Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

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Clinical coccidiosis in calves and its treatment

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Abstract
A total of three cases, around two month old non-descript calves, were brought to Teaching Veterinary Clinical Complex, Jabalpur in the month of January and February 2018 with a history of inappetence and bloody diarrhoea for last 2-3 days. On clinical examination, calves were found rough hair coat, dehydration, weakness, dry muzzle, pale mucous membrane, low body temperature and blood mixed faeces attached to the perineum regions. Samples were collected per rectum and brought to the Department of Veterinary Parasitology and processed for standard qualitative and quantitative examination. Parasitological examination of the faecal sample revealed the presence of coccidian oocysts and after sporulation, a total five *Eimeria* species were identified. *Eimeria zuernii* was found to be the most predominant species followed by *Eimeria pellita* like, *Eimeria subspherica*, *Eimeria alabamensis* and *Eimeria bovis*. The affected calves were treated with Biotrim @ 3-4 ml IV and supportive medication for 3 days. Animal recovered after 3 days post-treatment and further faecal sample examined revealed no evidence of oocysts. Base on literature and our knowledge, species-wise identification of *Eimeria* in cattle have been recorded for the first time in Madhya Pradesh.

Keywords: Coccidiosis, *Eimeria zuernii*, calves, treatment

Introduction

Bovine coccidiosis is caused by protozoan parasites of the family Eimeriidae and usually affects animal under one year old, but it occasionally has seen in yearlings and adults [1]. Adult animals are usually asymptomatic carriers that often serve as a source of infection for young one, which is more susceptible to infection [2]. The most important disease problems in the area in the young calf are pneumonia and diarrhoea. The important pathogens associated with calf diarrhoea are rotavirus, coronavirus, *E. coli, Salmonella* species, and protozoan parasites *Eimeria* and *Cryptosporidium* species. Coccidiosis has been indicated as an important cause of diarrhoea in calves [3]. The infection is transmitted through the ingestion of sporulated oocysts in contaminated feed, water and licking of contaminated surfaces. A disease is more commonly linked to poor hygiene, higher stock densities and other stress conditions like weaning. The disease is particularly a problem of confined animals kept under intensive husbandry practices and is more common in housed animals than in those on pastures. The severity of the clinical disease depends on the number of sporulated oocysts ingested. The more oocysts ingested, the more severe the disease. This parasite causes great economic losses due to damage in the intestine lining that leads to reduced appetite, reduced body weight, impaired feed conversion, unthriftiness, diarrhoea, dysentery, anaemia and increased susceptibility to other diseases [4]. It has been estimated that annual losses due to coccidiosis in cattle approximate $62 million per year [5]. Of the 12 species recorded, *Eimeria zuernii* and *Eimeria bovis* are the two most common causes of clinical coccidiosis in calves and young cattle worldwide [6]. Base on literature and our knowledge, species-wise identification of *Eimeria* in cattle have been not recorded in Madhya Pradesh. Therefore, the aim of the present investigation was to identify the *Eimeria* species which cause clinical coccidiosis and its therapeutic management.

Materials and Methods

A total three cases, around two month old non-descript calves (two female and one male), were presented at TVCC, College of Veterinary Science and Animal Husbandry, Jabalpur Madhya Pradesh, India in the month of January and February 2018 with a history of inappetence, reduce body weight and bloody diarrhoea for last 2-3 days. On clinical examination, calves were found rough hair coat, dehydration, weakness, dry muzzle, pale and

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congested conjunctival mucous membrane, low body temperature and blood mixed faeces attached to the perineum regions. One of the calf show signs of tenesmus and prolapsed rectal mucosa. Based on history and clinical symptoms it was suspected as coccidiosis and faecal samples were collected directly from rectum as per standard procedure and transported in a clean plastic container to the Department of Veterinary Parasitology and examined on the same day of collection. Faecal samples were processed by qualitative examination *viz*; flotation technique for the presence or absence of the oocysts [7]. A quantitative method was performed in positive samples to determine the number of oocysts of *Eimeria* per gram of faeces (OPG). The method used for this purpose was the well known McMaster technique as described by Johannes [8] and then faecal sample dilute with distilled water and sieved to remove the large faecal debris. After repeated washing, the oocysts are concentrated by centrifugation at 3000 rpm for 10 minutes. The oocysts then spread out in shallow Petri dishes and covered with thin layer of 2.5% solution of Potassium dichromate at room temperature for 7-10 days until the oocysts sporulated. The sample was shaken and mixed well, and then a proportion of it was put onto a glass slide by a pipette, covered by a coverslip and examined under 400× magnifications (one l0× ocular lens and one 40× objective lens) to identify the species based on their sizes (micrometry) and morphological characteristics (shape, colour, form index, presence or absence of micropyle and its cap, presence or absence of residual, polar and stieda bodies) of the oocysts [7, 9].

Statistical Analysis
The entire collected raw data were entered into Microsoft Excel spreadsheet program v2010 (Microsoft, Redmond WA, USA) and analyzed in terms of arithmetic means, minimum and maximum values and a percentage was used to calculate prevalence.

Results and Discussion
According to quantities of faecal examination by using Mc master technique, to determine the number of *Eimeria* oocysts per gram of faeces (OPG) revealed OPG value of 7,700, 12,000 and 75,0000 (Table 1). Ernst *et al*. [10] and Oda and Nishida [11] reported that faecal samples with normal consistency had relatively large oocyst numbers and many diarrhoeic samples had low numbers. Contrary to these findings, higher OPG recorded with diarrhoeic samples. The variation in the OPG might be due to a large number of sporulated oocyst ingested by calf and immune status of animals. Based on animals' history, clinical signs and clinical examination indicated that calves were suffering from coccidiosis. Similar clinical cases were observed by Chakrabarti and Jha [12] and Gopalakrishnan *et al*. [13] in Jharkhand and Uttar Pradesh in India, respectively. In the present study, calves (< 3 months of age) suffering from clinical coccidiosis. These findings are in agreement with most of the studies in previous years who suggested that clinical coccidiosis was more common in young once (< 1 year old) [14, 15]. This might be due to lack of immunity, poor

hygiene, higher stock densities and other stress conditions like weaning. Based on morphological characteristics and micrometry of sporulated oocyst, a total five Eimerian species were identified in the present investigation. Although more 12 *Eimeria* species has been recorded from all over India only two *Eimeria zuernii* and *Eimeria bovis* are most pathogenic [6, 16, 17, 18]. In case number one, *Eimeria zuernii* (70.41%) was the most commonly prevalent species followed by *Eimeria pellita* like (16.57%), *Eimeria alabamensis* (6.51%), *Eimeria subspherica* (4.14%) and *Eimeria bovis* (1.18%) whereas other two cases, *Eimeria zuernii* (90% & 85%) and *Eimeria subspherica* (10% & 14.29%) were prevalent (Table 1 & 2 Fig. 1). These findings are in good agreement with a number of authors reported that *Eimeria zuernii* was the most pathogenic species in cattle which causes clinical coccidiosis [19, 20, 21]. The variation in prevalence of *Eimeria* spp. may be attributed due to different geographical distributions, host factors and climatic conditions required for their development. The severity of clinical coccidiosis depends on the number of sporulated oocysts ingested and the general health of the infected host. In the present investigation, the clinical signs of coccidiosis in calves are inappetence, dehydration, weakness, reduced body weight, impaired feed conversion, unthriftiness, anaemia, bloody and mucoid diarrhoea or dysentery, rectal mucosal prolapse with tenesmus (Fig. 2). These findings are in similar to reported by Ernst and Benz [13] and Gopalakrishnan *et al*. [22]. The severity of clinical coccidiosis depends on the number of sporulated oocysts ingested and the general health of the infected host [13]. A major difficulty in treating clinical coccidiosis is that signs of the disease do not appear until the life cycle is almost complete. By this time, the gut may be severely damaged. Most anticoccidial drugs are only effective during early stages of a coccidian life cycle. Thus, the difficulty in treating coccidiosis is that by the time signs appear, parasites have already passed through the stage in which anticoccidial drugs are most effective. Infected animals often recover without treatment due to acquired resistance to the disease [23]. However, treatment with anticoccidial drugs should be administered at the earliest clinical signs because it may reduce the severity of the disease and decrease mortality. In the present investigation, sulphadiazine and trimethoprim (Biotrim I.V injection@ 3-4 ml intravenously) were given for three days to control infection. Dextrose normal saline (DNS@ 250-300 ml) and Ringer's lactate (RL@250-300 ml) was given intravenously along with multivitamin preparation (MVI@ 2ml) to prevent dehydration and electrolyte imbalance. Metronidazole (Metrogyl) was given @ 10 mg/kg intravenously, twice daily, for 3 days, to prevent secondary anaerobic bacterial infections. Mortality from coccidiosis is usually associated with severe diarrhoea, which causes loss of electrolytes and dehydration. Blaxter and Wood [23] reports that calves with diarrhoea lost 8 and 18 times more sodium and potassium respectively than normal calves. The calves have shown good improvement after 3 days post-treatment and further faecal sample examined revealed no evidence of oocysts.

Table 1: Oocyst per gram and prevalence of *Eimeria* species infection in calves

Case No.	Oocyst Per Gram (OPG)	*Eimeria* species	Prevalence rate (%)
1.Female calf (2 month of age)	12,000	1. *Eimeria zuernii*	70.41
		2. *Eimeria pellita* like	16.57
		3. *Eimeria alabamensis*	6.51
		4. *Eimeria subspherica*	4.14

		5. *Eimeria bovis*	1.18
2. Female calf (1.5 month of age)	7,700	1. *Eimeria zuernii*	90
		2. *Eimeria subspherica*	10
3. Male calf (2 month of age)	75,0000	1. *Eimeria zuernii*	85.71
		2. *Eimeria subspherica*	14.29

Table 2: Species wise micrometric and sporulation time of *Eimeria* as observed

| S. No	Eimeria species	Mean size (µm) Length x Width	Maximum (µm) Length x Width	Minimum (µm) Length x Width	Sporulation Time (day)
1	*Eimeria zuernii*	16.59 x 15.32	17.91 x 17.07	14.27 x 12.80	2-5
2	*Eimeria pellita* like	15.61 x 14.36	17.87 x 16.24	13.80 x 12.57	2-4
3	*Eimeria alabamensis*	18.36 x 15.74	19.07 x 17.60	17.88 x 13.51	2-4
4	*Eimeria subspherica*	14.54 x 14.13	14.86 x 14.42	13.95 x 13.88	2-4
5	*Eimeria bovis*	28.49 x 20.08	30.59 x 25.24	22.82 x 15.27	2-5
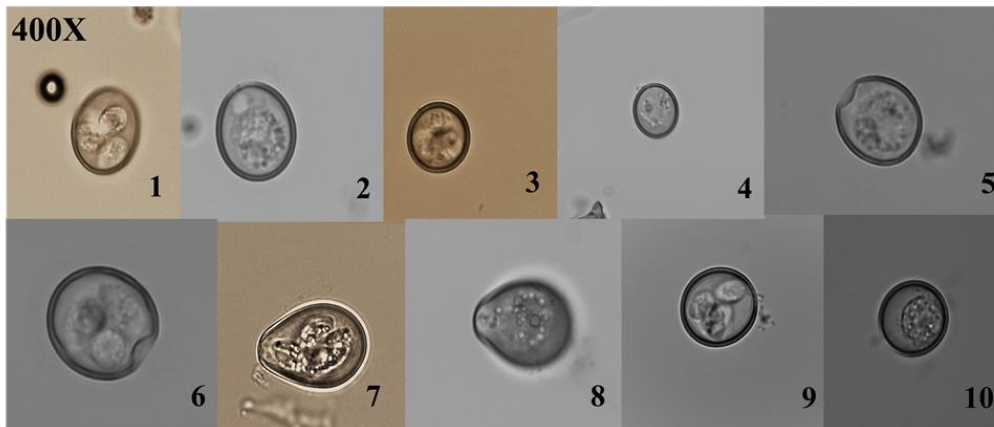
Fig 1: Oocysts of *Eimeria* species identified microscopically before and after sporulation 1. *Eimeria alabamensis* (sporulated), 2. *Eimeria alabamensis* (unsporulated), 3. *Eimeria subspherica* (sporulated), 4. *Eimeria subspherica* (unsporulated), 5. *Eimeria pellita* like (sporulated), 6. *Eimeria pellita* like (unsporulated), 7. *Eimeria bovis* (sporulated), 8. *Eimeria bovis* (unsporulated), 9. *Eimeria zuernii* (sporulated), 10. *Eimeria zuernii* (unsporulated).

Fig 2: Clinically affected calf a. Pale & congested mucus membrane, b. Prolapse of rectal membrane, c. Blood mix diarrhea, d. Frank hemorrhages on plastic gloves

Conclusion

The present investigation shows that *Eimeria zuernii* species mainly responsible for clinical coccidiosis in calves which causes great economic losses due to reduced body weight gain, weakness, anaemia, dehydration, tenesmus, diarrhoea and subsequent loss of fluid and blood via the intestine. The results of the present findings suggested providing an adequate amount of colostrum feeding, nutrition and good hygiene as well as reducing and monitoring stress levels caused by weaning, a change in feed and overcrowding. A prophylactic drug like decoquinate @ 0.5–1 mg ⁄ kg body weight in calves ration during at-risk periods for 28 days can be used for the prevention of disease.

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