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**PREVALENCE STUDIES ON COCCIDIA OF GOATS
IN ASSIUT GOVERNORATE WITH NOTES
ON SEASONAL VARIATION**
(With 5 Tables and 1 Plate)

By

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دراسات عن مدى تواجد الكوكسيديا في الماعز في محافظة أسيوط
مع الإشارة إلى الاختلافات الفصلية

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أجريت هذه الدراسة لتحديد نسبة الإصابة بالكوكسيديا في الماعز في محافظة أسيوط خلال ١٢ شهر. وقد اشتملت تلك الدراسة على ١٣١ من صغار الماعز و ١٥٧ من الحيوانات البالغة. بلغت نسبة الإصابة بالكوكسيديا في الماعز ٩٣.٧٥%. وقد تم التعرف على ٨ أنواع من الإيميريا التي تصيب الماعز في محافظة أسيوط وتم الوصف المورفولوجي وتحديد نسبة الإصابة لكل منها. بلغت نسبة العدوى المشتركة بأكثر من نوع من الإيميريا ٨٠.٥٥%. وقد كانت نسبة الإصابة بالإيميريا عالية طوال العام. كما تم عزل جميع أنواع الكوكسيديا خلال العام ماعدا إيميريا ابشرونكا التي لم يتم عزلها خلال فصل الخريف في كل من الصغار والكبار.

SUMMARY

Parasitological study was done to determine coccidial infection rates among goats in Assiut Governorate during 12 months period. The study included 288 goats (131 kids and 157 adults) in different localities of Assiut Governorate. *Eimeria* oocysts were found in 270 (93.75%) of examined samples. Eight species of *Eimeria* were identified in the present work. The most common species was *E.jolchijevi* (63.9%) and the lowest one was *E.apshronica* (8.3%). Mixed infection by more than one species was detected in 80.55%. All species were detected all over the year except *E.apshronica* which was not detected in Autumn in both kids and adults. Morphological characters of each *Eimeria* species were described.

Key words: *Coccidia, Goats.*

INTRODUCTION

Goats are widely distributed all over the world. In developing countries they are known as "the poor man's cow" because they are used as a source of meat in addition to milk and mohair fiber production. Coccidia is one of the important parasites of goats especially in the growing kids (Matthews, 1999).

Smith and Sherman (1994) reported that *Eimeria* oocysts were widely prevalent in faeces of both normal and diseased goats of all ages, but the highest incidence of clinical disease occurred in kids. They added that, in the past, *Eimeria* species infecting goats and sheep were presumed to be the same as a result of close morphological similarity between the oocysts of *Eimeria* spp.

McDougald (1979) after well-controlled experiments demonstrated that each small ruminant host has its own host specific *Eimeria* species that are not readily cross-infective. These results led to redescription and renaming of *Eimeria* spp. of goats.

Norton (1986) described nine species of *Eimeria* in English goats and the total incidence was 98%. Mathew (1999) stated that goats are affected by 12 species of *Eimeria*.

Yvone *et al.* (1980) recorded that a mixture of pathogenic spp. of *Eimeria* in kids produced haemorrhagic enteritis and papilloma like lesions in small intestine, while Gregory (1983) mentioned that coccidia which attacks the large intestine of ruminants produce lethal effects than the species which develop in small intestine.

In Egypt, goats are breeding in small numbers in villages or individually in houses. Furthermore, knowledge about *Eimeria* of goats in Egypt was represented by only few authors (El-Shrif *et al.*, 1959 and Otify, 1984).

The aim of the present study was to determine the incidence of *Eimeria* spp. in kids and adult goats, identification of different *Eimeria* spp. and study their seasonal variations in Assiut Governorate.

MATERIAL and METHODS

Random faecal samples from 288 goats (131 kids and 157 adult goats) were collected from different localities in Assiut Governorate during year 2000-2001. Faecal samples were collected in clean plastic cups, labeled and delivered directly to the laboratory.

Each faecal sample was examined macroscopically then microscopically by floatation technique with concentrated salt solution (Soulsby, 1982).

Oocysts of different *Eimeria* species were collected and mixed with 2% potassium dichromate solution and incubated at 27°C for sporulation.

The identification of different *Eimeria* species was done by reference to the descriptions given by Levine (1985), Norton (1986) and Smith & Sherman (1994).

The size of different oocysts was measured by the use of eye-piece micrometer (Lawrence and Thomas, 1987) and illustrated by photomicrographs.

RESULTS and DISCUSSION

I- Incidence of *Eimeria* spp. in goats in Assiut Governorate:

Out of 288 goats examined in the present work, 270 (93.75%) were infected with coccidian oocysts all over the year. This incidence included 127(96.95%) of kids and 143(91.08%) of adult goats (Table 1). This high incidence is considered one of the main characters of *Eimeria* infection in goats. In England, Norton (1986) recorded them in 98% of examined goats. In Czech Republic, Koudela and Bokova (1998) detected them in 92.2% of goats, while the prevalence reached 100% in South Africa (Harper & Penzhorn, 1999). In Egypt, Otify (1984) detected them in 94.65% of examined goats. These high incidences of *Eimeria* could be due to adaptation and higher resistance of oocysts to the different environmental conditions, in addition to poor hygienic conditions. This opinion agrees with Smith and Sherman (1994) who mentioned that *Eimeria* oocysts are quite resistant to environmental degradation, and are even more resistant when sporulation occurs.

II- Incidence of different *Eimeria* spp. in goats:

Eight *Eimeria* spp. were identified in the present work. The most common species were *E.jolchijevi* (63.9%), *E.herci* (59.7%), *E.alijevi* (58.7%) and *E.arlongi* (48.6%). The less frequently encountered species were *E.chrestensini* (29.7%), *E.caprina* (24.65%) and *E.ninakohlyakimovae* (23.3%). The lowest infection species was *E.apshrenica* (8.3%). (Table 4). *E.arlongi*, *E.caprina* and *E.chrestensini* were more abundant in kids than adults.

The identification of different Eimerian oocysts depends on the close similarity of their characters and their dimensions with those previously mentioned by Soulsby (1982), Norton (1986) and Smith & Sherman (1994) (Table 5) (Plate I).

Most of the present species were detected by several authors but with variable incidences (Norton, 1986; O'Callaghan, 1989; Kanyari, 1993; Koudela & Bokova, 1998 and Jalila *et al.*, 1998). This variation in incidence of infection may depend on the stage of potency of infection and immune state of the animals to each species.

Mixed infection by more than one sp. of *Eimeria* was detected in 80.55% of examined samples where it was 81.68% in kids and 79.62% in adults (Table 2). This result agrees with Otify (1984); Norton (1986) and Koudela & Bokova (1998). Yvone *et al.* (1980) considered that healthy kids could support heavy infection with mixed species of coccidia but stress factors could precipitate disease. Smith & Sherman (1994) however mentioned that concurrent infection with multiple *Eimeria* sp. is the rule.

III- Seasonal variation of *Eimeria* in goats:

Incidence of *Eimeria* infection is considered high all over the year, where it ranged from 89.5% in Summer to 97.3% in Winter (Table 3). In kids it ranged from 92.7% in Summer to 100% in Autumn, Winter and Spring. In adult goats, it ranged from 80.95% in Summer to 96.1% in Winter. All species were detected all over the year except *E. apshronica* which was not detected in Autumn. These results could be attributed to the overcrowding of pens specially in cold weather, stress factors as weaning, change of food in addition to resistance of the oocysts to environmental conditions. These results agree with Otify (1984) and Smith & Sherman (1994).

The present study cleared that there is a slightly difference in incidence of infection with *Eimeria* between kids and adults. These results could be attributed to the presence of kids with their dams specially during lactation, where adults act as a carrier for eimerian oocysts. Smith & Sherman (1994) mentioned that age-related resistance to clinical coccidiosis is reported in all ruminants, but this immunity is relative (not absolute) so it does not eliminate infection but it effectively checks the rate of coccidia reproduction of oocysts.

From the above mentioned results it could be concluded that coccidia is still one of the serious problems for goats in Assiut

Governorate. So strict hygienic measures especially that related to thorough cleaning of stables, collection and disposal of animal manure in addition to administration of suitable anticoccidial drugs should be applied to control of coccidial infection.

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Table (1): Incidence of *Eimeria* in goat in Assiut

	No. of examined animals	Infected animals		Non infected animals		Single infection		Mixed infection	
		No.	%	No.	%	No.	%	No.	%
Kids	131	127	96.95	4	3.05	20	15.75	107	84.25
Adult goat	157	143	91.08	14	8.89	18	12.59	125	87.41
Total	288	270	93.75	18	6.25	38	14.07	232	85.93

Table (2): Incidence of mixed infection of goats with *Eimeria* spp.

	No. of examined Animals	No. of <i>Eimeria</i> spp.										total mixed infection	%
		0	1	2	3	4	5	6	7	8			
Kids	131	4	20	25	21	20	23	12	6	-	-	107	81.68
Adult goat	157	14	18	31	30	25	18	17	3	1	-	125	79.62
Total	288	18	38	56	51	45	41	29	9	1	-	232	80.55

Table (3): Seasonal variation of *Eimeria* infection in goats

	Summer			Autumn			Winter			Spring		
	Ex.	Inf.	%	Ex.	Inf.	%	Ex.	Inf.	%	Ex.	Inf.	%
Kids	55	51	92.7	18	18	100	23	23	100	35	35	100
Adult goats	21	17	80.95	52	48	92.3	51	49	96.1	33	29	87.9
Total	76	68	89.5	70	66	94.3	74	72	97.3	68	64	94.1

Table (4): Incidence of *Eimeria* spp. in kids and adults goats in different seasons.

	Spring n = 68				Summer n = 76				Autumn n = 70				Winter n = 74				Total n = 288	
	kids	adult	Total		kids	adult	Total		kids	adult	Total		kids	adult	Total		No.	%
			No.	%			No.	%			No.	%			No.	%		
<i>E.jolchijevi</i>	29	24	53	77.9	20	5	25	32.9	13	34	47	67.1	23	36	59	79.7	184	63.9
<i>E.berci</i>	32	16	48	70.6	31	7	38	50.0	8	21	29	38.7	15	43	58	78.4	173	60.1
<i>E.adijevi</i>	22	17	39	57.35	20	8	28	36.8	10	34	44	62.9	23	35	58	78.4	169	58.7
<i>E.arlongi</i>	20	12	32	47.1	22	6	28	36.8	15	20	35	50.0	20	25	45	60.8	140	48.6
<i>E.chrestensini</i>	20	11	31	45.6	8	1	9	11.8	3	14	17	21.43	11	16	27	36.5	84	29.7
<i>E.caprina</i>	11	5	16	23.5	16	3	19	25.0	6	6	12	17.1	13	11	24	32.4	71	24.65
<i>E.nina</i>	15	4	19	27.9	6	3	9	11.8	3	11	14	20.0	10	15	25	33.8	67	23.3
<i>E.apshronic</i>	8	4	12	17.6	1	-	1	1.3	-	-	-	-	4	7	11	14.9	24	8.3

Table (5): Morphological characters of different *Eimeria* spp.

	Morphological characters	Mean of oocyst size	Mean of oocyst wall	mean of sporocyst size	Sporulating time
1- <i>E.herci</i>	Spherical or ovoid shape, has small pointed micropyle, wall is smooth & yellow colour, has clear residual body, sporocyst ovoid shape and each sporozoite has round vacuole at the middle	23.3 × 16.5	1.6	8.5 × 4.5	1-3 days
2- <i>E.arlongi</i>	Ellipsoid shape with slightly straight wall & has clear micropyle cap, wall is reddish colour, no residual body, has elongated ovoid sporocyst and each sporozoite has large vacuole at the broad end.	30.6 × 18.4	1.3	10.0 × 6.0	2-4 days
3- <i>E.alijevi</i>	small spherical oocyst, no micropyle cap has smooth and colourless wall and no residual body. Sporocyst small ovoid shape. Each sporozoite has central vacuole.	16.3 × 13.6	1.0	6.6 × 4.3	2-4 days
4- <i>E.apstironic</i>	Ovoid shape, has distinct micropyle but no micropyle cap, yellowish brown wall. Has large residual body. Sporocyst ovoid shape and each sporozoite has two vacuoles.	27.3 × 17.6	1.6	9.2 × 6.5	3-5 days

Table (5): continued

<i>5-E. mihakohy-akimova</i>	Subspherical or ovoid shape has no micropyle cap and indistinct micropyle. Its wall yellowish colour. Has no residual body, but has polar granule. Rounded or ovoid sporocyst, each sporozoite has two vacuoles	21.8 × 16.4	1.2	8.2 × 5.3	2-4 days
<i>6-E. caprina</i>	Ellipsoidal oocyst, without micropyle cap but has distinct micropyle, wall is greenish yellow in colour. Has no residual body, sporocysts are elongated and each sporozoite has large vacuole at broad end with numerous fine granules.	29.4 × 20.8	1.5	10.0 × 6.8	2-3 days
<i>7-E. jolchijevi</i>	Piriform shaped oocyst with distinct flat micropyle cap. Yellow to redish colour oocyst wall, no residual body, each ovoid sporocyst has two vacuolated sporozoite	28.5 × 21.5	1.5	10.3 × 6.1	2-4 days
<i>8-E. chrestensini</i>	Large, ovoid oocyste with distinct micropyle cap. Its wall is yellow colour. There is no residual body but has polar granule. Has large ovoid sporocyst and their sporozoites has large vacuole at broad end.	34.7 × 22.8	1.7	10.8 × 7.4	3-6 days

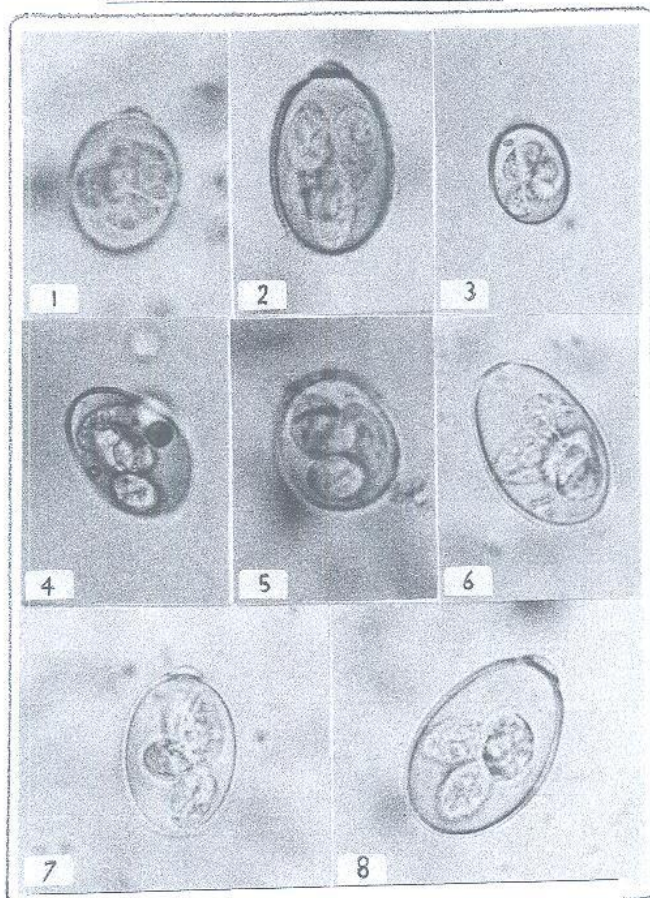


Plate I

1- *E. hirci*

3- *E. aljevi*

5- *E. ninakohlyakimova*

7- *E. jolchijevi*

2- *E. arlongi*

4- *E. apsheronica*

6- *E. caprina*

8- *E. christenseni*