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## Successful therapeutic management of concurrent infection of *Babesia* and *Theileria* in cattle

Manu Jaiswal, Rajat Varshney, Kuldeep Saini, Mohammed Nazeer and Pratyush Kumar

### Abstract

A non-descript cow of age 4 year was presented at Veterinary Clinical Complex (VCC), PGIVER, Jaipur, with the history of fever, anorexia, hypersalivation, sneezing, coughing from last 3 days and change in urine colour from last day. Tick infestation, swelling of pre-scapular lymph node, anaemia, haemoglobinuria came into portrait after thorough physical and haematological examination. Peripheral blood smear examination ruled out the presence of *Babesia* spp. and piroplasmic stages of *Theileria* in cow's blood. The cow was treated with the Diminazene diaceturate deep intramuscular (I/M) @ 3.5 mg/kg body weight (BW) and Oxytetracycline long acting deep I/M @ 20 mg/kg BW at every 48 hour interval for 3 doses along with supportive therapy. Triumphant post-therapy recovery was observed.

**Keywords:** Cattle, hyloma, piroplasmic stages, Babesia, theileriosis

### Introduction

Tick-borne diseases (TBDs) impede productivity and growth of livestock sector in tropical and sub-tropical regions of the world. Ixodidae ticks implicated in transmission of both *Babesia* and *Theileria* species (Preston, 2001; Urquhart *et al.*, 1996) [9, 11], cause huge economic loss in livestock sector. Nowadays world-wide prevalence of piroplasmosis and escalation of piroplasmosis infection in many species of mammals is one of leading public health problems (Schorn *et al.*, 2011; Zanet *et al.*, 2014) [10, 13]. Babesiosis, an apicomplexan hemoprotozoan disease, primarily caused by *Babesia bovis*, *Babesia bigemina* and *Babesia divergens*, accounts for high mortality rates (up to 50%) in susceptible cattle herds of tropical and subtropical region (Antoniassi *et al.*, 2009) [1]. In India, an estimated annual economic loss due to babesiosis was 57.2 million US dollars (McLeod *et al.*, 1999) [6]. Rhipicephalus spp. ticks are foremost vectors that are involved in transmission of *B. bovis* and *B. bigemina*. Ixodes ricinus is considered major arthropod vector of *B. divergens*. The most frequent noticeable complications of babesiosis in cattle are fever, hemoglobinuria, anaemia, coffee colour urine, jaundice, deep shallow respiration and inability to suckling.

*Theileria annulata*, an intracellular obligate hemoprotozoan, causes tropical theileriosis in both wild and domestic animals. Hyalomma and Rhipicephalus are arthropod vectors that are involved in transmission of theileria. The most frequently observable clinical symptoms of theileriosis are high fever, enlargement of regional superficial lymph nodes, inappetence and cessation of rumination, cachexia, anemia, leucopenia, laboured breathing, lacrimation and conjunctivitis. After clinical recovery from acute infections, animal may become carriers with long-term persistent infections (Brown, 1990) [3]. Hence, early detection of blood parasites, successful treatment of diseased animal and strategic use of Raksha vac-T in disease prone area may check further outbreak of the disease. Microscopy using Giemsa stained blood smears has been well thought-out the "gold standard" for detecting *Theileria* and *Babesia* organisms in the blood of acute infected animals (Bose *et al.*, 1995; Nayel *et al.*, 2012) [2, 8].

Although concurrent babesiosis and theileriosis in animal are less frequent, however, the present study documents concurrent infection of theileriosis and babesiosis in a non-descript cattle of age 4 year and its effective therapeutic management from Jaipur.

### Case history, clinical observation and diagnostic work -up

A non-descript cow of age 4 year was presented at Veterinary Clinical Complex (VCC), PGIVER, Jaipur, with the history of fever, anorexia, hypersalivation, sneezing, coughing from last 3 days and alteration in urine colour from last day. Thorough physical examination

revealed that the presence of ticks on udder, perineum and vulva, swelling of pre-scapular lymph node, pale white mucous membrane of conjunctiva and vulva suggestive of anaemia, pyrexia (105.3 °F), decrease in ruminal motility, tachycardia (82 beats/min) and tachypnea.

Blood sample was collected aseptically from juglar vein of cow or bull in a sterilized EDTA vial for haematological examination. The Haemoglobin (Hb) of cow or bull was 4 g/dl indicative of marked anaemia. A peripheral blood smear was made from ear tip and stained with Giemsa and examined under oil immersion objective of microscope for the presence of any haemoprotozoan. Peripheral blood smear examination confirmed the presence of *Babesia* spp. (+++) and piroplasmic stages of Theileriosis (+).

**Treatment and post-treatment follow up**

The cow was treated with the single dose of Diminazene diacetate (Prozomin) deep intramuscular (I/M) @ 3.5 mg/kg body weight (BW) along with three doses of oxytetracycline long acting (Oxy Vet-LA) deep I/M @ 20 mg/kg BW at every 48 hour interval. Intravenous (I/V) injection of Flunixin Meglumine (Megludyne) @ 2.2 mg/kg BW B.I.D. for 3 days, I/V 2 litre DNS for 3 days, I/M injection of 7 ml Feritas (Iron sorbitol + folic acid + hydroxycobalamine) and sub-cutaneous (S/C) injection of Ivermectin (Neomac) @ 0.2 mg/kg BW were also instituted. The cow was recovered successfully after treatment with no more ticks on the body and restore normal blood profile. The blood smear divulged free of the *Babesia* sp and *Theileria* spp.



**Fig 1:** The presence of ticks on udder of cow



**Fig 2:** Change in urine colour

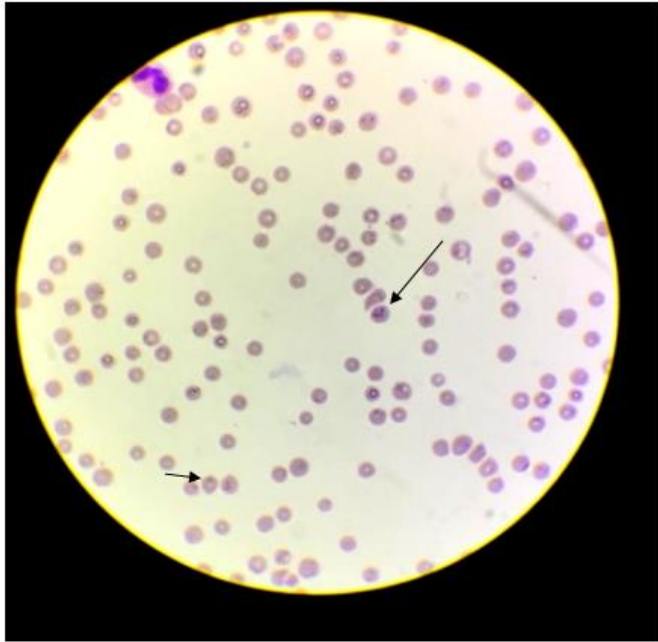


**Fig 3:** Pale white mucous membrane at vulva region and conjunctiva



**Fig 4:** swelling of prescapular lymph node





**Fig 4:** *Babesia* spp. and piroplasmic stages of *Theileria*

### Discussion

The aforesaid clinical symptoms of cattle and the presence of ticks on the different parts of body of cattle pointed towards haemoprotozoan infection. Hemoglobinuria, jaundice, fever and marked anaemia were predominate noticeable clinical symptoms of babesiosis which was in tune with previous reports (Jyothisree *et al.*, 2013; Wadhwa *et al.*, 2018) [4, 11]. Destruction of huge number of erythrocyte due to the presence of *Babesia* piroplasms inside the erythrocytes resulted to marked anaemia and hemoglobinuria in cattle. Identification of *Babesia* and *Theileria* parasites in blood smear *via* microscopy are still the cheapest and fastest diagnostic methods (Mosqueda *et al.*, 2015) [7]. Giemsa stained peripheral blood smear examination ruled out concurrent babesiosis and theileriosis in cow. Concurrent infection of *Babesia* and *Theileria* exacerbated clinical complications and reflected immuno-compromised status of cow.

In order to overcome clinical complications, the cow was treated with Diminazene aceturate as Diminazene aceturate and imidocarb are the most frequently used antibabesial agent in the field of veterinary medicine. Apart from antibabesial agent, Diaminazene aceturate are also indicated for treatment of trypanosoma and theileria. Diminazene aceturate, water soluble drug, is usually indicated at doses of 3-8 mg/kg *via* Intramuscular (I/M) route (Kuttler, 1981) [5]. Oxytetracycline in combination with other supportive therapy has been used to resolve all form of theileria infection in cattle. Long acting oxytetracycline has a prophylactic effect against *Babesia divergens* infection (Urquhart *et al.*, 1996) [11]. On account of these facts, cow was treated with long acting oxytetracycline in order to combat *Babesia*, *Theileria* and secondary bacterial infections if any.

Flunixin Meglumine, NSAID, was used to treat pyrexia and to restore normal ruminal motility in the present case as Flunixin is non-selective Cox inhibitor and Flunixin at 2.2 mg/kg IV in cows decreased fever and improved rumen motility without any effect on milk production. Feritas (Iron sorbitol + folic acid + hydroxycobalamine) was also instituted for combating anaemia. Ivermectin was also administrated S/C for controlling tick infestation.

The use of Live, attenuated strains of *B. bovis*, *B. bigemina* or *B. divergens* and Rakshavac T in babesiosis and theileriosis prone area respectively minimize the occurrence of disease. Apart from vaccination and therapeutics, tick control is utmost important as tick implicated in transmission of haemoprotozoan infection. Tick can be controlled by the use of acaricides. The frequently used acaricides are the chlorinated hydrocarbons, carbamates, natural and synthetic pyrethrins, and avermectins.

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