

## Short Paper

# Prevalence of *Cryptosporidium spp.* oocysts in dairy calves in Kerman, southeastern Iran

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## Summary

Faecal samples from 291 dairy calves from 10 dairy herds in Kerman were examined to investigate the prevalence of *Cryptosporidium* infection. *Cryptosporidium spp.* oocysts were identified by using the modified Ziehl-Neelsen staining technique in 63 (21.65%) calves. Calves were grouped according to their age as follows: <3 months, 3–6 months and 6–9 months. *Cryptosporidium* infection was detected in 28.2, 20.6 and 15.09%, of the calves in the respective age groups. A significant age-associated decrease in the detection rate of *Cryptosporidium* infection ( $P < 0.05$ ) was found. *Cryptosporidium* infection was detected in 11 of the 30 (36.66%) diarrhoeic and 52 of the 261 (19.92%) non-diarrhoeic calves. There was a significantly ( $P < 0.05$ ) higher prevalence of *Cryptosporidium* infection in diarrhoeic than in non-diarrhoeic calves.

**Key words:** *Cryptosporidium* oocyst, Cattle, Prevalence, Kerman, Iran

## Introduction

Cryptosporidia (*Cryptosporidium spp.*) are obligatory parasitic protozoa of different vertebrates including man. Infections cause severe diarrhoea and may even lead to death in immunocompromised hosts (Hassl *et al.*, 2001). These intestinal coccidia live in the mucosal epithelium of the small intestine where the parasite undergoes both sexual and asexual reproduction with the resulting oocysts excreted in the faeces (Fayer *et al.*, 1997). The importance of this infection was only appreciated in the early 1970s when the infection was associated with diarrhoea in calves (Panciera *et al.*, 1971; Tzipori *et al.*, 1980). *Cryptosporidium* is one of the most common entero-pathogens causing neonatal diarrhoea. Other organisms responsible for neonatal diarrhoea are rotavirus, coronavirus, enterotoxigenic *Escherichia coli* and *Salmonella spp.* (Quílez *et al.*, 1996). It is generally believed that the cryptosporidiosis results in high morbidity but low mortality in calves (de Graaf *et al.*,

1999). Bovine cryptosporidiosis is widespread and prevalence studies showed a wide range of oocyst shedding from 5.3% to more than 93% depending on the age, clinical situation and breeding regime of animals (Xiao and Herd, 1994; Fagan *et al.*, 1995; Quílez *et al.*, 1996; Mtambo *et al.*, 1997; de la Fuente *et al.*, 1999; Lefay *et al.*, 2000; Uga *et al.*, 2000; Castro-Hermida *et al.*, 2002). Epidemiological studies on *Cryptosporidium* infection in human and animals have so far been reported in some regions of Iran (Ahourai *et al.*, 1985; Nouri and Karami, 1991; Nouri and Toroghi, 1991; Nouri and Mahdavi Rad, 1993; Zali *et al.*, 2004; Hamedi *et al.*, 2005).

The objective of this study was to determine the prevalence and age distribution of *Cryptosporidium* infection in calves, as well as the occurrence of protozoa in cases of calf diarrhoea in Kerman province, southeastern Iran.

## Materials and Methods

During winter and spring of 2001, faecal

samples were collected from 291 Holstein calves randomly selected from 10 dairy cattle farms in Kerman, southeastern Iran. Faecal samples were taken from the rectum by using a disposable latex glove. The faeces were classified according to their consistency as diarrhoeic or non-diarrhoeic. Calves were categorized according to their age as calves aged <3 months, 3–6 months and 6–9 months. Fresh faecal specimens were processed by the formol-ether sedimentation technique and smears of concentration were stained by the modified Ziehl-Neelsen (MZN) technique. The complete surface of the smear was examined for the presence of *Cryptosporidium* oocysts.

Statistical analyses were performed using the chi-square test. A p value <0.05 was considered statistically significant.

## Results

The overall prevalence of cryptosporidial infection in 291 faecal samples from dairy calves from 10 herds was 21.65%. Of 291 calves, 117, 68 and 106 calves aged <3 months, 3–6 months and 6–9 months, respectively. *Cryptosporidium* infection was detected in 28.2, 20.6 and 15.09% of the calves aged <3 months, 3–6 months and 6–9 months, respectively (Table 1). The *Cryptosporidium* infection rate was significantly ( $P<0.05$ ) higher in calves aged <3 months than in those aged 3–9 months. The *Cryptosporidium* infection rate was also significantly ( $P<0.05$ ) higher in calves aged 3–6 months than 6–9 months old calves (Table 1). Of 291 faecal samples, 30 were diarrhoeic and 261 were non-diarrhoeic. *Cryptosporidium* infection rate was significantly ( $P<0.05$ ) higher in diarrhoeic ( $n = 11$ ; 36.66%) than in non-diarrhoeic ( $n=52$ ; 19.92%) samples (Table 2).

## Discussion

The overall detection rate of *Cryptosporidium* in this study (21.65%) is higher than that reported from Yazd province (14.59%) (Rasoli and Nouri, 2002). The prevalence of *Cryptosporidium* infection in calves in this study (21.65%) is relatively

lower than that reported in other countries. For instance, in Great Britain, a prevalence of 80% of *Cryptosporidium* infection was reported in calves (Scott *et al.*, 1995), whereas, in Japan, oocysts were isolated from 93% of the faecal specimens taken from the calves aged <1 month (Uga *et al.*, 2000).

**Table 1: Prevalence of *Cryptosporidium* infection in calves according to their age group**

Age	No.	Cryptosporidium	
		No. of infected	%
<3 months	117	33	28.2
3–6 months	68	14	20.6
6–9 months	106	16	15.09
Total	291	63	21.65

**Table 2: Prevalence of *Cryptosporidium* infection in calves according to their faecal consistency**

Diarrhoea	No.	Cryptosporidium	
		No. of infected	%
Yes	30	11	36.66
No	261	52	19.92
Total	291	63	21.65

The rate of *Cryptosporidium* infection in calves is 17.9% in France (Lefay *et al.*, 2000), 19.7% in Spain (Quílez *et al.*, 1996) and 5.3% in Tanzania (Mtambo *et al.*, 1997). These different prevalence rates may be due to geographical and environmental differences, level of care and hygiene in the farm and age of animals.

In this study, *Cryptosporidium* infection was detected in calves aged <3 months to 9 months. The infection rate was significantly decreased by advancement of age. The same results have been reported by Quílez *et al.*, (1996), who have demonstrated that the infection rates of 53.8, 14 and 7.7% in calves aged <1.5 months, 1.5–4 months and 4–24 months, respectively. *Cryptosporidium spp.* oocysts were detected in cows as young as 3 days old to adults; the prevalence was significantly higher in suckling calves (de Graaf *et al.*, 1999). Huetink *et al.*, (2001) reported that oocyst shedding was found in animals as young as 2 days old to adults and that the prevalence was significantly higher

in calves than in adults.

Henriksen and Krogh (1985) have reported an infection rate of 25% in calves 8–14 days old, a rate that apparently decreased when the age of calves increased. Mtambo *et al.*, (1997) have reported that the prevalence of *Cryptosporidium* infection was higher in calves <3 months of age as compared to weaned calves and adults. In the current study, the *Cryptosporidium* infection rate was significantly higher in diarrhoeic than in non-diarrhoeic calves. Other researchers have also reported a statistically significant association between cryptosporidial infection and diarrhoea (Sobieh *et al.*, 1987; Quílez *et al.*, 1996; Lefay *et al.*, 2000).

*Cryptosporidium* was found to be the major causative agent in neonatal diarrhoea by several researchers (de Graaf *et al.*, 1999; de la Fuente *et al.*, 1999; Naciri *et al.*, 1999; Castro-Hermida *et al.*, 2002). The clinical presentation of the infection varies from a moderate to intermittent diarrhoea, to an acute diarrhoea with serious dehydration (Anderson, 1981; Fayer and Ungar, 1986).

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