



UDC 636.52/.58:619:616.99

Some Epizootological Peculiarities of Chicken Eimeriosis in the Small Poultry Farms

V.V. Grigoryan, A.R. Hakobyan*Armenian National Agrarian University***S.V. Yeribekyan***National Center for Disease Control and Prevention, RA Ministry of Health***L.H. Grigoryan***Armenian National Agrarian University*grigoryanvgv@mail.ru, akobian.anush@yandex.ru, vivarium2016@mail.ru, lianagrigoryan7878@mail.ru

ARTICLE INFO

Keywords:*eimeriosis,
oocyst,
protozoa,
poultry,
disease*

ABSTRACT

The prevalence of chicken eimeriosis has been investigated per the geographical and climatic zones of Armenia and housing type of poultry, while the infection rate with eimeriosis has been determined according to the age group and zoo-hygienic conditions.

The data of investigations indicate that eimeriosis infection is observed mainly in the chickens aging from two weeks up to 45 days old and is associated with well pronounced clinical signs, being the main reason for the animal death.

At the same time, it can be mentioned that the relation of the causative agent of pathogenesis with the age of the host is eventually due to the adaptability developed throughout the evolution of the pathogens towards the animal body.

Introduction

It is well known that nowadays poultry farming is one of the profitable branches of livestock sector, which supplies high quality, dietary, protein-rich and animal-based meat and egg products to the population of the republic.

Eimeriosis is a widespread animal and human disease, the pathogens of which are sporing protozoa belonging to the subfamily of Eimeriinae. The pathogens of this subfamily

parasitize and end up their biocycle in one host organism (Lazareva and Perepelkina, 1999, Naghashyan, et al., 2017).

Young animals at the age of 10-90-day old are more susceptible towards the mentioned infection. Initially the pathogens propagate in the chickens' intestine asexually (merogony), and together with quantitative growth sexual propagation also takes place. The formed embryo is excreted to the external medium together with the poultry feces in the form of oocyst (allantoic sac) and surviving

the sporogonic period, it becomes already contagious (Khovanskikh, et al., 1999, Chernukha and Gostev, 1987, Braunies, 1984, Jadhav, et al., 2011). Eimeriosis is mainly a disease of juvenile chicks and is spread worldwide, including Republic of Armenia.

It is known that the intensity of chickens' eimeriosis infection is different in various geographic and climatic zones related to temperature, relative air humidity and precipitations (Mkrtychyan, 1995, Naghashyan, et al., 2017, Rakhimzhanov, 1988, Nematollahi, et al., 2008, Novikov and Safiullin, 2015).

The egg production capacity of the eimeriosis-diseased and recovered laying chickens is reduced by 10-80 %, while the meat yield per a broiler makes 270 g (Bakulin, 2006, Bolotnikov, 1979, Naghashyan, et al., 2017).

In the adult chickens the clinical manifestation of the disease is absent but they are infection carriers. K.L. Abuladze (1999) reports, that in the large poultry farms no seasonality of eimeriosis is observed.

Materials and methods

The research was conducted from October 2021 to March 2022 within the frame of the topic encoded as 21T-4A007 in the laboratories of the Chair of Epidemiology and Parasitology at the Armenian National Agrarian University and ANAU Research Center of Veterinary Medicine and Veterinary Sanitary Examination.

Feces samples of the chickens kept in cage and floor housing conditions taken from the poultry farms of Yerevan city, Aragatsotn, Lori, Gegharkunik and Tavush regions of the RA have served as a study subject. To determine the prevalence of chicken eimeriosis among different age groups, 180 samples of bird droppings were studied, while 135 samples of droppings, taken equally from the mountainous, piedmont and lowland belts of the republic, were studied to determine the infection rate of chicken eimeriosis per housing type and climatic-geographical zones. The disease of eimeriosis was diagnosed in the chickens based on the epidemiological data, clinical signs, as well as on the laboratory research data of the feces samples. The samples have been investigated through flotation methods – Fuelleborn's and Darling's methodologies.

It is worth mentioning that implementing investigations through the Darling's method is more relevant, since in that case the studied field of view is more clearly visible under the microscope. The micro-preparations were viewed with the microscopes of 80x magnification and if

required we covered them with coverslips and viewed with that of 400x magnification.

Results and discussions

The prevalence of chicken eimeriosis has been studied per the geographical and climatic zones of the republic, as well as according to the poultry housing type, while the eimeriosis infection level has been determined per the age group and zoo-hygienic conditions.

During the investigations the sanitary-hygienic conditions of livestock house, i.e., ventilation, lighting, feeding facilities and other factors have been taken into account. The data introduced in Table indicate the infection rate of chicken eimeriosis per the age group.

Throughout the investigations it has been found out that in the chickens of up to 14 days old, the infection rate has made 24 % in case of floor housing, while in conditions of cage housing the same index makes 15 %. In the 14-45-day chickens the mentioned index has amounted to 51 % and 36 %, while in those of 45-90 years old – 27 % and 20 % respectively.

The research results indicate that the high infection rate with eimeriosis is mainly recorded in the poultry aging from two weeks up to 45 days old associated with well pronounced clinical signs, which causes animal death for the most cases.

Table. The infection rate of chicken eimeriosis per the age groups (30 samples from each farm have been investigated)*

Farms	Up to 14 days old chickens		14-45 days old chicken		45-90 days old chicken	
	Infection rate %		Infection rate %		Infection rate %	
	Floor housing	Cage housing	Floor housing	Cage housing	Floor housing	Cage housing
Tsovagyugh	4	1	6	5	3	2
Sevan	4	2	8	5	5	2
Dilijan	5	4	10	6	6	4
Ijevan	4	4	10	7	6	6
Stepanavan	4	3	10	8	6	4
Aparan	3	1	7	5	1	2
Total	24	15	51	36	27	20

*Composed by the authors.

Meanwhile, it can be inferred that the relation of causative agent's pathogenesis with the age of the host organism is possibly due to the adaptability of the pathogens towards the animal organism formed throughout their evolution process, i.e., the eimeriosis pathogens are adapted mainly to a specific medium, which exists particularly in the poultry of the abovementioned age group.

While examining the litter samples, a huge number of oocysts were found in a field of the microscope view (Figure 1).

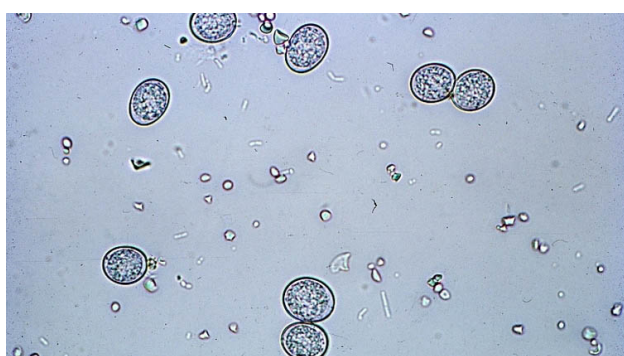


Figure 1. Oocysts of eimeria in chickens.

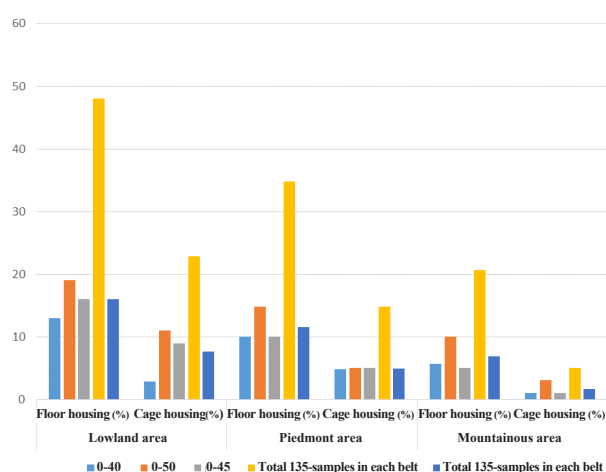


Figure 2. Determination of chickens eimeriosis infection rate per the geographical and climatic zones and housing type (composed by the authors).

According to the geographical and climatic zones, the incidence of the chickens' eimeriosis in the lowland area has made 48 % in case of floor housing and 22.9 % in case of cage housing. In the piedmont zone it makes 34.8 % and 14.8 % and in the mountainous area – 20.7 % and 5.1 % respectively.

The research results make it evident (Figure 2) that the highest incidence rate of the eimeriosis disease has been recorded in conditions of floor housing in the lowland areas. So, on the whole, the infection indices in the lowland, piedmont and mountainous areas have subsequently decreased by 13.2 % and 14.1 % in case of floor housing, while in conditions of cage housing – by 8.1 % and 9.7 % respectively. The infection rate of 40 feces samples taken from the floor housed animals in lowland geographical zone averaged 16 %, and in cage housed chicken it was 7.6 %, the infection rate of 50 feces samples taken from the animals of piedmont geographical zone was 11.6 % and 4.9 % respectively, while the contamination of 45 feces samples taken from the chickens of mountainous climatic zone was 6.9 % and 1.7 %, respectively.

The mentioned indicators resulted per the zoning and housing characteristics are evidently due to the effect of temperature, moisture and direct solar radiation, as well as the contact of the chickens imposed upon the housing type of the poultry.

It is noteworthy that in all poultry farms the feeding conditions were at high level: the feed ration of the animals was rich, contained fresh-cut grass and hay, anyhow, the unfavorable zoo-hygienic conditions, for example, fouled cell floors/bottom nets of the cages and anti-sanitary state of troughs and water tanks and, what is most important, the high relative air humidity in the livestock houses were likely to promote the spread of eimeriosis. In the aforementioned farms the ventilation facilities were missing, while ventilation was provided via the entrance doors.

Chickens with eimeriosis are depressed, gather in heaps, lose their appetite, lag behind in growth and development and significant losses are recorded among the young chickens (Figure 3).



Figure 3. 5-month-old chickens infected with eimeriosis.

The main source of the disease spread is the infected chicken who contaminate the external medium through the excrement.

Conclusion

1. The poultry infection with eimeriosis is mainly observed in the chickens aging from two weeks up to 45 years old and the disease is associated with clearly pronounced clinical signs leading the animals to death.

2. The infection rate determined per zoning and housing forms is closely related to the temperature, humidity, direct sun radiation effects and the contacts between the chickens as a result of housing conditions.

3. The floor housing of the poultry promotes the quick transmission of the eimeriosis pathogen, which takes place only via alimentary tract.

4. Cage housing prevents both the dissemination of eimeriosis biological agent and the further development of Eimeria.

References

1. Abuladze, K.I. (1975). Parasitology and Invasion Diseases of Farm Animals. - M., 1975, - 472 p. (in Russian).
2. Bakulin, V.A. (2006). Poultry Diseases. - St. Petersburg, - 686 p. (in Russian).
3. Bolotnikov, I.A. (1979). Coccidiosis: Coccidiosis of Chickens and Measures to Combat them / I.A. Bolotnikov, V.F. Krylov // Petrozavodsk, - p. 49 (in Russian).
4. Braunies, W.W. (1984). Epidemiology of Eimeria in Broiler Fowls and the Effect of Anticoccidial Drugs on the Econom Performance / W.W. Braunies // Zootech. Journ. - V. 6, - pp. 48-53.
5. Chernukha, V.K., Gostev, D.I. Some Questions of the Epizootology of Porcine Coccidiosis // Modern Problems of Protozoology: Abstracts of Reports 1 at the Congress of the All-Union Society of Protozoologists. Leningrad, - p. 163 (in Russian).
6. Jadhav, B.N., Nikam, S.V., Bhamre, S.N., Jaid, E.L. (2011). Study of Eimeria Necatrix in Broiler Chicken from Aurangabad District of Maharashtra State India // Intern. Multidis. Res. - V. 1, - pp. 11-12.
7. Khovanskikh, A.E., Ilyushechkin, Yu.P., Kirillov, A.I. (1999). Coccidiosis of Poultry. - L.: Agropromizdat, - 151 p. (in Russian).
8. Lazareva, O.F., Perepelkina, O.V. (1999). All-Russian Conference with International Participation: Ecology and Distribution of Corvids in Russia and Neighboring Countries. Conference of Ornithologists of the CIS Countries, Stavropol (in Russian).
9. Mkrtchyan, M. E. (1995). Epizootology and Therapy of Mixed Ascaridiosis-Coccidiosis Invasion of Chickens in Armenia: Ph.D. Cand. Biol. Sciences: 03.00.19 Yerevan, - 117 p. RSL OD, 61:06-3/956.
10. Naghashyan, O.Z., Shcherbakov, O.V., Hakobyan, A.R., Grigoryan, L.G. (2017). Parasitic Associations of Chickens in Small Poultry Farms in Armenia. Proceedings of the International Scientific Conference "Biological Diversity and Problems of Fauna Protection - 3". September 27-29, Yerevan, Armenia, - pp. 222-224 (in Russian).
11. Nematollahi, A., Moghaddam, G.H., Niyazpour, F. (2008). Prevalence of Eimeria spp. among Broiler Chicks in Tabriz (Northwest of Iran) // Res. J. Poult. Sci. - V. 2, - pp. 72-74.
12. Novikov, P. V., Safiullin, R.T. (2015). Methodical Guidelines for the Struggle against Chicken Eimeriosis in Farms and Private Subsidiary Holdings // Russian Journal of Parasitology, - V.4, - pp. 109-113 (in Russian). <https://doi.org/10.12737/17818>.
13. Rakhimzhanov, B.A. (1988). Eimeriosis of Chickens (Prevention and Immunogenesis) / B.A. Rakhimzhanov // Abstract, Ph.D. Candidate of Veterinary Sciences, L., - 16 p. (in Russian).

Accepted on 07.03.2022

Reviewed on 11.04. 2022