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CRYPTOSPORIDIUM INFECTION IN LAMBS AND GOAT KIDS IN SERBIA

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The prevalence of Cryptosporidium infection among lambs and goat kids in Serbia was examined. The animals were grouped according to age, i.e., up to 30 days and from 31 to 90 days. The infection was diagnosed using three coprological procedures. Sheather's sugar flotation was employed to determine the concentration of oocysts. Modified Ziehl-Neelsen technique and modified Kinyoun technique were used as staining procedures.

Cryptosporidium oocysts were detected in 42.1% examined lambs and 31.8% goat kids.

These findings clearly demonstrate the presence of Cryptospodium infection in lambs and goat kids in Serbia and indicate the potential role of these animals as reservoirs of cryptosporidia.

Key words: Cryptosporidium, lambs, goat kids, diarrhea

INTRODUCTION

Coccidian protozoon *Cryptosporidium* causes cryptosporidiosis in a wide range of vertebrates, including humans. *Cryptosporidium* is prevalent in sheep and goats and considered to be an important agent in the etiology of neonatal diarrhea syndrome of lambs and goat kids. There is a close association between the prevalence of the *Cryptosporidium* infection and age of the animal (Causape *et al*., 2002; Noordeen *et al*., 2001; Olson *et al*, 1997). It causes considerable direct and indirect economic losses, and morbidity can approach up to 100% in goats less than six months of age (Abd-El-Wahed, 1999; Ahourai *et al*., 1985; Borodina *et al*., 1994; Card *et al*., 1987; de Graaf *et al*., 1999; Fleta *et al*., 1995; Foreyt, 1990; Johnson *et al*., 1999; Kaminjolo *et al*., 1993; Mahdi and Ali, 2002; Munoz *et al*., 1996; Musaev *et al*., 1996; Olson *et al*., 1997; Tzipori *et al*., 1981, Tzipori *et al*., 1982, Vieira *et al*., 1997; Villacorta *et al*., 1991).

The aim of this study was to examine the prevalence of *Cryptosporidium* infection among lambs and goat kids, up to three months of age.

MATERIALS AND METHODS

Lambs and goat kids were divided into two age groups; up to 30 days and 31-90 days. A total of 214 animals were examined, including 64 lambs up to 30 days of age, 62 lambs from 31 to 90 days, 54 goat kids old up to 30 days and 34 goat kids from 31 to 90 days of age.

Cryptosporidium infection was diagnosed through stool examination. Fresh fecal samples were collected with plastic gloves and placed in technically sterile plastic containers. Specimens were stored in a refrigerator at +4°C. Fecal samples were concentrated using Sheather's flotation technique in saturated sucrose solution (Garcia *et al*., 1983). The surface film from the top was transferred with a disposable culture loop on to a microscope slide and covered with a glass slip. The entire covered area was examined under high power (total magnification x 400). The modified Ziehl-Neelsen and modified Kinyoun techniques were used for confirmation as they are specialized staining procedures. Fresh feces and isotonic saline were mixed and spread out on the microscope slide to obtain a homogenous and transparent film. Slides were air-dried, fixed in absolute methanol, stained, and examined under oil immersion (x 1000) (Garcia *et al*., 1993). Oocyst size was measured using bright field microscopy with a calibrated eyepiece micrometer.

RESULTS AND DISCUSSION

Positive samples were detected in 81 animals (37.8%) out of 214 examined.

The morphometric data derived from measurements of oocysts showed oocysts are sized between 4-5 μm (Figure 1).

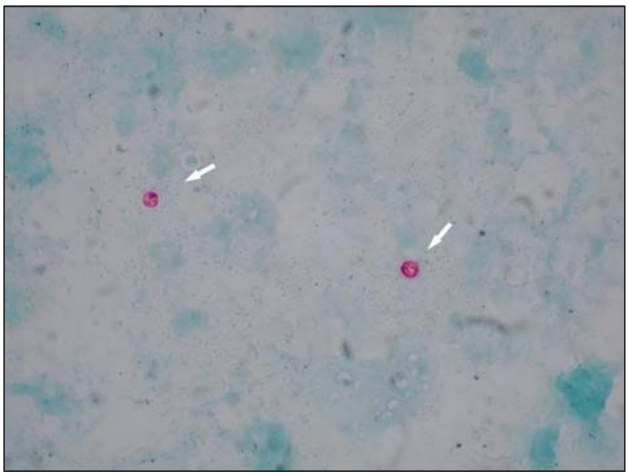

Figure 1. *Cryptosporidium* oocysts (indicated by arrow), modified Kinyoun technique (x 1000)

Cryptosporidium oocysts were found in 53 (42.1%) out of 126 fecal samples from lambs (Table 1). Even more positive cases were detected among young lambs aged up to 30 days (45.3%), as reported by Causape *et al*. (2002); Noordeen *et al*. (2001) and Olson *et al*. (1997).

Table 1. *Cryptosporidium* infection in lambs aged up to 90 days

Age (days)	Examined	Positive	
	No	No	%
1-30	64	29	45.3
31-90	62	24	38.7
Total (1-90)	126	53	42.1

The prevalence of *Cryptosporidium* varies among sheep and goat farms and geographic locations, and is probably present in most herds worldwide. Diarrhea is frequent among lambs and goat kids, and *Cryptosporidium* is more often detected in those animals (Kaminjolo *et al*., 1993). Among the lambs aged up to 90 days and positive for *Cryptosporidium* 50.9% had diarrhea. Diarrhea was more frequent in younger lambs positive on *Cryptosporidium* (69.0%), while in older lambs the infection was frequently asimptomatic (70.8%) (Table 2).

Table 2. Prevalence of diarrhea among lambs aged up to 90 days positive for *Cryptosporidium*

Age (days)	Positive with diarrhea		Positive without diarrhea		Total positive	
	No	%	No	%	No	%
1-30	20	69.0	9	31.0	29	100.00
31-90	7	29.2	17	70.8	24	100.00
Total (1-90)	27	50.9	26	49.1	53	100.00

The parasite was detected in 28 (31.8%) out of 88 fecal samples from goat kids (Table 3). All positive cases were detected among younger goat kids aged up to 30 days (51.8%).

Table 3. *Cryptosporidium* infection in goat kids aged up to 90 days

Age (days)	Examined	Positive	
	No	No	%
1-30	54	28	51.8
31-90	34	0.0	0.0
Total (1-90)	88	28	31.8

Among the goat kids aged up to 30 days and positive for *Cryptosporidium* 53.6% had diarrhea (Table 4).

Table 4. Prevalence of diarrhea among goat kids aged up to 90 days positive for *Cryptosporidium*

Age (days)	Positive with diarrhea		Positive without diarrhea		Total positive	
	No	%	No	%	No	%
1-30	15	53.6	13	46.4	28	100.00
31-90	0	0.0	0	0.0	0	0.00
Total (1-90)	15	53.6	13	46.4	28	100.00

The results of previous studies on *Cryptosporidium* infection in calves and piglets aged up to three months showed that this parasite is frequently involved in the etiology of neonatal diarrhea in the Belgrade area (Mišić *et al*., 2001).

Results of the current study reveal a high prevalence of *Cryptosporidium* among lambs and goat kids in Serbia. This can cause considerable direct and indirect economic loses. The high prevalence among these animals is probably due to the presence of animal carriers, as well as to the physical features of some facilities on the farms where oocysts can remain viable and infectious for a long time. Excretion of *Cryptosporidium* oocysts by ewes at parturition may play a role in initiating cryptosporidiosis in lambs (Causape *et al*., 2002; Ortega-Mora *et al*., 1999; Xiao *et al*., 1993; Xiao *et al*., 1994). Lambs are more often infected than adult sheep, and the intensity of infection is higher in lambs than in sheep (Majewska *et al*., 2000). *Cryptosporidium* oocyst counts are usually significantly higher in younger goats (Noordeen *et al*., 2000). Clinically infected lambs and goat kids, along with other young animals, are a major source of environmental contamination.

At present, there is no totally effective therapy for this infection other than a healthy immune system. Therefore, the control of cryptosporidiosis relies mainly on hygienic measures, strict sanitation, good management and quarantine of sick animals (Causape *et al*., 2002; Foreyt, 1990; Mišić *et al*., 2003). Improved hygienic measures and management systems may reduce the prevalence of cryptosporidial infection on those farms. Veterinarians and breeders should be aware of the disease among sheep and goats in order to avoid great losses and to prevent its transmission to humans. Veterinarians have an important role in public health to recognize this emerging disease and apply the required strategies to prevent and control *Cryptosporidium* infections in the future.

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CRYPTOSPORIDIUM **INFEKCIJA KOD JAGNJADI I JARADI U SRBIJI**

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SADRŽAJ

U ovom radu su izneti rezultati Ispitivanja raširenosti *Cryptosporidium* infekcije kod jagnjadi i jaradi na teritoriji Srbije. Ispitivane životinje su podeljene u dve starosne grupe: do 30 dana i od 31-90 dana. Za dijagnostiku kriptosporodijalnih infekcija korišćene su tri koprološke metode: flotacija po Sheatheru za koncentraciju oocista i modifikovane Ziehl-Neelsen i Kinyoun tehnike kao metode bojenja. Oociste kriptosporidija su ustanovljene kod 42,1% pregledane jagnjadi i 31,8% jaradi. Ovi nalazi ukazuju na potencijalnu ulogu jagnjadi i jaradi kao rezervoara infekcije za kriptosporidije drugih vrsta životinja i ljudi u Srbiji.