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Diagnosis and treatment of babesiosis in a cross bred cattle

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Abstract

A crossbred cow was presented with history of heavy tick infestation, pyrexia, partial anorexia and passing coffee coloured urine, during an animal health camp. Clinical examination of the animal revealed high temperature, pale mucous membrane and haemoglobinuria. Blood smear examination was carried out which showed the presence of *Babesia* spp. piroplasms in the erythrocytes. Polymerase Chain Reaction of 18S rRNA gene confirmed *Babesia* infection. The animal was successfully treated with diminazine aceturate and supportive therapy.

Keywords: *Babesia*, Diminazine aceturate, polymerase chain reaction

Introduction

Bovine babesiosis is a tick borne intraerythrocytic apicomplexan protozoan disease prevalent in domestic and wild animals with major impact on cattle productivity [1, 2]. The major species infecting cattle are *Babesia bovis* and *Babesia bigemina*, latter being cosmopolitan in distribution. Both species are highly prevalent in tropical and subtropical countries. The disease is transmitted transovarially by the tick, *Rhiphicephalus (Boophilus) microplus*. Clinically, the disease is characterised by high rise of temperature, weakness, anorexia, pale mucous membrane, haemoglobinuria and decreased milk production. The crossbred cattle are at higher risk of contracting the disease than zebu and buffaloes, which act as carriers [3]. In India, the annual economic loss due to babesiosis is estimated to be US\$ 57.2 million [4]. This study investigates a four year old cross bred cow for *Babesia* spp. infection with conventional and molecular methods of diagnosis and its successful treatment.

Case history and Clinical observations

A three years old female cow was attended during clinical camp with a high fever 105.6° F brought with complaint of high fever 105.6° F, heavy tick infestation, lethargy, partial anorexia, decreased milk yield, pale mucous membrane (Fig. 1) and haemoglobinuria i.e. coffee coloured urine (Fig. 2). Blood smear was stained with Giemsa stain immediately after blood collection and was examined microscopically which revealed the presence of *Babesia* piroplasms inside the RBCs (Fig. 3). Haematological examination revealed haemoglobin (Hb) 3.6 g/dl, packed cell volume (PCV) 11.0%, mean corpuscular haemoglobin (MCH) 16.9 pg and mean corpuscular haemoglobin concentration (MCHC) 39.6 g/dl. Ticks were collected and identified by preparing permanent mounts. Based on morphological characters, the tick species was identified as *Rhiphicephalus microplus*. Further, genomic DNA was extracted from the infected blood sample using DNeasy Blood and Tissue Kit (Qiagen, Germany) as per the given protocol. PCR was carried out targeting the 18S rRNA gene of *Babesia* spp. amplifying 504 bp region as per [5]. The amplification is shown in Fig. 4.

BB 18S F TCCATTCAAGTTTCTGCCCCCATCA

BB 18S R CCATTACCAAGGCTCAAAGCAACAA

Treatment

The cow was treated with specific drug for *Babesiosis* i.e. diminazine aceturare (Nilbery™, Intas) @ 3.5mg/kg body weight deep I/M., Melonex plus™ (Meloxicam and Paracetamol, Intas) 25 ml I/M, Anistamin 10 ml I/M and bolus Feritas™ (Iron Sorbitol, Hydrocobalamin and Folic acid, Intas) @ 1 bolus/day for 10 consecutive days as supportive therapy.

The animal ceased to pass coffee coloured urine (haemoglobinuria) after 24 hours of treatment and regained its normal appetite after completion of the treatment.



Fig 1: Cattle infected with *Babesia* showing pale mucous membrane



Fig 2: Cattle infected with *Babesia* showing haemoglobinuria

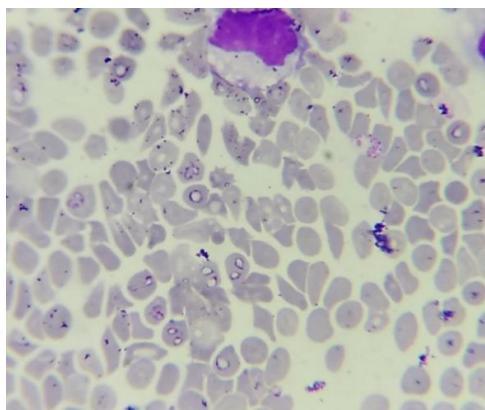


Fig 3: RBCs infected with *Babesia* piroplasms in erythrocytes (arrow)

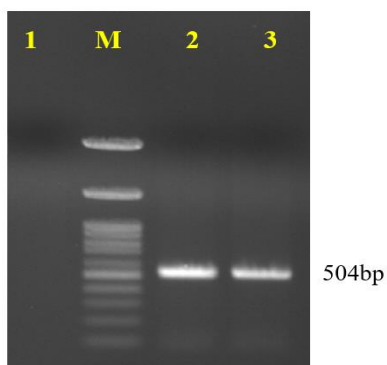


Fig 4: PCR amplification of *Babesia* 18S gene rRNA, Lane 1; negative control 2: positive control, 3: test sample M: 100 bp plus ladder

Discussion

Babesiosis is an economically important tick borne protozoan disease of cattle in tropical and subtropical regions of world. The crossbred cattle exhibit higher rate of susceptibility than zebu and buffaloes, which mainly act as carrier [6]. A characteristic feature of *Babesia* infection is that animals which recover from acute infection become carriers, creating a potential source of infection to healthy susceptible population. Microscopy has always been termed as 'Gold standard' for the diagnosis of infection in blood smear but often the carrier state or animals with low parasitemia are left undiagnosed. Polymerase chain reaction (PCR) has been widely used for the detection of *Babesia* parasites owing to its high specificity and sensitivity [7]. The genetic polymorphism of *Babesia* spp. has been studied using sequence information of 18S rRNA gene [7]. In the present study also PCR based on 18S rRNA gene provided confirmatory diagnosis of *Babesia* infection.

The most commonly encountered clinical signs induced by hameoproteozoon include high grade fever, anemia, hemoglobinuria, ataxia, and sometimes death [1]. Anemia occurs due to erythrophagocytosis, lysis of RBCs due to parasite multiplication and subsequent removal by reticuloendothelial system [13]. Consequently, the vital blood parameters which include level of haemoglobin, packed cell volume, MCHC, MCV, total leucocyte count and total erythrocyte count tend to decrease. Decreased blood parameters i.e. Hb and PCV was a common finding in animals affected with babesiosis due to anaemia [9, 10]. In the present study typical haemoglobinurea was evident and similar clinical findings have been reported by other workers [11, 12]. The agro-climatic conditions of the Jammu region are highly favourable for growth and multiplication of ticks which act as natural vectors of theileriosis, babesiosis and anaplasmosis. *Rhipicephalus (Boophilus) microplus* is the only tick which infests the bovines of Jammu region [13] and the presence of *Rhipicephalus microplus* ticks has been reported earlier in *Babesia bigemina* infection [14]. Diminazine aceturate has been used for treatment of babesiosis since long, as it is suggested that it disrupts the parasite's DNA synthesis and aerobic glycolysis [15].

The haemoproteozoon infections have a potential impact on milk production which is a major economical set back. Since, India has a major impetus towards milk production so cross bred cattle population is of immense importance. The paper presents a clinical case of babesiosis in a crossbred cattle and its successful treatment which is a good lead in field conditions.

Ethical Matters

In the present study the blood sample was obtained from clinical case presented for health check up, hence, no ethical issues are involved in this study.

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