. Так как единственным методом лечения диоктофимоза является хирургическое вмешательство и извлечение диоктофим из пораженного органа (почки), приведены собственные оригинальные материалы по поэтапному оперативному вмешательству с целью извлечения гельминта из почек собак и лечения животных. Состояние прооперированных животных удовлетворительное, прогноз при проведении оперативного вмешательства благоприятный.

Ключевые слова: собаки, плотоядные, гельминты, гельминтозы, мониторинг, нематоды, эпизоотолого-эпидемиологическая обстановка, гематурия, диоктофимоз, УЗИ, МЭБ, ВОЗ, инвазированный материал, моча, фекалии, почки, оперативное лечение.

Information about authors:

Balgimbayeva A., Kazakh National Agrarian University, Almaty, Kazakhstan; https://orcid.org/0000-0002-4187-6733

Shabdarbaeva G., Kazakh National Agrarian University, Almaty, Kazakhstan; shgs52@mail.ru; https://orcid.org/0000-0001-5708-5162

Zhanteliyeva Laura, Kazakh National Agrarian University, Almaty, Kazakhstan; laura.zhanteli.@kaznau.kz; https://orcid.org/0000-0002-7564-2089

Ibazhanova A., Kazakh National Agrarian University, Almaty, Kazakhstan; sema.serikova@mail.ru; https://orcid.org/0000-0002-2833-1413

Khussainov Damir, Kazakh National Agrarian University, Almaty, Kazakhstan; doctor-vet@mail.ru; https://orcid.org/0000-0002-0244-8381

REFERENCES

[1] Fedorov K.P. i dr. Osnovy obshhej i prikladnoj veterinarnoj parazitologii. Novosibirsk, 2004. S. 650-655.

[2] Akbaev M.Sh., Vasilevich F.I., Akbaev R.M., Vodjanov A.A., Kosminkov N.E., Pashkin P.I., Jatusevich A.I. – Parazitologija i invazionnye bolezni zhivotnyh//M., «KolosS», 2008. S. 347-349.

[3] Ferreira, V.L., Medeiros, F.P., July, J.R., Raso, T.F., 2010. Dioctophyma renale in a dog: clinical diagnosis and surgical treatment. Vet. Parasitol. 168, 151–155 doi:10.1016 /j.vetpar.2009.10.013

[4] Measures, L., 2001. Dioctophymatosis. In: Samuel, W., Pybus, M., Kocan, A. (Eds.), Parasitic Diseases of Wild Mammals. Iowa State University Press/Ames, Iowa, pp. 357–364. ISBN 0-8138-2978-X

[5] Chauhan, S., Kaval, S., Tewari, S., 2016. Dioctophymiasis: a rare case report. J. Clin. Diagn. Res. 10, DD01–DD02. doi: 10.7860 / JCDR / 2016 / 17394.7305

[6] Sergiev V.P., Lobzin Ju.V., Kozlov S.S. Parazitarnye bolezni cheloveka (protozoozy i gel'mintozy). Rukovodstvo dlja vrachej. Sankt-Peterburg, «Foliant», 2006, S. 461-463.

[7] Hajialilo, E., Mobedi, I., Masoud, J., Hasanpour, H., Mowlavi, G., 2015. Dioctophyme renale in Vulpes vulpes from the Caspian Sea littoral of Iran. Iran. J. Public. Health. 44, 698–700. PMID:26284212 PMCID: PMC4537628

[8] Zolhavarieh, S.M., Norian, A., Yavari, M., 2016. Dioctophyma renale (Goeze, 1782) infection in a domestic dog from Hamedan, Western Iran. Iran. J. Parasitol. 11, 131–135 Available at: http://ijpa.tums.ac.ir

[9] A.S. Ibazhanova, G. S. Shabdarbyeva, N. P. Ivanov, A. M. Namet, M. A. Aliyev, D. M. Bekenov//Ketosis of cattle in the farm "Vayserke-agro» News of the national academy of sciences of the republic of Kazakhstan series of agricultural sciences ISSN 2224-526h Volume 2, Number 50 (2019), 45 – 50 https://doi.org/10.32014/2019.2224-526H.15

[10] Amireev S.A. Jepidemiologija. Chastnaja jepidemiologija. 2 tom. Almaty, 2002. 687 s.

[11] Urkhart G. i dr. Veterinarnaja parazitologija. M., «Akvarium», 2000. S. 124-125.

[12] Zhavoronok S.V., MiCura V.M., Krasavcev E.L., Mihajlov M.I., Karpov I.A., Semenov V.M. – Tropicheskie i parazitarnye bolezni//Minsk, «Vyshjejnaja shkola», 2014. 349 s.

[13] Belov, A.D. Bolezni sobak /A.D. Belov, E.P. Danilov, I.I. Dikur i dr. -M.: Kolos, 1995. 2-e izd. - 205 s.

[14] Berkinbaj O., Ahmetsadykov N. Bolezni zverej i ptic. Uchebnik. «Prints», Almaty, 2009, 432 s.

[15] Lider L.A. Invazionnye bolezni plotojadnyh i pushnyh zverej. Tipografija KATU, Astana, 2009, 180 s.

[16] Romanenko N.A. i dr. Sanitarnaja parazitologija. M., «Medicina», 2000. 1 Mezhdunarodnye rukovodjashhie principy tehniki bezopasnosti JuNEP v oblasti biotehnologii // JuNEP. 1995. 39 s.

[17] Informacionnyj bjulleten' № 99 Vsemirnoj organizacii zdravoohranenija. Ijul' 2013 g. [Jelektronnyj resurs]. – Rezhim dostupa: http:// www. who. int/ mediacentre/ factsheets/fs099/ru/

[18] Kereev Ja.M. Jehinokokkoz zhivotnyh. Monografija -Ural'sk, 2010.- 197 s.

[19] Shalmenov M.Sh. Rekomendacii po profilaktike jehinokokkoza s/h zhivotnyh v Zapadno-Kazahstanskoj oblasti. – Ural'sk, 2005. – 18 s.

[20] Akshulakov S.K. Jehinokokkoz cheloveka //Almaty, 2002. – 86 s.

[21] Shabdarbaeva G.S., Abdibekova A.M., Shapieva Zh.Zh. Antropozoonozy i mery ih profilaktiki v Respublike Kazahstan//Monografija. Almaty, «S-Print», 2012, 104 s.

[22] Shabdarbaeva G.S., Abdybekova A.M., Shalmenov M.Sh., Shapieva Zh.Zh. - Jepizootologo-jepidemiologicheskij analiz zoonoznyh gel'mintozov v zapadnyh regionah Kazahstana//Materialy Mezhdunarodnoj nauchno-prakticheskoj konferencii «Veterinarija v HHI veke: problemy, metody, reshenija», KazATU, g.Astana. 2016. S. 216-220.

[23] «Rekomendacii po kontrolju zoonoznyh gel'mintozov v Kazahstane»//Rekomendacii. Almaty, Izd-vo «Print-Master», 2017. 50 s. (Avtory: G.S.Shabdarbaeva; D.M.Husainov, S.S.Amirgalieva, H.B.Abeuov; G.E.Turganbaeva, A.S.Ibazhanova, Zh.Zh.Kenzhebekova; A.I.Balgimbaeva.

[24] Mandrykina Ul'jana, Shabdarbaeva G.S. - Sluchaj dioktofimoza u sobaki v g.Almaty//Materialy X Mezhdunarodnoj studencheskoj jelektronnoj nauchnoj konferencii «Studencheskij nauchnyj forum-2018», Moskva, 2018. Sajt: http://scienceforum.ru/2018/3/7953.

[25] Metodicheskie rekomendacii «Metody issledovanija ryb»//Metodicheskie rekomendacii utverzhdeny na NTS NII problem animalogii pri KazNAU. Izd-vo «PRINT-MASTER», Almaty, 2017. 35 s. = 1,5 p.l. (Shabdarbaeva G.S., Isbekov K.B., Asylbekova S.Zh., Kojshybaeva K.K., Ibazhanova A.S., Kenzhebekova Zh.Zh., Turganbaeva G.E.).

[26] «Rekomendacii po patologicheskoj morfologii parazitarnyh boleznej ryb»//Rekomendacii utverzhdeny na NTS NII problem animalogii pri KazNAU. Izd-vo «PRINT-MASTER», Almaty, 2017. 20 s. = 1,5 p.l. (Shabdarbaeva G.S., Isbekov K.B., Asylbekova S.Zh., Kojshybaeva K.K., Ibazhanova A.S., Kenzhebekova Zh.Zh., Turganbaeva G.E.).

[27] Shabdarbaeva G., Ibazhanova A., Kenzhebekova Zh., Balgimbayeva A., Zhanteliyeva L. - Clinical-morphology of moneyosiosis in sheep // zhurnal «Izvestija NAN. Serija agrarnyh nauk», №3(45) 2018. ISSN 2224-526X. Maj-ijun'. P. 67-72.