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Raju Shelar
KNP College of Veterinary Science, Shirwal, Dist- Satara, (Maharashtra Animal & Fishery Sciences University, Nagpur, Maharashtra, India

Balaji Ambore
KNP College of Veterinary Science, Shirwal, Dist- Satara, Maharashtra Animal & Fishery Sciences University, Nagpur, Maharashtra, India

Vitthal Dhaygude
KNP College of Veterinary Science, Shirwal, Dist- Satara, Maharashtra Animal & Fishery Sciences University, Nagpur, Maharashtra, India

Pooja Shinde
KNP College of Veterinary Science, Shirwal, Dist- Satara, Maharashtra Animal & Fishery Sciences University, Nagpur, Maharashtra, India

Santosh Swami
KNP College of Veterinary Science, Shirwal, Dist- Satara, Maharashtra Animal & Fishery Sciences University, Nagpur, Maharashtra, India

Sayali Deshmukh
KNP College of Veterinary Science, Shirwal, Dist- Satara, Maharashtra Animal & Fishery Sciences University, Nagpur, Maharashtra, India

Corresponding Author:
Balaji Ambore
KNP College of Veterinary Science, Shirwal, Dist- Satara, Maharashtra Animal & Fishery Sciences University, Nagpur, Maharashtra, India

Therapeutic management of Anaplasmosis in a jersey cow

Raju Shelar, Balaji Ambore, Vitthal Dhaygude, Pooja Shinde, Santosh Swami and Sayali Deshmukh

Abstract
A Jersey cow, aged 4 years was brought to VCC, KNPCVS, Shirwal due to symptoms of anorexia, high fever (104.3^{0}F), progressive weakness, laboured breathing, yellowish mucous membranes, enlarged pre-scapular lymph nodes, slight yellow-coloured faeces, dark urine, reduced milk production, and tick infestation. Upon microscopic examination of the blood smear, *Anaplasma marginale* piroplasms were discovered in the RBCs. Haematological analysis revealed anaemia with low haemoglobin level (3.3g/dl), low PCV (9.5%), and decreased erythrocyte count (1.68×10^6/µl). The cow was successfully treated and managed with antibiotic oxytetracycline supported with hematinics and beetroot feeding.

Keywords: *Anaplasma marginale*, haematology, therapy, beet root

Introduction
Anaplasma marginale is an obligate intra-erythrocytic rickettsial organism, belonging to the family *Anaplas mataceae* and order Rickettsiales (Dumler *et al*., 2001) [5]. Anaplasmosis is a disease that affects cattle and is caused by the rickettsia *Anaplasma marginale*. It is commonly found in tropical and subtropical areas worldwide and causes significant economic losses in both the dairy and beef industries. While cattle are the primary target, other ruminants like buffalo, bison, and African antelopes can also be infected. The disease is mainly transmitted by ticks, especially *Boophilus microplus* (*Rhipicephalus B. microplus*), but other species like *Rhipicephalus*, *Dermacentor*, *Haemaphysalis*, *Hyalomma*, and *Ixodes* can also transmit *Anaplasma* spp. Additionally, iatrogenic and mechanical transmission by insects like *Tabanus* spp. and *Stomoxys* spp. is possible.
Anaplasma marginale and *Anaplasma centrale* are the most significant Anaplasma species. *A. marginale* causes a clinical disease where the animal suffers from anaemia without haemoglobinuria. Calves younger than one year of age may not show clinical signs or may have only mild disease (anaemia). In contrast, adult cattle, especially those older than two years of age, often have severe acute illness and possible high mortality. Once cattle of any age become infected with *A. marginale*, they remain persistently infected for life, regardless of whether clinical disease occurs. *A. centrale*, however, can only cause a moderate degree of anaemia, and clinical outbreaks in the field are exceptionally rare. This report describes the occurrence and therapeutic management of anaplasmosis due to *A. marginale* in a Jersey cow.

Materials and Methods
History and clinical examination
At the Veterinary Clinical Complex of KNP College of Veterinary Science in Shirwal, Dist. Satara (Maharashtra), a Jersey cow suspected of haemoprotozoan infection was brought in for examination. The details history regarding the duration of the illness, clinical signs, and treatment given was taken from owner. A thorough clinical examination was conducted to assess parameters such as rectal temperature, heart rate, respiratory rate, mucous membrane color (conjunctival and vaginal), and external parasites.

Haematological analysis
A blood sample was collected from the jugular vein using an EDTA vial and analyzed for haematological estimation within an hour of collection. The analysis was conducted using a fully automated haematology analyzer (Abacus Jr Vet 5, Diatron, Hungary). A thin blood smear was then prepared and immediately stained using the Giemsa method (Benjamin, 1986) [1].

Finally, the stained smear was examined under 40X and 100X objectives for any inclusions, morphological abnormalities, or parasites.

Therapeutic management

The cow was successfully treated and managed with antibiotic oxytetracycline, supportive treatment with haematinics and beetroot feeding.

Results and Discussions

The presented cow showed various symptoms like high temperature of 104.3^{0}F, reduced milk yield, anorexia, progressive weakness, anaemia, and laboured breathing. The cow also passed dark yellow urine, and there was a history of tick infestation on its body. During the initial physical examination, the cow's conjunctival and vulvar mucous membranes were pale, anaemic, and icteric (Plate-1) and the pre-scapular lymph nodes were enlarged. Soulsby (1982) [8] noted that the disease usually begins with a fever, and animals will stop eating. similar findings were also recorded in present study. Clinical signs like persistent fever, lethargy, icterus, weight loss, abortion, decreased milk yield, and death in more than 50% of untreated animals were recorded as important clinical signs in cattle more than 2 years of age by M'Ghirbi *et al.* (2016) [6]. Similarly, Vatsya *et al*. (2013) [10] and Brahma *et al*. (2018) [2] recorded similar clinical signs in anaplasmosis. In present study haematological examination revealed a decrease in the values of haemoglobin (3.3g/dl), packed cell volume (9.5%), total erythrocyte count (1.68×10^6/µl), platelet count (1.05 lacs/µl), as well as neutrophilia (59%). These findings corroborate with the findings of M'Ghirbi *et al.* (2016) [6]. Vatsya *et al*. (2013) [10] and Brahma *et al*. (2018) [2]. Additionally, microscopic examination of blood smears revealed the presence of peculiar solid blue dot forms of *A. marginale* surrounded by a clear hollow at the margin of RBCs (see Plate 2). As the disease progresses, infected and even uninfected red blood cells may be destroyed predominantly in the liver and spleen, resulting in increasing anaemia with or without hemoglobinuria. RBCs showed marked anisocytosis and hypochromasia. This can cause a noticeable paleness in the mucous membranes (Stewart *et al.*, 1981) [9].

Plate 1: Pale and icteric conjunctival and vulvar mucous membranes

Therapeutic management

After the confirmed diagnosis of Anaplasmosis, the cow was treated with a multifaceted approach, Inj. Oxytetracycline @ 10 mg /kg body weight slow I/V given daily for 3 days as a drug of choice. Supporting treatment with Anti-pyretic Inj. Melonex plus @ 0.5 mg/kg body wt. I/M for 2 days, Antihistaminics @10 ml I/M for 5 days, B complex with liver extract (Inj. Belamyl @10 ml I/M for 5 days), Vit. C Inj 15ml, Inj. Catasol @ 10 ml intravenously 3 doses on alternate days. Parenteral haematinic Inj. Ferritas (M/s Intas Pharmaceuticals Ltd.,) @10 ml i/m for 3 consecutive days to cope with anaemia., Liq.3D Red @50 ml orally twice daily for 15 days. Also, the farmer was advised to feed beetroot @ half kg per day for 10 days to increase haemoglobin level. After treatment clinical signs started to subside from third day of post-treatment with decreasing body temperature, improving appetite, stool and urine colour returning to normal. On blood smear examination RBCs were negative for piroplasms after treatment (plate 3). For the elimination of the carrier state of the organism long acting oxytetracycline (20mg/Kg, I/M) was administered at weekly intervals for two weeks. The blood was collected 10 days post-treatment and there was a significant improvement in Hb, PCV and TEC values (Table 1). Oxytetracycline is recommended as a specific drug in anaplasmosis by Coetzee (2022) [4] and the present study also records the efficacy of the same in bovine anaplasmosis.

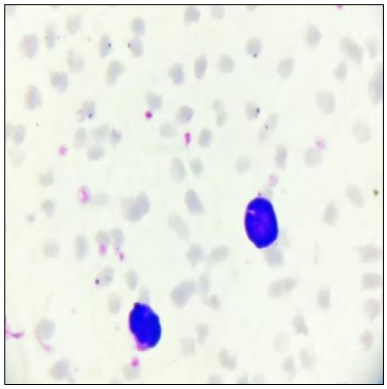

Plate 2: *A. marginale* at margin of RBCs (1000X)

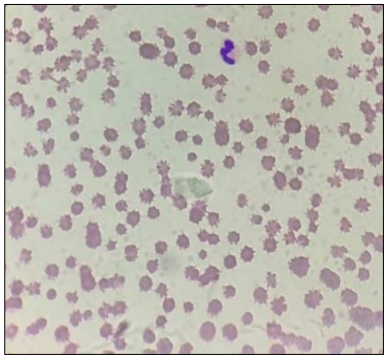

Plate 3: RBCs negative for piroplasms after treatment (1000X)

Table 1: Hematology before and after treatment in Anaplasmosis infected Jersey cow

Parameters	Before treatment	After treatment
Hb (g/dl)	3.3	6.7
TEC ($\times10^6$/µl)	1.68	2.83
PCV (%)	9.5	19.30
TLC ($\times10^3$/µl)	9.36	6.66
Platelets (Lacs/µl)	1.05	4.19

Conclusion

Effective treatment for anaplasmosis in cows involves administering Oxytetracycline at a rate of 10 mg/kg body weight through slow intravenous injection along with supportive treatment. It is crucial to promptly diagnose and treat any cow exhibiting clinical signs such as anorexia, high

body temperature, labored breathing, tick infestation, and dark yellow urine. Time is of the essence to ensure a successful outcome.

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