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INCIDENCE OF CRYPTOSPORIDIOSIS FROM AN ORGANISED CATTLE FARM IN THRISSUR

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ABSTRACT

Cryptosporidiosis, caused by a protozoan parasite of the genus *Cryptosporidium* is a zoonotic disease that affects young animals and humans. The objective of the study was to estimate the prevalence of *Cryptosporidium* infection in calves. A total of 30 faecal samples were collected from calves below six months of age and subjected to examination for the presence of *Cryptosporidium* oocysts using a modified Ziehl–Neelsen staining procedure. The overall prevalence of cryptosporidiosis was 16.60 per cent with infection significantly high in diarrhoeic calves. It is apparent that there is a lack of diagnosis of cryptosporidiosis in cattle in these regions, indicating a potentially high prevalence of infection..

Keywords: Cattle, *Cryptosporidium parvum*, Modified Ziehl–Neelsen, Prevalence

INTRODUCTION

Cryptosporidiosis represents an emerging protozoan disease with significant public health implications. The transmission of *Cryptosporidium* oocysts is typically *via* the faecal-oral route, either directly between hosts or indirectly *via* contamination of food or water (Khair *et al*., 2014). Approximately 24 species and over 40 genotypes of *Cryptosporidium* have been identified, of which four primary species, namely *Cryptosporidium parvum* (*C. parvum*), *C. andersoni*, *C. ryanae*, and *C. bovis* are considered the most prevalent. Other species that have been identified in cattle include *C. suis*, *C. hominis*, *C. xiaoi*, *C. ubiquitum*, *C. meleagridis*, *C. muris* and *C. felis* (Fayer, 2010; Ebiyo and Haile, 2022). Of these latter species, *C. parvum* is of particular significance, representing a primary etiological agent for neonatal diarrhoea in calves and exhibiting considerable zoonotic potential. (Olson *et*

al., 2004; Singh *et al*., 2006).

Infections with *Cryptosporidium* spp. can have significant consequences in immunocompromised mammals and the public health sector. The oocysts are resistant to the environment and have the capacity to contaminate a wide range of food sources (Karanis *et al*., 2007; Cano-Romero *et al*., 2011). In livestock, the disease can have a significant economic impact, leading to losses due to mortality, growth retardation, costs associated with medical intervention, veterinary care and increased labor requirements.

The detection of *Cryptosporidium* spp. can be accomplished through the utilisation of diverse methodologies, including microscopic, immunological, and molecular techniques. Microscopy is based on the detection of oocysts in faecal samples. Oocysts can be identified through the use of Ziehl-Neelsen staining method on fecal smears. The sporozoites exhibit a distinct bright red coloration, appearing as granular structures (Ebiyo and Haile, 2022). Presently, effective treatments for cryptosporidiosis are not available. Thus, the basic epidemiological data may facilitate the formulation of strategies for the prevention and control of this disease. The present study aims to elucidate the incidence of cryptosporidiosis in calves from an organised cattle farm in Thrissur district of Kerala state, India.

MATERIALS AND METHODS

The present study was conducted in an organised cattle farm in Thrissur district of Kerala state, India, where an incidence of calf diarrhoea was reported. Calves from one to six months of age were included in this study. A total of 30 faecal samples from diarrhoeic and non-diarrhoeic calves were collected and examined for the presence of oocysts of the parasite. Faecal samples were obtained directly from the rectum or from the faecal mass immediately after defecation. The samples that were collected were then labelled and transported to the laboratory. All the faecal samples were initially processed for routine parasitological examination. They were subjected to sedimentation and floatation to detect concurrent parasitism. Thin faecal smears were prepared and stained using a modified Ziehl-Neelsen method for confirmation of *Cryptosporidium* spp. as described by Garcia *et al*. (1983). Samples were treated with carbol-fuchsin solution for 3 minutes as recommended by Lennette *et al*. (1985). The discoloration procedure was realized with 1 per cent acid alcohol for 15-20 seconds. Smears were washed with running water and counterstained with solution of methylene blue for 1 minute. After the final wash with water, the slides were examined microscopically

at 100x objective using oil immersion. The samples were recognised as positive for the *Cryptosporidium* oocysts based on the oocyst colour. Further, morphometric studies were conducted on *Cryptosporidium* spp. oocysts.

RESULTS AND DISCUSSION

Of the thirty calves examined, *Cryptosporidium* oocysts were recorded in five calves which were diarrhoeic. Incidence of concurrent endoparasitism was not observed in the animals under study. An overall prevalence of 16.60 per cent cryptosporidiosis was observed in calves below six months of age. *Cryptosporidium* oocysts appeared as bright red granules on a blue background (Figure 1). It was observed that the shedding of oocysts was significantly higher in diarrhoeic animals when compared to non-diarrhoeic animals. Even though the size (4.5–5.4 - 4.2–5.0 mm) and shape of the oocysts identified in positive samples were similar to that of *C. parvum*, molecular identification by polymerase chain reaction (PCR) using suitable genes is needed for confirmation.

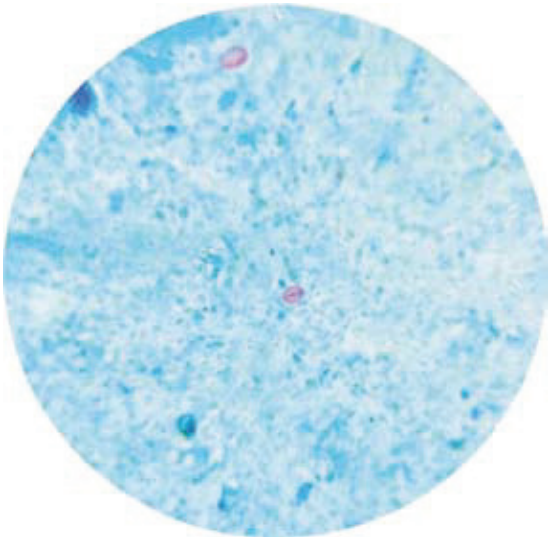

Fig.1 *Cryptosporidium* spp. oocyst under 100x objective

The high prevalence of *Cryptosporidium* in young calves is consistent with previous reports by Castro-Hermida *et al*. (2002) and Lefay *et al*. (2000) who reported that infection is more common in new born or unweaned calves. The occurrence of high infection rates in this age category is attributed to poor immunity in new born calves and the ease (Castro-Hermida *et al.* 2005; McCluskey *et al*., 1995) of oocyst contamination through bucket feeding. In the current study, the infection rate was higher in diarrhoeic cattle. Thus, it can be concluded that *Cryptosporidium* infection is associated with the occurrence of diarrhoea in these cattle. A statistically significant association exists between cryptosporidial infection and diarrhoea (Uga *et al.,* 2000: Pilarczyk and Balicka-Ramisz 2002).

The results of the present study clearly demonstrated that bovine cryptosporidiosis was endemic and locally widespread. A number of studies have demonstrated that *Cryptosporidium* oocysts are capable of enduring for protracted

periods within faecal matter and the surrounding environment. Furthermore, it has been established that a mere minimal quantity of viable oocysts is sufficient for an infection (Chako *et al*., 2010). The apparent variability in prevalence observed between geographical localities may be indicative of differences in the levels of calf management practices employed at the farm level and housing-related factors (the presence of single housing, the cleanliness of calf sleeping areas). Additionally, the impact of calf-related factors at the time of sampling (diarrhoea status versus non-diarrhoea status), the nature of the study (cross-sectional versus prospective longitudinal studies), and the faecal screening technique employed must be considered (El-Shazly *et al*., 2002; Kaushik *et al*., 2008).

Drugs like azithromycin, oxytetracycline and trimethoprim-sulphamethoxazole are commonly used against *Cryptosporidium* infection. Of these, azithromycin was identified as the most efficacious, exhibiting the capacity to elicit a pronounced diminution in oocyte output, whereas oxytetracycline and trimethoprim-sulphamethoxazole neither reduced oocyte output nor showed any clinical improvement (Sreekrishnan, 2013). In this study, infected calves were treated with azithromycin tablets orally at a dosage of 10 mg/kg body weight once daily for a period of five days. The treatment resulted in clinical cure as well as a reduction in oocyst output by the affected calves.

Measures to control and prevent *Cryptosporidium* infection should be considered in animal production facilities, both to increase productivity of the animals and also to reduce the risk of human infection. It has been stated that constant monitoring and awareness generated among the veterinarians and farmers related to cryptosporidiosis can lead to the containment of infection through early diagnosis.

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