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ABSTRACT

of the dissertation for the degree of Doctor of Philosophy

STUDY OF BIOECOLOGICAL CHARACTERISTICS OF MIXED INVASIONS AND CAUSATIVE AGENTS OF TURKEYS (*MELEAGRIS GALLOPAVO*) IN GAZAKTOVUZ ECONOMIC REGION

Speciality: 2429.01 – Parasitology

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INTRODUCTION

The research relevance and development degree. Many factors affect the development, productivity, and meat quality of turkeys *(Meleagris gallopavo)* in family poultry farms, the main reason of which is various types of diseases, including helminthiases.

Mono and mixed invasions considered dangerous for turkeys for almost the last 50 years have remained unstudied.[1] Taking this into consideration, we conducted research on family poultry farms on the territory of the Gazakh-Tovuz economic region, and it was decided that studying the mixed invasions of turkeys would be appropriate.

In order to timely identify any disease that may occur in the farms and to protect the turkeys, solving problems such as the investigation of the infection of turkeys with different types of nematodes and cestodes depending on age groups and the seasons of the year in the lowland, foothills and mountainous climate zones of Shamkir, Tovuz and Gadabay administrative districts of the Gazakh-Tovuz economic region, determination of changes in blood parameters of turkeys infected with one or more types of parasites, development of preventive measures against more widely distributed parasites, the effect of mono and associative invasions on the development of turkeys and the calculation of the economic efficiency obtained from the developed control measures, were taken a basis.

The object and subject of the research. The main object of the research was mixed invasions of turkeys kept on family farms in the Gazakh-Tovuz economic region.

The object of the research is the study of age, seasonal dynamics and intensity of *Ascaridia dissimilis, Heterakis gallinarum, Raillietina tetragona, Syngamus trachea* and *Capillaria obsignata* helminths, which are mono and mixed invasions of turkeys in different climate zones of this area, and to investigate the differences caused by mono and mixed invasions in the blood parameters of turkeys, to propose a modern prevention scheme against the eggs of *A.dissimilis -H.gallinarum* helminths, and to determine the obtained economic income.

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[1] Билалов, Р.М. Гельминтозы индеек и меры борьбы с ним в Азербайджанской ССР: / дисс. канд. вет. наук. / – Баку, 1979. – 201 с.

The purpose and tasks of the research. The main task in the conducted research work is the study of mixed invasions of turkeys in the Gazakh-Tovuz economic region and the bioecological characteristics of their causative agents.

To achieve the solution to the issues envisaged in the research work, the following main tasks have been set: to study the dynamics of the prevalence of parasites of turkeys in family farms in the lowland, foothills, mountainous climate zones in the Gazakh-Tovuz economic region and depending on the seasons of the year, age dependence of their intensity, pathological differences in blood parameters of diseased turkeys infected with mono and mixed invasions, their impact on weight gain, to develop a new preventive measure against dominant associative diseases, to calculate the economic efficiency obtained from this measure.

Research methods. In the examinations, helminth eggs were detected in the faeces using a Biolam microscope. Faecal samples taken from turkeys were studied by coprological methods such as Fulleborn and sequential washing, and the intensity of helminths was determined with the help of K.I.Skryabin method of incomplete helminthological dissection. Leukocyte and erythrocyte counts in the blood of parasites-infected turkeys were studied using the Goryaev chamber, the amount of hemoglobin was studied using Sahli's hemoglobinometer, and the erythrocyte sedimentation rate (ESR) was studied with the help of the Panchinkov device.[2]

In the preparation of the preventive measure, solutions of different concentrations of different chemical substances and a mechanical sprayer were used.

The main provisions of the defense:

1. To determine the extensiveness and intensity of infection of turkeys with helminths in different age groups in the Gazakh-Tovuz economic region.

2. To investigate the extensiveness and intensity of helminth infection in turkeys in different climate zones (lowland, foothills, mountainous) of Shamkir, Tovuz, and Gadabay districts concerning the

[2] Hacıyev, H.M. Klinik diaqnostika / H.M.Hacıyev. – Bakı: Maarif nəşriyyatı, – 1974. – 349 s.

seasons of the year.

3. To investigate the differences in blood parameters of turkeys infected with mono and associative helminths.

4.To study the effect of disinfection substances at different concentrations against the causative agents of *A.dissimilis* and *H. gallinarum.*

5. To determine the weight gain in turkeys infected with mono and associative helminths.

6. To calculate the economic efficiency of a new disinfection scheme against the associative disease of turkeys.

The scientific novelty of the research:

1. For the first time, the dependence of the infection of turkeys with different types of parasites and their intensity on the age of turkeys were studied in private farms in the Gazakh-Tovuz economic region (Shamkir, Tovuz, Gadabay).

2. The prevalence and intensity of helminths in turkeys in private poultry farms of the Gazakh-Tovuz economic region (Shamkir, Tovuz, Gadabay) in the lowland, foothills and mountainous climate zones were determined depending on the seasons of the year.

3. The impact of mono and mixed invasions of turkeys on blood parameters was studied.

4. Different concentrations of chemicals with disinfection effect against *A.dissimilis, H.gallinarum* eggs were tested and a 100% disinfection effect was obtained from the application of iodine monochloride 5.0%.

5. For the first time, weight gain was studied in turkeys mono-infected with *Raillietina tetragona,* and mixed infected with *R.tetragona -A.dissimilis, R.tetragona-A.dissimilis-H.gallinarum.*

6. From the application of the new disinfection measure against ascaris and heterakis eggs, 1 manat 73 gapiks was obtained per turkey.

Theoretical and practical significance of the research. Ascaridia, Heterakis, Syngamus, Capillaria and Raillietina parasites that infect turkeys, in the lowland, foothills and mountainous areas of the Gazakh-Tovuz economic region were investigated in large areas with different climate zones depending on the seasons and age groups and the extensiveness and intensity of the parasites were fully clarified.

Pathological changes in the blood parameters of turkeys infected with *A.dissimilis, H.gallinarum, R.tetragona* in mono and mixed form

were investigated.

As a result of the conducted research, a preventive measure against ascaris and heterakis helminths of turkeys was developed and a recommendation in the title "New disinfection scheme against the causative agents of associative invasions of turkeys" was published. The disinfection measure developed to combat mixed invasions affecting turkey development and productivity was tested in a wide range of farm conditions and demonstrated high economic efficiency.

Approbation and application of the research. The main provisions of the dissertation work were discussed and published in the materials of the international scientific-practical conference "Application of innovations in the directions of development of veterinary science" held at the Veterinary Scientific Research Institute (2019), International conference held in Makhachkala (2020): Collection of scientific works, the international scientific and practical conference “Modern trends and successes in the fight against zooanthroponosis of farm animals and poultry”, the international scientific-practical conference "Azerbaijan in the new stage of development - Food security in the era of globalization and post-pandemic: held at Lankaran State University (2021), etc.

The name of the organization where the dissertation work was performed. The research was performed in the laboratory of the Parasitology Department of the Veterinary Research Institute.

The structure and volume of the dissertation. The total volume of the dissertation consists of 160 pages with 199801 characters including the introduction, 6 chapters, discussion, results and practical recommendations. The structure of the work includes introduction (13581 characters), I chapter, a literature review (58539 characters), II chapter (6499 characters), III chapter (51985 characters), IV chapter (10679 characters), V chapter (20582 characters), VI chapter (10166 characters), discussion of the research (21987 characters), results (5199 characters), practical recommendations (1184 characters), a list of 151 references. Of these, 28 are Azerbaijani, 63 are Russian, and 60 are other foreign sources. 21 tables, 8 graphs and 1 figure are given in the dissertation work.

I CHAPTER. LITERATURE REVIEW

In this chapter, detailed information is given about the infection of turkeys with helminths in our Republic and foreign countries, the measures taken against them, the changes in the blood parameters of infected turkeys, the measures taken against the diseases and the obtained economic benefit, the biology of helminths, the physical and geographical features of the Gazakh-Tovuz economic region.

II CHAPTER. MATERIAL VƏ METHODS

The research work covers the years 2018-2022. It is based on coprological examinations of turkeys in family poultry farms in the lowland, mountainous and foothill climate zones of Tovuz, Gadabay and Shamkir administrative districts of the Gazakh-Tovuz economic region, depending on age groups and seasons of the year. The intensity of helminths was determined with the help of the dissection examination.[3]

Using various atlases, the species composition of helminths was determined.[4, 5]

When calculating the economic damage caused by ascaris-heterakis mixed invasions to farms and the economic benefit obtained from the new disinfection measure, various methodological tools and literature data were used.[6,7]

III CHAPTER. THE GENERAL STATE OF HELMINTHS INFECTION IN TURKEYS IN THE GAZAKH-TOVUZ ECONOMIC REGION

After the agrarian reforms carried out in our republic, the intensive prevalence of parasitic diseases in mono and associative forms continues

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[3] Скрябин, К.И. Метод полных гельминтологических вскрытий позвоночных, включая человека / К.И.Скрябин. – Москва: – 1928. – 45 с.

[4] Капустин, В.Ф. Атлас гельминтов сельскохозяйственных животных – Москва: ГИСЛ, – 1953. 135 с.

[5] Bayramov, S.Y. Quşların parazit xəstəliklərinin törədicilərinə aid Atlas / S.Y.Bayramov, K.D. Mirzəbəyov, A.M.Həsənov [və b.] – Bakı: AMEA mətbəəsi – 2018. – 20 s..

[6] Hacıyev, Y.H. Helmintozlarda tətbiq işlərinin iqtisadi səmərəsinin hesablanması // – Bakı: Azərbaycan Aqrar elmi, – 2000, №1-2, – s. 66-70.

[7] Сафиуллин, Р.Т Распространение и экономический ущерб от основных гельминтозов жвачных животных // – Москва: Ветеринария, – 1997. №6, – с. 28-32.

among turkeys raised in newly created poultry farms. Taking into account the distribution of mono and mixed invasions spread among turkeys kept in individual poultry farms of the Gazakh-Tovuz economic region depending on the age of the turkeys, the seasons of the year and different climate zones (lowland, foothills, mountainous), the intensity of helminths, study of the pathological processes caused by them in the body, development of innovative preventive measures against them, timely prevention of any disease that may occur in advance, we considered it necessary to conduct research in this field.

3.1. Age dependence of helminth infection of turkeys in Shamkir district

To investigate the infection of helminths in turkeys aged 2-3 months and 4-6-months and olders fed on private farms located in the lowland (Konullu village), foothills (Yenikend village), and mountainous (Chenlibel village) areas of the district, various research was conducted. In the conducted research, high infection with ascaridia, heterakis, syngamus and raillietina was recorded in 2-3 month-old turkeys in the foothills, and capillaria was high in 4-6 month-old turkeys.

The intensity of helminth infection in 2-3 and 4-6 months, and older turkeys fed on private farms in the districts's lowland, foothills, and mountainous areas was investigated. According to the helminthological examinations carried out on turkeys in different natural climate zones of the district, the intensity of *A.dissimilis, H.gallinarum, R.tetragona* was high among 4-6 month-old turkeys in Konullu village, all helminths were observed to be high in the 4-6 month-old turkeys in Yenikend village, and the intensity of *A. dissimilis, H.gallinarum, S.trachea, R.tetragona* was high in 4-6 month-old turkeys and *C.obsignata* was high in older turkeys in Chenlibel village.

3.2. Seasonal dynamics of helminth infection of turkeys in Shamkir district

Helminth infections of turkeys were studied depending on the seasons of the year in private poultry farms in the lowland (Konullu

village), foothills (Yenikend village) and mountainous (Chenlibel village) areas of the district.

Depending on the season, the extensiveness of *A.dissimilis, H. gallinarum, S.trachea, C.obsignata and R.tetragona* helminths that infect turkeys in the farms was the highest in the foothills and the lowest in the mountainous areas.

According to the examinations carried out on turkeys in these areas concerning the seasons of the year, the intensity of the prevalence of invasions by seasons was clarified. The extensiveness and intensity of *A.dissimilis, H.gallinarum, S.trachea, C.obsignata and R.tetragona* helminths that infected turkeys fed in areas with different natural climates of the districts were the highest in the foothills and the lowest in the mountainous areas depending on the seasons. In all three climate zones, the intensity of invasions in turkeys was highest in the summer, and lowest in the winter.

3.3. Age dependence of infection of turkeys with helminths in Tovuz district

The extensiveness of helminths prevalence in 2-3, 4-6 months and older turkeys kept in private poultry farms in Cheshmali (mountainous), Esrik (foothills) and Azabli villages (lowland) located in different climate zones of Tovuz district was determined. According to the conducted studies, in the mountainous area, 2-3 month-old turkeys were more infected with ascaridia, heterakis, raillietina, 4-6 month-old turkeys with syngamus; in the foothills, 2-3 month-olds with ascaridia, heterakis, raillietina, 4-6 month-olds with syngamus; in the lowland area, 2-3 month-olds were more infected with ascaridia, heterakis, raillietina and syngamus. These invasions were intensively prevalent in the lowlands.

The intensity of helminths infected 2-3, 4-6 months-old and older turkeys raised in farms in the Tovuz district, where examinations were carried out, was determined. While examining the characteristics of infection of turkeys with helminths in mountainous, foothills and lowland natural climate zones, the intensive prevalence of *A. dissimilis, H.gallinarum, S.trachea and R.tetragona* was observed in 2-3 month-old turkeys in all three areas. The intensity of invasions was recorded

in the lowland area.

3.4. Seasonal dynamics of helminth infection of turkeys in Tovuz district

The extensiveness of infection of turkeys raised in family poultry farms in mountainous, foothills and lowland climate zones of the district, depending on the season, was investigated. Depending on the seasons of the year, the intensity of invasions in turkeys raised in the mountainous, foothills and lowland areas of the district was higher in summer and lowest in winter. The maximum level of invasions was found in 2-3-month-old turkeys in the lowland, and the minimum level was found in the farms in the mountainous zone.

The intensity of helminths infecting turkeys was studied depending on the seasons of the year in this district. It was recorded that the prevalence of *A.dissimilis, H.gallinarum, S.trachea and R. tetragona* helminths infecting turkeys was low in mountainous areas and high in lowland areas, and compared to other seasons, it was high in summer and low in winter.

3.5. Age dependence of the infection of turkeys with helminths in Gadabay district

In order to study the extensiveness of parasitic infections in 2-3, 4-6 months and older turkeys in the family poultry farms in the mountainous, foothills and lowland climate zones of the district, coprological examinations were carried out.

In the villages of Dayagarabulag (mountainous), R.Aliyev (foothills) and Zahmet (lowland) of the district with different climate conditions, turkeys were found to be infected with 3 types of invasion and it was more prevalent in 2-3 month-olds. According to the conducted studies, the prevalence of ascaris and heterakis helminths was higher in the foothills, and the prevalence of raillietina in the lowland area was higher than in other age groups.

The intensity of parasites infected by 2-3, 4-6 month-old and older turkeys in farms in mountainous, foothills and lowland climate zones was clarified. The infection of turkeys with invasions

and their intensity was higher in 2-3 month-olds. The intensity of *A.dissimilis, H.gallinarum and R.tetragona* invasions in turkeys was intense in the foothills.

3.6. Seasonal dynamics of helminth infection of turkeys in Gadabay district

The dynamics of infection of turkeys with parasites depending on the seasons of the year in family poultry farms in the district's mountainous, foothills and lowland climate zones was investigated. According to the research we conducted, turkeys were more intensively infected with *A. dissimilis, H.gallinarum and R. tetragona* helminths in summer. Among these helminths, ascaridias were the most common among turkeys.

The intensity of helminths infecting turkeys was studied in these farms concerning the seasons. Thus, the intensity of *A.dissimilis, H. gallinarum and R.tetragona* helminths infecting turkeys kept in lowland, foothills and mountainous areas was recorded in the foothill climate zone, it was found to be higher in summer and lower in mountainous areas in winter.

Due to the influence of climate zones in the areas, the extensiveness of infection of turkeys with parasites varies. Because external environmental factors are favorable for the development of helminth eggs, parasites are widespread in these areas.[8, 9]

3.7. The epizootic situation on helminthiases of turkeys depending on age groups and seasons in different climate zones of the Gazakh-Tovuz economic region

Various parasitological examinations were carried out to study the epizootic situation on helminths of turkeys in the Gazakh-Tovuz economic region. (Table 1, Graph 1).

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[8] Seyidbəyli, M.İ. Naxçıvan MR ərazisində fəsillərdən asılı olaraq ev su quşlarının helmintlərə yoluxma dinamikası // – Bakı: Azərbaycan Aqrar elmi, – 2019. №2, – s. 203-206.

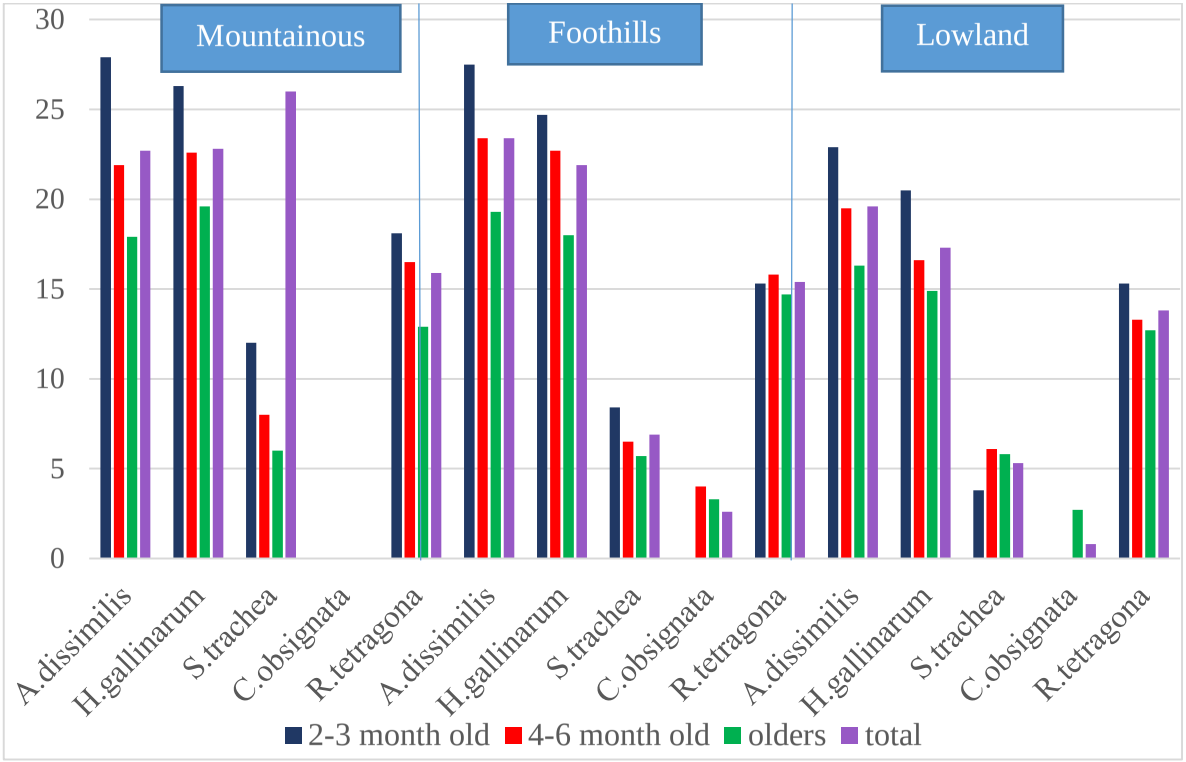
[9] Bilalov, R.M. Azərbaycanda hind toyuqlarının qurd xəstəlikləri // Baytarlıq elmi XXI əsrdə-gələcəyə doğru, Beynəlxalq elmi praktiki konfrans materialları, – Bakı: Müəllim nəşriyyatı, – 2021, – s. 124-127.

Table 1

Infection of turkeys with helminths in private poultry farms of the Gazakh-Tovuz economic region (according to the coprological examination)

Age groups (month)	Examined faecal samples (sample)	Species of helminths									
		A.dissimilis		*H.gallinarum*		*S.trachea*		*C.obsignata*		*R.tetragona*	
		Number of infected turkeys (turkey)	EI with %	Number of infected turkeys (turkey)	EI with %	Number of infected turkeys (turkey)	EI with %	Number of infected turkeys (turkey)	EI with %	Number of infected turkeys (turkey)	EI with %
Lowland											
2-3	243	68	27.9	64	26.3	12	4.9	-	-	44	18.1
4-6	255	56	21.9	57	22.6	8	3.1	-	-	42	16.5
Olders	224	40	17.9	44	19.6	6	2.8	-	-	29	12.9
Total	722	164	22.7	165	22.8	26	3.6	-	-	115	15.9
Foothills											
2-3	251	69	27.5	62	24.7	21	8.4	-	-	39	15.3
4-6	278	65	23.4	63	22.7	18	6.5	11	4,0	44	15.8
Olders	244	47	19.3	44	18.0	14	5.7	8	3.3	36	14.7
Total	773	181	23.4	169	21.9	53	6.9	19	2.6	119	15.4
Mountainous											
2-3	235	54	22.9	48	20.5	9	3.8	-	-	36	15.3
4-6	277	54	19.5	46	16.6	17	6.1	-	-	37	13.3
Olders	221	36	16.3	33	14.9	13	5.8	6	2.7	28	12.7
Total	733	144	19.6	127	17.3	39	5.3	6	0.8	101	13.8

Of 2-3 month-old turkeys in the lowland area of the economic district, 68 turkeys were infected with *A.dissimilis* (27.9%), 64 with *H.gallinarum* (26.3%), 12 with *S.trachea* (4.9%), 44 with *R.tetragona* (18.1%); Of 4-6 month-old turkeys, 56 turkeys were infected with



Graph 1. Age dynamics of infection of turkeys with helminths in private poultry farms in the Gazakh-Tovuz Economic Region (according to coprological examinations, %)

A.dissimilis (21.9%), 57 with *H.gallinarum* (22.6%), 8 with *S.trachea* (3.1%), 42 with *R.tetragona* (16.5%); Of older group, 40 turkeys were infected with *A.dissimilis* (17.9%), 44 with *H.gallinarum* (19.6%), 6 with *S.trachea* (2.8%), 29 with *R.tetragona* (12.9%). In all age groups, 164 (22.7%) turkeys were infected with *A.dissimilis*, 165 (22.8%) with *H.gallinarum*, 26 (3.6%) with *S.trachea*, and 115 (15.9%) turkeys were infected with *R.tetragona*.

In the foothills, of 2-3 month old turkeys, 69 turkeys (27.5%) were infected with ascaridia, 62 (24.7%) with heterakis, 21 (8.4%) with syngamus, 39 (15.3%) with raillietina; of 4-6 month-old turkeys, 65 turkeys (23.4%) were infected with ascaridia, 63 (22.7%) with heterakis, 18 (6.5%) with syngamus, 11 (4.0%) with capillaria, 44 (15.8%) with raillietina; of the older group, 47 (19.3%) with ascaridia, 44 (18.0%) with heterakis, 14 (5.7%) with syngamus, 8 (3.3%) with capillaria, 36 (14.7%) with raillietina. In total, 181 (23.4%) turkeys were infected with ascaridia, 169 (21.9%) with heterakis, 53 (6.9%) with syngamus, 19 (2.6%) with capillaria, 119 (15.4%) with raillietina.

In mountainous areas, of 2-3 month-old turkeys, 54 (22.9%) turkeys were infected with ascaridia, 48 (20.5%) with heterakis, 9 (3.8%) with syngamus, 36 (15.3%) with raillietina; of 4-6 month-old turkeys, 54 (19.5%) with ascaridia, 46 (16.6%) with heterakis, 17 (6.1%) with syngamus, 37 (13.3%) with raillietina; of older group, 36 (16.3%) turkeys were infected with ascaridia, 33 (14.9%) with heterakis, 13 (5.8%) with syngamus, 6 (2.7%) with capillaria, 28 (12.7%) with raillietina. For all age groups in the mountainous area, 144 (19.6%) turkeys were infected with ascaridia, 127 (17.3%) with heterakis, 39 (5.3%) with syngamus, 6 (0.8%) with capillaria, 101 (13.8%) with raillietina.

In the examinations carried out by age groups, 2-3 months old turkeys in the lowland, foothills and mountainous areas were highly infected with ascaridia, heterakis and raillietina invasions, and weakly infected with syngamus.

As a result of 2228 coprological examinations, 1438 turkeys were found to be infected with mono and mixed invasions. Of these turkeys, 625 were found to be infected with mono and 813 with associative invasions. Of these, 35.7% (246) were mono-infected with *A.*

dissimilis, 29.8% (201) with *H.gallinarum*, 11.7% (81) with *S.trachea*, 5.3% (37) with *C.obsignata*, 17.9% (124) with *R.tetragona*. Of 813 turkeys, 36.5% (297) was mixed infected with *A.dissimilis* and *H. gallinarum*, 29.7% (242) with *A.dissimilis*, *H.gallinarum* and *C. obsignata*, 17.9% (146) with *A.dissimilis*, *H.gallinarum*, *S.trachea* and *R.tetragona*, 15.7% (128) with *A.dissimilis*, *H.gallinarum*, *S.trachea*, *C.obsignata* and *R.tetragona*.

In 2-3 month-old turkeys in lowland areas of the region, the extensiveness of *A.dissimilis* was 26.3%, the intensity 2-23, *H. gallinarum* EI 24.8% with II 2-24, *S.trachea* EI 6.0% with II 2-10, *R.tetragona* EI 15.8% with II 1-11; in 4-6 month-old turkeys, *A. dissimilis* EI 21.1% with II 3-18, *H.gallinarum* EI 20.5% with II 2-23, *S.trachea* EI 3.3% with II 2-9, *R.tetragona* EI 15.0% with II 1-8; in older group, *A.dissimilis* EI 22.6% with II 2-17, *H.gallinarum* EI 17.3% with II 1-19, *S.trachea* EI 2.4% with II 3-8, *R.tetragona* EI 11.3% with II 1-7, capillaria helminths were not detected. Totally, in this climate zone, ascaridia EI 23.1% with II 2-23, heterakis EI 20.6% with II 1-24, syngamus EI 3.7% with II 2-10, raillietina EI 13.9% with II 1-11 were observed.

In the foothill climate zones of the region, in 2-3 month-old turkeys, ascaridia EI 26.2% with II 1-19, heterakis EI 24.8% with II 2 -21, syngamus EI 6.4% with II 1-9, raillietina EI 17.0% with II 1-8 were detected; in 4-6 month-old turkeys, ascaridia EI 18.5% with II 1 -17, heterakis EI 23.0% with II 2-20, syngamus EI 6.7% with II 2-8, capillaria EI 5.1% with II 2-5, raillietina EI 15.1% with II 2-7 were observed; In older turkeys, ascaridia EI 17.3% with II 1-16, heterakis EI 16.8% with II 1-18, syngamus EI 5.8% with II 1-9, capillaria EI 2.9% with II 2-3, raillietina EI 12.8% with II 2-7 were detected. In this climate zone, ascaridia EI 20.3% with II 1-19, heterakis EI 21.3% with II 1-21, syngamus EI 6.3% with II 1-9, capillaria EI 2.8% with II 2-5, raillietina EI 14.8% with II 1- 8 were identified.

In the mountainous climate zone of the region, in 2-3 month-old turkeys, ascaridia EI 20.7% with II 1-17, heterakis EI 18.2% with II 1-16, syngamus EI 3.8% with II 1-4, raillietina EI 13.8% with II 1-6; in 4-6 month-old turkeys, ascaridia EI 18.9% with II 1-14, heterakis EI 17.1% with II 2-15, syngamus EI 5.9% with II 2-8, raillietina EI

13.0% with II 2-5; in older turkeys, ascaridia EI 15.9% with II 1-13, heterakis EI 14.2% with II 1-13, syngamus EI 5.1% with II 1-7, capillaria EI 2.6% with II 2-6, raillietina EI 10.9% with II 1-5 were observed. In this climate zone, ascaridia EI 18.5% with II 1-17, heterakis EI 16.6% with II 1-16, syngamus EI 4.9% with II 1-8, capillaria EI 0.8% with II 2-6, raillietina EI 12.6% with II 1-6 were identified (Table 2).

By age groups, heterakis and raillietina were more prevalent in lowland areas with a slight difference, and ascaridia, syngamus and capillaria were more prevalent in the foothills, and low infection of turkeys with helminths was determined in mountainous areas.

In spring in the mountainous areas of the economic region, 19.1% (41) of turkeys were infected with *A.dissimilis*, 17.6% (38) with *H.gallinarum*, 6.0% (13) with *S.trachea*, 13.0% (28) with *R.tetragona*, 2.3 % (5) with *C.obsignata*; in summer, 23.3% (49) of turkeys were infected with ascaridia, 20.9% (44) with heterakis, 9.0% (19) with syngamus, 3.3% (7) with capillaria, 17.1% (36) with raillietina; in autumn, 16.2% (38) with ascaridia, 14.0% (33) with heterakis, 4.3% (10) with syngamus, 1.7% (4) with capillaria, 10.6% (25) with raillietina; in winter, 13.7% (29) infected with ascaridia, 10.4%(22) with heterakis, 1.9% (4) with syngamus, 1.4% (3) with capillaria, 8.9% (19) with raillietina.

In spring in the foothill climate zones of the economic region, 44 (22.3%) turkeys were infected with ascaridia, 40 (16.6%) with heterakis, 16 (8.2%) with syngamus, 6 (3.0%) with capillaria, 31 (15.7%) with raillietina; in summer, 59 (28.4%) with ascaridia, 58 (27,8%) with heterakis, 22 (10.6%) with syngamus, 9 (4.3%) with capillaria, 41 (19.7%) with raillietina; in autumn, 48 (20.4%) with ascaridia, 41 (17.4%) with heterakis, 17 (7.2%) with syngamus, 7 (2.9%) with capillaria, 32 (13.6%) with raillietina; in winter, 35 (17.8%) turkeys were infected with ascaridia, 30 (15.3%) with heterakis, 7 (3.6%) with syngamus, 5 (2.5%) with capillaria, 22 (11.2%) with raillietina.

In lowland climate zones, 39 (21.6%) turkeys were infected with ascaridia, 39 (21.6%) with heterakis, 7 (3.9%) with syngamus, 28 (15.6%) with raillietina in spring, 54 (26.2%) with ascaridia, 55 (26.7%) with heterakis, 13 (6.3%) with syngamus, 40 (19.4%) with

Table 2

The intensity of infection of turkeys with helminths in private poultry farms of the Gazakh-Tovuz economic region (according to dissection examinations)

Age groups (month)	Number of dissected turkeys (turkey)	Species of helminths														
		A.dissimilis			*H.gallinarum*			*S.trachea*			*C.obsignata*			*R.tetragona*		
		Number of infected turkeys (turkey)	EI with %	II	Number of infected turkeys (turkey)	EI with %	II	Number of infected turkeys (turkey)	EI with %	II	Number of infected turkeys (turkey)	EI with %	II	Number of infected turkeys (turkey)	EI with %	II
Lowland																
2-3	133	35	26.3	2-23	33	24.8	2-24	8	6.0	2-10	-	-	-	21	15.8	1-11
4-6	180	38	21.1	3-18	37	20.5	2-23	6	3.3	2-9	-	-	-	27	15.0	1-8
Olders	168	38	22.6	2-17	29	17.3	1-19	4	2.4	3-8	-	-	-	19	11.3	1-7
Total	481	111	23.1	2-23	99	20.6	1-24	18	3.7	2-10	-	-	-	67	13.9	1-11

Continuation of Table 2

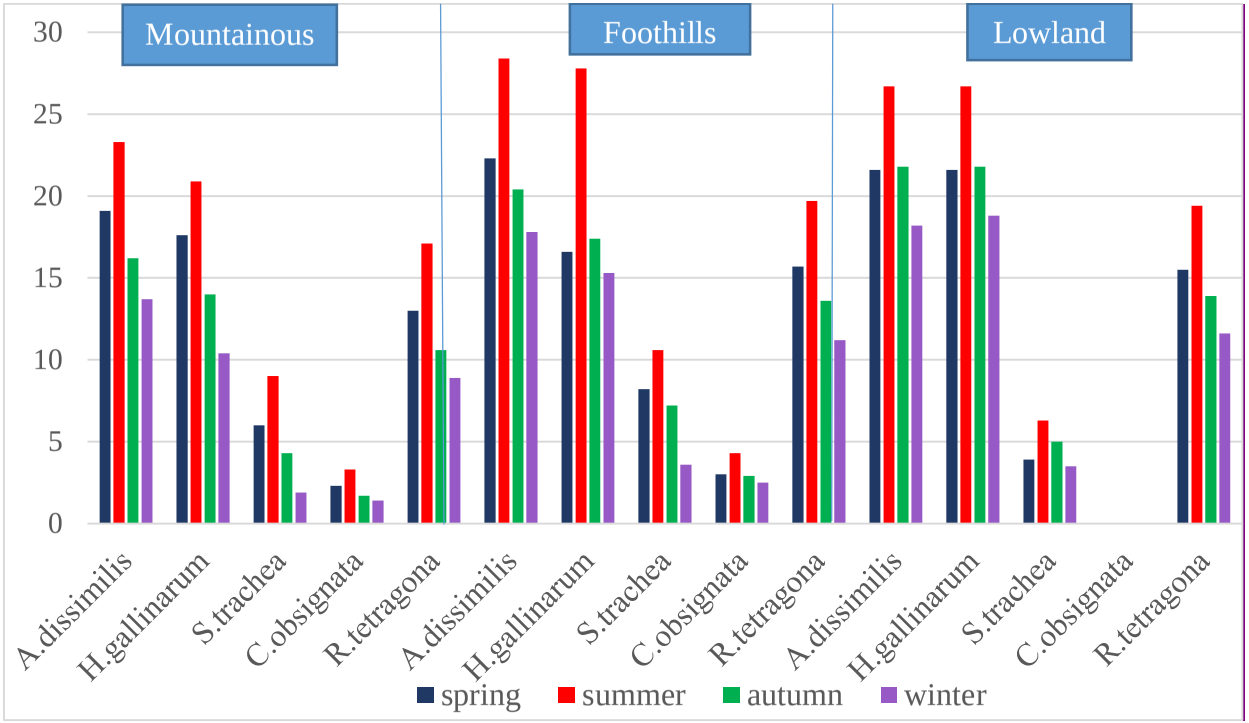
Foothills																
2-3	141	37	26.2	1-19	35	24.8	2-21	9	6.4	1-9	-	-	-	24	17.0	1-8
4-6	178	33	18.5	1-17	41	23.0	2-20	12	6.7	2-8	9	5.1	2-5	27	15.1	2-7
Olders	173	30	17.3	1-16	29	16.8	1-18	10	5.8	1-9	5	2.9	2-3	22	12.8	2-7
Total	492	100	20.3	1-19	105	21.3	1-21	31	6.3	1-9	14	2.8	2-5	73	14.8	1-8
Mountainous																
2-3	159	33	20.7	1-17	29	18.2	1-16	6	3.8	1-4	-	-	-	22	13.8	1-6
4-6	169	32	18.9	1-14	29	17.1	2-15	10	5.9	2-8	-	-	-	22	13.0	2-5
Olders	155	24	15.9	1-13	22	14.2	1-13	8	5.1	1-7	4	2.6	2-6	17	10.9	1-5
Total	483	89	18.5	1-17	80	16.6	1-16	24	4.9	1-8	4	0.8	2-6	61	12.6	1-6

raillietina in summer, 52 (21.8%) with ascaridia, 55 (26.7%) with heterakis, 12 (5.0%) with syngamus, 33 (13.9%) with raillietina in autumn, 36 (18.2%) with ascaridia, 37 (18.8%) with heterakis, 7 (3.5%) with syngamus, 23 (11.6%) with raillietina in winter (Table 3, Graph 2).

Table 3

Infection of turkeys with invasions in private poultry farms of the Gazakh-Tovuz economic region concerning the seasons of the year (according to coprological examinations)

Seasons of the year	Faecal samples (sample)	Species of helminths									
		A.dissimilis		*H.gallinarum*		*S.trachea*		*C.obsignata*		*R.tetragona*	
		Number of infected turkeys (turkey)	EI with %	Number of infected turkeys (turkey)	EI with %	Number of infected turkeys (turkey)	EI with %	Number of infected turkeys (turkey)	EI with %	Number of infected turkeys (turkey)	EI with %
Mountainous											
Spring	215	41	19.1	38	17.6	13	6.0	5	2.3	28	13.0
Summer	210	49	23.3	44	20.9	19	9.0	7	3.3	36	17.1
Autumn	235	38	16.2	33	14.0	10	4.3	4	1.7	25	10.6
Winter	212	29	13.7	22	10.4	4	1.9	3	1.4	19	8.9
Foothills											
Spring	197	44	22.3	40	16.6	16	8.2	6	3.0	31	15.7
Summer	208	59	28.4	58	27.8	22	10.6	9	4.3	41	19.7
Autumn	235	48	20.4	41	17.4	17	7.2	7	2.9	32	13.6
Winter	196	35	17.8	30	15.3	7	3.6	5	2.5	22	11.2
Lowland											
Spring	180	39	21.6	39	21.6	7	3.9	-	-	28	15.5
Summer	206	54	26.2	55	26.7	13	6.3	-	-	40	19.4
Autumn	238	52	21.8	52	21.8	12	5.0	-	-	33	13.9
Winter	197	36	18.2	37	18.8	7	3.5	-	-	23	11.6



Graph 2. Seasonal dynamics of infection of turkeys with helminths in private poultry farms in the Gazakh-Tovuz Economic Region (according to coprological examinations, %)

The extensiveness of invasions in turkeys was high during summer in the foothills and reached a minimum during winter in mountainous areas.

The intensity of helminths infecting turkeys was as follows (Table 4). In the lowland climate zone, in spring, ascaridia EI 24.7% (34) with II 2-17, heterakis EI 23.3% (35) with II 2-15, syngamus EI 5.8% (9) with II 2-10, raillietina EI 15.6% (24) with II 1-8, in summer, ascaridia EI 26.1% (46) with II 2-21, heterakis EI 26.7% (47) with II 2-24, syngamus EI 7.4% (13) with II 2-14, raillietina EI 19.9% (35) with II 2-11, in autumn, ascaridia EI 20.6% (39) with II 2-14, heterakis EI 23.8% (45) with II 2-19, syngamus EI 4.8% (9) with II 3 -9, raillietina EI 13.7% (26) with II 1-7, in winter, ascaridia EI 16.4% (36) with II 1-11, heterakis EI 17.8% (39) with II 2-13, syngamus EI 3.7% (8) with II 2-4, raillietina EI 10.9% (24) with II 1-5.

In the foothills areas of the economic region, the extensiveness and intensity of invasions depending on the seasons of the year were as follows: in spring, ascaridia EI 21.3% (32) with II 2-16, heterakis EI 19.3% (29) with II 2-17, syngamus EI 8.0% (12) with II 1-6, capillaria EI 2.7% (4) with II 2-3, raillietina EI 15.3% (23) with II 1-8, in summer, ascaridia EI 28.2% (48) with II 3-21, heterakis EI 27.6% (47) with II 2-23, syngamus EI 9.4% (16) with II 2-9, capillaria EI 4.1% (7) with II 3-9, raillietina EI 18.8% (32) with II 2-12, in autumn, ascaridia EI 18.7% (39) with II 2-14, heterakis EI 17.3% (36) with II 2-16, syngamus EI 6.7% (14) with II 2-5, capillaria EI 2.4% (5) with II 3-8, raillietina EI 13.4% (28) with II 2-7, in winter, ascaridia EI 16.2% (35) with II 1-11, heterakis EI 14.4% (31) with II 1-11, syngamus EI 2.8% (6) with II 1-3, capillaria EI 1.8% (4) with II 1-4, raillietina EI 10.2% (22) with II 2-6.

In the mountainous areas of the economic region, the extensiveness and intensity of invasions depending on the seasons of the year were as follows: in spring, ascaridia EI 18.4% (33) with II 1-8, heterakis EI 16.2% (29) with II 1-8, syngamus EI 5.0% (9) with II 1-4, capillaria EI 1.7% (3) with II 1-5, raillietina EI 12.8% (23) with II 1-5, in summer, ascaridia EI 22.8% (41) with II 2-13, heterakis EI 19.4% (35) with II 2-12, syngamus EI 8.9% (16) with II 2-7, capillaria EI 3.3% (6) with II 2-6, raillietina EI 15.5% (28) with II 2-6, in

Table 4

Seasonal intensity of helminth infection of turkeys in private poultry farms of the Gazakh-Tovuz economic region (according to dissection examination)

Seasons of the year	Number of dissected turkeys (turkey)	Species of helminths														
		A.dissimilis			*H.gallinarum*			*S.trachea*			*C.obsignata*			*R.tetragona*		
		Number of infected turkeys (turkey)	EI with %	II	Number of infected turkeys (turkey)	EI with %	II	Number of infected turkeys (turkey)	EI with %	II	Number of infected turkeys (turkey)	EI with %	II	Number of infected turkeys (turkey)	EI with %	II
Lowland area																
Spring	154	34	24.7	2-17	35	23.3	2-15	9	5.8	2-10	-	-	-	24	15.6	1-8
Summer	176	46	26.1	2-21	47	26.7	2-24	13	7.4	2-14	-	-	-	35	19.9	2-11
Autumn	189	39	20.6	2-14	45	23.8	2-19	9	4.8	3-9	-	-	-	26	13.7	1-7
Winter	219	36	16.4	1-11	39	17.8	2-13	8	3.7	2-4	-	-		24	10.9	1-5

Continuation of Table 4

Foothills area																
Spring	150	32	21.3	2-16	29	19.3	2-17	12	8.0	1-6	4	2.7	2-3	23	15.3	1-8
Summer	170	48	28.2	3-21	47	27.6	2-23	16	9.4	2-9	7	4.1	3-9	32	18.8	2-12
Autumn	208	39	18.7	2-14	36	17.3	2-16	14	6.7	2-5	5	2.4	3-8	28	13.4	2-7
Winter	215	35	16.2	1-11	31	14.4	1-11	6	2.8	1-3	4	1.8	1-4	22	10.2	2-6
Mountainous area																
Spring	179	33	18.4	1-8	29	16.2	1-8	9	5.0	1-4	3	1.7	1-5	23	12.8	1-5
Summer	180	41	22.8	2-13	35	19.4	2-12	16	8.9	2-7	6	3.3	2-6	28	15.5	2-6
Autumn	222	39	17.5	2-8	29	13.1	2-15	12	5.4	1-4	4	1.8	1-4	23	10.3	1-4
Winter	216	29	13.4	1-6	24	11.1	1-10	3	1.4	1-2	3	1.3	1-3	18	8.3	1-2

autumn, ascaridia EI 17.5% (39) with II 2-8, heterakis EI 13.1% (29) with II 2-15, syngamus EI 5.4% (12) with II 1-4, capillaria EI 1.8% (4) with II 1-4, raillietina EI 10.3% (23) with II 1-4, in winter, ascaridia EI 13.4% (29) with II 1-6, heterakis EI 11.1% (24) with II 1-10, syngamus EI 1.4% (3) with II 1-2, capillaria EI 1.3% (3) with II 1-3, raillietina EI 8.3% (18) with II 1-2.

The prevalence intensity of helminths was low in mountainous areas and maximum in foothills. The intensity of invasions was maximum in summer and minimum in winter.

3.8. The impact of bioecological factors on the prevalence of causative agents of helminthiases in different climate zones

The results obtained from the conducted studies show the presence of a suitable temperature in the air and moisture in the soil are the main conditions for helminth eggs that have fallen into the external environment to develop and reach the invasion stage. A decrease in relative humidity due to an excessive increase in temperature in the external environment and, on the contrary, a sharp decrease in temperature and an increase in humidity weaken the development of helminth eggs and reach the invasion stage or cause their destruction. If the temperature in the environment is high and the humidity is within the norm, it accelerates the helminth eggs to reach the invasion stage.

For the causatives of parasites that have fallen into the external environment to develop and reach the invasion stage, the optimal temperature, humidity, and oxygen changing within the norm are the main conditions. The optimal temperature for the development of parasitic disease agents is 20-30^{0}C.

IV CHAPTER. CHANGES IN THE BLOOD OF TURKEYS INFECTED WITH MONO AND ASSOCIATIVE INVASIONS

Blood is examined in case of all diseases in organs and tissues. Although the general examination of the blood diagnoses anemia, leukemia, and blood parasite diseases, it has an important role in the examination of the general condition of the body during other diseases, the results of the treatments carried out, and the prevention of the disease. The general results of the conducted blood tests and together with the visible clinical

signs of the disease in the body by differentiating different pathological processes from each other leading to a correct diagnosis.

It is considered important to examine the number of erythrocytes, leukocytes, the percentage of hemoglobin and the erythrocyte sedimentation rate (ESR) by conducting a clinical blood examination during the disease.

4.1. Morphological changes in the blood of turkeys infected with mono and associative invasions

Various changes in the composition of the blood occur as a result of mono and associative invasions of turkeys, depending on the type and intensity of parasites in the body.

Although the changes in blood parameters (decrease in the number of erythrocytes, increase in the number of leukocytes and amount of hemoglobin) of turkeys mono-infected with *R.tetragona* were different compared to turkeys in the control, these differences were higher in turkeys mixed infected with associative *R.tetragona-A. dissimilis, and R.tetragona-A.dissimilis-H.gallinarum*.

4.2. Physiological changes in the erythrocyte sedimentation rate in the blood of turkeys infected with mono and associative invasions

By taking into account the visible clinical signs of the disease along with the changes in ESR in the blood, it is possible to fully specify the diagnosis of the pathology. To determine ESR, blood was taken from turkeys and examinations were performed for 15, 30, 45, and 60 minutes.

ESR was accelerated in the blood of turkeys mono-infected with *R.tetragona* compared to healthy turkeys. This acceleration was found to be more intense in turkeys mixed infected with *R.tetragona -A.dissimilis, and R.tetragona-A.dissimilis-H.gallinarum*.

4.3. Impact of helminth species and intensity on changes in blood parameters of turkeys infected with mono and associative invasions

The number of helminths infecting turkeys, their infection with different types of parasites in an associative form and their intensity play an active role in showing their influence on the number of erythrocytes, leukocytes, amount of hemoglobin and erythrocyte sedimentation rate in the blood.

V CHAPTER. DEVELOPMENT OF NEW PREVENTIVE MEASURES AGAINST EGGS OF ASCARIDIA DISSIMILIS AND HETERAKIS GALLINARUM OF TURKEYS AND TESTING THEM UNDER FARM CONDITIONS

In order to eliminate infectious and invasive diseases occurring in farms, control measures are carried out following the pre-prepared epizootic plan. During the control measures against helminthiases, the biological development of parasites, their prevalence characteristics and ways of infection are fully clarified. The implementation of preventive measures is planned depending on the biology of helminths prevalent in farms and their epizootological characteristics.

Taking into account the special importance of veterinary-sanitary and preventive measures for increasing the number and productivity of turkeys kept in the family poultry farms, breeding high-yielding breeds, timely prevention of possible diseases and deaths, sanitization of stables and pens where turkeys are kept, we considered it important to prepare the new disinvasion measure.

5.1. Investigation of disinfectant agents against the causative agents of *A. dissimilis and H. gallinarum* helminths in the laboratory

For the development of new disinvasion measures against mixed invasions of turkeys, 1.0, 3.0, 5.0, 8.0% solutions of iodine monochloride, carbolic acid and formalin were used.

The direct effect of chemicals on eggs taken from different types of helminths that have not reached the invasion stage and eggs of *A. dissimilis* and *H.galinarum* that developed to the larval stage was investigated with the help of experiments conducted in the laboratory. In the conducted studies, 5.0% and 8.0% solutions of iodine monochloride showed a 100% destructive effect on the eggs of *A.dissimlis* and *H.gallinarum*, taking this into account, the use of 5.0% solution was taken as a basis in the subsequent experiments. It was also tested on test objects and soil in the laboratory for disinfection against the eggs of *A.dissimilis* and *H.gallinarum* helminths. To continue the experiments, 1400 ascaris eggs and 1400 heterakis eggs were sprinkled on each plot of land and contaminated. At the end of the experiments, it

was found that iodine monochloride 5.0% destructed 100% of eggs of both helminths, carbolic acid 8.0% destructed 81.4% of ascaris eggs (1180), 77.1% of heterakis eggs (1080), formalin 8.0% destroyed 37.1% (520) of ascaris eggs and 35.0% (490) of heterakis eggs.[10]

5.2. Biological test after disinfection effect of iodine monochloride 5.0% on helminth eggs

After laboratory experiments with an iodine monochloride 5.0%, biological tests were conducted to determine the ability of ascaris and heterakis eggs to infect young turkeys. As a result, it was confirmed that ascaris and heterakis eggs were completely destroyed by the effect of iodine monochloride 5.0% solution.

5.3. Testing of iodine monochloride against the eggs of *A.dissimlis* and *H. gallinarum* helminths under farm conditions

Considering that the iodine monochloride 5.0% used in various experiments against the eggs of *A. dissimilis and H.gallinarum*, mixed invasions of turkeys, under laboratory conditions was 100% effective, it was tested under large farm conditions. formalin solution 8.0% was used for comparison in the experiments.

Before starting the experiments, in order to clarify the prevalence of A.dissimlis and *H.gallinarum* in the farms, of 135 turkeys, 15 faecal samples were taken from the floor of the stable and 20 faecal samples were taken from the pens and parasitological examination was carried out. In the coprological examinations, 43.7% (59) of faecal samples were infected with *A. dissimlis* and 48.1% (65) with *H. gallinarum*, helminth eggs were found in all samples taken from the floor and the pen. In the experiments, the first area was sprayed with iodine monochloride solution 5.0%, the second area with formalin solution 8.0%, and the third control area was sprayed with normal water and the exposure time was set for 3 hours. After the exposure period, 10 samples were taken from each experimental area and 5 samples from the control area and examined and it

[10] Nəsibova, G.R. *Ascaridia galli* və *Heterakis gallinarum*-un yumurtalarına qarşı dezinvaziya maddələrinin laboratoriya şəraitində sınaqdan keçirilməsi // – Naxçıvan: Naxçıvan Dövlət Univerisiteti, Elmi əsərlər, Təbiət və tibb elmləri seriyası, – 2021. №3 (112), – s. 144-149.

was determined that iodine monochloride 5.0% had a 100% destructive effect on the eggs of *A.dissimilis* and *H.gallinarum* helminths, formalin solution 8.0% had 41.5% (141) disinfection effect on ascaris eggs, 37.3% (153) on heterakis eggs.

VI CHAPTER. ECONOMIC EFFICIENCY OF DISINVASION MEASURES PREPARED AGAINST MIXED INVASIONS (*A. DISSIMLIS, H. GALLINARUM*) OF TURKEYS

Parasitic diseases cause high economic damage to farms. For this purpose, the economic damage to the farm is prevented due to the high result obtained after testing the new preventive measure against helminth diseases of turkeys under farm conditions. When investigating the economic damage caused by helminths to farms, first of all, the decrease in productivity of turkeys, and deaths caused by diseases are taken into account. While calculating the economic effect of the prepared preventive measure, the current market price of turkey meat is taken as a basis.

6.1. Weight gain in turkeys infected with mono and mixed invasions

Turkeys infected with *R. tetragona* had a weight gain of 72 g for 25 days compared to pre-experimental indicators, 51 g in turkeys mixed infected with *R.tetragona and A.dissimilis*, 44 g in turkeys mixed infected with *R.tetragona-A.dissimilis-H.gallinarum*, and 231 g in the control group.[11] This shows that the mono and mixed invasions of turkeys have a greater impact on their development.

6.2. Economic efficiency of a new preventive measure against the causative agents of *A. dissimilis and H. gallinarum* helminths

As a result of the preventive use of iodine monochloride 5.0% developed against the eggs of *A.dissimilis* and *H.gallinarum* helminths, which are mixed invasions of turkeys, an economic income of 1.73 manats was obtained per turkey.

[11] Nəsibova, G.R. Hind toyuqlarının qarışıq invaziyalarına qarşı hazırlanmış yeni profilaktiki tədbirin iqtisadi səmərəsi // – Bakı: AMEA Genetik Ehtiyatlar İnstitutu**,** Elmi əsərləri, – 2022. c. XI, №2 – s. 72-77.

RESULTS

1. To determine the infection of turkeys with different types of helminths in Shamkir, Tovuz, Gadabay districts of the Gazakh-Tovuz economic region of the Republic, helminthoovoscopic examination of 4760 faecal samples and dissection examination of 3756 birds were performed depending on the age groups and seasons of the year. For the first time, as a result of 2228 coprological examinations carried out by age groups in poultry farms in different climate zones of the economic region, it was found that 1438 turkeys were infected with mono and mixed invasions. Of these turkeys, 625 were infected with mono and 813 with associative invasions. Of turkeys, 35.7% (246) were mono-infected with *A.dissimilis*, 29.8% (201) with *H.gallinarum*, 11.7% (81) with *S.trachea*, 5.3% (37) with *C.obsignata*, 17.9% (124) with *R.tetragona.* Out of 813 turkeys, 36.5% (297) were mixed-infected with *A.dissimilis* and *H.gallinarum*, 29.7% (242) with *A.dissimilis*, *H.gallinarum* and *R.tetragona*, 17.9% (146) with *A.dissimilis*, *H.gallinarum*, *S.trachea* and *C. obsignata*, 15.7% (128) with *A.dissimilis*, *H.gallinarum*, *S.trachea*, *C.obsignata* and *R.tetragona* [7].
2. In coprological examinations of turkeys by age groups in different climate zones, in the foothills of Shamkir district (Yenikend village), *A.dissimilis* EI 31.3%, *S.trachea* EI 13.2%, *R.tetragona* EI 20.8% were more prevalent in 2-3 month-old turkeys, while *H.gallinarum* EI 32.6% and *C.obsignata* EI 12.5% were more prevalent in 4-6 month-old turkeys. The intensity of invasions was as follows: *H. gallinarum* 3-16 in 4-6 month-olds in the lowland area, *A.dissimilis* 2-15, *S.trachea* 2-6, *R.tetragona* 2-7 in 4-6 month-olds in the foothills area, *C.obsignata* 2-5 came up to minimum in older group in the mountainous area.

   In the helminthological examinations carried out on turkeys concerning the seasons of the year, the extensiveness and intensity of invasions in the foothills (Yenikend) in summer were as follows: *A. dissimilis* EI 32.4% with II 4-21, *H.gallinarum* EI 35.1% with II 3 -19, *S.trachea* EI 16.2% with II 2-7, *C.obsignata* EI 12.2% with II 3 -9, *R.tetragona* EI 18.9% with II 3-12 [1, 5].

3. In the helminthological examinations carried out depending on the age groups of turkeys in different climate zones of the Tovuz district, the extensiveness and intensity of helminths infecting turkeys were determined in 2-3 month-old turkeys in the lowland region (Azabli village). According to the results of the research, *A.dissimilis* EI 29.2% with II 3-23, *H.gallinarum* EI 33.8% with II 2-24, *S.trachea* EI 18.5% with II 2-10, *R.tetragona* EI 21.5% with II 2-11 were intensive.

   In the seasons of the year, the extensiveness and intensity of the invasions of turkeys reached the highest level in summer in the lowland area (Esrik village). It was determined that *A.dissimilis* EI was 26.7% with II 4-21, *H.gallinarum* EI 35.2% with II 3-24, *S.trachea* EI 18.3% with II 2-14, *R.tetragona* EI 23.9% with II 3-11 [2, 6].
4. In the lowland, foothills and mountainous areas of the Gadabay district, reaching maximum of the extensiveness and intensity of helminth infection of turkeys by age group was detected in 2-3 month -old turkeys in the area of R. Aliyev village (foothills). According to the studies, *A.dissimilis* EI was 25.7% with II 2-21, *H.gallinarum* EI 22.9% with II 3-18, *R.tetragona* EI 17.5% with II 3-8. According to the season, the extensiveness and intensity of parasites infecting turkeys were more intense in the summer in the foothills. Thus, *A. dissimilis* EI 28.3% with II 3-21, *H.gallinarum* EI 26.6% with II 4 -23, *R.tetragona* EI 22.4% with II 3-12 [3, 4].
5. When investigating the deficiencies caused by mono and mixed invasions in the blood parameters of turkeys, the amount of hemoglobin increased in turkeys mono-infected with *R.tetragona* and mixed infected with *R.tetragona-A.dissimilis,* and *R.tetragona-A. dissimilis-H.gallinarum* compared to the control group. The number of erythrocytes was decreased in turkeys mono-infected with *R. tetragona*, mixed infected with *R.tetragona-A.dissimilis* and *R. tetragona-A.dissimilis-H.gallinarum* compared to the control group. When the number of leukocytes was compared with turkeys in the control group, an increase was recorded in turkeys mono-infected with *R.tetragona*, mixed infected with *R.tetragona-A.dissimilis and R. tetragona-A.dissimilis-H.gallinarum*. ESR was accelerated in turkeys infected with mono and associative invasions compared to the

control group. In general, the results of blood tests of turkeys show that the pathological processes were more intense in turkeys infected with associative invasions compared to turkeys infected with mono invasions [8].

6. Various chemicals were tested against the causative agents of *A. dissimilis-H.gallinarum in vitro* and farm conditions, and it was determined that a 5.0% solution of iodine monochloride destroyed helminth eggs by 100% [10].
7. In 70-90-day-old turkeys infected with mono and associative invasions, the weight gain was 213 g in turkeys in the control group, 72 g in turkeys infected with *R.tetragona*, 51 g in turkeys mixed infected with *R.tetragona -A.dissimilis*, 44 g in turkeys mixed infected with *R.tetragona-A.dissimilis-H.gallinarum* for 25 days. It was evaluated that associative invasions have a greater effect on stunting the growth of turkeys [11].
8. In laboratory and farm experiments, 5.0% iodine monochloride solution tested for disinfection against mixed invasions of turkeys, *A. dissimilis- H.gallinarum* agents, gave 100% results, which was highly evaluated from a practical and economic point of view. Based on the positive results of the experiments, it is considered appropriate to apply it in larger conditions on larger farms where turkeys are kept [9, 13].
9. The economic income of 1 manat 73 gapiks per turkey was obtained from the application of a 5.0% solution of iodine monochloride as a disinfectant agent against the causative agents of *A. dissimilis- H. gallinarum* [12].

PRACTICAL RECOMMENDATIONS

1. One of the main issues is to feed the turkeys kept on farms with quality feed, and periodically perform veterinary-sanitary measures against helminths. After the stables and pens where turkeys are kept are cleaned of manure in time, preventive measures should be followed, the collected manure should be neutralized, and sick turkeys should be kept separately from healthy ones.

2. Against the eggs of *A. dissimilis and H. gallinarum*, which are associative invasions of turkeys, a preventive measure of 5.0% iodine monochloride solution was developed, and its economic benefit was 1 manat 73 gapiks per turkey. Taking into account the positive results of the experiments, it is considered appropriate to apply it in larger conditions on larger farms where turkeys are kept.
3. Based on the final result of the conducted research, a recommendation titled "A new disinvasion scheme against the agents of associative invasions of turkeys" was prepared.
4. The results of the conducted scientific research can be used as visual aids by students of higher and secondary educational institutions and qualified specialists working in these fields.

THE LIST OF PUBLICATIONS ON THE TOPIC OF THE DISSERTATION

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4. Насибова, Г. Р. Гельминтозы индеек и их сезонная динамика // – Нижневартовск: Бюллетень науки и практики, – 2020. т. 6, № 11, – с. 147-153.
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7. Nəsibova, G.R. Qərb bölgəsində hind toyuqlarının invaziyalarla yoluxma xüsusiyyətləri // "Azərbaycan yeni inkişaf mərhələsində - qloballaşma və postpandemiya dövründə ərzaq və qida təhlükəsizliyi: müasir vəziyyət, çağırışlar, perspektivlər" mövzusunda (onlayn – distant formada) Beynəlxalq elmi-praktiki konfrans materialları, – Lənkəran: LDU-nin mətbəsi, – 8-9 oktyabr, 2021, – s. 186-191.
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