

Prevalence And Risk Factors of Haemoparasitic Infections In Sheep (*Ovis Aries*) And Goats (*Capra Hircus*) Slaughtered At Jibia Modern Abattoir, Katsina State, Nigeria

Kabir Mu'azu^{1*}, Taofik Babatunde Ademola¹ and Kabiru Abdullahi²

¹Department Of Biology, Umar Musa Yar'adua University, Katsina-Nigeria

²Department of Biological Sciences, Federal University, Gusau-Nigeria

Corresponding Author's Email & Phone No.: muazukabir26@gmail, +234 803 752 7558

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ABSTRACT

Haemoparasites are blood-borne parasites that cause a range of clinical conditions, from fatal infections to subclinical presentations. This study investigates the prevalence and associated risk factors of haemoparasitic infections in sheep and goats slaughtered at Jibia Modern Abattoir, Katsina State, between December 2021 and May 2022. Blood samples were collected monthly from the jugular veins of 320 animals (160 sheep and 160 goats). Thin and thick blood smear techniques were used for parasitological analysis. Three parasites were identified: *Anaplasma* species had the highest prevalence at 3.02% in goats, followed by *Theileria* species (1.67%) and *Babesia* species (1.46%). The findings underscore the importance of targeted control measures to mitigate the impact of haemoparasitic infections on livestock productivity.

Keywords: Prevalence, Risk factors, Haemoparasites

1.0 INTRODUCTION

Ruminant animals, including sheep and goats, play a critical role in the Nigerian livestock industry, contributing significantly to meat, milk, and skin production. These animals also serve as financial assets for rural populations (Kosgey *et al* 2017). However, diseases, particularly those caused by haemoparasites, significantly impair their productivity. Haemoparasites, transmitted via vector organisms such as ticks and flies, induce conditions such as anaemia, infertility, and weight loss (Egbe *et al*, 2017).

This research aims to provide an updated perspective on haemoparasitic infections in small ruminants within

Jibia Local Government Area, highlighting the prevalence and contributing risk factors.

2.0 METHODOLOGY

2.1 Study Area

The study was conducted in Jibia, the administrative center of Jibia Local Government Area in Katsina State, Nigeria. The region spans 1,037 square kilometers, with a population of approximately 125,000. Jibia experiences distinct dry and rainy seasons, with an average temperature of 34°C. The area is economically reliant on livestock farming, pottery, and hunting (Ibrahim Yusuf Ladan 2017).

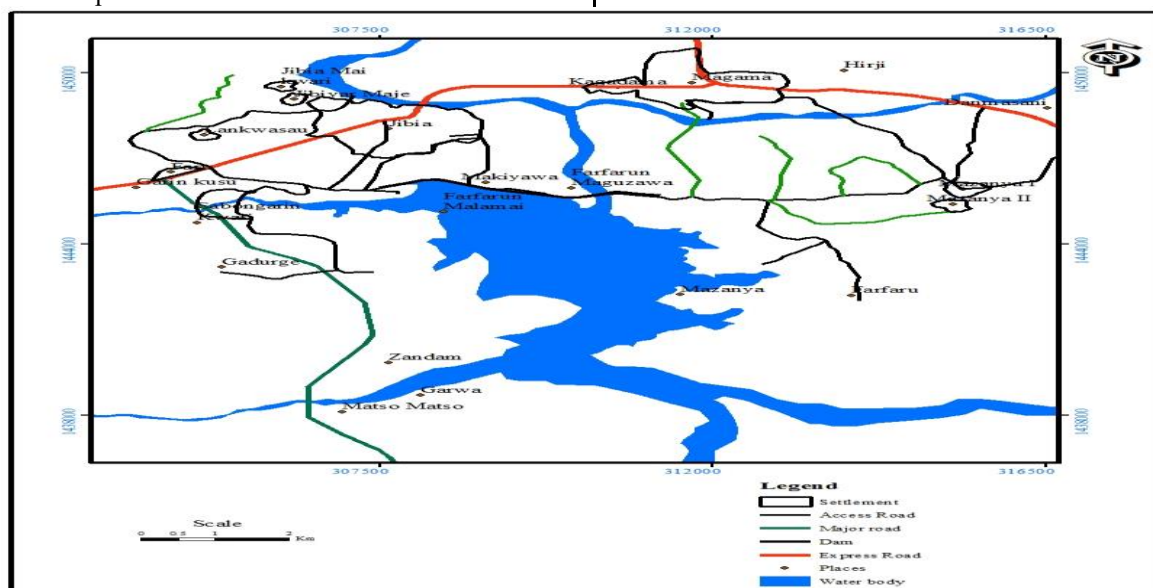


Figure 1: Study Area (Jibia). Source: Cartography section (Geography Department- UMYUK, 2023).

2.2 Study Animals and Sampling

Blood samples were collected from 320 animals (160 sheep and 160 goats) over six months. Random sampling was employed to include animals of varying ages and sexes. Approximately 5ml of blood was drawn from the jugular vein and stored in ethylene diamine tetra-acetic acid (EDTA) tubes for laboratory analysis.

2.3 Laboratory Analysis

Thin and thick blood smears were prepared and stained with Giemsa for microscopic examination at 100× magnification. Haemoparasites were identified based on morphological keys provided by (Taylor et al. 2016).

2.4 Statistical Analysis

Prevalence rates were analyzed using GraphPad InStat 3 software. Fisher's exact test (Dr. Harvey Motulsky 2021) and t-tests were employed to determine statistical significance in the prevalence rates between species (William Sealy Gosset 1908).

3.0 RESULTS

3.1 Prevalence Rates

The study found an overall haemoparasite prevalence of 6.15% in goats and 5.0% in sheep. Among the identified parasites, *Anaplasma spp.* was the most prevalent, with a rate of 3.02% in goats and 2.19% in sheep. *Theileria spp.* accounted for 1.67% in goats and 1.35% in sheep, while *Babesia spp.* showed an equal prevalence of 1.46% in both species. These findings indicate that *Anaplasma spp.* is the dominant haemoparasite in small ruminants in the study area, highlighting its significant role in livestock infections.

3.2 Monthly Distribution

Infections showed variation across the study period from December 2021 to May 2022, with the highest prevalence recorded in February 2022 (8.12% in goats and 7.5% in sheep). December 2021 also showed elevated infection rates in goats (8.13%) compared to sheep (3.75%). Prevalence in subsequent months fluctuated, with March 2022 reporting 6.25% in goats and 6.88% in sheep. The lowest rates were observed in April and May, where the prevalence in goats dropped to 3.13% and 3.75%, respectively, while sheep prevalence remained at 3.75%. Statistical analysis revealed no significant variation in monthly prevalence rates ($p > 0.05$). These patterns suggest potential seasonality in haemoparasite transmission, influenced

by environmental factors such as vector population dynamics and climatic conditions.

3.3 Parasite Distribution by Species

Detailed analysis of parasite prevalence within species revealed that goats were more frequently infected by *Anaplasma spp.* than sheep, at rates of 3.02% and 2.19%, respectively. *Theileria spp.* infections were marginally higher in goats (1.67%) than in sheep (1.35%), while *Babesia spp.* showed uniform prevalence (1.46%) in both. These variations suggest species-specific differences in susceptibility, possibly linked to behavioral and physiological factors.

3.4 Risk Factors for Infection

The study identified key risk factors contributing to haemoparasitic infections. Poor management practices were the predominant factor, accounting for 60% of cases, followed by poor hygiene (22.5%), harsh climatic conditions (10%), and overcrowding (7.5%). Goats exhibited higher overall prevalence, potentially due to their increased mobility and exposure to vector habitats, such as grazing areas with stagnant water and dense vegetation. Sheep, by contrast, may benefit from relatively sedentary behavior, reducing their interaction with infected vectors.

3.5 Impact of Gender and Age

Age and gender analysis suggested no significant differences in infection rates. However, adults exhibited slightly higher prevalence compared to young animals, which may be due to prolonged exposure to vectors. Gender did not appear to influence susceptibility significantly, though slight variations in prevalence were observed, with males being marginally more affected.

3.6 Statistical Analysis

Statistical comparisons using Fisher's exact test and t-tests indicated no significant differences in overall infection rates between sheep and goats ($p > 0.05$). Similarly, monthly variations and gender-specific prevalence were not statistically significant. This reinforces the idea that the observed patterns are consistent and likely influenced by common environmental and management factors.

3.7 Summary of Prevalence

The cumulative data showed an overall haemoparasite prevalence of 11.15% across all samples, with *Anaplasma spp.* being the most common at 5.20%, followed by *Theileria spp.* (3.02%) and *Babesia spp.* (2.92%). These findings underline the pervasive nature of haemoparasitic infections in small ruminants in the study area and the need for targeted interventions.

Table 1: The Prevalence of haemoparasite species of Sheep and Goat slaughtered in Jibia modern Abattoir in the Month of December 2021 – May 2022

Months	No. Examined	No. Infested (%)	Anaplasma (%)	Theileria (%)	Babesia (%)
December2021	160	6 (3.75)	3 (1.88)	1 (0.63)	2 (1.25)
January2022	160	7 (4.37)	3 (1.88)	2 (1.25)	2 (1.25)
February2022	160	12 (7.5)	5 (3.13)	3 (1.88)	4 (2.50)
March2022	160	11 (6.88)	3 (1.88)	4 (2.50)	4 (2.50)
April2022	160	6 (3.75)	3 (1.88)	2 (1.25)	1 (0.63)
May2022	160	6 (3.75)	4 (2.5)	1 (0.63)	1 (0.63)
Total(%)	960	48(5.0%)	21(2.19%)	13(1.35%)	14(1.46%)

N = 960, *P* value 0.0599**Table 2. The Prevalence of heamoparasite species of Sheep and Goat slaughtered in Jibia modern Abattoir in the Month of December 2021 – May 2022**

Months	No. Examined	No. Infested	Anaplasma (%)	Theileria (%)	Babesia (%)
December2021	160	13 (8.13)	6 (3.75)	4 (2.50)	3 (1.88)
January2022	160	12 (7.5)	5 (3.13)	4 (2.50)	3 (1.88)
February2022	160	13 (8.12)	6 (3.75)	4 (2.50)	3 (1.88)
March2022	160	10 (6.25)	5 (3.13)	3 (1.88)	2 (1.25)
April2022	160	5 (3.13)	2 (1.25)	1 (0.63)	2 (1.25)
May2022	160	6 (3.75)	5 (3.13)	0 (0.00)	1 (0.63)
Total	960	59(6.15%)	29(3.02%)	16(1.67%)	14(1.46%)

N = 960, *P* value 0.067**Table 3.Overall prevalence of heamoparasite of Sheep and Goat slaughtered in Jibia modern Abattoir from the Months of December 2021 - May 2022**

Parasites	Anaplasma	Theileria	Babesia	Total (%)
<i>Animal species</i>				
Sheep	21 (2.19%)	13 (1.35%)	14 (1.46%)	48 (5%)
Goat	29 (3.02%)	16 (1.67%)	14 (1.46%)	59 (6.15%)
Total(%)	50(5.20%)	29(3.02%)	28(2.92%)	107(11.15%)

N = 960, *P* value 0.071

3.8 Risk Factors

Poor management practices accounted for 60% of the risk factors, followed by poor hygiene (22.5%), harsh climatic conditions (10%), and overcrowding (7.5%). Goats exhibited a higher prevalence, potentially due to their increased mobility and exposure to vectors (Ogbaje *et al* 2018).

4.0 DISCUSSION

This study provides valuable insights into the prevalence and risk factors of haemoparasitic

infections in sheep and goats slaughtered at Jibia Modern Abattoir. The findings reinforce the widespread presence of haemoparasites, particularly *Anaplasma spp.*, in tropical regions. This parasite was the most prevalent among the three identified species, likely due to its efficient transmission by ticks, which are common in the area (Taylor *et al.*, 2016). The relatively lower prevalence of *Theileria spp.* and *Babesia spp.* may be attributed to their dependence on specific vector species, whose population dynamics

and activity might be limited by environmental factors or management practices (Egbe-Nwiyi et al., 2018).

The higher prevalence observed in goats compared to sheep is consistent with previous studies and may be explained by species-specific differences in grazing behavior and immune response (Ademola & Onyiche, 2013). Goats tend to roam farther in search of forage, increasing their exposure to vectors in areas with poor vegetation and stagnant water, which are ideal habitats for ticks and flies (Ogbaje et al., 2018). Additionally, goats may possess a less robust immune response to these infections compared to sheep, which might further explain the observed disparity in prevalence (Adejinmi et al., 2004).

Risk factor analysis highlights critical areas for intervention. Poor management practices, including inadequate housing and lack of proper nutrition, were identified as the leading contributors to infection risk. These practices create favorable conditions for vector survival and reproduction, thereby increasing the likelihood of parasite transmission (Egbe et al., 2017). Poor hygiene and overcrowding exacerbate these risks, particularly in communal grazing systems or during transport to slaughterhouses, where animals are confined in close quarters (Ogbaje et al., 2018).

Monthly prevalence data, although showing some variation, were not statistically significant. However, the observed peaks during February suggest that climatic factors, such as temperature and humidity, might influence vector activity. This observation aligns with studies suggesting that vector populations often fluctuate with seasonal changes (Nwoha et al., 2013). Understanding these seasonal dynamics could inform the timing of interventions, such as acaricide application and grazing restrictions.

The economic impact of haemoparasitic infections extends beyond immediate production losses, affecting long-term livestock health and market value (Khan et al., 2005). Subclinical infections can go unnoticed but still reduce growth rates, fertility, and milk production, compounding the economic burden on farmers. Addressing these challenges requires a multifaceted approach, combining routine veterinary screening with enhanced vector control measures, such as regular acaricide use, improved housing designs to minimize vector exposure, and community-wide education programs on proper livestock management (Isaac et al., 2020).

In conclusion, the study underscores the importance of targeted interventions tailored to the unique challenges of the Jibia area. Collaboration between veterinary authorities, local governments, and livestock owners is crucial to implement sustainable control strategies. Further research should explore the role of emerging

environmental changes, such as shifting weather patterns, on haemoparasite prevalence and vector behavior to anticipate future trends in disease risk.

5.0 RECOMMENDATIONS

- i. Implement routine health screening for livestock to detect infections early.
- ii. Conduct further epidemiological studies to assess environmental and management-related risk factors.
- iii. Strengthen veterinary services to provide adequate treatment and preventive measures.

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7.0 CONTRIBUTIONS OF THE AUTHORS

K. Muazu was the graduate who undertook the research and field under the supervision of K. Abdullahi and TB Ademola was the Co-Supervisor

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