Turk. J. Vet. Anim. Sci.
2007; 31(6): 411-414

Short Communication

The Prevalence of *Eimeria* Species in Goats in Iğdır

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Received: 04.10.2006

Abstract: This study was conducted to identify *Eimeria* species in goats in 5 districts of Iğdır province in Turkey. Faecal specimens (approximately 3-5 g) were obtained from the rectums of 212 goats. In the laboratory examination of faecal samples, 10 different *Eimeria* species were identified in 82.55% of the specimens: *E. arloingi* (47.43%), *E. christenseni* (45.14%), *E. ninakohlyakimovae* (36.00%), *E. alijevi* (26.85%), *E. hirci* (23.42%), *E. caprina* (18.28%), *E. caprovina* (16.57%), *E. pallida* (13.14%), *E. jolchijevi* (10.28%), and *E. apsheronica* (3.42%). *E. caprina* and *E. caprovina* are reported for the first time in the Iğdır province of Turkey.

Key Words: Goat, *Eimeri* spp., Iğdır, Turkey

Iğdır'da Keçilerde *Eimeria* Türlerinin Yaygınlığı

Özet: Bu çalışma, Türkiye'nin Iğdır ilinin farklı beş bölgesindeki keçilerde bulunan *Eimeria* türlerini tespit etmek amacıyla yapıldı. Bu amaçla 212 keçinin rektumundan dışkı örnekleri alındı. Dışkı örneklerinin laboratuar incelenmelerinde Iğdır yöresinde 212 keçinin 175 (% 82,55)'nin farklı 10 *Eimeria* türü ile enfekte olduğu görüldü. Bunlar *E. arloingi* (% 47,43), *E. christenseni* (% 45,14), *E. ninakohlyakimovae* (% 36,00), *E. alijevi* (% 26,85), *E. hirci* (% 23,42), *E. caprina* (% 18,28), *E. caprovina* (% 16,57), *E. pallida* (% 13,14), *E. jolchijevi* (% 10,28) ve *E. apsheronica* (% 3,42) türleridir. Bu türler arasında *E. caprina* ve *E. caprovina* Türkiye'de ilk defa Iğdır ilinde tespit edilmiştir.

Anahtar Sözcükler: Keçi, *Eimeria* spp., Iğdır, Türkiye

Eimeriosis is the most important parasitic infection in poultry worldwide and it also causes problems in cattle, sheep, goats, pigs, horses, and rabbits (1,2). Clinical coccidiosis of goats occurs mainly in young goats and has a higher prevalence under conditions of intensive husbandry (3). The disease may occur under stress factors such as weaning, dietary changes, inclement weather, or travel and regrouping (4).

Clinical coccidiosis in goats is most frequently caused by *E. arloingi* (5), *E. ninakohlyakimovae* (6), and *E. caprina* (7). Several species of *Eimeria* occur commonly in domestic goats (7-10). For example, Eimerian oocysts have been found in the faeces of 98.0% of 422 goats in England (7), 71.0% of 110 goats in Poland (8), 97.0% of 497 goats in South Australia (9), 98.2% of 108 goats in South Africa (10), 95.0% of 50 goats in Kenya (11), 89.9% of 1092 goats in Zimbabwe (12), 92.2% of 2897 goats in the Czech Republic (13), and 15.28% of 615 goats in Iraq (14).

There have been some studies on caprine coccidiosis in Turkey. In these studies, Eimerian oocysts have been found in the faeces of 94.8% of 147 goats (15), 84.0% of 100 goats (16), 88.0% of 900 goats (17), 53.3% of 353 goats (18), and 73.6% of 242 goats (19).

The purpose of this study was to investigate the prevalence and intensity of *Eimeria* species in goats in Iğdır province of Turkey.

The study was performed between September 2005 and June 2006. Faecal specimens were collected from 5 districts in Iğdır province. Animals were chosen randomly from each sheepfold. Goats were 2-5 years old and did not show any clinical symptoms of eimeriosis.

Faecal samples of approximately 3-5 g were collected from the rectums of 212 domestic goats and were stored at 4 °C until processing. The specimens were concentrated by Sheather's sugar flotation technique and examined microscopically for the presence of oocysts.

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Eimeria species were identified following sporulation (2-3 days, 25 °C) of faeces in a thin layer of 2.5% potassium dichromate (19).

Species identification was based on morphological characteristics of oocysts and sporocysts (20).

Eimeria oocysts were found in 175 (82.55%) of the 212 specimens (Table 1). The highest prevalence (100%) was observed in goats in Kırçiçek village. The lowest prevalence (78.85%) was observed in goats in Aktaş village.

A total of 10 *Eimeria* species were found in 9 different regions in Iğdır province. The most common species were *E. arloingi* (47.43%), *E. christeseni* (45.14%), and *E. ninakohlyakimovae* (36.00%). Other species were *E. alijevi* (26.85%), *E. hirci* (23.42%), *E. caprina* (18.28%), *E. caprovina* (16.57%), *E. pallida* (13.14%), *E. jolchijevi* (10.28%), and *E. apsheronica* (3.42%) (Table 2).

Multiple-species infections were found in 82.55% of the specimens. Multiple infections with 2 (16.51%), 3 (19.81%) or 5 (14.15%) species were common, while infections with 4, 6, 7, and 8 species were less common. Mixed infections were detected in 82.55% of the samples. No oocysts were recovered from 17.45% of the specimens (Table 3).

In this study, *E. caprina* and *E. caprovina* are reported for the first time in Iğdır province of Turkey (Figures 1 and 2).

Coccidiosis in goats has been reported by some researchers in Turkey and in some other countries (7-18). Identified *Eimeria* species are *E. arloingi, E. christenseni, E. alijevi, E. pallida, E. hirci, E. ninakohlyakimovae, E. jolchijevi, E. apsheronica, E. punctata, E. caprina, E. caprovina,* and *E. intricata.*

The prevalence and identification of coccidia in goats in Iğdır province have not been reported previously. Infections by coccidia were detected in 82.54% of 212 goats. In previous studies in goats, 9 *Eimeria* spp. (16-18) were identified in different regions of Turkey. In this study, 10 species were identified: *E. arloingi, E. christenseni, E. ninakohlyakimovae, E. alijevi, E. hirci, E. caprina, E. caprovina, E. pallida, E. jolchijevi,* and *E. apsheronica*.

Previous studies have shown that *E. caprina* and *E. caprovina* were identified in the faecal samples of goats in Poland (8), South Australia (9), South Africa (10), Kenya (11), Zimbabwe (12), and the Czech Republic (13). In the present study, *E. caprina* and *E. caprovina* were identified for the first time in Iğdır province of Turkey.

Table 1. The number of examined and infected goats in 5 districts in Iğdır.

Location	Number examined	Number infected	%
Aktaş	52	41	78.85
Bulakbaşı	58	46	79.31
İslamköy	46	37	80.43
Kırçiçek	27	27	100.00
Yazlık	29	24	82.76
Total	212	175	82.55

Table 2. Prevalence of *Eimeria* species in Iğdır.

Eimeria species	Number of infected goats	Infection rate (%)
E. arloingi	83	47.43
E. christenseni	79	45.14
E. ninakohlyakimovae	63	36.00
E. alijevi	47	26.85
E. hirci	41	23.42
E. caprina	32	18.28
E. caprovina	29	16.57
E. pallida	23	13.14
E. jolchijevi	18	10.28
E. apsheronica	6	3.42

Table 3. Number of goats with single or mixed infections of *Eimeria* spp.

	The number of *Eimeria* species in specimens									
	0	1	2	3	4	5	6	7	8	Total
Infected goats	37	0	35	42	27	30	17	14	10	212
Percentage	17.45	0	16.51	19.81	12.74	14.15	8.02	6.60	4.72	82.55

Figure 1. *E. caprina* (sporulated),

E. caprina (unsporulated)

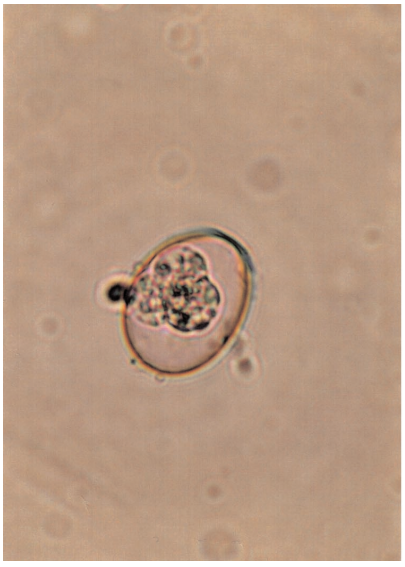
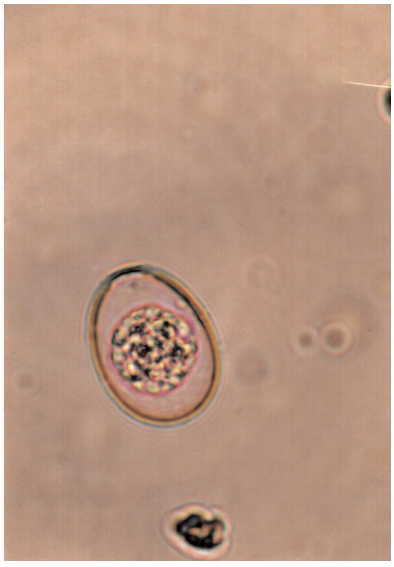


Figure 2. *E. caprovina* (sporulated),



E. caprovina (unsporulated)

E. punctata, which was identified in goats in Van (18), was not identified in goats in Iğdır.

Many parasitological studies carried out in goats have shown a high prevalence of *Eimeria* spp. infections. *E. arloingi, E. ninakohlyakimovae,* and *E. christenseni* are considered to be the most pathogenic species (4). *E. arloingi, E. alijevi, E. hirci,* and *E. ninakohlyakimovae* were the most common species in Poland (8), South Australia (9), South Africa (10), Kenya (11), and the Czech Republic (13). In this study, *E. arloingi, E. christenseni,* and *E. ninakohlyakimovae* were the most prevalent species.

E. apsheronica in both South Australia (9) and Kenya (11), *E. hirci* in Poland (8), and *E. pallida* in South Africa (9) were rarely reported. *E. punctata* is the least common species in Zimbabwe, and it has not been reported in Poland (8), South Australia (9), South Africa (10), Kenya (11), or the Czech Republic (13).

Mixed infections have been reported in studies conducted by Chhabra and Pandey (12), Sayın (17), and Değer et al. (18). In this study, we detected the presence of 2 or more *Eimeria* species in 82.55% of the faecal samples. Oocysts were not detected in 17.45% of the samples.

In conclusion, 82.55% of the goats were infected with up to 10 *Eimeria* species. Furthermore, in this study, *E. caprina* and *E. caprovina* were identified for the first time in Turkey.

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