

Prevalence and Risk Factors of Bovine Hemoparasites in Peri-Urban Dairy Farms of Kayes, Mali

Ichiaka DIABY ^{1,*}, Ibrahima MARIKO ¹, Modibo DIAKITE ¹ and Alpha Seydou YARO ²

¹ Diagnostic and Research Service, Central Veterinary Laboratory, Bamako, Mali.

² Department of Biology, Faculty of Science and Technology, University of Sciences, Techniques and Technologies of Bamako, Mali.

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Abstract

The objective of this study was to determine the prevalence and risk factors of bovine hemoparasites in peri-urban dairy farms of Kayes, Mali. Between June and September 2022, blood samples were collected from 150 cattle belonging to nine farms and examined using the Buffy Coat and Giemsa-stained smears. Results showed that 58.7 % of the animals were infected with *Babesia spp.* and 11.3 % with *Trypanosoma spp.*, with 40 % co-infection between the two genera. A significant decrease in mean hematocrit (31 %) was observed in infected animals. Cattle drinking from the river and grazing for more than eight hours were the most infected. These findings highlight the endemic nature of bovine hemoparasites in Kayes and emphasize the need for integrated vector control and improved management of watering points to reduce their zotechnical and economic impact.

Keywords: *Babesia spp.*; *Trypanosoma spp.*; Hematocrit; Cattle; Mali

1. Introduction

Livestock plays a major role in Mali's economy, contributing between 11 % and 15 % of the national GDP and supporting over 30 % of rural households [1]. However, cattle productivity is severely constrained by haemoparasitic diseases such as babesiosis, trypanosomosis, and anaplasmosis, which cause anaemia, reduced milk production, growth retardation, and high mortality, resulting in substantial economic losses [2,3].

The dominant bovine haemoparasites in West Africa are *Babesia spp.*, *Anaplasma spp.*, and *Trypanosoma spp.*, transmitted by ticks and biting flies [4]. Recent studies have shown high prevalence rates associated with livestock management and ecological factors [5]. In Mali, few studies have been conducted on bovine babesiosis, and data remain scarce [6].

In Kayes, ecological conditions such as high temperatures, seasonal humidity, and proximity to the Senegal River favor the persistence of vectors. However, updated data on the prevalence, co-infections, and risk factors of haemoparasitoses in this area remain limited.

Objective: To determine the prevalence of *Babesia spp.* and *Trypanosoma spp.* infections in peri-urban dairy farms of Kayes, identify associated risk factors, and assess their impact on haematocrit levels in cattle.

* Corresponding author: Ichiaka DIABY

2. Materials and Methods

2.1. Study area

The study was conducted in the peri-urban area of Kayes (12° N, 14° W), located along the Senegal River. Nine dairy farms were selected in Niaganiaga, Allahina, Diomba, Khouloun, Samé Ouloff, Dyalla, Darsalam, and Kersignane based on herd density and accessibility. Farms were of semi-intensive type, combining daytime grazing and evening feed supplementation.

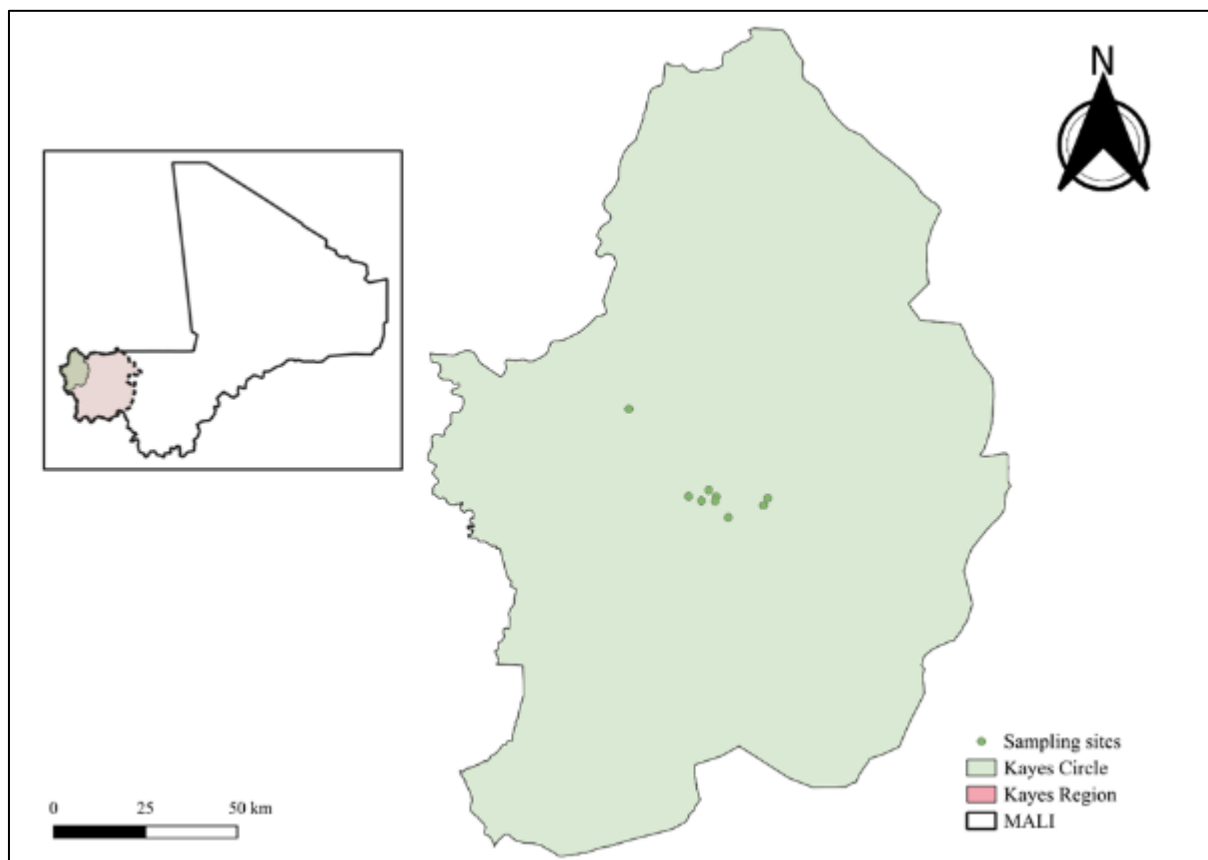


Figure 1 Geographic distribution of sampling sites in peri-urban dairy farms of Kayes, Mali

2.2. Sampling

A total of 150 cattle (25 males and 125 females) of local and crossbred zebu breeds were randomly sampled between June and September 2022.

2.3. Blood collection and laboratory analysis

- Blood was collected from the jugular vein into EDTA tubes and analyzed at the Kayes Veterinary Laboratory.
- Buffy Coat technique: centrifugation at 12,000 rpm for 5 min; examination at the plasma–leukocyte interface for motile trypanosomes.
- Giemsa-stained smears: examined under oil immersion ($\times 100$) for *Babesia* spp.
- Hematocrit: measured with a micro-hematocrit reader; anemia was defined as hematocrit < 25 %.

2.4. Statistical analysis

Data were processed using SPSS v29. Prevalence rates were expressed as percentages. Associations between infection and risk factors (sex, age, watering source, grazing duration) were tested using Pearson's Chi-square test at a 5 % significance level.

3. Results

3.1. Overall prevalence

Among the 150 examined cattle, 118 (78.7 %) were parasitized: 58.7 % with *Babesia spp.* and 11.3 % with *Trypanosoma spp.* Co-infection occurred in 40 % of positive cases. Infection rates were slightly higher in females (58.9 %) than in males (56 %) but not significant ($p = 0.769$).

3.2. Hematocrit and parasitic status

Mean hematocrit was 31 % (range = 10–55 %). Anemia (< 25 %) was observed in 18 % of animals, mainly infected with *Babesia spp.* (74 %). The association between anemia and parasitic infection was significant ($p < 0.05$).

3.3. Risk factors

Prevalence varied significantly with watering source ($p < 0.005$). Cattle drinking from the river showed the highest infection rates. Similarly, grazing duration was a significant factor: animals grazing more than eight hours had the highest prevalence ($p < 0.005$).

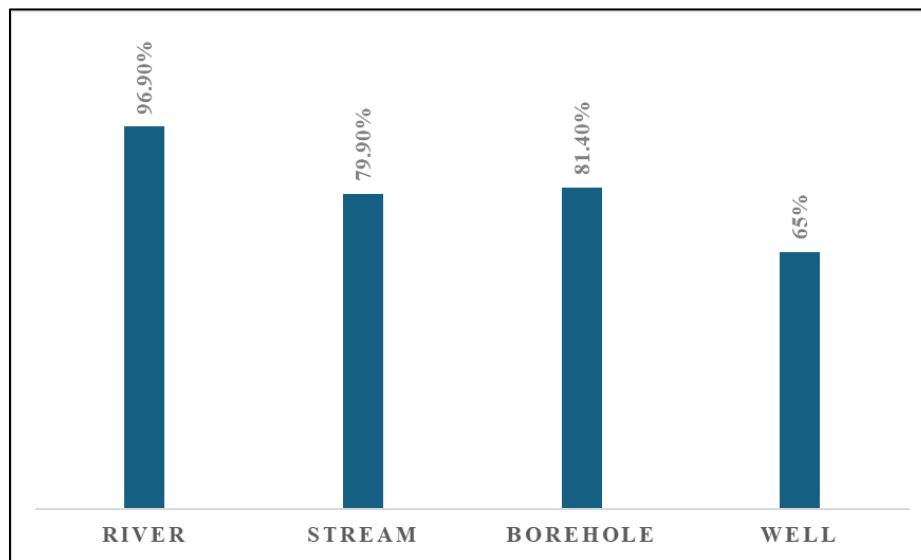


Figure 2 Prevalence of bovine hemoparasites according to watering sources in peri-urban Kayes

4. Discussion

This study confirms the high endemicity of bovine haemoparasitoses in Kayes, with *Babesia* prevalence (58.7 %) exceeding reports from Côte d'Ivoire (19.2 %) and Senegal (34.2 %) [7,8], and even above the global pooled estimate of 29 % [9]. Such results suggest an intense local transmission dynamic, possibly linked to tick proliferation and climatic factors [10].

Comparable studies in Ethiopia (50.9 %) and Kenya (25.9 %) also report high *Babesia* prevalence and vector involvement [11,12]. The occurrence of *Rhipicephalus (Boophilus) microplus*, a competent vector recently identified in Mali, may exacerbate transmission [6].

Our findings align with continental trends showing higher prevalence of tick-borne pathogens in Africa (42 %) compared to Asia (20.7 %) [13]. Given that microscopic methods may underestimate infection, molecular confirmation is recommended in future studies.

For trypanosomosis, the 11.3 % prevalence observed agrees with results from Côte d'Ivoire (13.5 %) [14] and prior data from West African cotton zones [15]. The presence of mechanical vectors such as *Tabanus* and *Stomoxys* species likely sustains residual transmission, especially during the rainy season.

The significant decrease in haematocrit among infected cattle reflects the pathogenic impact of haemoparasites. *Babesia* infection induces intra- and extravascular haemolysis, leading to anaemia and productivity losses [8,16]. Longer grazing time and use of unprotected watering points increase vector exposure, underscoring the importance of improved management and tick control.

Limitations include reliance on microscopy, single-season sampling, and absence of multivariate risk analysis. Future studies should employ molecular assays, multi-seasonal designs, and acaricide-resistance monitoring.

5. Conclusion

Bovine hemoparasites are highly prevalent in peri-urban Kayes, dominated by *Babesia spp* and *Trypanosoma spp* infections. These parasitosis significantly reduce hematocrit levels and constitute a major constraint to dairy productivity.

Recommendations

- Implement regular tick control and integrated vector management;
- Sanitize and fence watering points;
- Promote pasture rotation and veterinary monitoring;
- Strengthen molecular surveillance to characterize circulating strains.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare that they have no financial or personal relationships that could inappropriately influence or bias the results presented in this study. Specifically:

References

- [1] APESS. Note on the bovine sector in Mali: potential, constraints, and perspectives. Inter-Réseaux Développement Rural, 2022.
- [2] Mortelmans J. Quelques aspects économiques en rapport avec la parasitologie vétérinaire. *Tropicultura*. 1986;4(3):112-116.
- [3] Bonfoh B, Fokou G, Ould Taleb MO, et al. Dynamics of dairy production systems, risks and socioeconomic transformations in Mali. *Rev Elev Med Vet Trop*. 2007;60(1-4):1-4.
- [4] Auty H, Torr SJ, Michoel T, Jayaraman S, Morrison LJ. Cattle trypanosomosis: diversity of trypanosomes and implications for control. *Rev Sci Tech*. 2015;34(2):587-598.
- [5] Mor NH, Montenegro Tavera JV, Tobón JC, et al. Hemoparasitism in grazing cattle and risk factors associated with husbandry management in eastern Colombia. *J Parasit Dis*. 2024;48(4):924-935.
- [6] Diakité M, Sacko B, Sery A, et al. Prevalence of *Babesia bovis* and *Babesia bigemina* in Mali. *World J Biol Pharm Health Sci*. 2023;16(2):45-53.

- [7] Yéo N, Karamoko Y, Soro D, et al. Prevalence of *Trypanosoma*, *Babesia* and *Anaplasma* in cattle in northern Côte d'Ivoire. *Int J Biosci*. 2017;10:21-28.
- [8] Soffo YV. Survey on bovine haemoparasites and gastrointestinal parasites in the savanna region of Côte d'Ivoire. PhD Thesis, EISMV Dakar; 2010.
- [9] Jacob SS, Sengupta PP, Paramanandham K, et al. Bovine babesiosis: a global perspective through systematic review and meta-analysis. *Vet Parasitol*. 2020;283:109136.
- [10] Rimal S, Sah RK, Shakya S, et al. Bovine babesiosis: a clinical review. *Mathews J Vet Sci*. 2025;9(5):1-17.
- [11] Fesseha H, Mathewos M, Eshetu E, Tefera B. Babesiosis in cattle and ixodid tick distribution in southern Ethiopia. *Sci Rep*. 2022;12:6385.
- [12] Githaka NW, Bishop RP, Šlapeta J, et al. Molecular survey of *Babesia* parasites in Kenya. *Parasites & Vectors*. 2022;15(1):161.
- [13] El-Alfy ES, Abbas I, Elseadawy R, et al. Global prevalence and species diversity of tick-borne pathogens in buffaloes: a meta-analysis. *Parasites & Vectors*. 2023;16(1):115.
- [14] Acapovi-Yao G, Cissé B, Mavoungou JF, Tongue LK. Status of bovine trypanosomosis in major cattle-rearing regions of northern Côte d'Ivoire. *RASPA*. 2013;11:1-6.
- [15] Talaki E. Study of trypanosome resistance to isometamidium and diminazene in West African cotton zones (Mali-Guinea-Burkina Faso). Doctoral Thesis, University of Bobo-Dioulasso; 2008.
- [16] Yaro AS. Acaricides used in peri-urban cattle farms of Bamako District. *Rev Mal Sci Technol*. 2019;21:177-186.