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ORGANIZATION OF EFFECTIVE METHODS OF PREVENTION AND DETECTION OF LESIONS OF DOMESTIC BIRDS WITH HELMINTHIC DISEASES ON THE TERRITORY OF THE CITY OF ARYS, TURKESTAN REGION

ANNOTATION

This article examines the dynamics of damage and preventive measures to the most common types of helminths (Ascaridia, Heterakis, Capillaria) that parasitize domestic birds in the territory of the Arys District of the Turkestan region. The aim of this research is to acquire expertise in helminthological investigation techniques. The practical importance of this study lies in the significant role that helminthiasis plays among the diseases affecting domestic chickens, which can lead to economic challenges within the poultry industry. Some helminths of domestic chickens cause mass death on the farm, exposing all birds to disease. Many types of helminthiases are chronic and provide gradual molting of the bird, inhibit the development of young chickens. Among the diseases of poultry in the Arys District of the Turkestan region, helminthiasis occupies a large place and is known to bring an economic crisis to poultry farming, therefore, to identify effective ways of measures to prevent and combat helminthiasis. Diagnosis of helminthiasis in domestic chickens during life does not give the desired result based on clinical signs, since these symptoms resemble the symptoms of other diseases. Therefore, the diagnosis of helminthiasis in birds during life is based on laboratory research methods, when the presence or absence of helminth eggs, parts of the body, and sometimes parasitic adult worms in the feces is determined. At the heart of helminthocoprological research is the study of fecalias by macroscopic and microscopic means.

Key words: *helminthology, poultry, coprological method, macroscopy, helminthoscopy, fecalia, eggs*

Introduction. Poultry farming is considered a viable sector within rural agriculture due to its ability to produce in a short time frame. The reason being, with minimal investment and in a short period, one can provide dietary food – meat and eggs. Chicken eggs are a rich source of vitamins. Its meat is easily digestible and nutritiou [1].

Helminthology is derived from ancient Greek words: «helmins» meaning worm and «logos» meaning science. It is the study of parasitic worms, or helminths, and the diseases they cause, known as helminthiases. In Russian, these worms were also referred to as «glist». Later on, based on the suggestion of academic Skryabin, the term «glist» was replaced with the term «helminth» [2].

Helminthiasis refers to the diseases caused by these worms or helminths. This disease can be found in humans, animals, and even plants. These parasites often reside in the internal organs (or tissues) of humans and animals, such as the lungs, liver, stomach, intestines, etc. [3; 4].

Special attention should be given to the inflammation of the stomach-intestinal tract, as this leads to the limited expansion of food, the liver's impaired function, and increased energy consumption for digestion [5].

In the CIS region, 50 types of helminths are found in domestic chickens, while in Kazakhstan there are 27 types, and in the Turkestan region, 16 types are observed [6; 7; 8].

Endoparasites in birds play a significant role in their preservation, biodiversity, and evolution [9].

Helminthiases occupy a significant place among the diseases of domestic chickens, leading to economic losses in poultry farming. Some helminths in domestic chickens can infect all birds in the farm, often leading to significant mortality. Many types of helminthiases manifest in a chronic form, weakening the bird and hindering its growth, particularly affecting young chickens [10].

In such cases of infection, there are reports of significant reductions in egg production and increased mortality [11].

The development of parasitology in our country was closely linked with Russia. In Kazakhstan, which was part of the Soviet Union, the helminthology laboratory was established in 1925 by the National Veterinary-Bacteriological Institute (now known as the Veterinary Science and Research Institute).

Many parasitologists worked there, making significant contributions to the study of helminths and the diseases they cause. Notable figures like Academician S. N. Boev, Professor R. S. Shultz, veterinary science candidate Z. K. Karabayev, and later Professors G. I. Dikov and V. T. Ramazanov extensively researched helminthiases prevalent in our country and determined strategies to combat them [12].

Materials and Methods. Research work was conducted in 2020–2021 in private poultry farms located in Arys city and the villages of Akdala and Dermene, within the Arys district. As of January 1, 2021, there were 69 615 domestic poultry birds in the Arys district, which is an increase of 3,131 birds or 109.7 % compared to 2020. Specifically, 19 970 birds were registered in Arys city, 15 500 in Akdala village, and 17,100 in Dermene village.

Coprological materials were collected from 4–5-month-old chickens in private farms of Arys city, Akdala, and Dermene villages in the Turkestan region. Samples were taken once every two months. Diagnosing helminthiasis in live chickens based on clinical signs often doesn't provide accurate results, as these symptoms can resemble other diseases. Therefore, the diagnosis of helminthiasis during the active phase in birds relies on laboratory research methods. In this context, fecal samples are analyzed to determine the presence or absence of helminth eggs, body parts, or in some cases, parasitic worms [13]. During the diagnosis of helminthiasis in live birds, helminth coprological studies are conducted. The foundation of helminth coprological studies is the examination of feces through both macroscopic and microscopic methods.

The macroscopic examination, or macrohelminthoscopy, of feces is used to identify entire specimens of helminths or their fragments in the feces. These helminths can either naturally be present in the feces or may be expelled due to the effects of various antihelminthic treatments [14].

The passage in Kazakh translates and can be paraphrased in English as:

The helminthoscopic method is also used to evaluate the effectiveness of deworming treatments.

Research Technique: Considering that the natural excretion of helminths is rare, it's essential to collect a full portion of the feces for helminthoscopic examinations. To determine the effectiveness of antihelminthic treatments, all excrements from birds should be collected 2–4 days after deworming.

All the collected feces from the birds are first visually inspected from the surface, during which large helminths and segments of cestodes can be observed. Subsequently, the feces are placed into a fine sieve, mixed with 5–10 times its volume of water, and thoroughly stirred.

Any visible helminths are then extracted with tweezers and examined under a microscope to identify their specific type [15].

Fulleborn Method: This method is widely used in veterinary helminthological experiments due to its simplicity and high efficiency. It is particularly effective in detecting many types of nematode larvae. Here's how the Fülleborn method is performed:

Prepare a saturated solution of table salt by adding as much salt to boiling water in a pot as it can dissolve. Once no more salt can dissolve, it's considered saturated. Filter this solution through a funnel lined with muslin or another filter cloth. Let the solution cool down. The settling of salt crystals indicates that the solution has been correctly prepared. Pour the saturated salt solution into a regular glass, and mix it with a portion of the feces. The feces need to be thoroughly mixed in the solution. Any large particles

that float to the surface should be removed with a spatula. Then, the rest can be filtered through muslin into another glass. Leave this for half an hour or so. Most of the parasitic larvae will float to the surface because their specific gravity is less than that of the saturated salt solution. For examination, take a drop from the surface layer using a loop, typically ranging in diameter from 5 mm to 1 cm. After each test, the loop should be flamed to prevent any larvae from being transferred to subsequent samples. The taken drop is then placed on a microscope slide, covered with a coverslip, and examined under a microscope.

To enhance the effectiveness of the Fülleborn method, researchers sometimes use saturated solutions of other substances instead of table salt. These alternatives can include thiosulfate, sodium nitrate, magnesium sulfate, sugar, glycerin, and so forth [16; 17].

Helminthological Examination Methods in Young Birds: The diagnosis of helminth infections in young birds is determined through both clinical-epizootiological and laboratory examination methods. When it is difficult to detect the disease early, helminthological examinations of the changed organs during the development are used.

External symptoms in birds become noticeable about 7–10 days after they have been infected with worm larvae. The disease causes a reduction in the hatching of eggs, and the birds appear weakened. Their feather quality deteriorates, they become less active, their wings droop, and digestion and defecation issues can be observed. Diarrhea may also be a symptom [18–19].

For diagnosing ascariasis (roundworm infection) in young birds based on their external symptoms, researchers use the Fülleborn or Darling helminthoscopic methods to detect worm larvae in feces. It is essential to differentiate the larvae of ascaridia (a type of roundworm) from heterakis due to the latter's larvae being very soft and having a distinct appearance. The primary confirmation of a bird's death from ascariasis is the discovery of nematodes (roundworms) inside its body [20–21].

Changes Observed in Infected Birds: In affected birds, there is noticeable inflammation of the intestines and a reddening of the skin around the vent. Atrophy (wasting away) can be seen in the muscle tissues and certain organs such as the liver, spleen, etc. Due to the presence of numerous worms in the intestines, it may become blocked or narrowed, leading to potential rupture. Interestingly, it's not unusual to find roundworms (ascariasis worms) inside the eggs of the bird. This occurs because the worms can move from the intestines to the cloaca and from there enter the oviduct, eventually making their way into the egg [22; 23].

Results and Discussion. Utilizing the Helminthoscopic Examination Method by Fullborn: The above-mentioned helminthoscopic examination method by Fullborn was employed to analyze fecal samples. These samples were periodically collected every two months from 120–130 day-old chickens sourced from private poultry farms in locations like Arys city, Akdala, and the Dermen village. Additionally, in the private poultry farm in Arys city, 20 of the 120-150 day-old domestic chickens were examined. Using the helminthoscopic examination techniques, various types of parasites were identified. The results of the investigation are presented in Table 1.

Table 1 – Types of Larvae Found (within Arys City)

No.	Species of parasites where larvae were detected			
	Ascaridia galli	Heterakis gallinarium	Capillaria caudinflata	Eimeria
1	D	D	ND	ND
2	D	ND	D	D
3	ND	D	D	ND
4	D	D	ND	ND
5	D	D	ND	D
6	D	ND	ND	D
7	D	D	ND	ND
8	D	ND	ND	ND
9	D	ND	D	D
10	D	ND	ND	D
11	D	D	ND	ND
12	ND	D	D	D
13	D	D	ND	ND

14	ND	D	ND	D
15	D	ND	ND	D
16	D	ND	ND	ND
17	D	ND	ND	ND
18	D	ND	D	ND
19	D	ND	D	ND
20	D	ND	ND	ND
**Note:* D – determined; ND – non-determined.				

The table leads to the following insights:

1. Of 20 examined chickens, 17 were infected with the Ascaridia galli worm, resulting in an 85 % infection rate.

2. Heterakis gallinarium larvae were present in 9 out of the 20 chickens, accounting for a 45 % infection rate.

3. 6 chickens showed traces of Capillaria caudinflata larvae, corresponding to a 30 % infection rate.

4. 8 chickens had Eimeria larvae, signifying a 40 % infection rate.

Continuing the research, 20 chickens from a personal farm in the Akdala village, aged between 120 to 150 days, were analyzed. Different parasite species were detected using the helminthoscopic methods previously discussed. These findings are depicted in the subsequent table (Table 2).

Table 2 – Types of Larvae Found (within Akdala)

No.	Species of parasites where larvae were detected			
	Ascaridia galli	Heterakis gallinarium	Capillaria caudinflata	Eimeria
1	2	3	4	5
1	D	ND	ND	ND
2	D	D	D	ND
3	ND	D	D	ND
4	D	D	ND	ND
5	ND	ND	ND	ND
6	ND	ND	ND	ND
7	D	D	D	ND
1	2	3	4	5
8	D	D	D	ND
9	ND	ND	ND	ND
10	D	D	ND	D
11	D	ND	ND	ND
12	D	ND	ND	ND
13	D	D	D	ND
14	ND	D	D	D
15	D	D	ND	ND
16	ND	ND	ND	ND
17	ND	ND	ND	ND
18	D	D	D	ND
19	D	D	D	ND
20	ND	ND	ND	ND
**Note:* D – determined; ND – non-determined.				

The data from the table leads to these insights:

1. Of the 20 studied chickens, 12 tested positive for the Ascarida galli worm, signifying a 60 % infection rate.

2. 11 out of the 20 chickens were infected with Heterakis gallinarium larvae, translating to a 55 % infection rate.

3. Capillaria caudinflata larvae were present in 8 chickens, making up a 40 % infection rate.

4. Only 2 out of the 20 chickens showed traces of Eimeria larvae, equating to a 10 % infection rate.

Further, 20 chickens from a personal farm in the Dermene village, aged between 120 to 150 days, underwent examination. Different parasite species were detected using helminthoscopic methods. These findings will be detailed in an upcoming Table 3.

Table 3 – Types of Larvae Found (within Dermene)

No.	Species of parasites where larvae were detected			
	Ascaridia galli	Heterakis gallinarium	Capillaria Caudinflata	Eimeria
1	2	3	4	5
1	2	3	4	5
1	D	D	ND	ND
2	D	ND	D	D
3	ND	D	D	D
4	D	ND	ND	ND
5	D	D	ND	D
6	ND	ND	D	D
7	D	D	ND	ND
8	D	D	ND	D
1	2	3	4	5
9	ND	ND	D	D
10	D	ND	ND	D
11	D	ND	D	ND
12	ND	D	D	D
13	D	D	ND	ND
14	ND	D	ND	D
15	D	ND	D	D
1	2	3	4	5
16	D	D	ND	ND
17	D	D	ND	ND
18	D	D	D	ND
19	D	ND	D	ND
20	D	D	ND	ND
**Note:* D – determined; ND – non-determined.				

From the data in the third table:

1. 70 % (or 14 out of 20) of the chickens were found to have the Ascarida galli worm.

2. 60 % were infected with the larvae of Heterakis gallinarium.

3. 45 % had Capillaria caudinflata larvae.

4. 55 % tested positive for Eimeria larvae.

When we analyze and compare the data from the first three tables, it's evident that there's a significant prevalence of worm infections in Arys city and the Akdala and Dermene villages. This comparative analysis will be detailed in the upcoming Table 4.

Table 4 – The overall spread dynamics of helminth infections

Type of Larvae	Number of chickens	Arys	Akdala	Dermene
		EC, %	EC, %	EC, %
Ascaridia galli	20	85	60	70
Heterakis gallinarium	20	45	55	60
Capillaria caudinflata	20	30	40	45

Eimeria	20	40	10	55

The change in the prevalence of Ascaridia galli invasion in Arystan district was found to range from 60 % to 85 % in broiler chickens raised for meat production. Meanwhile, the alteration in the prevalence of Heterakis gallinarium ranged from 45 % to 60 %, Capillaria caudinflata from 30 % to 45 %, and Eimeria ranged from 10 % to 55 %.

In the first quarter of 2021, when examining 120–150 day-old broilers in private households in the city of Arystan using parasitological methods, the following results were obtained: Heterakis eggs were found in six samples, Ascaridia eggs in eight samples, Capillaria eggs in four samples, and Eimeria oocysts in six samples.

Furthermore, when comparing the situation in private households with broiler farms, it was identified that the volume of birds in private households had significantly higher infestations with various types of helminths.

In summary, the prevalence dynamics of helminth infections in broiler chickens undergoing meat production in Arystan district exhibited changes in the mentioned percentages, and the study highlighted a higher infestation rate of various helminth species in private households compared to broiler farms.

Conclusion. During the research conducted, the types of helminths commonly found in chicken coops in the Arys district of Turkestan region were identified in the city of Arys, Akdala, and Dermen villages. Three types of nematodes (Ascaridia galli, Heterakis gallinae, and Capillaria caudinflata) were prevalent in chicken coops, along with the concurrent occurrence of Eimeria in these environments. Additionally, in remote village coops, the presence of 12 different types of nematodes (Ascaridia compar, Ascaridia skrjabini, Heterakis gallinae, Ganguleterakis altaicus, Subulura brumpti, Subulura suctoria, Subulura skrjabini, Seurocyrnea eurucerca, Tetrameres timopheevoi, Cheilospirura gruveli, Oxyspirura schulzi, Capillaria caudinflata) was identified.

The changes in the prevalence of Ascaridia galli invasion ranged from 60 % to 85 % in broiler chickens raised in private households in the Arys district. For Heterakis gallinarium, the alteration in prevalence ranged from 45 % to 60 %, Capillaria caudinflata from 30 % to 45 %, and Eimeria from 10 % to 55 %. When compared to broiler farms, chickens in private households exhibited significantly higher infestation levels with various types of helminths.

The identified methods for the primary control of helminth infections include segregating young and adult chickens, maintaining clean coop areas, disinfection, keeping chickens outdoors during the spring and summer months, conducting deworming according to a planned schedule, and providing balanced nutrition

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ТҮЙІН

Аталған мақалада Түркістан облысы Арыс ауданы аумағындағы үй құстарында паразиттік тіршілік ететін гельминттердің жиі кездесетін түрлерінің (Ascaridia, Heterakis, Capillaria) зақымдану динамикасын және алдын алу шаралары зерттелген. Зерттеудің мақсаты - гельминтологиялық зерттеулердің әдістерін игеру. Зерттеудің тәжірибелік маңызы: үй тауықтарының ауруларының ішінде гельминтоздар үлкен орын алады және құс шаруашылығына экономикалық дағдарыс әкеледі. Үй тауықтарының кейбір гельминттері шаруашылықта барлық құстарды ауруға ұшыратып, жаппай өлімге әкеп соқтырады. Гельминтоздардың көптеген түрлері созылмалы түрде өтеді және құстың біртіндеп азуын қамтамасыз етеді, жас тауықтардың дамуын тежейді. Түркістан облысы Арыс ауданындағы үй. құстарының ауруларының ішінде гельминтоздар үлкен орын алады және құс шаруашылығына экономикалық дағдарыс әкелетіні белгілі, сондықтан гельминтоздардың алдын алу және күресу шараларының тиімді жолдарын анықтау. Үй тауықтарының тірі кезіндегі гельминтоздарының диагностикасы клиникалық белгілерге қарай керекті нәтиже бермейді, өйткені бұл белгілер басқа аурулардың симптомдарына ұқсайды. Сондықтан құстардың гельминтоздарының тірі кезіндегі диагностикасы лабораториялық зерттеу әдістеріне негізделеді, бұл кезде фекалияларда гельминттердің жұмыртқаларының, дене бөліктерінің, кейде паразиттік ересек құрттардың болуы немесе болмауы анықталады. Гельминтокопрологиялық зерттеулердің негізі нәжісті макроскопиялық және микроскопиялық зерттеу болып табылады.

РЕЗЮМЕ

В данной статье изучена динамика и меры профилактики поражения наиболее распространенных видов паразитирующих гельминтов (Ascaridia, Heterakis, Capillaria) у домашних птиц на территории Арысского района Туркестанской области. Цель исследования-овладение методами гельминтологических исследований. Практическая значимость исследования: Среди болезней домашних кур большое место занимают гельминтозы и приносят птицеводству экономический кризис. Некоторые гельминты домашних кур поражают всех птиц на ферме, вызывая массовую смерть. Многие виды гельминтозов протекают хронически и обеспечивают постепенное вынашивание птицы, тормозят развитие молодых кур. Дом в Арысском районе

Туркестанской области среди болезней птиц большое место занимают гельминтозы и, как известно, приносят птицеводству экономический кризис, поэтому необходимо определить эффективные способы профилактики и борьбы с гельминтозами. Диагностика гельминтозов домашних кур при жизни не дает должного результата на основании клинических признаков, так как эти признаки напоминают симптомы других заболеваний Поэтому диагностика гельминтозов птиц при их жизни основывается на лабораторных методах исследования, при которых выявляется наличие или отсутствие в фекалиях яиц гельминтов, частей тела, а иногда и взрослых паразитических червей. В основе гельминтокопрологических исследований лежит исследование фекалий макроскопическим и микроскопическим путем.