



## Hematological and Diagnostic Evaluation of Bovine Anaplasmosis: A Case Study

**Manish Singh\*, Deepak Saxena, Vinay Chaudhary and Shobhit Singh**

*Final Year Veterinary Student, College of Veterinary and Animal Sciences, Meerut*

**\*Corresponding Author:** Manish Singh, Final Year Veterinary Student, College of Veterinary and Animal Sciences, Meerut.

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### Abstract

Bovine anaplasmosis, primarily caused by *Anaplasma marginale*, is a tick-borne infectious disease that affects cattle worldwide, leading to significant economic losses due to morbidity, mortality, and decreased productivity. The disease is endemic in tropical and subtropical regions where vector populations are prevalent. This case study provides a comprehensive overview of the clinical signs, hematological disturbances, diagnostic approach, and therapeutic management of a naturally infected bovine case. The complete blood count (CBC) analysis before and after oxytetracycline treatment, as well as haemoprotozoal screening, underscores the importance of early detection and effective intervention in managing this disease. Our findings also emphasize the role of supportive therapy in facilitating recovery.

**Keywords:** Bovine Anaplasmosis; *Anaplasma Marginale*; Oxytetracycline; Hematology; Haemoprotozoa; Cattle

### Introduction

Anaplasmosis in cattle is caused by *Anaplasma marginale*, an intraerythrocytic rickettsial organism transmitted by ticks (*Rhipicephalus*, *Dermacentor*) and biting flies. The disease is characterized by progressive anemia, fever, icterus, and decreased productivity [1,2]. In endemic regions, subclinical carriers can perpetuate transmission. Early diagnosis and treatment are critical to avoid severe clinical outcomes or death. The disease predominantly affects adult cattle and may present more severely in *Bos taurus* breeds compared to *Bos indicus*. Transmission can also occur iatrogenically through contaminated instruments. Following infection, the organism targets red blood cells, leading to immune-mediated destruction, anemia, and associated clinical signs. Understanding the disease pathogenesis and transmission dynamics is critical for implementing control strategies, especially in herds with high tick exposure.

### Case Presentation

A 4-year-old crossbred cow was presented with signs of inappetence, weakness, pale mucous membranes, and decreased milk yield. Rectal temperature was 39.8°C. Physical examination revealed mild jaundice and increased heart rate.

### Diagnostic findings

Giemsa-stained blood smears revealed small, dark-staining round bodies at the periphery of erythrocytes, confirming the presence of *Anaplasma marginale*. No evidence of *Babesia*, *Trypanosoma*, or *Theileria* spp. was found, ruling out co-infection [3]. The diagnosis was further supported by microscopic observation of characteristic inclusion bodies within erythrocytes, predominantly located at the periphery of the cells. This method remains a cost-effective and reliable diagnostic tool in resource-limited settings, although polymerase chain reaction (PCR) assays can offer greater sensitivity and specificity where available.

Parameter	Value	Reference Range
Hemoglobin	6.5 g/dL	8–15 g/dL
Packed Cell Volume	16%	24–46%
Total Leukocyte Count	$7.2 \times 10^9/L$	$4\text{--}12 \times 10^9/L$
Neutrophils	48%	25–45%
Lymphocytes	42%	45–75%
Platelet Count	$120 \times 10^9/L$	$100\text{--}800 \times 10^9/L$

Table 1: Hematological Findings Before Treatment.

Treatment and outcome

The cow was treated with long-acting oxytetracycline at 20 mg/kg IM, repeated after 72 hours. Supportive therapy included he-matinics and multivitamins. The animal showed clinical improve-ment within 4 days. Follow-up hematology after 2 weeks revealed significant recovery [4]: The choice of long-acting oxytetracycline was based on its efficacy in clearing the parasitemia and improving

hematological parameters. The animal was also provided with anti-inflammatory agents to alleviate systemic signs, and fluid therapy was initiated to address dehydration. Over the course of treatment, the cow showed progressive clinical improvement, resumption of appetite, and normalization of vital signs. Follow-up hematologi-cal assessments confirmed a marked increase in hemoglobin and packed cell volume levels.

Parameter	Value	Reference Range
Hemoglobin	10.4 g/dL	8-15 g/dL
Packed Cell Volume	28%	24-46%
Total Leukocyte Count	$9.5 \times 10^9/L$	$4\text{--}12 \times 10^9/L$
Neutrophils	40%	25-45%
Lymphocytes	54%	45-75%
Platelet Count	$310 \times 10^9/L$	$100\text{--}800 \times 10^9/L$

Table 2: Hematological Findings After Recovery (Day 14).

Discussion

This case highlights the hematological impact of Anaplasma marginale infection and the utility of blood smears in field diag-nosis [3]. Prompt treatment with oxytetracycline is effective, par-ticularly in uncomplicated cases [4]. Differentiation from other haemoprotozoal diseases is vital, especially in co-endemic regions. The hematological changes observed, including anemia and mild thrombocytopenia, align with previous reports in naturally infect-

ed cattle. Early detection, guided by CBC and blood smear findings, allows prompt therapeutic intervention that can significantly im-prove prognosis. The integration of vector control measures and routine herd screening can further aid in managing disease out-breaks. Vaccination strategies are available in some countries, but their efficacy varies. In endemic areas, maintaining herd immunity and carrier management remain key components of long-term con-trol programs.

### Conclusion

Veterinarians in endemic regions should maintain a high index of suspicion for anaplasmosis in cattle with anemia and fever. Routine blood smears and CBC evaluation are practical diagnostic tools, and timely antibiotic therapy results in favorable outcomes.

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