

**Diagnosis and clinical management of coccidiosis in calf at Upazila Livestock Office and Veterinary Hospital, Karnaphuli, Chattogram, Bangladesh**



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A clinical report submitted as per approved style and content

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## **Abstract**

Coccidiosis may be the second most common cause of diarrhea in calves, behind rotavirus infection. The causative agent is sporozoan protozoa. This condition can develop in young calves due to reduced immunological competence. On September 19, 2023, a one-month-old calf with severe clinical symptoms, including bloody diarrhea, muscle weakness, and dehydration, was brought to the Upazila Livestock Office and Veterinary Hospital in Karnaphuli, Chattogram. Physical examination revealed a range of abnormal vital signs. Based on clinical history and symptoms, coccidiosis was initially suspected. Confirmation of coccidiosis was achieved through fecal examination at the Parasitology Lab in Chattogram Veterinary and Animal Sciences University. Unsporulated oocysts of *Eimeria spp.* were identified. Treatment involved a comprehensive approach, including intravenous fluid therapy, antibiotics, antiprotozoal drug, a chemotherapeutic agent, and vitamin supplements and oral saline. While the bleeding stopped after three days, diarrhea and anorexia persisted. Additional treatment with growth promoters, an anthelmintic medication, and vitamin-mineral supplements was provided. Remarkably, within four days of the extended treatment regimen, the calf's condition significantly improved, with the return to normal feeding and the absence of persistent diarrhea.

**Keywords: Coccidiosis, Calf, Diarrhea, Fecal examination, Treatment**

## Chapter 01: Introduction

Bovine coccidiosis is caused by protozoan parasites that are members of the Eimeriidae family. At least 21 species of apicomplexans in the genus *Eimeria* have been linked to the gastrointestinal illness known as "bovine coccidiosis" in cattle worldwide (Lee et al., 2018). Until now, more than 20 different *Eimeria* species have been identified as infecting cattle and buffalo (Enemark et al., 2013). Prevalent species of *Eimeria* are *Eimeria bovis*, *Eimeria zuernii*, *Eimeria auburnensis*, *Eimeria anadensis*, *Eimeria ellipsoidalis*, *Eimeria subspherica*, *Eimeria cylindrica*, *Eimeria alabamensis*, *Eimeria wyomingensis*, *Eimeria bukidnonensis*, *Eimeria illinoisensis*, *Eimeria pellita*, and *Eimeria rasilensis* (Sanchez et al., 2008; Abebe et al., 2008). The most common and pathogenic pathogens that cause clinical illness in calves are *E. bovis* and *E. zuernii*. Rests of *Eimeria spp.*, on the other hand, are considered low-pathogenic to animals (Dauguschies and Najdrowski, 2005). *Eimeria spp.* have a monoxenous life cycle with endogenous (schizogony and gametogony) and exogenous (sporogony) phases (Dauguschies and Najdrowski, 2005). The fecal-oral pathway is used for transmission from polluted water and feed. Among the diseases that cause both clinical and subclinical losses in the livestock business, coccidiosis is one of them, particularly in young cattle (Lopez-Osorio et al., 2018). While subclinical diseases are characterized by weight loss, slowed weight growth, and loss of appetite, with potentially long-lasting effects, clinical infections can cause diarrhea, anorexia, weakness, dehydration, and occasionally even mortality (Tomczuk et al., 2015). According to Ekawasti et al. (2022), subclinical instances are more prevalent and are thought to subtly alter intestinal physiology, leading to a high feed conversion. According to Thomas (1994), coccidiosis results in significant financial losses since it lowers feed efficiency, slows weight gain, and makes an animal more susceptible to other illnesses. During the developing stage, coccidia typically infect the gut mucosa's epithelial cells (Ernst and Benz, 1986). The severity of the disease is determined by a number of factors, including number of oocysts consumed. A dose of 50,000 *E. bovis* oocysts administered orally to a naive calf results in diarrhea, while a dose of 100,000 results in severe hemorrhagic scours (Dauguschies et al., 1986).

Reducing the parasitic load in the cattle habitat through improved hygienic practices, stress management, and colostrum feeding, among other activities, is one way to control coccidiosis in the herd (Bangoura & Bardsley, 2020). Another method is to use chemical drugs to block the disease's life cycle and eradicate its causative agents (Philippe et al., 2014).

Numerous internal and external factors can have an impact on the prevalence of coccidiosis in farms and individual animals (Tomczuk et al., 2015). The age of the host has possibly been the risk factor most linked to coccidiosis in cattle. Both young animals (less than a year old) and animals of different ages kept together in the same space are more vulnerable to coccidiosis (Hermosilla et al., 2012). According to Alcala-Canto et al. (2020), different factors like rearing system, type of installation, farm size, seasonality, and altitude affect the occurrence of coccidiosis for some species. Additionally, macroenvironmental variables like temperature and rainfall influence the presence of *Eimeria spp.* in cattle.

This report describes a case of coccidiosis in a calf, diagnosis confirmation and successful clinical management procedures of it.

## Chapter 02: The case

On September 19, 2023, a one-month-old calf was brought to the Upazila Livestock Office and Veterinary Hospital in Karnaphuli, Chattogram. The calf exhibited clinical signs of bloody diarrhea, was in a sternal recumbent position, and displayed muscle weakness. Upon physical examination, the calf had a body temperature of 100°F. Furthermore, it exhibited severe dehydration, with pale and anemic mucous membranes. The calf's respiration rate as measured was 27 per minute, and its heart rate was found to be 56 beats per minute. The owner reported that the calf had not been consuming any feed and had been experiencing bloody diarrhea for the past two days. On the basis of the clinical history and clinical symptoms, coccidiosis was initially suspected (Figures 1 & 2).

To further confirm the condition, feces were collected from the calf's rectum and stored in a Falcon tube containing normal saline. Subsequently, the sample was promptly placed in a polythene bag with ice and sent to the Parasitology Lab at Chattogram Veterinary and Animal Sciences University (CVASU).

At the laboratory, the feces sample was examined by direct wet method. After filtering the excrement sample, normal saline was added and this mixture was taken on a slide. A cover slide was placed on it and the sample was examined under a compound microscope with objective lens 10x at first followed by 40x. The examination revealed the presence of unsporulated oocyst of *Eimeria spp.* confirming the case as a case calf coccidiosis (Figures 3 & 4).

After confirmation of the case as coccidiosis, the treatment started with intravenous administration of 250 normal saline with dextrose (Fig. 5). Then, sulfamethoxazole and trimethoprim combined drug was given orally for 5 days (Bolus Cotrim vet, SQUARE Pharmaceuticals PLC). An antibiotic, Ciprofloxacin was also administered intramuscularly for 4 days (Injection Ciprocine vet, SQUARE Pharmaceuticals PLC, 10mg/kg). In addition, a chemotherapeutic agent, Esb<sub>3</sub> in powder given orally for 7 days along with vitamin-K (Pow. Vita K) for 4 days. Furthermore, metronidazole tablet was given orally three times a day for 7 days



(Tab. Amodis 400, SQAURE Pharmaceuticals PLC. 60 mg/kg). Oral saline was given frequently at 2 hours intervals. It was also advised to continue feeding the calf with the mother's milk..

After three days from the date of commencement of the treatment, the owner revisited the Upazila Livestock Office and Veterinary Hospital in Karnaphuli, Chattogram. The owner reported that although the calf's bleeding had stopped, it still suffered from persistent diarrhea and anorexia (Figure 6). Consequently, additional treatment was provided. This additional treatment included administration of a growth promoter containing probiotics and enzymes for six days (specifically, Powder Probiozyme from SQUARE Pharmaceuticals Plc). Additionally, an anthelmintic preparation, Albendazole (in the form of Tablet Helmex Vet from Renata Limited, at a dosage of 15 mg/kg), was recommended. To enhance the calf's recovery, a feed supplement rich in vitamins and minerals (in the form of Powder Dmin, courtesy of Nicosia International in India) was prescribed .

After just four days of this additional treatment, the calf exhibited a significant improvement of its condition (Figure 7 and 8). It's feeding returned to normal, and there were no signs of persistent diarrhea, suggesting that the calf recovered completely from coccidiosis



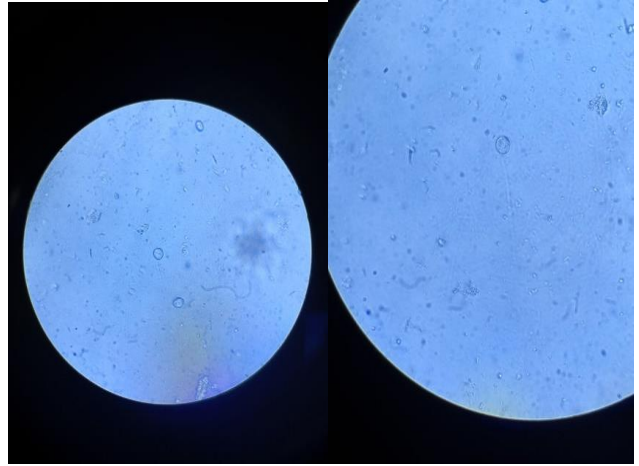
**Figure 1: Examination of the calf**



**Figure 2: Bloody diarrhea**



**Figure 3: Examination of fecal sample under microscope**



**Figure 4: Unsporulated oocyst of *Eimeria* spp. under microscope (40x)**



**Figure 5: Fluid therapy**



**Figure 6: After 3 days, no blood in feces but diarrhea present**



**Figure 7: After 7 days, the animal was in standing position, there was no sternal recumbency**



**Figure 8: After 7 days, no blood in feces and improvement from diarrhea**

## Chapter 03: Discussion

Coccidiosis, a protozoal disease, causes severe diarrhea in young animals (Bangoura et al., 2012). Diarrhea is most common in young stocks during the first month of life and becomes less common as stocks age (Dauguschies and Najdrowski 2005). The primary symptoms of bovine coccidiosis, which is caused by *Eimeria* spp., include varied degrees of bloody diarrhea, dehydration, severe intestinal lesions, and occasionally even death (Cho and Yoon, 2014). In this case report, the calf had coccidiosis at a very young age (one month) and developed severe bloody diarrhea and dehydration.

*Eimeria* oocysts are shed by calves as early as two weeks, according to Svensson et al. (1993). But in the first few weeks of life, colostrum offers passive protection to the young calves; subsequently, they develop active immunity that protects them from coccidial illness (Hermosilla et al., 1999). *Eimeria* oocysts can be quickly and easily recognized by light microscopy with applying the direct smear method on a glass slide. By using cover slip, the objective lens is kept clean and the optics are improved. It is better to use saline solution rather than water since it keeps protozoa's delicate trophozoites from lysing (Dwight, 1995). In this case, I used the direct smear method to analyze a fecal sample under a light microscope, to reveal the presence of numerous unsporulated oocysts of *Eimeria* spp.

Clinical symptoms naturally disappear once the parasite's stage of multiplication is over, indicating that the condition is self-limiting. Early treatment protects the animal by preventing the development of stages, decreasing oocyst discharge, and decreasing the risk of secondary infection (Radostits et al., 2000). Numerous anticoccidial medications are used for therapy. These consist of the following: monensin (2 mg/kg/day for 20 days from the day of inoculation), amprolium (10 mg/kg/day for 5 days), and sulfaquinoxaline (3 mg/kg/day for 3-5 days) (Radostits et al., 2000; Mass, 2007).

It is hard to control coccidiosis. Using prophylactic anticoccidial medications, treating clinically affected animals, feeding from bunks, and practicing good hygiene are the key strategies for controlling coccidiosis. It is challenging to remediate the environment since oocysts are so common in nature. The pressure of infection in animal houses may be decreased by using commercial disinfectants (Coetzer and Justin, 2004).

This report explores the treatment of coccidiosis, and the calf responded positively to the therapy. Intravenous fluid therapy was the first step in the treatment to avoid electrolyte imbalance and dehydration. Sulfamethoxazole and Trimethoprim combined drug were orally prescribed as a coccidiostat. Additionally, Ciprofloxacin, effective against both gram-positive and gram-negative bacteria contributing to enteritis, was administered intramuscularly. Powdered vitamin K was administered in order to prevent blood leakage to feces. Esb3 powder administered is also an effective drug against coccidiosis Oral metronidazole was administered because it is effective against both obligate anaerobic bacteria and protozoa. Oral rehydration saline was administered to stop dehydration attributed to diarrhea.

The use of drugs as additionally prescribed included a growth promoter containing probiotics and enzymes to stimulate the gut health. Albendazole was administered to address various intestinal parasite infections, if they were present. To expedite the recovery and to enhance overall health status, the calf was provided a feed supplement rich in vitamins and minerals.

After the initial treatment and the subsequent treatments, as mentioned above, the calf recovered completely, suggesting that the treatment regimen as applied for the clinical case of calf coccidiosis can also be successfully used for similar cases with necessary modification in the combination of drugs and other supplements, such as antibiotics, normal saline, anthelmintics and growth enhancers depending on the physical conditions of the patients.

## **Chapter 04: Conclusion**

A case of clinically presented bovine coccidiosis can be confirmed by microscopic examination of the fecal material collected from the animal affected. Depending on the body conditions, specific and supportive treatments might vary. The first line of treatment is the use of antiprotozoal drugs, but if the affected animals have become already dehydrated, intravenous normal saline should be administered. Depending on body conditions and apprehension of secondary bacterial infections, in addition to fluid therapy, antimicrobial drugs and growth promoters can be used to expedite the clinical recovery, and at the end of the therapy anthelmintic preparation can be recommended to enhance the growth of the affected animal latter. The complete recovery of the bovine coccidiosis case, as presented in this report, suggests that similar cases can also be treated with combination different drugs by assessing the body conditions of the patients. However, the first and foremost approach should be the case confirmation by clinical evaluation supported with laboratory testing.

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## **Biography**

Muhammad Newas Hossain, the son of Mohammad Nurul Amin and Mst. Monuara Begum, was born in the charming town of Satkania in Chattogram, Bangladesh. In 2014, he achieved an academic milestone, securing his secondary school certificate from Govt. Muslim High School, Chattogram. His educational journey continued to flourish, and in 2016, he added another feather to his cap by earning his Higher Secondary Certificate from Hazera-Taju Degree College, Chattogram. Currently, He is an intern student in the Faculty of Veterinary Medicine at the esteemed Chattogram Veterinary and Animal Sciences University, Chattogram, Bangladesh. His sights are set on a future in veterinary public health and research, where he aspires to make a meaningful contribution to the well-being of both animals and humans.