



DISTRIBUTION OF CHICKEN EIMERIOSIS IN ARGATSOTN REGION OF THE REPUBLIC OF ARMENIA

A.R. HAKOBYAN, V.V. GRIGORYAN, S.V. YERIBEKYAN,
M.A. MOVSISYAN, L.H. GRIGORYAN

Research Center of Veterinary Medicine and Veterinary Sanitary Expertise,
National Agrarian University of Armenia
lianagrigoryan7878@mail.ru
grigoryanvg@mail.ru

The study of the prevalence of chicken eimeriosis in private poultry farms was carried out in the Argatsotn region of the Republic of Armenia. Three species of *Eimeria* were discovered, of which *Eimeria acervulina* is the most common. The highest rates of infection with *Eimeria* were recorded in the foothills zone in the spring months, and the lowest in the high mountain zone in the winter. A low extensiveness and intensity of invasion was recorded, which is due to the geographical location and climatic conditions of the region.

Birds – eimeria – prevalence – Eimeria acervulina – Eimeria necatrix – Eimeria tenella

Հավերի էյմերիոզի տարածվածության ուսումնասիրությունը մասնավոր թռչնաբուծական տնտեսություններում կատարվել է Հայաստանի Հանրապետության Արագածոտնի մարզում: Հայտնաբերվել են էյմերիաների երեք տեսակներ, որոնցից առավել տարածվածություն ունի *Eimeria acervulina*-ն: էյմերիաներով վարակվածության ամենաբարձր ցուցանիշները գրանցվել են նախալեռնային գոտում գարնան ամիսներին, իսկ ամենացածրը՝ բարձրլեռնային գոտում ձմռանը: Արձանագրվել են ինվազիայի ցածր էքստենսիվություն և ինտենսիվություն, որը պայմանավորված է մարզի աշխարհագրական դիրքով և կլիմայական պայմաններով:

Թռչուններ – էյմերիոզ – տարածվածություն – Eimeria acervulina – Eimeria necatrix – Eimeria tenella

Исследование распространенности эймериоза кур в частных птицеводческих хозяйствах было проведено в области Арагацотн Республики Армения. Было обнаружено три вида эймерий, из которых *Eimeria acervulina* является наиболее распространенным. Наиболее высокие показатели зараженности эймериями отмечены в предгорной зоне области в весенние месяцы, а самые низкие показатели – в высокогорной зоне в зимний период. Отмечена низкая экстенсивность и интенсивность инвазии, что связано с географическим положением и климатическими условиями изученного региона.

Птицы – эймерии – распространенность – Eimeria acervulina – Eimeria necatrix – Eimeria tenella

In the Republic of Armenia, poultry farming is considered one of the developing and promising branches of animal husbandry, providing the population of the country with valuable protein foods. Approximately 1/3 of the total number of birds, bred in the republic, is kept in subsidiary farms.

The successful development of poultry farming largely depends on the health of the bred birds. In subsidiary farms, outdoor keeping of birds is practiced, which increases the susceptibility of birds to parasitic diseases, the etiological profile of which is very diverse. Taking into account the ever-increasing number of small and subsidiary poultry farms, it is necessary to pay attention to the economic damage caused by parasitic diseases, among which the proportion of eimeriosis of chicken is especially high. The economic damage from eimeriosis is formed from the death of young animals and from the implementation of forced therapeutic and preventive measures. In addition, the egg production of chickens with eimeriosis decreases by 10-80% [14, 16].

Eimeriosis of birds is widespread in all poultry farms that practice outdoor keeping of birds [10]. Currently, veterinary science has studied and described many types of the causative agent of eimeriosis, of which 9 species are parasitic in chickens [1, 7, 8, 15]. The eimeriosis of chickens hinders the successful development of poultry farming, especially in small farms [4, 9].

Materials and methods. Research work was carried out within the framework of the 21T-4A007 program in 2021-2022 in small and subsidiary farms of the Aragatsotn region of the Republic of Armenia with a population of birds from 5 to 100 individuals. Outdoor and free keeping of birds was practiced in the studied farms. The research covered three cities and 64 villages belonging to the Aragatsotn region.

The research was carried out in the laboratory of the “Veterinary and Veterinary-Sanitary Examination Research Center” of the National Agrarian University of Armenia. Samples of chicken manure taken from small and subsidiary poultry farms were used as material for laboratory studies. The detection of oocyst eimeria in litter samples was carried out by the flotation methods of Fulleborn and Darling [3, 6].

For determine the quantitative indicators of infection of birds with eimeriosis, the modified Stoll method proposed by Krasilnikov and Volkov was used [5, 13, 2]. The species composition of eimeria was determined using the pathogenic protozoa determinant proposed by Krylov [12]. Evaluation of the results of laboratory examination of litter samples of chickens, infected with eimeriosis, based on the number of detected oocysts per kilogram, was carried out according to the scoring system proposed by Smirnov [11, 16]. The seasonality of chicken eimeriosis was studied through year-round laboratory studies.

Results and Discussion. As a result of research in the Aragatsotn region, three species of eimeria were discovered: *Eimeria acervulina*, *E. necatrix*, *Eimeria tenella* (fig.1,2,3). At the same time, the prevailing species was eimeria acervulina. The disease was registered in the foothill, mountain and high-altitude zones of the region.



Fig. 1. Oocyst *Eimeria acervulina*



Fig. 2. Oocyst *Eimeria necatrix*



Fig. 3. Oocyst *Eimeria tenella*

In the high mountain zone, the species *Eimeria acervulina* was found in all infected samples, in the mountainous zone – in 45.45 %, and in the foothill zone – in 50.79 % of all infected samples. The *Eimeria Necatrix* species was found in 42.42 % of infected samples taken from the mountainous and in 34.13 % of samples taken from the foothill zone, while the contamination of litter samples with the *Eimeria tenella* species was 12.12 % in the mountainous and 15.09 % in the foothill zones of the region (tab. 1).

Table 1. Prevalence of chicken eimeriosis in the Aragatsotn region

Geographical zones	Total number of settlements	Number of settlements investigated	Total number of examined litter samples	Total number of infected litter samples	Extensiveness of invasion (%)	Percentage (%) and quantitative species ratio of eimeria in infected samples					
						<i>Eimeria acervulina</i>		<i>Eimeria necatrix</i>		<i>Eimeria tenella</i>	
High mountain	40	20	400	50	12,5	50	100	-	-	-	-
Mountainous	22	17	340	66	19,41	30	45,45	28	42,42	8	12,12
Foothill	59	30	600	126	21	64	50,79	43	34,13	19	15,09
Total	121	67	1340	242	18,05	144		71		27	

This prevalence of eimeria is apparently due to the peculiarities of the biological development of parasites, depending on the geographical location and the climatic conditions of the region.

From the data given in tab. 1, it can be seen that the settlements surveyed by us make up 55.37 % of all settlements in the region. The research covered 50 % of high mountain settlements, 77.27% of mountainous settlements and 50.8 % of settlements in the foothill zones. In the high mountain zone the extensiveness of invasion was 12.5; in the mountainous zone – 19.4, and in the foothill zone – 21%. The total extensiveness of invasion in all three geographical zones was 18.05 %. Such fluctuations in the extensiveness of invasion in case of eimeriosis depending on the time of year, are due to geographical and climatic features of settlements (tab. 2).

Table 2. Seasonal dynamics of infection with eimeriosis in the Aragatsotn region

Geographical zones	Total number of infected samples	The number of infected samples depending on the time of year				Winter		Spring		Summer		Autumn	
		Winter	Spring	Summer	Autumn	Extensiveness %	Intensity (oocysts)	Extensiveness %	Intensity (oocysts)	Extensiveness %	Intensity (oocysts)	Extensiveness %	Intensity (oocysts)
High mountain	50	8	17	11	14	2	1300 (2points)	4,25	3800 (2points)	2,75	(2100) (2points)	3,5	4100 (2points)
Mountainous	66	12	19	18	17	3,5	1800 (2points)	5,5	4100 (2points)	5,2	2500 (2points)	5,0	4400 (2points)
Foothill	126	23	40	29	34	3,8	2600 (2points)	6,6	4900 (2points)	4,8	1700 (2points)	5,6	4800 (2points)

Only 8 samples, taken from poultry farms located in the high–altitude zone, were infected with eimeria, the extensiveness of invasion was 2 %, and the intensity of invasion was 1300 oocysts. The low infection rates of samples, taken from the high mountain zone, are obviously due to the duration of winter (5-6 months) and the harsh climate in this region, which negatively affect the survival of oocysts of eimeria found in the external environment.

In the spring months, there is an increase in both the extensiveness (4.25 %) and the intensity (3800 oocysts) of the invasion, while the heat and high humidity in July and August contribute to a slight decrease in these indicators to 2.75 % and 2100 oocysts, respectively. A further increase in the dynamics of the seasonality of eimeriosis is observed in September-October, while the extensiveness of invasion reaches 3.5 %, and the intensity of invasion is 4100 oocysts.

During the winter months, a relatively high extensiveness (3.5 %) and intensity (1800 oocysts) of invasion is observed in the mountainous area of the region. At the same time, the spring months in this zone are conducive to sporulation of oocysts: an increase in the extensiveness (5.5 %) and intensity (4100 oocysts) of invasion is observed in April-May. In July-August, with a decrease in relative humidity, the extensiveness (5.2 %) and intensity (2500 oocysts) of invasion also decrease. In this zone, the highest rates of extensiveness and intensity of invasion are observed in September-October, and in some settlements in the first 10 days of November.

In the foothill zone during the winter months, the extensiveness of invasion was 3.8 %, and the intensity of invasion was 2600 oocysts. A high level of these indicators was also observed in the spring months: 6.6 % extensiveness and 4900 oocysts intensity of invasion, which explains the epizootic outbreaks of eimeriosis observed in this geographical area since the end of April. In summer, the indicators of the extensiveness and intensity of invasion in chicken eimeriosis decrease by 4.8 % and 1700 oocysts, respectively. The increase of the above indicators in this climatic zone is again observed from the end of September to mid-November.

Conclusion

As a result of research conducted in 2021-2022 in the Aragatsotn region of the Republic of Armenia, three species of eimeria were discovered: *Eimeria acervulina*, *E. necatrix*, *Eimeria tenella*. The most common is the species *Eimeria acervulina*, which was found in all geographical zones of the region, while the species *Eimeria Necatrix* and *Eimeria tenella* were found only in mountainous and foothill zones. The prevalence of *Eimeria tenella* was especially high in the foothill zone, due to climatic conditions, particularly high air temperature (28-30°C), contributing to the process of sporulation of this particular type of eimeria in the external environment.

The highest extensiveness and intensity of invasion with eimeriosis in the foothill region were observed during the spring months and in the high mountain region – in winter.

Comparatively low rates of extensiveness and intensity of invasion in chicken eimeriosis in the Aragatsotn region are due to the climatic and geographical features of the region.

REFERENCES

1. *Mathis G.F.* Coccidiosis control with anticoccidial medicated or nonmedicated feed / G.F. Mathis, R. Froyman, T. Jrion, T. Kennedy. *Avian Dis.*, 47, 2, p.463-469, 2003.
2. *Endriss Y., Escher E., Rohr H., Weiss N.* Kato-Katz technique for helminth eggs, chapter 8. In: *Methods in parasitology*. Swiss Tropical Institute: Basel; p. 51, 2005.
3. *Akbaev M.Sh., Vasilevich F.I., Akbaev R.M.* Practicum on the diagnosis of invasive diseases of farm animals / Moscow, 536, 2013.
4. *Gordeeva T.I.* Trends in the development of breeding poultry farming of the future / T.I. Gordeeva. Collection of articles of the first international scientific and practical seminar. Izhevsk: "Commonwealth", pp. 59-65, 2000.
5. *Davidyants V.A., Pashinyan E.R.* Clinical and laboratory diagnostics of helminthiasis. Moscow, p. 31-38, 1990.
6. *Davidyants V.A., Chernikova E., Lungu V.* Control and prevention of geohelminthiasis in the countries of the who european region Collection of reference and methodological materials. World Health Protection Organization, p. 27-28, 2017.

7. *Demina N.V.* Sources of infection of chickens with eimeria /N.V. Demina. Entomol. and parasitol. research. in the Volga region / Saratov, state. university. Saratov, Issue 2, pp. 113-114, 2003.
8. *Eliseeva E.H.* Effective drugs for the prevention and treatment of poultry coccidiosis / E.H. Eliseeva. BIO. Yekaterinburg, June, p.2-4, 2003.
9. *Ziper A.F.* Breeding of chickens of meat and egg breeds / A.F. Ziper. M.: "ACT Publishing house"; Donetsk: "Stalker", 241 p., 2002.
10. *Kirillov A.I.* Coccidiosis of birds. M.: Russian Agricultural Academy, 2008; 230 p
11. *Ksavyera F. Ch.* Parasitizes of chickens and the development of therapeutic-preventive measures in the conditions of peasant-farm households of the Krasnodar Region. Dissertation for the degree of Candidate of Veterinary Sciences, Krasnodar, p. 166, 2021.
12. *Krylov M.V.* Determinant of parasitic protozoa / M.V. Krylov. St. Petersburg, 602 p. 1996.
13. *Sergieva V.P., Lobzina Yu.V., Kozlova S.S.* Human parasitic diseases (protozooses and helminthiasis). A guide for doctors. Ed. 3rd ed. Saint Petersburg: Folio; pp. 74-78, 2016.
14. *Smirnov V.N.* Results of epizootological examination and laboratory diagnostics of bird diseases./V.N.Smirnov, E.V.Chufarova, T.I.Kalpikova, A.A.Orlov. Veterinary pathology. No.4, pp. 60-62, 2008.
15. *Orlov S.* World anti-coccidiosis program of the company "Alfarma" / S. Orlov // Poultry farming. 3, pp. 22-23, 2005.
16. *Titova T.G., Razbitsky V.M.* Resistance in eimeria field isolates to anticoccidium drugs and ways to overcome it. Efficient animal husbandry. 129, 8, p. 53-55, 2016.

Received on 27.09.2022