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INTESTINAL PROTOZOAL INFECTION AMONG GOATS IN EGYPT

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SUMMARY

A survey on enteric coccidia was carried out among goats in Egypt Eimeria and cryptosporidium spp. oocysts were detected in 604 (91.5%) and 14 (2.12%) out of 660 examined faccal samples collected from different localities in Egypt, respectiviely. Age and season were found to affect the incidence and intensity of infection. As kids are found to be more susecptible to infection than adult goats, the highest rate of infection was more remarkable during summer.

In the present study, nine species of Eimeria were identified. The detected species were *E. arloingi* (92.7%), E. altijevi (66.22 %). *E. ninakohlyakimovae* (59.6%), E. hirci (49.7%), *E. christenseni* (38.08%), *E. jolchijevi* (19.87%), *E. caprina* (14.90%), *E. caprovina* (9.93%) and *E. apsheronica* (5.97%). All positive cases were found to have more than one species of *Eimeria* (93.37% of cases).

Also, in the same study, *Cryptosporidium* species was identified as *C. parvum*. The importance of infection with *Cryptosporidium parvum* has been discussed from the zoonotic point of view.

INTRODUCTION

Goats are important sources of food and income for samll farmers in tropical areas of the world (Devendra, 1981).

In Egypt goats are considered as one of the important sources of milk, meat and mohair which are of great economic value.

Recent estimates on goats population in Egypt showed that it reached about 3.131288 million heads (Ministry of Agriculture, 1995).

The climatic conditions in Egypt are more or less favourable for the development and existence of different parasites. In fact, there are very few reports on the incidence of gastrointestinal protozoan parasites among goats in Egypt. The adverse effects of protozoan parasites on the health of goats make the quick diagnosis of infection very important. Protozoan parasites

cause severe diseases among goats, including *Theileria, Babesia, Toxoplasma, Sarcocystis, Eimeria* and Cryptosporidium spp. (Levine, 1985).

Coccidiosis is one of the most serious enteric protozoan diseases of domestic goats, especially, newly weaned kids kept in large number under intensive management (Craig, 1986 and Foreyt, 1990). About nine Eimeria species affect goats of which Eimeria arloingi and Eimeria ninakahlyakimovae are regarded as the most pathogenic ones (Levine, 1985 and Norton, 1986).

Cryptosporidiosis caused by Cryptosporidium species is another protozoan disease. Cryptosporidium is a coccidian of the family Cryptosporidiidae belonging to Phylum protozoa (Levine, 1980). Cryptosporidium infection causes economic losses due to high morbidity and mortality rates in the affected animals, and considerable retardation in growth, emaciation and poor general condition of animals (Fischer, 1984). Moreover, Cryptosporidiosis is a zoonotic disease in which numerous cases of zoonotic transmission from animals to man and from man to animals have been reported (Reese et al., 1982 and Casemore, 1990).

In Egypt, goats do not receive particular attention, they deserve, as little is nkown about the importance of protozoan parasites among them. Therefore, it is found necessary to carry out a study on the prevalence and intensity of intestinal protozoan parasites affecting goats of age groups in Egypt.

MATERIALS AND METHODS

Atotal of 660 faecal samples were collected from goats of different ages and sexes in different localities in Egypt during one year from December 1996 to December 1997.

Samples were classified according to the age of animals into:

a) 140 kids < 6 month -up to 12 month-old.
b) 240 goats 1-2 year-old.
c) 280 goats over 2 year-old.

Fresh faecal samples were collected from individual goats in plastic bags labeled with complete necessary data then placed in refrigerator at 4°C to be examined within two days. Each sample was examined microscopically using the concentration flotation technique according to SouIsby (1968) for the presence of coccidian oocysts.

Count of coccidian oocysts were performed on all positive samples using a modified MacMaster technique (MAFF, 1977).

Then in order to allow sporulation of oocysts, a portion of each positive sample was mixed with 2.5 % potassium dichromate and incubated at 27°C and sporulation time was calculated according to Davis et al., (1955). At least 100 oocysts were differentiated from each sample and identified according to the descriptions and illustrations given by Norton (1986) and O,Callaghan (1989).

Animals were divided according to the degree of infection to light, moderate and heavy infection (Johnson and Reid, 1971).

Degree of infection	Total oocyst count/gm
Light	100-1000
Moderate	1001-50.000
Heavy	over 50.000

Faccal samples were examined for the presence of *Cryptosporidium* oocysts by direct smears, where a pin head of fresh well mixed faecal samples was placed on a glass slide after being mixed thoroughly with a drop of water to obtain a homogenous suspension. Then, the mixture was spread on a glass slide to form a thin transparent layer and left to dry at room temperature. The film was fixed by absolute methanol for 10 minutes and stained with a modified Ziehl-Neelsen technique, as described by Henriksen and Pohlenz (1981) to be examined and measured.

RESULTS

Out of 660 faecal samples collected from goats, 604 samples showed to be positive to Eimeria (91.5%). Results in table (1) showed that the coccidian parasites were more prevalent in young kids than in older goats.

It was clear from table (2) that the highest incidence of infection was recorded in summer followed by spring, autumn and winter respectively. The intensity of infection with coccidia is shown in table (3) where heavy and moderate infectiosn were predominant in kids while in older goats the infection was light and moderate.

Table (4) showed that the incidence of mixed infection was 93.37% where 2-5different species of Eimeria were detected in most of the infected goats.

Table (1) Prevalence of Eimeria infection among different age groups of goats.

Age group	No. of examined goats	No. of infected goats	%
< 6 m. - 12 m.	140	140	100
1-2 year	240	220	91.7
Over 2 year	280	244	87.1
Total	660	604	91.5

Table (2) Seasonal prevalence of Eimeria infection among examined goats in Egypt.

Season	Total No. of examined goats	Total No. of infected goats	%
Summer	180	175	97.2
Spring	160	147	91.9
Autumn	150	133	88.7
Winter	170	149	87.6
Total	660	604	91.5

Table (3): Mean total oocyst count of Eimeria species infecting goats of different ages in Egypt.

Age	Type of infection	No. + Ve	No. + Ve animal	%	Mean of total oocyst count/gm
< 6-12 m.	Light	140	25	17.86	428
	Moderate		70	50.0	7432
	Heavy		45	32.14	58428
1-2 year	Light	220	128	58.18	350
	Moderate		87	39.55	3350
	Heavy		5	2.27	51922
Over 2 year	Light	244	190	77.86	300
	Moderate		54	22.13	6550
	Heavy		-	-	-

Table (4): The number of Eimeria species found in individual animals.

Total No. of examined goats	Total No. of + Ve goats	Single infection		Mixed infection	
		No.	%	No.	%
660	604	40	6.62	564	93.37

Table (5): Morphological character of different Eimeria species infecting goats.

Shape	Oocyst size µm Length		breadth		Micropyle	Micropyle cap	Eimeria species	Sporulation time/day
	Mn	Mx	Mn	Mx				
Ellipsoidal straightly ovoid	23	36	15	26	Present	Present	*E.arloingi*	1 - 4
Elliposidal to subspherical	17.5	29	15	22	Present	Present	*E.hirci*	1 - 3
Ellipsoidal ovoid	25.5	38.5	17	27	Present	Present	*E. jolchijevi*	2 - 4
Ovoid	27	43	16	32	Present	Present	*E.christenseni*	2 - 6
Subspherical spherical	14	24	12	22	Absent	Absent	*E.alijevi*	1 - 5
Ellipsoidal or subspherical	18.5	29	14	23	Present	Absent	*E.ninakohlya-kimovae*	1 - 4
Ovoid	24	37	18	26	Present	Absent	*E.apsheronia*	1 - 2
Slightly ovoid	27	40	19	26	Present	Absent	*E.caprina*	2 - 3
Ellipsoidal subspherical	26	36	21	28	Present	Absent	*E.caprovina*	2 - 3

Table (6): Prevalence of Eimeria species infecting goats.

Total No. examined goats	Total No. infected goats	Eimeria species	Eimeria species	%
660	604	*E.arloingi*	560	92.7
		E.alijevi	400	66.22
		E.ninakohlya-kimovae	360	59.6
		E.hirci	300	49.7
		E.christenseni	230	38.08
		E. jolchigevi	120	19.87
		E.caprina	90	14.90
		E.caprovina	60	9.93
		E.apsheronia	35	5.79

Table (7): Incidence of Cryptosporidium sp. infection among goats of different age groups.

Age group	No. examined goats	No. infested goats	%
< 6m. - 12 m.	140	10	7.14
1-2 year	240	4	1.66
Over 2 years	280	-	-
Total	660	14	2.12

Table (8): Seasonal prevalence of *Cryptosporidium* sp. infection among goats.

Season	No. of examined goats	No. of infected goats	%
Summer	180	7	3.88
Spring	160	4	2.5
Autumn	150	2	1.33
Winter	170	1	0.5
Total	660	14	2.12

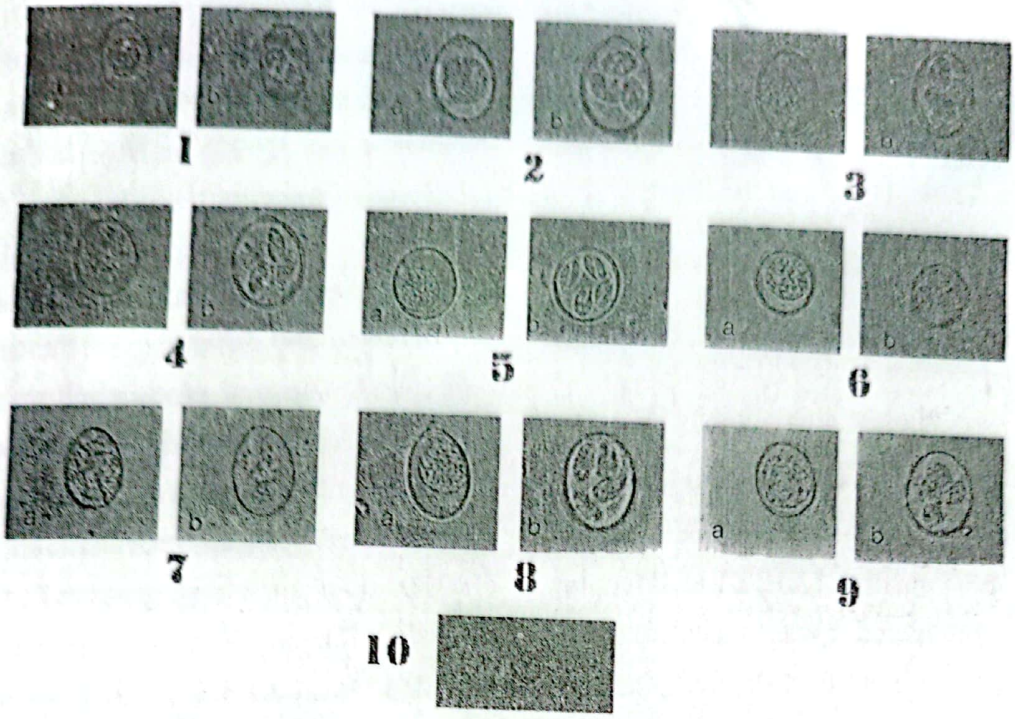

Plate (1): Illustrations of unsporulated and sporulated Eimeria and Cryptosporidum oocysts identified in goats faeces. X 400 and X 1000 respectively.

EXPLANATION OF FIGURES

Fig. 1: *E.arloingi* a-Unsporulated oocyst b- Sporulated oocyst X 400
Fig. 2: *E. christenseni* a-Unsporulated oocyst b- Sporulated oocyst X 400
Fig. 3: *E. jolchijevia* a-Unsporulated oocyst b-Sporulated oocyst X 400
Fig. 4: *E.hirci* a- Unsporulated oocyst b-Sporulated oocyst X 400.
Fig. 5: *E.ninakohlyakimovae* a-Unsporulated oocyst b-Sporualted oocyst X400.
Fig. 6: *E.alijevi* a- Unsporulated oocyst b-Sporulated oocyst X 400.
Fig. 7: *E.apsheronica* a-Unsporulated oocyst b-Sporulated oocyst X 400.
Fig. 8: *E.caprina* a-Unsporulated oocyst b-Sporulated oocysts X 400.
Fig. 9: *E.caprovina* a-Unsporulated oocyst b-Sporulated oocysts X 400.
Fig. 10: *Cryptosporidium* parvum oocyst (X1000) stained with Modified Ziehl-Neelsen.

The present study revealed tha nine Eimeria species were identified (Table 5). The following species dtected were : *E. arloingi, E. alijevi, E.ninakohlyakimovae, E.hirci, E.christenseni, E.jolchijevi, E.caprina, E.caprovina* and *E.apsheronica*. Plate (1) showed the illustration of each species (Figs. 1-9).

The incidence of different species was presented in table (6).

Examination of the collected 660 samples for *Cryptosporidium sp.* oocysts revealed that, 14 samples only were positive (2.12%) to infection. The species recovered was identified as *Cryptosporidium parvum*. It measured 4x5 µm (Plate 1, Fig. 10).

Tables(7 & 8) showed that the highest incidence of *Cryptosporiduium* sp. oocysts was in kids during the summer season.

DISCUSSION

In the present work infections with coccidia species were found to be common among goats, particularly in young kids. However, nine *Eimeria* species have been detected in 604 out of 660 goats. The most predominant species were *E.arloingi* (92.7 %), *E.alijevi* (66.22 %). *E.ninakohlyakimovae* (59.6%). Penzhorn et al., (1994) declared the predominance of the same species. The other species detected were *E.hirci* (49.7%), *E. christenseni* (38.08 %), *E.jolchijevi* (19.87%), *E.caprina* (14.90%), *E. caprovina* (9.93%) and *E. apsheronica* (5.97%).

The incidence of infection with these *Eimeria* species in Egyptian goats was (91.5). Similar results were recorded by Otify (1984) in Egypt and Alyousif et al., (1992) in Saudi Arabia, while, Ahmed et al., (1992) in Nigeria recorded lower incidence of infection.

The difference of infection rates could be attributed to the difference in the environmental conditions, nature of pasture and management, as well as age and breed of animals. From the foregoing results, it was clear that coccidian parasites were more prevalent in young kids (100%) than in older goats of over 2 years (87.1%). These findings agreed wih those recorded by Lloyd et al., (1978) and Otify (1984). The high degree of infection in young kids to coccidian infection might be attributed to their susceptibility to infection and lower immunity.

As shown in table (2), the highest incidence of infection was recorded in summer season. Similar results were recorded by Otify (1984) in Egypt and Ahmed et al., (1992) in NIgeria, while, Penzhorn et al ., (1994) in USA found that infection rate was higher during Autumn and winter. This difference might be due to the different meteorological conditions.

Sayin et al., (1980) statd that E. arloingi was lethal to kids and Levine and Ivens (1970) mentioned that E.ninakohlyakimovae was regarded as the most pathogenic to goats. Yvore et al., (1980) stated that when there was a mixed infection with these two species together with E.christenseni, hemorrhagic enteritis and

papilloma-like lesions in the small intestine of infected animals appeared.

The present study revealed that, 14 out of 660 (2.12%) were positive for Cryptosporidium parvum infection. These results were in close relation with those reported by Salem (1989) and Selim (1995).

Kids were more susceptible to Cryptosporidium parvum infection than adults. This result is nearly similar to that recorded by Abou Eisha (1994).

The highest rate of *Cryptosporidium parvum* infection was during summer. The same result was reported by Salem (1989) in Egypt.

According to Levine (1984), the isolated *Cryptosporidial* oocysts could be related to *Cryptosporidium parvum*. however, such goats are carriers of these parasites and therefore, they can be considered as transmitters of infection to human beings, especially young children. Hence, the control of this zoonotic parasite is very important.

In the present study, the occurrence of multiple parasitism with different species of *Eimeria* and *Cryptosporidium* sp. oocysts was noticed. This may lead to serious effect on general condition of goats,especially kids as mentioned by (Foreyt, 1990) who stated that the presence of both *Eimeria* and *Cryptosporidium* oocysts infection cause diarrhoea, inefficient productivity, loss weight gain and occasionally death in advanced cases.

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