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Dependence of helminth infection characteristics of domestic pigs on age and season

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Abstract

This study investigates the impact of age and seasonal variations on the prevalence of helminth infections in domestic pigs at farms in the Khachmaz region of Azerbaijan. The research was conducted in 2020-2021, examining fecal samples from pigs of different age groups (2-6 months, 7-12 months, and older pigs) across four seasons. Helminth infections studied included ascariasis, esophagostomosis, and trichocephalosis. The findings revealed age and season-specific infection rates, with younger pigs showing higher susceptibility to ascariasis and trichocephalosis, while older pigs exhibited increased rates of esophagostomosis. Infection rates peaked during spring and declined in winter, correlating with favorable environmental conditions for helminth egg development in warmer seasons. The study emphasizes the economic and health impacts of helminth infections in pig farming and underscores the need for targeted control measures based on age and seasonal dynamics.

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Introduction

The article talks about the research conducted on the infection of pigs with helminthosis depending on age and season in pig farms located in Khachmaz region of Guba-Khachmaz economic region.

Although the number of pig farms in Azerbaijan is limited, they functioning. Almost all farms operating in the country are individual farms. The meat of the pigs raised in those farms is used in the production of sausages, and a small part is used as a meat product.

Helminthosis also occurs in pigs and has a negative effect on their development. Ascariasis is the most widespread of these helminthosis - nematodes. Ascariasis is caused by the nematode *Ascaris suum* (Goeze, 1782). Adult ascarids parasitize the small intestine of household and wild pigs. The eggs that the female helminth sheds in the intestine of the animal are excreted with feces. Eggs under the necessary conditions reach the invasion stage within 10-15 days. Pigs become infected when they ingest invasive ascarid eggs in feed and it takes up to 1.5-3 months from the day of infection until the larvae turn into adult helminths. Ascarid eggs are very resistant to the influence of the external environment. Piglets (2-4 months old) and young pigs are more intensively infected than older ones. This is explained by their relatively weak immune system (1). Trichocephalosis is caused by a helminth named *Trichocephalus suis* (Schrank, 1778). The helminth is mainly parasitic in the caecum of the animal. Helminth eggs excreted with feces, and become invasive in 2-3 weeks under favorable conditions. Pigs become infected with trichocephalosis by ingesting helminth eggs through water and feed. During intensive infection, diarrhea occurs in the animal, which is sometimes observed with bloody and mucus. The infected animal stops eating and loses weight (Yakubovsky and Karasev, 2001).

Esophagostomosis is caused by the helminth *Oesophagostomum dentatum* (Rud, 1803). The parasite resides in the large intestine of pigs. The eggs of the parasite are spread to the external environment with feces and larvae emerge from them within 1 day at a temperature of 23-25°C. Those larvae become invasive by changing their shell twice. Intensive infestation occurs among older pigs, 2-4 months young ones are less infected. After infection, the normal functioning of the digestive system of pigs is disturbed, are observed smelling diarrhea, blood and slimy in feces (Memmedov, 1986).

In foreign countries, a number of research works on the spread of helminthosis of pigs, their treatment and prevention, the study of biochemical indicators of blood in infected animals, and the determination of the economic damage caused by helminthosis have been carried out and are being carried out continuously. However, little research has been carried out on pig diseases, including helminthosis, in Azerbaijan (Brauskas, 1984; Brezginova, 1991; Ivanyuk and Bobkova, 2016; Economic damage in ascariasis of pigs, 2020; Lukyanova *et al.*, 2017).

Therefore, the study of age and seasonal dependence dynamics of helminthosis in pigs in Azerbaijan was set as a goal.

Materials and methods

The research works were carried out in 2020-2021 on the basis of the pathological material collected from the pig farm in the Khachmaz region of the Guba-Khachmaz economic region. So, in order to study the dynamics of infection with helminths by age and season, the pathological materials (feces samples) of pigs of different ages kept in pig farms were collected, and examined in the laboratory of the Parasitology Department of the Veterinary Scientific Research Institute. 48 feces samples for each season of 2-6 months old, 7-12 months old, and old pigs taken from the Khachmaz region farm were coprological examination by Fülleborn, Darling, Sherbovich methods. In order to study the degree of infection of pigs with helminthosis according to the seasons of the year and age dynamics, coprological examinations were carried out and it was determined which season and age of pigs have a higher infection extent.

Results and discussion

Feces samples taken from pig farms located in Khachmaz region of Guba-Khachmaz economic region were coprologically examinede to determined the dynamics of infection with helminthosis according to the age of the animals, and the seasons of the year.

As a result of the examinations were determined associative infection 33.3% in 2-6 month olds, 17.6% in 7-12 month olds, 12.5% in old animals with ascariasis ; 6.7% in 2-6 month olds, 11.8% in 7-12 month olds, 18.8% in older animals with esophagostomosis; 26.6% in 2-6 month olds, 17.6% in 7-12 month olds, 6.3% in old animals with trichocephalosisin spring; in the summer season, 13.3% of 2-6 month olds, 11.8% in 7-12 month olds, and 6.3% in older animals with ascariasis. Was not detected infection in 2-6-month-old pigs with esophagostomosis, but 5.9% infection was detected in 7-12-month-old pigs, and 12.5% infection in older animals. Trichocephalosis were infected 13.3% in 2-6 month olds, 5.9% in 7-12 month olds, and 6.3% in old animals.

Table 1. Seasonal infection of animals of different ages in pig farms with helminthosis (%)

Age	Checked	Ascariasis		Esophagostomosis		Trichocephalosis	
		Infected	IR* (%)	Infected	IR (%)	Infected	IR (%)
Spring							
2-6 months old	15	5	33,3	1	6,7	4	26,7
7-12 months old	17	3	17,6	2	11,8	3	17,6
The elderly	16	2	12,5	3	18,8	1	6,3
Total	48	10	20,8	6	12,5	8	16,7
Summer							
2-6 months old	15	2	13,3	-	-	2	13,3
7-12 months old	17	2	11,8	1	5,9	1	5,9
The elderly	16	1	6,3	2	12,5	1	6,3
Total	48	5	10,4	3	6,3	4	8,3
Autumn							
2-6 months old	15	4	26,7	1	6,7	3	20,0
7-12 months old	17	2	11,8	1	5,9	2	11,8
The elderly	16	2	12,5	2	12,5	1	6,3
Total	48	8	16,7	4	8,3	6	12,5
Winter							
2-6 months old	15	2	13,3	-	-	1	6,7
7-12 months old	17	1	5,9	1	5,9	2	11,8
The elderly	16	1	6,3	1	6,3	-	-
Total	48	4	8,3	2	4,2	3	6,3

Note: İR*- Infection Rate

Were determined infection 26.7% in 2-6 month olds, 11.8% in 7-12 month olds, 12.5% in older animals with ascariasis; 6.7% in 2-6 month olds, 5.9% in 7-12 month olds, 12.5% in old animals with esophagostomosis; 20.0% in 2-6 month olds, 11.8% in 7-12 month olds, 6.3% in old animals with trichocephalosis in autumn; but in the winter season, 13.3% in 2-6 month olds, 5.9% in 7-12 month olds, and 6.3% in old animals with ascariasis. Was not detected infection with esophagostomosis in 2-6 month olds, however were 5.9% in 7-12 month olds and 6.3% in older animals; trichocephalosis 6.7% in 2-6 month olds, 11.8% in 7-12 month olds were studied, but it was not detected in older animals (Table 1).

Summarizing the obtained results infection with ascariasis was studied: 20.8% in spring, 10.4% in summer, 16.7% in autumn, and 8.3% in winter; with esophagostomosis:12.5% in spring, 6.3% in summer, 8.3% in autumn, and 4.2% in winter; with trichocephalosis:16.7% in spring, 8.3% in summer, 12.5% in autumn, and 6.3% in winter (Fig. 1).

It follows that the highest rate of infection of pigs with ascariasis, esophagostomosis and trichocephalosis is

determined in spring, while the lowest rate of infection is determined in winter. The reason for the infection of pigs with helminths in the farm in Khachmaz region is the presence of favorable conditions for helminth eggs to enter the invasion stage. The high prevalence of infection in spring, summer and autumn depends on the warm weather, helminth eggs develop faster when the weather is warm. The fact that the extent of infection is weak in winter depends on the low air temperature. The air temperature drops in winter, the development of larvae in helminth eggs weakens, and as a result, the percentage of infection with helminths decreases.

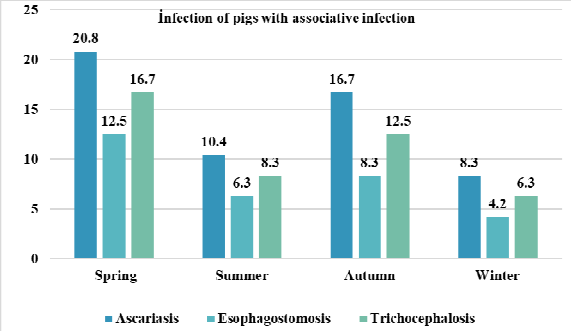

Fig. 1. Percentage of infection with helminthiasis by seasons

Became clear from research conducted by foreign researchers, as well as from our research in pig farms that, that helminthosis often occurs in a (mixed) associative form among pigs, as in other animals. Monoinvasion is rarely encountered. The reason for this is the high spread of pathogens in that area and the factors that positively affect their development.

If pigs are infected with several helminths at the same time in pig farms, the productivity and quality of meat in the animals kept in that farm decreases. From this point of view, the unhealthy pig farming due to invasive diseases leads to a decrease in meat production which has a negative effect on the profitability of the farm.

Conclusion

This study reveals that helminth infections in pigs vary significantly with age and season, peaking in spring and declining in winter. Younger pigs were more susceptible to ascariasis and trichocephalosis, while older pigs exhibited higher rates of esophagostomosis. Targeted, seasonally adjusted control measures are essential to reduce infections and improve farm productivity.

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