ISSN: 2456-2912
NAAS Rating (2025): 4.61
VET 2025; 10(8): 109-111

www.veterinarypaper.com
Received: 29-05-2025
Accepted: 30-06-2025

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Clinical management of piroplasmosis in a crossbred jersey cow

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Abstract
This case report describes the clinical management of piroplasmosis in a 5-year-old crossbred Jersey cow presenting with hemoglobinuria, pyrexia, and severe anaemia. Diagnosis was confirmed through blood smear microscopy revealing 20% parasitemia with *Babesia* spp. The animal was treated successfully with diminazene aceturate (3 mg/kg IM), long-acting oxytetracycline (20 mg/kg IM), and supportive therapy including hematinic and fluid therapy. Despite therapeutic success in this case, babesiosis remains a significant threat to cattle health, causing substantial economic losses through mortality, reduced productivity, and treatment costs. The report highlights the importance of early diagnosis, prompt treatment, and integrated tick control measures in endemic regions. Key challenges include emerging drug resistance and the limitations of current diagnostic methods, underscoring the need for improved detection techniques and alternative therapeutics.

Keywords: Bovine babesiosis, cow, piroplasm, diminazene aceturate

Introduction
Babesiosis, also known as piroplasmosis, Texas fever, or red water fever, is a tick-borne disease caused by protozoan parasites of the genus *Babesia* (Sahinduran, 2012) [25]. This disease poses a significant threat to livestock, particularly cattle, leading to substantial economic losses in dairy and meat production worldwide (Saunsoucy, 1995; Suarez & Noh, 2011; Suarez *et al*., 2018) [26, 30, 29]. The economic impact stems from reduced milk yield, weight loss, mortality, and additional costs associated with treatment and prevention measures (Guswanto *et al*., 2017; Menshawy, 2020) [13, 18]. The disease is endemic in tropical and subtropical regions, including parts of Africa, Australia, Asia, and the Americas, with notable prevalence in countries such as India (Bock *et al*., 2004; Bal *et al*., 2016; Hashem *et al*., 2018; Beugnet & Moreau, 2015; Rozej-Bielicka *et al*., 2015) [5, 3, 14, 4, 24]. Clinical manifestations of bovine babesiosis include fever, anemia, anorexia, cessation of rumination, increased heart and respiratory rates, hemoglobinuria, icteric mucous membranes, and, in severe cases, death (Wagner *et al*., 2002; Zintl *et al*., 2003; Demeke *et al*., 2018; Mezouaghi *et al*., 2019) [32, 33, 7, 19]. The disease is transmitted primarily by ticks of the family Ixodidae, with different *Babesia* species being vectored by specific tick genera (Silva *et al*., 2010) [27]. Among the various *Babesia* species affecting cattle, *B. bovis* and *B. bigemina* are the most clinically significant, while *B. divergens* is of particular concern in certain regions due to its zoonotic potential. The genus *Babesia* belongs to the phylum Apicomplexa and class Sporozoasida (Allsopp *et al*., 1994; Radostits *et al*., 2006) [1, 21]. Molecular taxonomy based on 18S rRNA sequencing has further refined the classification of *Babesia* species (Criado-Fornelio *et al*., 2003). The three most pathogenic species in cattle are *B. bovis*, *B. bigemina*, and *B. divergens* (Kaandorp, 2004; Radostits *et al*., 2007; Fakhar *et al*., 2012) [16, 22, 9]. *B. bovis* infections are often more severe than those caused by *B. bigemina* due to the parasite's ability to sequester in capillary vessels, leading to cerebral complications (Gubbels *et al*., 1999) [12]. Morphologically, *B. bovis* is small (1.1-1.5 × 0.5-1.0 µm) and typically found in the center of red blood cells (RBCs), whereas *B. bigemina* is larger (3-3.5 µm long and 1-1.5 µm wide), appearing as paired pyriform structures within erythrocytes (Soulsby, 1985; El Sawalhy, 1999) [28, 8]. *B. divergens* is smaller and forms an obtuse angle within RBCs (Jerram & Willshire, 2019; Alvarez *et al*., 2019) [15, 2]. Other less common species infecting cattle include *B. major*, *B. ovata*, *B. occultans*, and *B. jakimovi* (Menshawy, 2020) [18].

Transmission dynamics vary depending on the tick vector. *Rhipicephalus (Boophilus) microplus*, *R. annulatus*, and *R. geigyi* are primary vectors for *B. bovis* and *B. bigemina*, whereas *R. decoloratus* and *R. evertsi* transmit only *B. bigemina* (Bock *et al*., 2004; Gohil *et al*., 2013) [5, 10]. In contrast, *Ixodes ricinus* is the main vector for *B. divergens* (Bock *et al*., 2004) [5]. Bovine babesiosis leads to direct economic losses through decreased productivity, mortality, and trade restrictions in endemic regions (Menshawy, 2020) [18]. Indirect costs arise from tick control measures, acaricide resistance, and veterinary interventions (Guswanto *et al*., 2017) [13]. In acute cases, infected cattle exhibit hemolytic anemia, hemoglobinuria, and systemic collapse, often resulting in death if untreated (Zintl *et al*., 2003) [33]. Chronic infections may cause subclinical carrier states, perpetuating transmission within herds (Radostits *et al*., 2007) [22]. Diagnosis relies on clinical signs, microscopic examination of blood smears, serological assays (e.g., ELISA, IFAT), and molecular techniques such as PCR (Silva *et al*., 2010; Gohil *et al*., 2013) [27, 10]. Treatment typically involves antiprotozoal drugs like imidocarb dipropionate or diminazene aceturate, though drug resistance is an emerging concern (Menshawy, 2020) [18]. Preventive strategies include tick control, vaccination (where available), and herd management practices to reduce exposure (Bock *et al*., 2004) [5].

Case Presentation and History

A 5-year-old pluriparous crossbred Jersey cow was presented with clinical signs of coffee-colored urine (hemoglobinuria), diarrhoea, high fever (pyrexia), anorexia, dehydration, and pale conjunctival membranes indicative of anaemia. Physical examination revealed mild to moderate tick infestation and enlarged lymph nodes, raising suspicion of a tick-borne disease. Microscopic examination of blood smears confirmed the presence of intraerythrocytic Babesia spp. parasites with a high parasitemia level (20% infected RBCs). Hemogram analysis revealed severe anaemia characterized by markedly decreased haemoglobin (Hb), packed cell volume (PCV), total erythrocyte count (TEC), and thrombocytopenia. These clinical and laboratory findings were consistent with acute babesiosis (piroplasmosis), most likely caused by *Babesia bovis or Babesia bigemina*, given the endemic presence of their tick vectors in the region.

Treatment

The affected animals were treated with a single dose of diminazene aceturate (Inj. Berenil) at 3 mg/kg body weight administered intramuscularly at two different sites in the neck muscles. Additionally, long-acting oxytetracycline (Inj. Intamycin-LA, Intas Pharmaceuticals) was administered at 20 mg/kg body weight intramuscularly at 48-hour intervals for two doses. Supportive therapy included haematinic supplementation (Inj. Feritas, Intas Pharmaceuticals®) at 10 ml intramuscularly thrice weekly for one week, a rumenotoric agent at 40 ml orally once daily for 10 days, and intravenous fluid therapy at 500 ml daily for 3 days.

Discussion

Babesiosis, a tick-borne hemoprotozoan disease caused by *Babesia* spp., is characterized by hemolytic anemia, fever, and often hemoglobinuria, with potential fatal outcomes (Ristic *et al*., 1981) [23]. Disease severity depends on parasite load (minimum infective dose: 10^3 parasites IV), host immunity, and strain virulence. While subclinical infections with mild fever and anorexia often go unnoticed (Zintl *et al*., 2003) [33], acute cases exhibit marked hemoglobinuria, leukocytosis (Gray & Murphy, 1985) [11], and severe anemia (PCV <20%), with parasitemia ranging from 0.2%-45% (Urquhart *et al*., 1996) [31].

Diagnosis primarily relies on microscopy, despite limitations in sensitivity (Mosqueda *et al*., 2012) [20]. Treatment traditionally involves *diminazene aceturate* (3-5 mg/kg IM; Kuttler, 1980) [17] or *Imidocarb*, with long-acting oxytetracycline showing prophylactic efficacy (Urquhart *et al*., 1996) [31]. Supportive care, including hematinic and B-complex vitamins for 3 weeks, is critical for recovery. Recent advances offer new pharmacological options (Mosqueda *et al*., 2012) [20], though delayed intervention often leads to mortality, emphasizing the need for early diagnosis and therapy to mitigate production losses.

Conclusion

This case highlights the successful treatment of acute bovine babesiosis using diminazene aceturate and supportive therapy, while emphasizing the critical importance of early intervention. The findings reinforce the need for prompt diagnosis, effective tick control measures, and continued research into improved diagnostics and therapeutics to combat this economically significant disease in endemic regions. Prevention through integrated herd health management remains paramount for sustainable control of babesiosis in cattle populations.

Acknowledgments

Sincere thanks to Dairy farm owner to give opportunity to treat the animal at the earliest stage.

Conflict of Interest

Not available.

Financial Support

Not available.

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How to Cite This Article
Saravanan M, Vigneshwaran B. Clinical management of piroplasmosis in a crossbred jersey cow. International Journal of Veterinary Sciences and Animal Husbandry. 2025;10(8):xx-xx.