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Coccidides of the domestic pigs of the greater caucasus and their diffusion dynamics on altitude zones in Azerbaijan

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Abstract

The coccidia types found due to the physical and geographical characteristics of private and farms and their diffusion dynamics on altitude zones in the Azerbaijan territory of the Greater Caucasus are stated in the present article. It has been established that 3 species of Eimeria (*E.deblieski*, *E.polita*, *E.scabra*) and 1 species of Isospora (*I.suis*), 4 species of Eimeria (*E.deblieski*, *E.polita*, *E.scabra*, *E.perminuta*) in the mountain range and 1 Isospora (*I.suis*) were spread in plain and foothills. The highest extensiveness of the invasion (32.2%) was observed in farms located in the foothills zone, low extensiveness (21.4%) in farms located in the mountainous zone. But the extensivity of invasion is 22.2% in cultures situated at the lowlands. The investigations have been held during 2009-2015.

Keywords: Eimeria, pig, *E. deblieski*, *E. polita*, *E. scabra*, *E. perminuta*, *I. suis*

Introduction

Pig-breeding is one of the most productive fields of agriculture. As in other areas of agriculture, one of the factors that hinders the development of pigs is infectious and invasive diseases [1, 2]. As a result of diseases, the decrease in weight loss of animals, developmental loss, increased feed loss, and the quality of meat and products received from it have been observed, resulting in a great deal of damage to the farms. Especially high mortality among young animals is eimeriosis [3].

Since the 60's of the XX century an extensive research has been carried out on the study of coccidides, their composition, basic transmission ways, distribution in various natural and climatic conditions under the leadership of academician Musaev in Azerbaijan [4, 5]. While the research has been carried out to study the coccidides of large and small horned animals in Azerbaijan, research studies on pigs' coccidia are very limited. It is evident from the literature that eimeriosis is common in any part of the world where the domestic and wild pigs survive and are kept [6-9].

Since 2004, we have been studying eimeriosis of domestic pigs. The purpose of the present article was to determine the composition of the empires spreading between pigs in individual and farm households of the Greater Caucasus in the territory of Azerbaijan and to study the intensity of the invasion.

Materials And Methods

Fecal samples were taken from 2303 pigs kept in private farms during the research to determine the composition of the species emitted among animals in the Greater Caucasus region and to study the extensiveness of the invasion. The materials were collected from the regions Absheron (lowland), Khudat, Khachmaz, Guba (hills), Shamakhi, Ismayilli, Zagatala, Balaken (mountain) for 2009-2015. Coccidia oocysts were centrifugally separated from these examples (Fulleborn of Darling's) in the saturated sodium chloride solution by flotation method [10].

The features were taken as basis such as morphology of sporadic and non-sporadic oocysts, the duration of the spinning, the size and shape of the oocysts, the availability of the polar cap (cover) of micropyle and the residual body of sporocyst (internal the residual body) and the number and shape of sporocyst formed during sporulation was used in the identification of species. The samples were studied using the Amplival (Carl Zeiss) microscope (10x, 40x, 100x).

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Upon calculating the extracurrlicity of invasion, the following formula $IE \% = n \times 100 / N$ (N - the total number of individuals checked here, n - number of infected individuals), and upon calculation of interest rate error of extensiveness of invasions the following formula $mp\% = \sqrt{P(100-P)} / n$ was used (where P is the invasive extensiveness, n -total number of tested animals). The statistical analysis of experiments was carried out by Lakin, (1990) [11].

Results

Results of the analysis of the collected materials from the farms of the surveyed regions showed that eimeriosis was widespread in all the pigs kept in Azerbaijan.

In general, as a result of the coprological examination of samples taken from 2303 pigs for analysis, oocysts of coccidia belonging to Eimeria and Isospora genus were found in 567 samples (25.3%). It has been established that, regardless of the altitude of the regions, coccidia was found in all farms. However, pigs' infections with coccidium were not

the same in the regions located in different physical and geographical areas.

As a result of the analysis of materials collected from farms of Shamakhi, Ismayilli, Balakan and Zagatala, located in the highlands, the intensiveness of the invasive was 20.1% in Shamakhi, 21.4% in Ismayilli, 19.8% and 29.3% respectively in Balaken and Zagatala. There were four species of Eimeria (*E. deblieski*, *E. polita*, *E. scabra*, *E. perminuta*) and 1 species of Isospora (*I.suis*) found in the highland zone. As a result of comparative analysis of the frequency of occurrence of species registered in the highlands, 2 species of Eimeria (*E. deblieski* and *E. scabra*) were found in the farms of Shamakhi region. Four species of Eimeria (*E. deblieski*, *E. polita*, *E. scabra* and *E. perminuta*) were found in Ismayilli, Balakan and Zagatala regions. It should be noted that the *I. suis* species were not registered only in the farms of Shamakhi region (Tab.1).

Table 1: Infection dynamics of the domestic pigs with the coccidides from Eimeria and Isospora genus, depending on the location zones of regions

Location of collection materials	Number of animals		IE±mp%	Species
	Tested	Infected		
Plants				
Absheron	320	71	22,2±2,32	<i>E. deblieski</i> , <i>E. polita</i> , <i>E. scabra</i> <i>I. suis</i>
Foothills				
Khudat	165	88	45,1±3,87	<i>E. deblieski</i> , <i>E. polita</i> , <i>E. scabra</i> <i>I. suis</i>
Khachmaz	274	73	26,6±2,67	<i>E. deblieski</i> , <i>E. polita</i> , <i>E. scabra</i> <i>I. suis</i>
Guba	228	54	23,7±2,82	<i>E. deblieski</i> , <i>E. polita</i> , <i>E. scabra</i> <i>I. suis</i>
Total	667	215	32,2±1,81	3 species Eimeria +1 species Isospora
Highland				
Shamakhi	393	79	20,1±2,02	<i>E. deblieski</i> , <i>E. scabra</i>
Ismayilli	714	153	21,4±1,54	<i>E. deblieski</i> , <i>E. polita</i> , <i>E. scabra</i> <i>E. perminuta</i> , <i>I. suis</i>
Balakan	127	25	19,8±3,54	<i>E. deblieski</i> , <i>E. polita</i> , <i>E. scabra</i> <i>E. perminuta</i>
Zagatala	82	24	29,3±5,03	<i>E. deblieski</i> , <i>E. polita</i> , <i>E. scabra</i> <i>E. perminuta</i>
Total	1316	281	21,4±1,13	4 species Eimeria +1 species Isospora
Amount	2303	567	25,3±0,89	<i>E. deblieski</i> , <i>E. polita</i> , <i>E. scabra</i> <i>E. perminuta</i> , <i>I. suis</i>

Extractiveness of coccidiosis invasions in individual pig farms of Khudat, Khachmaz and Guba, where we collected materials from mountainous gardens, was 45.1%, 26.6% and 23.7% respectively. There were 3 species of Eimeria (*E. deblieski*, *E. polita* and *E. scabra*) and 1 species of Isospora (*I.suis*) in the farms located in this neighborhood. All of three surveyed farms was found to have the above-mentioned species.

The overall extensiveness of the invasions in the plain girdle of Absheron peninsula was 26.9%. Three species of Eimeria (*E. deblieski*, *E. polita*, *E. scabra*) and 1 species of Isospora (*I.suis*) were registered in farms of this region.

Thus, it has been established that the extracurrlicity of the invasive in farms located in the foothills zone is higher than in the plain and mountainous areas. There were three species of Eimeria (*E. deblieski*, *E. polita*, *E. scabra*) and 1 species of Isospora (*Isospora suis*) found in plains and foothills. The *E.perminuta* species was recorded in the highland zone in addition to the above mentioned 3 species. It has been established that regardless of the areas in which it is located, the extent of *E. deblieski* of extinction in the farms of all the regions is higher than that of other species.

The highest extensibility of the invasion (32.2%) was observed in the foothills zone but its low extensibility (21.4%) in the farms located in the mountainous zone.

Discussion

The observed difference between the eimerios invasions in household pigs can be explained by the climatic conditions of the farm's location and the inadequate compliance with sanitary conditions in the farms located in the mountainous and plain. The temperatures are warm and humid in temperate regions in comparison with the mountainous terrain and it creates favorable conditions for the development of oocysts. Therefore, the extracurrlicity of the invasive in the foothills is relatively high compared to other regions [10].

Dry climate in Absheron region, high temperature in summer, solar radiation, etc. factors are not considered to be an adverse factor for the development of coccidia oocysts, not all oocysts can complete the exogenous stage of development, so the extracurrlicity of the invasion is lower in the plain in summer compared to the foothills.

Contrary to the climatic conditions in the suburbs of the plain, due to the low temperatures in the mountain zones, oocysts can not complete the exogenous stage of development and the intensity of the invasion is low because of the inability to reach the invasion stage [4]. Summarizing the information obtained, it can be concluded that the difference between the extensibility of coccidiosis invasions is primarily related to the natural and climatic conditions of the regions where farms are located. It is also known from the literature that climate

factors (temperature, humidity, solar radiation, etc.) have a significant impact on the viability of oocysts that fall into the external environment and are the source of invasion. This's why, the natural and ecological climatic conditions in the region, affect the epizootic situation in general. Secondly, it should be borne in mind that the spread of coccidiosis among animals has a significant impact on the conditions of keeping animals and non-compliance with sanitary and hygienic rules. The difference in extensiveness of the invasion can be explained by the influence of various factors affecting the life activity of coccidia oocysts that fall into the external environment. Some scientific studies have been carried out on the ecology of coccidia of animals, mainly correlating the diversity and distribution of the coccidia with the feeding habits, biotopes, families and species of the host, sampling period, seasonality, urbanization of the environment, etc. (12). However, diffusion dynamics of coccidia in pigs on altitude zones in the Azerbaijan is not studied in Azerbaijan. As noted this study coccidia have been described in pigs demonstrate a wide geographical distribution. The difference in extensiveness of the invasion can be explained by the influence of various factors affecting the life activity of coccidia oocysts that fall into the external environment. Our results reported in the current study should be considered to be as new data in future publications.

Conclusion

Three species of *Eimeria* (*E. deblieski*, *E. polita*, *E. scabra*) and 1 species of *Isospora* (*I. suis*) in the plains and foothills, and 4 species of *Eimeria* (*E. deblieski*, *E. polita*, *E. scabra*, *E. perminuta*) and 1 species of *Isospora* (*I. suis*) in farms located in mountainous regions were found.

2. The extensivity of coccidia invasions in the pigs farms in Azerbaijan region of the Greater Caucasus is depends on the climatic factors of the altitude zones where farm are located.

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