Babesiosis in a 7-week-old calf: case report

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Abstract. Babesiosis is a febrile, hemolytic disease caused by the infection with protozoans of the genus Babesia. As far as the economical aspect is concerned, bovine babesiosis represents the most harmful arthropod-borne disease of cattle worldwide. Some of the most species known to affect bovines are Babesia bigemina, B. bovis and B. divergens. Bovine adults are more receptive to Babesia than calves. A case of bovine babesiosis was diagnosed in a 7-week-old calf, in Cluj county, Romania. The calf had no access to pastures before showing signs of illness. The owner reported that the mother had been on a tick-infested pasture 20 days before calving. The clinical signs consisted of fever (41.2°C), anemia, haemoglobinuria and jaundice. No ticks were found on the calf. Prior to the treatment blood samples were collected. The blood smears were stained Diff Quick Panoptic and the microscopic examination revealed the intracellular parasite. Also, the nested-PCR technique confirmed the diagnosis. Considering the age of the calf, in this case the infection with this protozoan parasite could however, come from the tick bites. The calf was treated with Diminazene (Berenil® R.T.U.). Following the treatment the clinical state of the calf improved.

Keywords: Calf; Babesia; Blood smears; Nested-PCR.

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Introduction

Parasitic diseases transmitted by blood-feeding arthropods are known to affect 250 million cattle worldwide (Radostits et al., 2000). Babesiosis is the second most widespread blood-borne disease of animals (Homer et al., 2000; Hunfeld et al., 2008; Gohil et al., 2013), also receiving increasing attention as an emerging zoonosis of humans (Kjemtrup and
Conrad, 2000; Zintl et al., 2003; Hunfeld et al., 2008; Leiby, 2011; Gohil et al., 2013). Thirty cases of human babesiosis, most likely caused by the cattle parasite *Babesia divergens* have been reported throughout Europe (Yugoslavia, France, Great Britain, Ireland, Portugal, Spain, Sweden and Switzerland) (Zintl et al., 2003; Gray et al., 2010).

Bovine babesiosis is an emerging intraerythrocytic tick-borne disease of cattle and domestic buffalos. The disease is also known as “red water fever”. There are many Babesia species that affect bovines worldwide, the most important being *B. bovis*, *B. bigemina* and *B. divergens*, of which *B. bovis* is the most pathogenic (Bock et al., 2004). Incubation time varies from one week to several weeks (Imes et al., 2011). The consequences of bovine babesiosis are represented by mortalities, abortions, decreased meat and milk production, as well as losses of potential production.

Clinically, the disease is characterized by fever and intravascular hemolysis with other symptoms like anemia, hemoglobinuria and jaundice being present. In general, the severity of the disease is influenced by several factors like the host’s age, immunological status, concurrent infections with other pathogens, and/or genetic factors the dose of the inoculated parasites, the virulence of the parasite strain (Schnittger et al., 2012). Adults are more receptive to *Babesia* infection than calves. Calves possess a strong innate immunity against *Babesia* infection that lasts for approximately 6 months after birth (Goff et al., 2001).

In this study, we present a case of bovine babesiosis diagnosed in a 7-week-old calf, in Cluj county, Romania.

**Case history**

A team from the Department of Parasitology and Parasitic Diseases, Faculty of Veterinary Medicine (Cluj-Napoca) was asked to examine a 7-week-old calf located in Cluj county, Romania, during August, 2018. The clinical signs observed were apathy, adynamy, fever (41.2°C), anemia, haemoglobinuria and jaundice. The owner reported that the calf was born indoor and without access to pastures before showing signs of illness. The calf’s mother had been on a tick-infested pasture 20 days before parturition.

Prior to any treatment, blood was collected from the jugular vein of the calf, in tubes with anticoagulant. As the mother cow was sent to the pasture, no blood could be collected from her. The team also performed blood smears from peripheral blood (ear), of the calf, which were later stained Diff Quick Panoptic. The sample was further tested by nested-PCR technique targeting the 18S rRNA gene (~600 bp) of piroplasmids (Zintl et al., 2011; Daskalaki et al., 2018). The microscopical examination of blood smears revealed the intracellular parasite *Babesia* spp. (length: 3, 39 μm) (figure 1) that was confirmed later by nested-PCR (figure 2). Based on the clinical signs combined with the results of laboratory exams the calf was diagnosed with bovine babesiosis. The treatment consisted of Diminazene (Berenil® R.T.U.) 3.5 mg/kg (a single dose). Following the treatment the clinical state of the calf improved.

**Discussion**

It is generally accepted that young animals are more resistant to babesiosis than adults (Trueman and Blight, 1978; Latif et al., 1979; Levy et al., 1982). Levy et al. (1982) have suggested that young animals are protected against babesiosis by the maternal antibodies found in the colostrum. Christensson (1987) analyzed the differences in the immunological response of newborn calves after the inoculation with *B. divergens*. The calves were divided into two separate groups. The first group had access to the maternal antibodies, while the second did not. The results showed no significant dissimilarity between the two groups. Colostrum antibodies are important for the innate immunity of the newborn, but there are other factors involved, that have been proved to be valuable for the resistance against *Babesia* infection. A non-immunological resistance factor has been demonstrated in the blood of young calves by *in vitro* cultivation of *B. bovis*. In 2001, Goff

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and his collaborators showed that the age-related immunity against *Babesia* in cattle, involves the rapid induction of interleukin-12, interferon-γ and inducible nitric oxide synthase mRNA expression in the spleen.

In the area where the present case occurred in Cluj county, the veterinarian reported many babesiosis cases in adult cows grazing on pastures.

There is one possibility that the mother cow may have transmitted the parasite to fetus in utero. This likelihood of intra-uterine transmission is also reported by other authors: Egeli (1996) reported babesiosis in a six-day old bull calf of the Norwegian red breed in Norway.

Yeruham et al. (2003) found *B. bovis* infection in a two-day old calf, in Israel. Also, Sunitha et al. (2011) recorded babesiosis in a 20-day old Jersey calf in India, Kerala. The authors concluded that, a possible manner for the calf to get infected could have been intra-uterine transmission, as the mother of the calf had been treated for babesiosis during the third trimester of pregnancy.

**Figure 1.** Microscopical image showing the intraerythrocytic *Babesia* spp. (Olympus BX61) (x100)

Considering the age of the calf in the present case, the infection with this protozoan parasite could however, come from the tick bites. In a natural infection with *Babesia*, the parasite multiplies fast enough to induce hemolysis that can be detected clinically after an incubation period of seven to twenty days (3 weeks). Regardless of the fact that the calf was born indoor, without access to pastures before getting infected, ticks might have been brought to the stable along with the hay. Mallick et al. (1980) reported *B. bigemina* infection in a 15-day old indigenous calf in Bareilly, India.
Also, Venu et al. (2015) described *B. bigemina* infection in a 14-day old Jersey crossbred in India. They concluded that the probable source of infection occurred after the birth but may not be from the mother. Such cases of *Babesia* infection in calves were also reported by several authors from India (Vairamuthu et al., 2012).

On rare occasions the protozoan can be transmitted following the contact between the mother’s blood and existent scratches or wounds found on the calf’s body. Such a case has been reported in 1980 by Moen.

Unfortunately, information regarding cattle babesiosis in Romania are scarce, even though there are many field cases reported in cows in this country.

Also, there is no information about the species causing the diseases in cattle in our country.

**References**


