

ORIGINAL RESEARCH

Prevalence of Gastrointestinal Parasites in Goats in Lokoja, Kogi State, Nigeria

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ABSTRACT

Globally, gastrointestinal parasites pose a major threat to goat health and productivity, undermining the growth and reproduction of the affected goats. This study assessed the prevalence and intensity of gastrointestinal parasites in 100 goats in Lokoja, Kogi State, Nigeria. The goats were randomly sampled from four locations, namely Crusher, Felele, Old Market, and Zango. Fecal samples were randomly collected and examined using sedimentation and formalin-ether concentration techniques, followed by microscopic identification of fecal sediments for the presence of parasite eggs, oocysts, and larvae. Data were analyzed using descriptive statistics and Chi-square tests to determine associations between parasite prevalence and selected risk factors. An overall parasite prevalence of 67.0% was recorded. Six parasite species were identified and these were: *Strongyloides papillosus*, *Eimeria spp.*, *Trichostrongylus spp.*, *Haemonchus contortus*, *Moniezia spp.*, and *Trichuris ovis*. *Strongyloides papillosus* and *Eimeria spp.* were the most frequently encountered parasites across all locations and *Moniezia spp.* and *Trichuris ovis* were the least prevalent. However, Chi-square analysis revealed no statistically significant associations between parasite prevalence and location, breed, age group, or sex. Parasite intensity was highest for *Strongyloides papillosus* and *Eimeria spp.*, indicating their major contribution to the overall parasite burden in the study area. The findings confirm that gastrointestinal parasitism remains widespread among goats in Lokoja and poses a significant threat to productivity. Improved hygiene, strategic deworming, and better grazing management are recommended to reduce infection levels and enhance goat health.

Keywords: Gastrointestinal parasites, Goats, Parasite prevalence, Parasite intensity, Lokoja

INTRODUCTION

Goats provide a diverse range of products, including meat, milk, and fibers, which are valuable for both subsistence and commercial purposes (Income et al., 2021; Sulim et al., 2022). They inhabit almost every climate and their adaptability to utilize diverse vegetation, and relatively low maintenance costs make them highly suitable for varied farming systems (Ruhoollah et al., 2021; Mohamed et al., 2023). Beyond their direct contributions to human nutrition and

livelihoods, goats also support agricultural sustainability through manure production, which enhances soil fertility and crop yields (Sodha et al., 2024; Karimou et al., 2024).

Despite their versatility and economic importance, goats face substantial health challenges, among which gastrointestinal parasitic infections are particularly significant (Challaton et al., 2022; Kalaivanan et al., 2024). These infections, often acquired through consumption of infectious eggs or larvae or by penetration of the skin, can severely impair growth, reproductive performance, and overall productivity (Matsepe et al., 2021; Kalwaghe, 2022). Infected animals may experience weight loss, reduced milk and meat yields, and increased mortality, particularly in young stocks (Malathi et al., 2021; Wuthijaree et al., 2022.) Furthermore, managing these infections imposes financial burdens due to costs of deworming, veterinary care, and other interventions (Mpofu et al., 2022; Rufino-Moya et al., 2024).

The frequency and severity of parasitic infections in the gastrointestinal tract in goats are influenced by multiple factors, including rearing systems, environmental conditions, veterinary care availability, and movement of animals between farms and markets (Mairiga et al., 2024; Mickiewicz et al., 2024). In Lokoja, factors such as management practices, and environmental conditions can influence the frequency and spread of intestinal parasites in goats (Igbatigbi et al., 2023). This highlights the need to investigate the distribution, intensity, and determinants of parasitic infections to guide effective control strategies and enhance goat productivity.

MATERIALS AND METHODS

Study Area

The study was conducted in Crusher, Felele, Old Market, and Zango communities. The first three communities are located within Lokoja Local Government Area, while Zango is situated in Adavi Local Government Area, all within Kogi State, Nigeria. Lokoja lies approximately between latitude 7°45'N and 7°51'N, and longitude 6°41'E and 6°45'E. The area covers about

63.82 km² and is characterized by a tropical climate with distinct wet and dry seasons. Annual rainfall ranges between 1,100 mm and 1,300 mm, with the rainy season typically occurring from April to October, and the dry season from November to March. Average temperatures range from 25°C to 35°C, with relatively high humidity during the wet season. The study area is influenced by both upland and lowland soils, which support agricultural activities including livestock production.

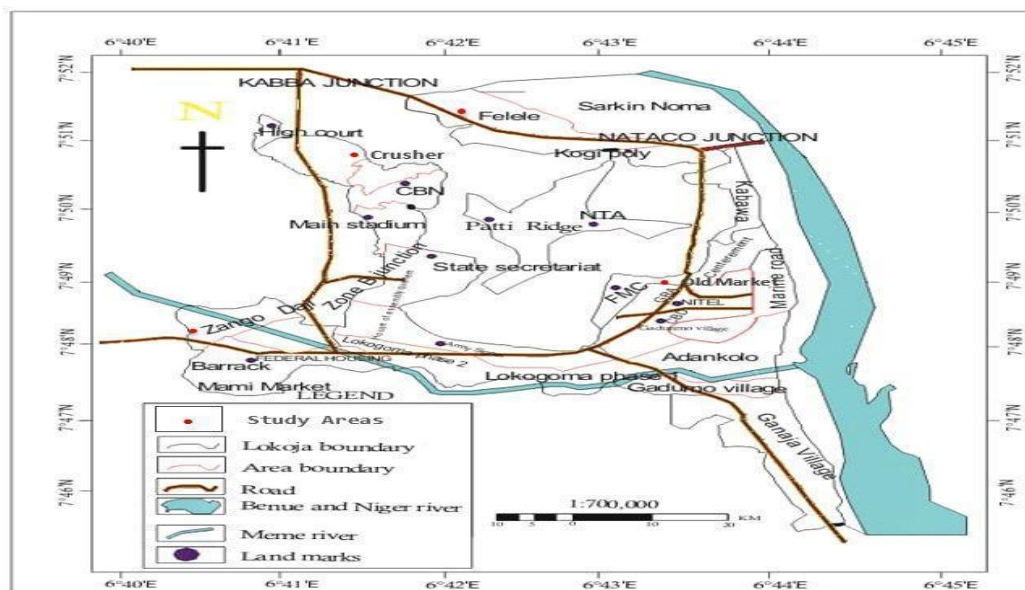


Figure 1: Map of Lokoja Showing Sampling Area
Source: Adapted from Ismail *et al.* (2018)

Sample Size Determination

A sample size of 100 was determined for this study using Fisher's formula with an adjusted margin of error of 9.75% and prevalence of 55% (Igbatigbi *et al.*, 2023). The sampling was evenly distributed across the four study locations, with 25 goats sampled from each area, (Crusher, Felele, Old Market, and Zango), to ensure adequate representation.

Sample Collection

Faecal samples were collected between the months of May and June, 2025. During this period, visits were made to each location on multiple days, depending on goat availability. On each sampling day, goats were randomly selected, and fresh faecal samples were collected either directly from the rectum or immediately after defecation to prevent environmental contamination, following standard procedures (Igbatigbi et al., 2023). Samples obtained from Felele and Old Market were collected from goats at the livestock markets, while those from Crusher and Zango were collected from goats reared on farms within the respective communities. For each sampled animal, relevant information including age, sex, breed, and sampling location was recorded at the point of collection. All samples were placed in clean, properly labeled sample bottles and transported in a cooler box to the Zoology Laboratory, Federal University Lokoja, for parasitological examinations.

Parasitological Procedures

Fecal samples were processed using simple sedimentation and formalin ether concentration techniques as described by Igbatigbi et al., (2023) and Khanet al., (2023). Approximately three grams of fecal material were emulsified in physiological saline, filtered through cheesecloth, and concentrated by centrifugation. The resulting sediment was examined microscopically at ten and forty times magnification. Parasite eggs, oocysts, and larvae were identified based on their morphological characteristics using standard parasitological keys (Zajac et al., 2021).

Data Analysis

Data was entered into Microsoft Excel and analyzed using IBM SPSS Statistics for Windows, Version 27.0. Prevalence was expressed as percentages. Associations between gastrointestinal parasite prevalence and risk factors such as age, sex, breed, and sampling location were analyzed using the Chi square test. Statistical significance was set at $p < 0.05$. Using the

technique outlined by Tumusiime et al.,(2022), Mean parasite intensity was calculated by dividing the total parasite count by the number of infected goats for each parasite species.

RESULTS

Prevalence of Gastrointestinal Parasites

Out of the one hundred (100) goats examined for parasites, (67.0%) tested positive for gastrointestinal parasites (Table 1) while (33.0%) tested negative. The highest prevalence was recorded in the Felele community, where 76% of the sampled goats were infected followed by Old Market, with a prevalence of 72% (Table 1). The lowest prevalence rate was recorded in Crusher (56%) (Table 1). Chi-square analysis ($\chi^2 = 0.87$, $p = 0.830$) indicated that the differences were not statistically significant. Three breeds of goats were identified during the study and these were Kano Brown, Red Sokoto, and West African Dwarf. Kano Brown goats were the most parasitized (73.7%) followed by West African Dwarf (68.8%) and Red Sokoto (56.7%) (Table 1). Chi-square analysis ($\chi^2 = 2.26$, $p = 0.32$) revealed no statistically significant association between breed and parasite infection.

Table 1: Prevalence of Gastrointestinal Parasites in Goats by Locations and Breed

Variable	No. Examined	No. Positive (%)	No. Negative (%)	χ^2	P-value
Location					
Crusher	25	14(56.0)	11 (44.0)	0.87	0.83
Felele	25	19(76.0)	06(24.0)		
Old Market	25	18(72.0)	07(28.0)		
Zango	25	16(64.0)	09(36.9)		
Total	100	67(67.0)	33(33.0)		

Breed					
Kano brown	38	28(73.7)	10(26.3)	2.26	0.32
Red Sokoto	30	17(56.7)	13(43.3)		
West African	32	22(68.8)	10(31.2)		
Dwarf					
Total	100	67(67.0)	33(33.0)		

When data was dis-aggregated by gender, 72.9% of the male goats examined were infected with gastrointestinal parasites and among females, 61.5% were infected (Figure 2). However, Chi square analysis did not reveal any significant difference in infection based on gender ($\chi^2 = 0.85$; $p=0.36$).

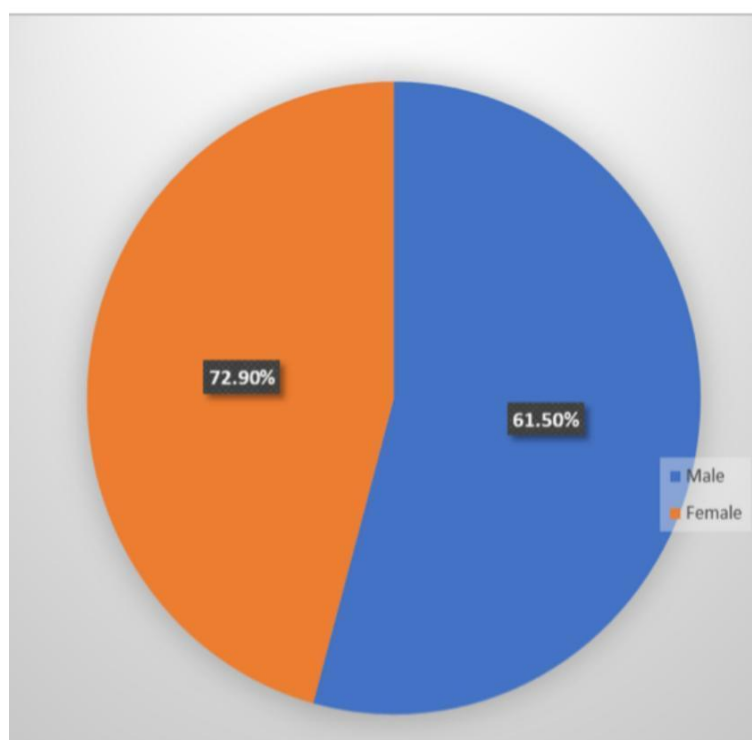


Figure 2: Gender Specific Prevalence of Parasite Infection in Sampled Goats

Analysis based on age showed that goats below six months old recorded a prevalence rate of 70.0% while those aged 7–12 months and 13 to 24 months old recorded a prevalence rate of

58.6% and 67.9% respectively (Figure 3). A prevalence rate of 73.9% was observed in older goats (above 24 months). Although these values suggest a slight increase in prevalence with advancing age, Chi-square analysis ($\chi^2 = 1.51$, $p = 0.68$) indicated that the differences were not statistically significant.

Six gastrointestinal parasite species were identified from the fecal samples examined. These included *Strongyloides papillosus*, *Eimeria spp.*, *Trichostrongylus spp.*, *Haemonchus contortus*, *Moniezia spp.*, and *Trichuris ovis*. *Strongyloides papillosus* was the most prevalent parasite, followed closely by *Eimeria spp.*, while *Moniezia spp.*, and *Trichuris ovis* were the least frequently encountered. The parasite intensity averaged approximately 6.0 epg for parasites such as *Strongyloides papillosus*, *Eimeria spp.*, and *Haemonchus contortus* (Table 2). *Trichostrongylus spp.* had a moderate intensity of 5.06epg, while *Moniezia spp.* and *Trichuris ovis* exhibited the lowest intensity, with an average of two eggs per infected goat. (Table 2).

Table 2: Intensity of Gastrointestinal Parasites in Goats in Lokoja

Parasite species	No. of Infected Goats	Total parasite count	Intensity
<i>Strongyloides papillosus</i>	47	280	5.96
<i>Eimeria spp.</i>	41	239	5.83
<i>Trichostrongylus spp.</i>	32	162	5.06
<i>Haemonchus contortus</i>	13	73	5.62
<i>Moniezia spp.</i>	06	14	2.33
<i>Trichuris ovis</i>	07	16	2.29



Plate 1: *Strongyloides papillosus* Egg.



Plate 2: *Trichuris ovis* Egg



Plate 3: *Eimeria spp.* Egg



Plate 4: *Moniezia spp.* Egg

DISCUSSION

The high prevalence of gastrointestinal parasite recorded in the study indicates a substantial parasite burden within the study area and it was indeed higher than the prevalence rate obtained in 2023 by Igbatigbi et al. (55%). Ezenwaka and Kolawale (2024) also recorded a much lower

prevalence rate (34%) in Bayelsa State as compared to our record of 67%. However, the prevalence rate recorded in this study is lower than the rate (78.0%) documented in Bauchi State by Sulim et al. (2022). Such variations are likely influenced by differences in ecological conditions, climatic factors, management practices, and sampling periods. Environmental factors such as temperature, humidity, and rainfall are known to enhance the survival and spread of gastrointestinal parasites' infectious stages, hence assisting in regional differences in prevalence (Kalaivanan et al., 2024).

Additionally, the absence of significant differences in prevalence across communities in the study suggests a relatively uniform distribution of gastrointestinal parasites within the study area. This pattern implies shared risk factors, including communal grazing systems and sub-optimal sanitary conditions, which promote widespread environmental contamination. Similar observations have been reported in Lokoja by Igbatigbi et al. (2023), reinforcing the role of common exposure sources in sustaining parasite transmission.

The lack of significant association between prevalence of gastrointestinal infection and breed indicate that breed was not a major determinant of susceptibility. This finding agrees with reports by Ezenwaka and Kolawale (2024) and Sulim *et al.* (2022), who attributed variations in infection primarily to management and grazing practices rather than inherent breed resistance. Goats in crusher and Zango were free range while those sampled from Felele and Old market were kept in stalls where movement was restricted. Therefore, minor variations in prevalence rate differences observed among breeds in the present study may reflect variations in husbandry systems and grazing behavior rather than genetic factors.

Age-related patterns showed higher prevalence in older goats, which may be explained by cumulative exposure to contaminated pastures over time. Similar trends have been documented

by Sulim et al. (2022), although other studies have reported higher infection rates in younger animals due to immature immune responses (Wuthijaree et al., 2022). These contrasting findings highlight the influence of both exposure duration and host immunity on infection dynamics.

Males had a slightly higher prevalence than females, according to gender analysis, however this difference was not statistically significant. This observation is similar with the findings by Kalaivanan et al. (2024) and Palomino-Guerrera et al. (2024), while contrasting reports have attributed higher male prevalence to grazing behavior and higher female prevalence to physiological stress associated with reproduction (Mairiga et al., 2024; Wuthijaree et al., 2022).

Strongyloides papillosus and *Eimeria spp.* were the most prevalent parasites identified, followed by *Trichostrongylus spp.*, whereas *Haemonchus contortus*, *Moniezia spp.*, and *Trichuris ovis* occurred at lower frequencies. The dominance of nematodes and coccidia is likely due to their direct life cycles and ability to rapidly proliferate under communal grazing and favorable tropical conditions (Karimou et al., 2024; Adeoye et al., 2020). This is in contrast, with the lower occurrence of *Moniezia spp.* Which requires availability of intermediate hosts (soil mites) and unfavorable soil conditions, while the reduced presence of *Haemonchus contortus* and *Trichuris ovis* may be linked to environmental sensitivity of larvae and prolonged egg development requirements (Namutosi et al., 2020; Karimou et al., 2024).

The lower intensities observed in *Moniezia spp.* and *Trichuris ovis* reflects their slower reproductive rates and lower fecundity (Karimou et al., 2024). High intensities of *Strongyloides papillosus* and *Eimeria spp.* can be attributed to their rapid reproductive capacities, while the high fecundity of *Haemonchus contortus* accounts for its substantial intensity (Sulim et al., 2022; Rufino-Moya et al., 2024). These findings emphasize that while prevalence reflects

exposure risk, intensity is driven by parasite reproductive biology, with nematodes and coccidia posing the greatest threat to goat productivity.

CONCLUSION

This study revealed a significant prevalence and severity of gastrointestinal parasites among goats in Lokoja, Kogi State, Nigeria. Six parasite species were identified, with *Strongyloides papillosus* and *Eimeria spp.* being the most prevalent and intense infections. Gastrointestinal parasitism was observed across all sampled locations, age groups, gender and breeds, indicating widespread exposure within the study area. The findings underscore the continued threat posed by gastrointestinal parasites to goat health and productivity in Lokoja.

AUTHOR'S CONTRIBUTION

Badaki, J. A: Conceptualization, Manuscript review & editing.

Johnson M. B: Writing - original draft, Data curation

CONFLICT OF INTEREST

The authors declare they have no competing interest.

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