

## The Coccidia of the Gallinaceous Birds in Azerbaijan

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**Abstract:** In this study the data on the coccidia of gallinaceous birds in Azerbaijan were presented. Chickens and pheasants have already been examined earlier concerning the presence of Eimeria and Isospora. Peacocks and quails are studied in this aspect for the first time. The examination of the gallinaceous birds concerning the presence of cryptosporidia oocysts has been also carried out for the first time. The results obtained are indicative of the presence of a few coccidian species in the gallinaceous birds which have not been detected in Azerbaijan before.

**Key Words:** Oocysts, Eimeria, Isospora, Cryptosporidium, Chickens, Pheasants, Quails.

### Azerbaycan'da Gallinace kanatlıların Coccidia'ları

**Özet:** Bu çalışmada, Azerbaycan'daki tavuk kuşların coccidia'ları hakkındaki veriler gösterildi. Tavuklar ve sülünlerde Eimeria ve Isospora cinslerinin coccidia'larının olması evvelce tesbid edilmişti ama tavus ve bıldırcın kuşlarında ilk defa görüldü. Tavuk kuşlarda cryptosporidia oocysts olması ilk defa olarak tesbid edildi. Tavuk kuşlarda, önceleri Azerbaycan'da tesbit edilmiş birçok coccidia çeşitleri elde edilmiştir.

**Anahtar Sözcükler:** Oocysts, Eimeria, Isospora, Cryptosporidium, Tavuklar, Sülünler, Tavuslar, Bıldırcınlar.

### Introduction

The poultry coccidiosis cause great losses in poultry breeding. Until the mid 70-s eimeria had been considered the most pathogenic of the parasitic protozoa (1, 2). To protect and preserve poultry livestock, various techniques for diagnosing, preventing and treating eimeriosis have been investigated (3). Due to the effective coccidiostatic preparations, the influence of eimeriosis on the development of poultry breeding has been significantly diminished since the late 70-s, so the relative role of the cryptosporidiosis has increased. The pathogens of the disease, cryptosporidia, were considered harmless and non-pathogenic organisms for a long time (4, 5). In spite of numerous investigations, cryptosporidiosis still remains a scarcely studied parastitary disease of both animals and humans.

In Azerbaijan the systematic study of the chicken coccidia has been carried out for many years. Since the mid-80-s this aspect of other gallinaceous birds, i.e. pheasants, quails and peacocks has also been studied. In this paper the results of the investigations on spreading coccidia in those birds are presented.

### Material and Methods

The material of investigation was served by the coccidian oocysts isolated from the faeces of chickens, pheasants, quails and peacocks. The chickens (*Gallus domesticus*) were examined at poultry farms, the quails (*Coturnix coturnix*) at private farms in the Apsheron district and the pheasants (*Phasianus colchicus*) and peacocks (*Pavo cristatus*) at the Airjy state breeding farm in the Barda district. To isolate the oocysts from the faeces, the flotation technique combined with centrifugation was used. The saturated solutions of sodium chloride or sucrose were used as the flotation liquids. The cryptosporidian oocysts were detected in fine faeces smears fixated with methanol spirit and stained with carbolfuxin after Ziehl-Neelsen (6). The preparations were observed and the oocysts were measured with the microscopic "Amplival". The objective 100x and the eyepiece 7x were used. The results obtained were statistically analyzed (7).

### Results

From 1989 till the present, faeces samples from 798 chickens, 120 quails, 203 pheasants, 62 peacocks have been examined concerning the presence of oocysts. The

Host	Eimeria spp.		Isospora spp.		Cryptosporidium spp.	
	No. animals examined	No.(%) positive	No. anim. examined	No.(%) positive	No. animals examined	No.(%) positive
Chickens	529	196(37.0)	529	–	269	135(50.6)
Pheasants	101	33(32.6)	101	3(29.7)	203	16(7.9)
Peacocks	30	16(53.3)	30	2(6.7)	62	8(12.9)
Quails	111	59(53.2)	111	–	120	26(21.7)

Table 1. Oocysts of the Coccidia species determined in the faeces of gallinaceous birds

Host	Dimensions of the oocysts (µm)		
	Length x width		shape index
	min-max x min-max	mean (n=50)*	(SI) LW
Chickens	(3.3-6.7) x (3.0-6.7)	5.3±0.2x4.6±0.2	1.0-1.1 (1.15)
Quails	(3.3-7.4) x (3.3-7.4)	5.14±0.12 x 4.8±0.11	1.0-1.4 (1.07)
Pheasants	(3.3-7.4) x (2.5-7.4)	4.4±0.22 x 3.9±0.24	1.0-1.3 (1.13)
Peacocks	(3.3-7.3) x (2.5-5.7)	4.7±0.3 x 4.15±0.2	1.3 (1.13)

Table 2. The dimensions of the Cryptosporidium oocysts detected in the gallinaceous birds

\* number of the oocysts measured from each isolate

extent of the invasion in chickens, pheasants, peacocks and quails was 37.05%, 32.6%, 53.3% and 53% respectively. In chickens well known species of Eimeria have been detected which are found worldwide (Table 1). The oocysts from pheasants were of ellipsoid shape, their dimensions being 18.8 - 29.2 x 16.7 - 18.8 (mean 23.1±0.46 x 17.3±0.2) µm. The oocyst walls were smooth, bilayered, 1.2 µm wide. Micropyle was absent. Residual body has not been observed either in the oocyst or in the sporocyst. The oocyst of Eimeria parasiting in quails were ellipsoid, ovoid or rarely, round. Their dimensions were 16.7 - 27.1 x 12.5 - 18.7 (mean 22.0±0.42 x 15.8±0.38) µm. The Isospora oocysts have been detected only in 3 of the examined pheasants (3%). The intensity was small, only 2-3 oocysts in the preparation from one bird. The oocysts were ellipsoid or ovoid. The wall was bilayered, no micropyle. The oocyst dimensions were 27.1 - 32.9 x 20.9 - 29.2 µm. There were residual bodies in the oocysts and sporocysts.

Only 2 of the 30 examined peacocks isolated the oocysts of Isospora. The invasion intensity was significantly higher, 2-5 oocyst per one field of vision in the preparations from both birds. The oocysts were ovoid rarely round. Their dimensions were 20.85 - 33.4 x 20.85 - 29.2 (30.0 x 24.25 µm). The wall was bilayered and the micropyle was very distinct.

Half of all chickens examined, 135 out of 269, isolated the cryptosporidian oocysts. Quails and peacocks iso-

lated them significantly more rarely, 26 out of 120 and 8 out of 62 specimens examined, respectively. The invasion extensities were 50.6%, 21.7% and 12.9%. Pheasants were least infested - 16 out of 203 examined (7.9%). The cryptosporidian oocysts detected in all the gallinaceous birds examined were of round or slightly ovoid shape, their lengths varied from 3.0 to 7.4 µm, the average dimensions being almost the same in different bird species (Table 2). In the oocysts, isolated by quails, average dimensions were 5.14 x 4.8 µm. (SI = 1.07), by pheasants 4.4 x 3.9 µm (SI = 1.13), by peacocks - 4.7 x 4.15 µm (SI = 1.3) and by chickens 5.3 x 4.6 µm (SI = 1.15). The detected differences between different species in the oocyst dimensions have been found to be statistically insignificant.

The adult quails were kept in cages, 11-12 specimens per cage (10-11 v and 1 m), young females and males were kept separately and newborn ones, 2-3 weeks old, were kept together. Thus we have managed to compare the quail oocysts from different isolates. The results obtained are summarized in Table 3. The results of measuring are evidence of the oocyst shape being rather constant in various isolates, the oocysts lengths and widths slightly varying and the average sizes of the oocysts in 5 month birds being very similar. The oocysts isolated from young birds were smaller than those from adult ones, the difference being statistically significant.

Table 3. The dimensions of the *Cyrtosporidium* oocysts from the isolates of quails of different ages

Age of birds	No. animals examined	No(%) positive	Dimensions of the oocysts (µm)			Shape index (SI)L/W
			length min-max	width min-max	mean (n=50)*	
4-14 days	9	1(11.1)**	3.3-4.9	3.3-4.1		1.0-1.2
1-2 months	24	8(33.3)	3.0-5.7	2.0-4.9	4.2±0.11x3.8x0.12	1.5-1.2(1.1)
3-4 "-	13	-				
5-" (V V)	25	9(36.0)	4.1-7.4	4.1-6.5	5.4±0.13x5.0x0.13	1.0-1.4(1.08)
5-" (M M)	15	5(33.3)	3.3-6.5	3.3-5.7	5.0±0.17 x 4.4x0.14	1.0-1.14(1.13)
8-10 "-	5	-				
12 "-	11	3(27.2)**	4.1-6.5	4.1-4.9		1.0-1.3
older 1 year	18	-				

\* number of the oocysts measured from each isolate

\*\* Single oocysts, no statistical analysis

Table 4. Comparison of morphological and structural properties of *Eimeria* species determined in pheasants and quails

Species (host)	Dimension (µm) (mean±SD)		Residual body		Micropyle	Polar granula	References
	Oocyst	Sporocyst	Oocyst	Sporocyst			
<i>E. phasiani</i> (pheasant)	19.17-28.96 x 14.89-21.72	no data	-	-	-	2-3	(Arnastauskene, 1970) from (8)
	20-26 x 13-18(23x14)	"-	+	+	-	no data	(Trigg, 1965) "-
	24.7 x 17.1	14.3 x 6.3	+	+	-	3	(14)
	22.0-29.0 x 14.0-19.5 (21.1x16.8)	8-14 x 5.5-8	+	+	-	no data	(17)
	18.8-29.2 x 16.7-18.8 (23.1 x 17.3)	7-14 x 6-7	+	+	-	1-2	own data
<i>E. basteri</i> (quail)	15-28 x 14-23 (23x18)	-	-	+	-	+	(Bhatia et al., 1965) from (8)
	14-28 x 12-19(20.5x15.3)	8-12 x 6-9 (10.3 x 7.5)	-	+	-	+	(Shaha Johnson, 1971) "-
	17.0-31x13-22(23.2x17.6)	10-13x6-8 (11.7x7.3)	-	+	-	+	(Norton, Peirce, 1971)-"-
	16.7-27.1 x 2.5-18.8 (22.2x15.8)	8-12.5 x 6-9	-	+	-	+	own data

## Discussion

Nine *Eimeria* species, capable of inducing disease have been described in chickens. These are *E. tenella*, *E. necatrix*, *E. brunetti*, *E. maxima*, *E. acervulina*, *E. mitis*, *E. praecox*, *E. hagai* and *E. mitavi* (8). The eimerioses of chickens are serious illnesses, running their courses painfully. In the host tissues, the metabolism of proteins, lipids and carbohydrates are being disturbed as well as activities of the enzymes catalyzing these processes. The economic loss is made up of the mortality, the growth and development retardation of the affected bird, the diminution of their body masses and rates of the oviposition, deteri-

oration of the meat quality and so on (9, 10). The specific composition of *Eimeria* and its spreading throughout Azerbaijan have been studied quite thoroughly. In chickens of Small and Great Caucasus, *E. tenella*, *E. mitis*, *E. maxima* and *E. acervulina* were prevalent (11-13), in the poultry farms of Apsheron. *E. brunetti* has been also found (10). At present for the chickens in the farms of Apsheron, the same specific composition of *Eimeria* is characteristic. Despite the fact that *Eimeria* has been thoroughly studied and that there has been significant progress in prevention of eimerioses, this group of intestine parasites is still of protozoological interest. First,

Host	Species	Dimensions (µm)	Shape index	Author
Chicken	<i>C.baileyi</i>	6.2x4.6	1.4	(19)
	-"	6.6 x 5.0	1.33	(19)
	<i>Cryptosporidium</i> sp.	5.3x4.6	1.15	own-data
Turkey	<i>C.meleagridis</i>	4.5x4.0	1.12	(18)
Pheasant	<i>Cryptosporidium</i> sp.	4.4x3.9	1.13	own-data
Peacock	<i>Cryptosporidium</i> sp.	4.7x4.15	1.3	-"
Quail	<i>Cryptosporidium</i> sp.	5.15x4.8	1.07	-"

Table 5. Comparative dimensions of the oocysts of different species of gallinaceous birds

*Eimeria*, being "typical" or "classical" Coccidia, sets a standard and other Coccidia detected in the same host are compared with them. On the other hand, in spite of the preventive arrangements and successful treatment of eimerioses, *Eimeria* continues to circulate between the host and the environment, their specific composition remaining practically constant for a relatively long time.

In pheasants 10 *Eimeria* species are described (8, 14). In Airijy nursery we detected the oocysts of *E.phasiani* and *Isospora* sp. *Eimeria phasiani* is a widespread species diagnosed rather easily. As far as *Isospora* are concerned we haven't found any data concerning. *Isospora* in pheasants and because we haven't been successful in experimentally infecting pheasants with the *Isospora* oocysts detected we have, for the time being, to refrain from their specific diagnosis. In the earlier paper of M.A. Musaev and F.K.Alieva (15) the detection of the oocysts of *E.phasiani*, *E.pacifica*, *E.duodenalis* and *Isospora* sp. was reported. However in that paper no characteristics of the oocysts detected were presented.

In quails, 4 *Eimeria* species are known: *E.bateri*, *E.coturnicis*, *E.usura* and *E.tahamensis* (8, 16). The morphology and dimension characteristics of the oocysts detected by us in quails are the same as those of *E.bateri* (Table 4) therefore we have regarded them as belonging to that species.

In peacocks, 5 *Eimeria* and 1 *Isospora* species have been noted (8). The oocysts that we have detected cannot be regarded as belonging to any of the previously described species. Their dimension characteristics differ quite significantly. Besides that, there are the micropyle and residual body in *isospora* oocysts isolated from the peacocks of Airijy farm.

At present in birds the following *Cryptosporidium* species are considered as valid ones: *C.meleagridis* and *C.baileyi*, *C.melagridis* was for the first time described in turkeys (18). Later this species has been noted in chickens (19). *C.baileyi* was described in broilers (20) and then it was detected in geese and pheasants (21, 22).

In faeces of quails (*Coturnix coturnix*), in the nasal cavities and tracheas of peacocks, (*Pavus cristatum*) and quails, (*Perdix perdix*) *Cryptosporidium* sp. were noted (23-27).

Comparing the dimension characteristics of the cryptosporidian oocysts detected by us in the faeces of peacocks, pheasants and quails with previous data brings us to the conclusion that the oocysts examined by us seem to belong to 2 different species: *C.meleagridis* and *Cryptosporidium* sp. Thus in birds there are at least 3 cryptosporidian species: *C. baileyi*, *C. meleagridis* and *Cryptosporidium* sp. (Table 5). Further investigations are necessary to ascertain the specific composition of *Cryptosporidium* in gallinaceous birds.

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