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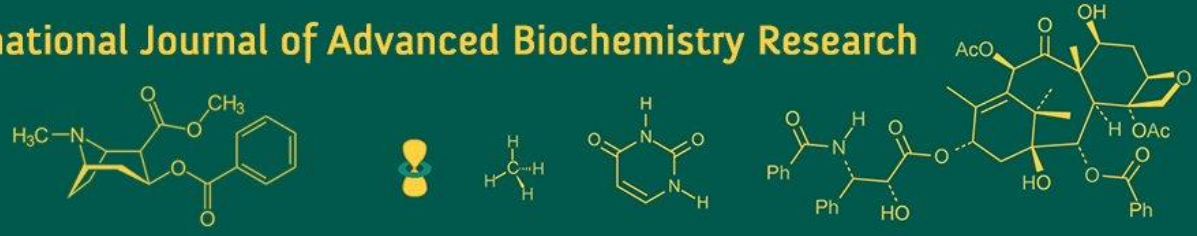

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Hematological changes caused by coccidiosis and its therapeutic management in Pulikulam cattle calves

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Abstract
At the age of 20 days, two Pulikulam cattle female calves were exhibited anorectic, haemorrhagic diarrhoea, tenesmus, poor coat condition and in sternal recumbency in a Pulikulam cattle herd during July 2024. The study was carried out to find the cause to make effective therapeutic management and hematological changes in whole blood samples. The dung samples examination under microscope revealed that the presence of *Eimeria* species oocyst in both samples. Based on the findings, the calves were treated with Sulphadiazine and Trimethoprim @ 30 mg per kg body weight with supportive therapy including Vitamin A-one ml intramuscularly, Dextrose Normal Saline @ 20 ml per kg body weight and Ringers Lactate @ 15 ml per kg body weight intravenously for intestinal mucosal regeneration, to correct the dehydration and electrolyte imbalances. The calves were administered the medication for 5 days and the calves were recovered fully with confirmation of the absence of *Eimeria* oocyst in the dung samples on 6th day of the treatment. The reduction of erythrocytes, hemoglobulin, Packed Cell Volume and elevated leukocytes in the infected animals revealed that those affected had with internal hemorrhage and secondary bacterial infection. The moist and warm environment might predispose for the occurrence of coccidiosis in Pulikulam cattle calves and the parenteral administration of Sulphadiazine and Trimethoprim was very effective against coccidiosis in calves.

Keywords: Pulikulam cattle, coccidiosis, Sulphadiazine, trimethoprim, hemoglobulin, leukocytes

Introduction
Pulikulam cattle is a one of the cattle breed in the southern Tamil Nadu of India and the cattle is mainly used for bull baiting game and draught purpose. The coccidiosis is an economically important disease caused by protozoan parasite of *Eimeria* species in calves and the disease occurs in calves under one year of age and is clinically characterized by bloody diarrhoea, anorexia, dehydration and death (Fitzgerald, (1962) [4], Ernst and Benz (1982) [3]. The main stress producing factors include extreme environmental conditions, transportation, overcrowding, malnutrition, and change of feed may predispose for the coccidiosis outbreaks in calves (Fitzgerald (1962) [4], Taylor and Catchpole (1984) [13]. The transmission of Coccidiosis is occurred from animal to animal by the faeco-oral route. The infected faecal material, contaminating feed, water, or soil are the important source of infection as carrier of the oocysts; therefore, the susceptible animal contracts the disease by eating and drinking, or by licking itself. The severity of clinical disease depends on the number of oocysts ingested. The more oocysts ingested, the more severe the disease. The prevalence of coccidiosis was reported in Ongole crossbred (Sudhakara Reddy *et al.* (2015) [12]. The aim of the present study is to diagnose the cause of the clinical signs, assessment of hematological parameters and followed by therapeutic management to alleviate the condition in the Pulikulam cattle calves.

Materials and Methods
The Pulikulam cattle calves (two) at the age of 20 days with haemorrhagic diarrhoea, anorectic, poor coat condition and in sternal recumbency were taken for the study. The study was conducted at Pulikulam Cattle Research Station (TANUVAS), Manamadurai in Tamil Nadu. The faecal sample was collected from two affected calves directly from the rectum using sterile gloves and processed by direct smear examination technique for parasitic ova as per the procedure described by Soulsby, (1986) [11]. The blood samples were collected to find out the hematological parameter both in affected and healthy calves and sent it to private

laboratory to assess the total leukocyte (WBS), erythrocyte counts (RBC), hemoglobulin (Hb) and Packed cell volume (PCV).

Results and Discussion

Faecal examination revealed the presence of unsporulated *Eimeria species* Oocyst in both the faecal samples (Fig 1.). The disease condition is confirmed as coccidiosis based on history, clinical manifestation and faecal sample examination (Fig 2. and 3).

The blood samples were analysed and found that the RBC, PCV and hemoglobulin level were lesser than healthy calves whereas the WBC level is more than healthy calves (Table 1.).

The calves were treated with Sulphadiazine and Trimethoprim @ 30 mg per kg body weight with supportive therapy including Vitamin A-one ml intramuscularly, Dextrose Normal Saline @ 20 ml per kg body weight and Ringers Lactate @ 15 ml per kg body weight intravenously for intestinal mucosal regeneration, to correct the dehydration and electrolyte imbalances for 5 days and the calves were recovered fully with confirmation of the absence of *Eimeria* oocyst in the dung samples on 6th day of the treatment.

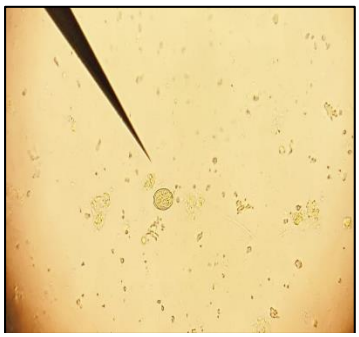

Fig 1: *Eimeria* sps., Oocysts identified by direct microscopic faecal examination

Fig 2: General poor coat and sternal recumbency of the affected Pulikulam cattle calf

Fig 3: Dirty perineal area with hemorrhagic fecal matter

Table 1: Hematological parameters of healthy and infected animals

Parameters	Healthy calves	Infected calves
WBC (×10^3 µL)	10.93-11.20	11.55-11.75
RBC (×10^3 µL)	7.91-8.24	7.10-7.35
Hb (g/dL)	11.5-12.06	9.85-10.25
PCV (%)	27.33-28.44	25.11-26.21

The significant reduction of RBC's, hemoglobulin and PCV might be attributed to the to intestinal tissue damage due consequent blood loss caused by endogenous stages of *Eimerian* parasites. The WBC's levels were found higher in the infected animals compared to healthy animals which was attributed to the severe tissue damage in the intestine, gastro-enteritis and fever. This finding is in accordance with the report of Radostits *et al.* (1994) [10] and Yilmaz *et al.* (2014) [16].

The animals were recovered fully by using potentiated sulfonamide which inhibits the formation and reduction of coccidial dihydro folic acid, di-amino pyrimidine and blocks DNA synthesis and eventually causes an anticoccidial effect. Dung samples were examined, which did not reveal any parasitic oocysts. This finding revealed in accordance with the findings of other workers (Ghoke *et al.* (2009) [5], Hazarika and Das, (2017) [6], Kumar *et al.* (2018) [8] and Verma *et al.* (2018) [14]. Then animal was recovered fully on 6th day of the treatment whereas Sudhakara Reddy *et al.* (2015) [12] and Pratap *et al.* (2023) [9] were reported that the complete recovery was observed after 7days and 3 days of potential sulfonamide treatment respectively.

The calves might get infection from clinically healthy, mature animals which could be carriers of the disease and still be sources of infection for young and susceptible animals as per the earlier reports of Kahn (2005) [7], Yatoo *et al.* (2013) [15], Bangoura and Bardsley (2020) [2]. The moist and warm environment might predispose for the occurrence of coccidiosis in Pulikulam cattle calves as Alcala-Canto *et al.* (2020) [1] reported that macroenvironmental variables such as temperature and rainfall influence the presence of *Eimeria* species in cattle. The severity of the disease and mortality could be reduced by earlier treatment thus immediately after exhibition of clinical signs (Verma *et al.* 2018) [14].

Conclusion

Coccidiosis in Pulikulam Cattle calves is the first of its kind report in India, though it is a self-limiting disease but it may cause heavy morbidity and mortality in calves less than 3 months of age. The present study accentuates that timely diagnosis and therapeutic management with suitable anticoccidial drugs along with supportive therapy can considerably increase the survival rates of calves. Proper colostrum feeding, hygienic feed, water and clean environment are the important factors to prevent and control coccidiosis in calves.

Acknowledgement

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Conflict of Interest

Authors have no conflict of interest in this study.

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