RESEARCH ARTICLE

PREVALENCE OF GASTROINTESTINAL PARASITES AND ASSOCIATED RISK FACTORS IN SLAUGHTERED TRADE DROMEDARY CAMELS IN KANO, NORTHERN NIGERIA

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ABSTRACT

Parasites play a crucial role in animal health due to the numerous substantial challenges they present to the health and well-being of animals. The prevalence and distribution of gastrointestinal parasitic infections among trade dromedary camels in Kano, a major hub for camel trade in Northern Nigeria, are not well documented. This study, which identified gastrointestinal parasites up to the genus level and assessed associated risk factors in camels slaughtered at the Kano Main Abattoir in Nigeria, contributes to developing effective parasite control strategies to improve camel health and productivity. Using a cross-sectional study design, a total of 115 camels were examined for gastrointestinal parasites using faecal flotation and sedimentation techniques. The overall prevalence of gastrointestinal parasites was 84.4%, with 76.3% of infected camels having mixed parasite infections. Seven different parasite types were identified, belonging to nematodes (*Strongyle*-type egg, *Trichuris* spp., *Strongyloides* spp.), cestodes (*Anoplocephala* spp.), trematodes (*Fasciola* spp.), and coccidia (*Eimeria cameli*, *Eimeria rajasthani*). The most prevalent parasites were *Strongyle*-type egg (12.4) and *Trichuris* spp. (7.2%). Risk factors significantly associated with parasite prevalence were sex (males 93.3%, females 74.5%) and faecal consistency (pasty 100%, pelleted 80.9%). Body condition score and presence of mucus in faeces did not show a significant association. The mean faecal egg count was 162.7 eggs per gram, with 92.6% of infected camels having mild infections. This study highlights the high burden of gastrointestinal parasites in camels in this region and the need for improved parasite control strategies.

Keywords: Camels, gastrointestinal parasites, Northern Nigeria, prevalence

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INTRODUCTION

Camel rearing is a crucial economic activity in arid and semi-arid regions worldwide, particularly in Africa and the Middle East (Faye, 2018). Dromedary camels (*Camelus dromedarius*) play a vital role in the livelihoods of pastoralist communities, providing milk, meat, transportation and other products essential for survival in harsh environments (Faye, 2018). However, the health and productivity of camel herds can be significantly impacted by various factors, with gastrointestinal parasitic infections being a major concern (Bekele, 2022).

Gastrointestinal parasites, including nematodes, cestodes and protozoa, pose a substantial threat to camel health and production (El-Khabaz et al., 2019). These parasites can cause a range of clinical signs, from subclinical infections to severe manifestations, including reduced growth rate, decreased milk yield, poor body condition, and even mortality in severe cases (El-Khabaz et al., 2019). The prevalence and impact of camel gastrointestinal parasites have been reported in various regions, with studies conducted in Nigeria (Bamaiyi and Kalu, 2011; Mahmuda et al., 2014), Ethiopia (Birhanu et al., 2014), Tanzania (Swai et al., 2011), and Egypt (El-Dakhly et al., 2020; El-Khabaz et al., 2019).

In Nigeria, several studies have investigated the prevalence of gastrointestinal parasites in camels. Bamaiyi and Kalu (2011) reported a high prevalence (92.4%) of gastrointestinal parasites in camels in Maiduguri, while Mahmuda et al. (2014) found a prevalence of 78% in Sokoto. These studies identified various parasites, including those with *Strongyle*-type egg, *Strongyloides* spp., *Trichuris* spp., and coccidian oocysts. However, these investigations were limited in scope and did not thoroughly explore the factors influencing parasite occurrence or the potential impact on camel health and productivity.

The prevalence and diversity of gastrointestinal parasites in camels are influenced by various factors, including agro-climatic conditions, management practices, and the presence of reservoir hosts (El-Khabaz et al., 2019; El-Naga and Barghash, 2016). The tropical agro-climatic conditions in Nigeria, characterized by wide deserts, high temperatures, and infrequent rainfall seasons, coupled with free-ranging management systems, may contribute to the high prevalence of parasites, particularly Strongyle species (Swai et al., 2011; Mahmuda et al., 2014).

Kano State, Nigeria is significant as it serves as a major hub for camel trade in the northern region, potentially influencing parasite transmission patterns. The findings from this research will contribute to a better understanding of the parasitic burden in camels within the study region and provide valuable insights that can inform more effective parasite control strategies for camel herds. This information is crucial for improving camel health management practices and, ultimately, enhancing the productivity and welfare of these important livestock animals in Nigeria and similar ecological zones. Despite the existing research, there remains a gap in our understanding of the comprehensive parasitic profile of camels in Nigeria, particularly in major trade hubs like Kano. The present study aims to address this gap by providing a detailed assessment of the prevalence and diversity of gastrointestinal parasites in camels slaughtered at the Kano Main Abattoir, Nigeria.

MATERIALS AND METHODS

Ethics Approval

Ethical approval for the use of camels in this study was obtained from Ahmadu Bello University Committee for Animal Use and Care (ABUCAUC) with the approval number: ABUCAUC/2022/055.

Study Area

Camels used in this study were sampled from the Kano Main Abattoir. The abattoir is located in Fagge Local Government, Kano, Kano State. The local government is one of the commercial districts of the city (Sani et al., 2020). Kano is located between latitude 11°59'59.57''N to 12°02'39.57''N and longitude 8°31'19.69''E to 8°33'19.69''E, with urban land area of 137 km²

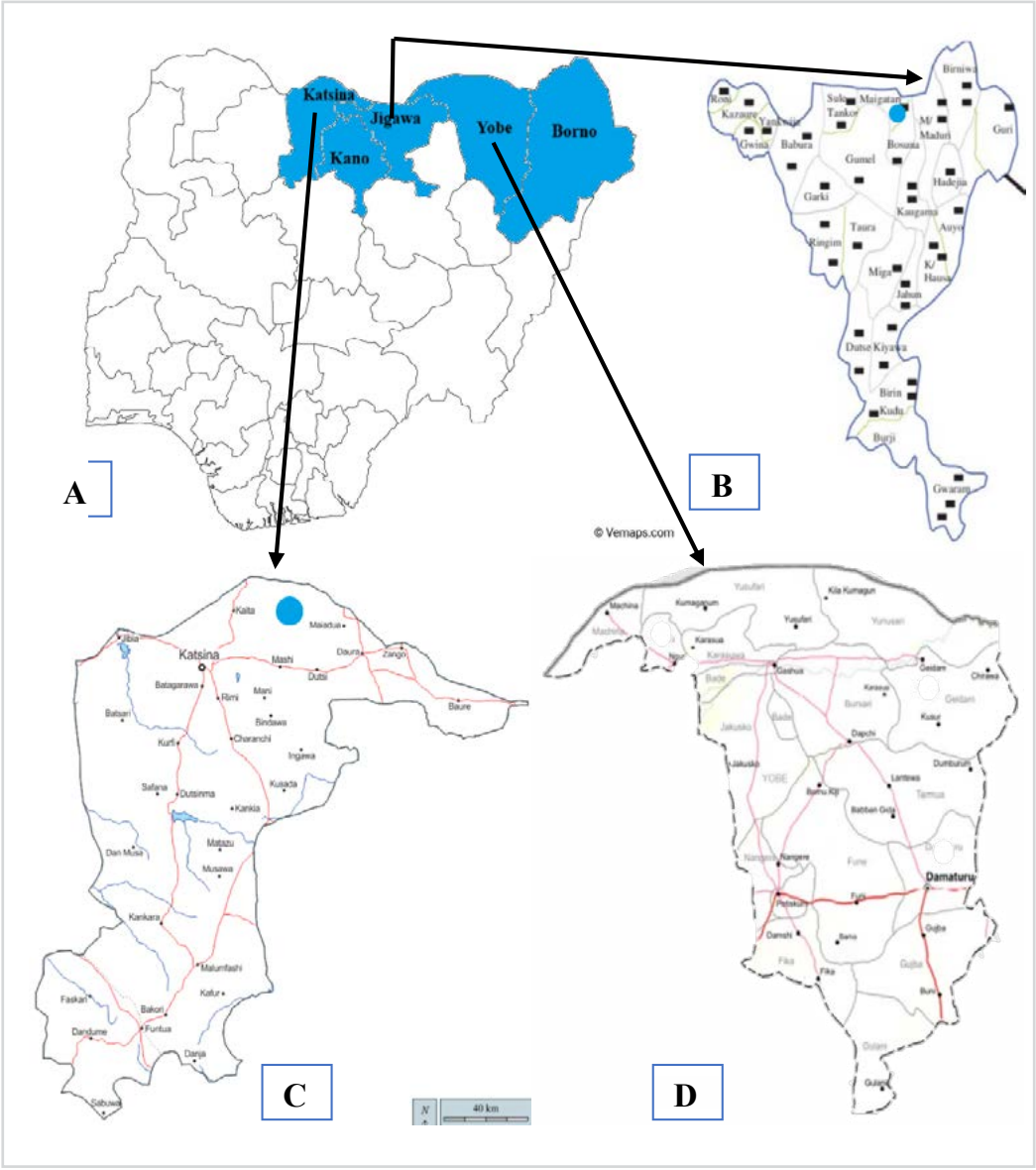

Figure 1 A. Map of Nigeria showing Katsina, Jigawa, Yobe, Borno and Kano States; B. Map of Jigawa State showing Maigatari town; C. Map of Katsina State showing Maiadua town; D. Map of Yobe State showing the Geidam, Nguru and Damaturu towns

and a metropolitan area of 499 km² (Ibrahim, 2014). Most of the camels were said to have been bought and transported from Geidam, Nguru and Damaturu towns of Yobe State; Maigatari in Jigawa State; Maiadua in Katsina State and from Borno State (Figure 1).

Study Design

The study was a cross-sectional study of the prevalence of gastrointestinal parasites and associated factors in camels slaughtered at Kano main abattoir. A purposive sampling method was employed in this study.

Sample Size

The sample size for the prevalence study was calculated according to Thrusfield (Thrusfield, 2018) using the formula below. Using the prevalence of 92.4% (gastrointestinal parasite infection in one-humped camels of Nigeria) reported by Bamaiyi and Kalu (Bamaiyi and Kalu, 2011), the sample size was calculated to be 108. But a total of 115 camels were sampled.

$$n = \frac{1.96^2 \times P_{exp}(1 - P_{exp})}{d^2}$$

where; n = required sample size
Pexp = expected prevalence (0.924)
d = desired absolute precision (0.05).

Sample Collection and Data Recording

Faecal samples were collected directly from the rectum of selected camels immediately after slaughter using disposable gloves. Approximately 10g of faeces were collected from each animal and placed in labelled plastic containers. The samples were then transported in a cool box to the Parasitology Laboratory at the Faculty of Veterinary Medicine, Ahmadu Bello University, Zaria, for analysis within 24 hours of collection.

During sample collection, data on the sex (based on physical characteristics), estimated age (based on dentition), body condition score (BCS), faecal consistency and faecal mucoid status of each camel were recorded. The body condition score was assessed using a 5-point scale as Faye et al. (2001) described, where 1 = emaciated, 2 = thin, 3 = average, 4 = fat, and 5 = obese. Modifying this scale, emaciated and thin were categorized as a poor condition; average as a moderate condition, and fat as a good condition. A total of 7 (6.09%) were in poor condition, 75 (65.22%) were in moderate condition, and 33 (28.70%) were in good condition. No obese camels were seen. Faecal consistency was categorized as pasty or pelleted. Faecal mucoid status was categorized as mucoid and non-mucoid.

Parasitological Examination

Faecal samples were examined using standard parasitological techniques, including direct smear, sedimentation and flotation techniques, as described by Soulsby (1982).

Direct Smear Technique

A small amount of faeces was mixed with a drop of normal saline on a clean glass slide, covered with a coverslip, and examined under a light microscope at 10x and 40x magnifications for the presence of motile parasites and protozoan trophozoites.

Sedimentation Technique

Two grams of faeces were mixed with 30 ml of water in a beaker. The mixture was filtered through a tea strainer, and the filtrate was allowed to sediment for 30 minutes. The supernatant was discarded, and the sediment was examined under a microscope at 10x magnification for the presence of trematode eggs.

Flotation Technique

Two grams of faeces were mixed with 28 ml of saturated sodium chloride and sugar solution. The mixture was strained through a tea strainer, and the filtrate was poured into a 15 ml test tube. The test tube was filled to the brim with the flotation solution, and a coverslip was placed on top. After 20 minutes, the coverslip was removed and placed on a glass slide for examination under a microscope at 10x and 40x magnifications.

Parasite eggs and oocysts were identified based on their morphological characteristics using a reference guide (Soulsby, 1982).

Quantitative Analysis

Quantitative analysis of parasite eggs was performed using the McMaster technique as described by Hansen and Perry, (1994). Two grams of faeces were mixed with 28 ml of saturated sodium chloride and sugar solution. The mixture was strained, and the filtrate was used to fill both chambers of a McMaster slide. After 5 minutes, the slide was examined under a microscope at 10x magnification. The number of eggs per gram

(EPG) of faeces was calculated by multiplying the total number of eggs in both chambers by 50.

Data Analyses

The collected data were summarised and presented in tables, charts and photomicrographs. Descriptive statistics were used to calculate the prevalence. The Chi-square test for association was used to check for the relationship between the prevalence of the disease and factors such as sex, body condition score, and the nature of faeces. SPSS version 26 from IBM was used for prevalence and risk factors analyses. Values of P less than or equal to 0.05 were considered significant.

RESULTS

In terms of sex, 60 (52.17%) were males, and 55 (47.82%) were females. Regarding body condition score, 7 (6.09%) were in poor condition, 75 (65.22%) were in moderate condition, and 33 (28.70%) were in good condition. No obese camels were seen. For faecal consistency, 21 (18.26%) had pasty faeces, and 94 (81.7%) had pelleted faeces. In terms of faecal mucus status, 20 (17.40%) had mucoid faeces, and 95 (82.61%) had non-mucoid faeces (Table 1).

Ninety-seven (84.35%) of the camels were positive for gastrointestinal parasites, while 18 (15.65%) were negative (Table 2).

In this study, seven (7) different parasite egg/oocyst types were identified based on their egg/oocyst morphology. Parasites belonging to the three classes of helminths namely nematodes, cestodes and trematodes as well as coccidian oocysts were identified in the faecal samples. The eggs of helminths seen were those of *Strongyle*-type egg (Figure 2a), *Strongyloides* spp. (Figure 2b), and *Trichuris* spp. (Figure 2c); *Anoplocephala* spp. (Figure 2d); and *Fasciola* spp. (Figure 2e). Also, *Eimeria camelli* (Figure 3b) and *Eimeria rajasthani* (Figure 3b) oocysts were seen.

Out of the total, 20 individuals (20.62%) were infected with nematodes, 1 (1.03%) with cestodes, none (0%) with trematodes, 2 (2.06%) with coccidia, while 74 (76.29%) had mixed gastrointestinal parasite infections (Table 3). Among nematodes, *Strongyle*-type egg (12 cases, 12.37%), *Trichuris* spp.(7 cases, 7.22%), and *Strongyloides* spp. (1 case, 1.03%) were identified. Among cestodes, *Anoplocephala* spp. (2 cases, 2.06%) was found. Among Protozoan parasites, *Eimeria* spp. (1 case, 1.03%) was identified. Seventy-four cases (76.29%) had mixed infections (Table 4).

There were cases of single infections with parasites like *Eimeria* spp., *Strongyle*-type egg, *Strongyloides* spp., *Trichuris* spp., and *Anoplocephala* spp. Double infections were observed with various combinations of two parasite genera. The most common double infection was *Eimeria* spp. + *Strongyle*-type egg (11 cases). Triple infections were present, with the most prevalent being *Eimeria* spp. + *Strongyle*-type egg + *Trichuris* spp. (15 cases). Quadruple infections involved four different parasite genera co-occurring, with the combination of *Eimeria* spp. + *Strongyle*-type egg + *Strongyloides* spp. + *Trichuris* spp. being the most frequent (7 cases). A few cases (2 cases) of quintuple infections with five different parasite genera were also observed (Table 5).

For body condition score: Poor (7 cases, 100%), Moderate (62 out of 75 cases, 82.67%), Good (28 out of 33 cases, 84.84%). For sex: Male (56 out of 60 cases, 93.33%), Female (41 out of 55 cases, 74.54%). For faecal consistency: Pasty faeces (21 out of 21 cases, 100%), pelleted faeces (76 out of 94 cases, 80.85%). For faecal mucus status: Mucoid faeces (19 out of 20 cases, 95.00%), non-mucoid faeces (78 out of 95 cases, 82.10%). Sex and faecal consistency showed a statistically significant association with gastrointestinal parasite prevalence (p-value < 0.05), while body condition score and faecal mucus status did not show a significant association (p-value > 0.05) (Table 6).

A mean faecal egg count of 162.70 ± 30.55 was recorded in this study. Out of the camels infected with gastrointestinal parasites, 92.63 % (90/97) had a mild infection (mean faecal egg count of 0-500), 3.16 % (3/97) had a moderate infection

(mean faecal egg count of 500-1000), and 4.21% (4/97) of the camels had a severe infection (mean faecal egg count above 1000). The mean faecal egg count was slightly higher (166 ± 41.90) in the female camels than in the male (162.20 ± 46.38). Interestingly, the mean faecal egg count was 250 ± 174.49 in camels with poor body condition and 142.86 ± 45.83 in those with good body condition.

Table 1 Demography of Slaughtered Trade Dromedary Camels in Kano, Northern Nigeria (n= 115)

Demography	Number	Percentage (%)
Sex		
Male	60	52.2
Female	55	47.8
Body condition score		
Poor	7	6.0
Moderate	75	65.2
Good	33	28.7
Faeces consistencies		
Pasty faeces	21	18.3
Pelleted faeces	94	81.7
Faecal mucus status		
Mucoid	20	17.4
Non-mucoid	95	82.6

Table 2 Prevalence of Gastrointestinal Parasite in Slaughtered Trade Dromedary Camels in Kano, Northern Nigeria

Gastrointestinal parasite	Number	Prevalence (%)
Positive	97	84.4
Negative	18	15.6
Total	115	100

Figure 2 Photomicrographs of a: Strongyle-type egg; b: *Strongyloides* spp.; c: *Trichuris* spp.; d: *Anoplocephala* spp; e: *Fasciola* spp. in the faeces of camels slaughtered in Kano Main Abattoir

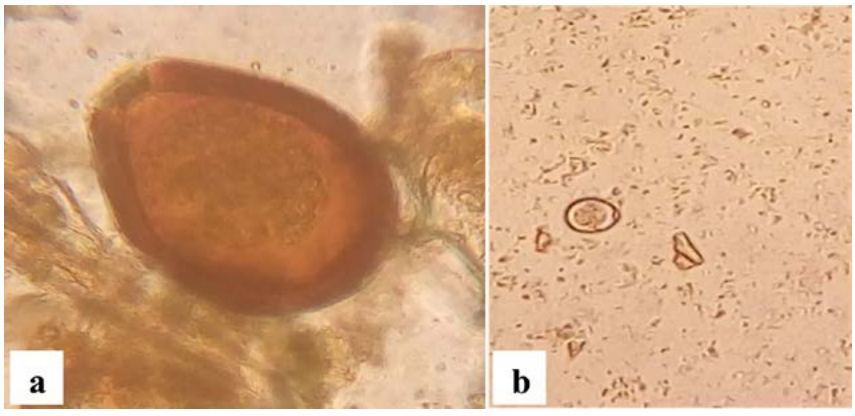

Figure 3 Photomicrographs of a: *E. camelli;* and b: *E. rajasthani* oocysts in the faeces of camels slaughtered at Kano Main Abattoir

Table 3 Summary of Gastrointestinal Parasites Found in Slaughtered Trade Dromedary Camels in Kano, Northern Nigeria

Gastrointestinal parasite	Number	Percentage (%)
Nematodes	20	20.62
Cestodes	1	1.03
Trematodes	0	0
Coccidia	2	2.06
Mixed GIT parasite	74	76.29
Total	97	100

GIT= Gastrointestinal

Table 4 Summary of Genus-Specific Gastrointestinal Parasites Found in Slaughtered Trade Dromedary Camels in Kano, Northern Nigeria

Gastrointestinal parasite	Frequency	Percentage (%)
Single Infections		
Nematodes		
Strongyle-type egg	12	12.37
Trichuris spp.	7	7.22
Strongyloides spp.	1	1.03
Cestodes		
Anoplocephala spp.	2	2.06
Trematodes		
Fasciola spp.	0	0
Coccidia		
Eimeria spp.	1	1.03
Mixed infection	74	76.29
Total	97	100

Table 5 Distribution of Specific Gastrointestinal Parasites Found in Each Slaughtered Trade Dromedary Camel in Kano Main Abattoir

Gastrointestinal parasites	No. positive	Prevalence
Eimeria spp.	2	2.04
Strongyle-type egg	12	12.24
Strongyloides spp.	1	1.02
Trichuris spp.	7	7.14
Anoplocephalide spp.	1	1.02
Eimeria spp. + *Fasciola* spp.	1	1.02
Eimeria spp. + *Strongyloides* spp.	1	1.02
Eimeria spp. +*Strongyle*-type egg	11	11.22
Strongyloides spp. + *Trichuris* spp.	1	1.02
Strongyle-type egg + *Fasciola* spp.	2	2.04

Gastrointestinal parasites	No. positive	Prevalence
Strongyle-type egg + *Strongyloides* spp.	5	5.10
Strongyle-type egg + *Trichuris* spp.	7	7.14
Eimeria spp. + *Strongyle*-type egg + *Trichuris* spp.	15	15.31
Eimeria spp. + *Strongyloides* spp. + *Trichuris* spp.	1	1.02
Eimeria spp. + *Strongyle*-type egg + *Anoplocephalide* spp.	2	2.04
Coccidia spp. + *Strongyle*-type egg + *Fasciola* spp.	1	1.02
Eimeria spp. + *Strongyle*-type egg + *Trichuris* spp.	5	5.10
Strongyle-type egg + *Trichuris* spp. + *Strongyloides* spp.	7	7.14
Eimeria spp. + *Strongyle*-type egg + *Strongyloides* spp. + *Trichuris* spp.	7	7.14
Eimeria spp. + *Strongyle*-type egg + *Strongyloides* spp. +*Anoplocephalide* spp.	1	1.02
Eimeria spp. + *Strongyle*-type egg + *Strongyloides* spp. + *Fasciola* spp.	1	1.02
Eimeria spp. + *Strongyle*-type egg + *Trichuris* spp. + *Anoplocephalide* spp.	2	2.04
Eimeria spp. + *Strongyle*-type egg + *Trichuris* spp. + *Fasciola* spp.	1	1.02
Strongyle-type egg + *Strongyloides* spp. + *Trichuris* spp.+ *Anoplocephalide* spp.	1	1.02
Eimeria spp. + *Strongyle*-type egg + *Strongyloides* spp. + *Trichuris* spp. + *Fasciola* spp.	1	1.02
Strongyle-type egg + *Strongyloides* spp. + *Trichuris* spp. + *Anoplocephala* spp. + *Fasciola* spp.	1	1.02
Total	97	100

Table 6 Evaluation of Body Condition Score, Sex, Faecal Consistency, and Faecal Mucus Status as Potential Risk Factors Associated with the Prevalence of Gastrointestinal Parasites in Slaughtered Trade Dromedary Camels in Kano Main Abattoir

Factor	No. of camel	No. of camel with GIT parasite	Prevalence of GIT parasite (%)	X^2 value	p- value
Body condition score					
Poor	7	7	100	2.5	0.298
Moderate	75	62	82.7		
Good	33	28	84.8		
Sex					
Male	60	56	93.3	7.6	0.006*
Female	55	41	74.5		
Faeces consistencies					
Pasty faeces	21	21	100	4.9	0.027*

Factor	No. of camel	No. of camel with GIT parasite	Prevalence of GIT parasite (%)	X^2 value	p- value
Pelleted faeces	94	76	80.9		
Faecal mucus status					
Mucoid faeces	20	19	95	2.7	0.101
Non-mucoid faeces	95	78	82.1		

* = significant ($p < 0.05$)

The present study revealed a high prevalence (84.35%) of gastrointestinal parasites in camels slaughtered at the Kano Main Abattoir, with Strongyle eggs being the most common (72.17%). This finding is consistent with previous studies conducted in Nigeria and other parts of Africa, highlighting the widespread nature of camel parasitic infections in these regions. The prevalence observed in our study is higher than that reported by Mahmuda et al. (2014) in Sokoto (78%) but lower than the 92.4% reported by Bamaiyi and Kalu (2011) in Maiduguri. These variations may be attributed to differences in geographical location, climate, management practices and sample size.

The high prevalence of parasitic infections, particularly mixed infections (76.29%), is likely attributable to several factors. First, the free-ranging management practices common in camel husbandry in Nigeria provide ample opportunities for parasite transmission (El-Khabaz et al., 2019). Camels often graze on communal pastures, increasing their exposure to infective stages of various parasites. Second, the presence of various reservoir hosts, such as sheep and goats, in the same ecological niche may contribute to cross-species transmission of certain parasites (El-Naga and Barghash, 2016). Third, the climatic conditions in northern Nigeria, characterized by high temperatures and seasonal rainfall, favour the survival and development of parasitic stages in the environment (Swai et al., 2011).

The significant associations observed between host factors and the prevalence of specific parasite types provide valuable insights into the epidemiology of these infections. The higher prevalence of Strongyle eggs in male camels and those with pasty faecal consistency is consistent with findings from other studies (Ahmed et al., 2013; Duguma et al., 2014). This may be related to differences in grazing behaviour, stress levels, or hormonal influences between males and females (Benaissa and Iglesias-Patrana, 2024). The association between body condition score and the prevalence of infection with *Strongyloides* and *Fasciola* suggests that these parasites may have a more pronounced impact on the overall health status of infected camels.

The low mean faecal egg counts observed in this study, despite the high prevalence of infections, warrant further investigation. Several factors could influence the number of parasite eggs found in faecal samples, including the stage of infection, host immunity, and the impact of recent anthelmintic treatments (Jesca et al., 2017). It is important to note that faecal egg counts may not always accurately reflect the actual worm burden, particularly in cases of immature or single-sex infections (Hansen and Perry, 1994). Future studies combining faecal egg counts with post-mortem worm counts would provide a more comprehensive understanding of the relationship between egg output and parasite burden in camels.

The identification of six different parasite types in this study (*Strongyle, Strongyloides, Trichuris, Anoplocephala, Fasciola*, and *Eimeria* parasites) highlights the diversity of gastrointestinal parasites affecting camels in the study area. This diversity poses challenges for effective parasite

control, as different parasites may require varying treatment approaches. The high prevalence of multiple infections (76.29%) further complicates the situation, potentially leading to more severe clinical manifestations in affected animals (Swai et al., 2011). Several limitations of this study should be acknowledged. First, the cross-sectional design provides a snapshot of parasite prevalence at a specific time point and does not capture seasonal variations or long-term trends. Second, the study was conducted at a single abattoir, which may not represent the entire camel population in Nigeria. Future studies incorporating multiple sampling sites and longitudinal designs would provide a more comprehensive understanding of camel parasite epidemiology in the region.

In conclusion, this study demonstrates a high prevalence of gastrointestinal parasites, particularly Strongyle species, in camels slaughtered at the Kano Main Abattoir. Further research is needed to elucidate the economic impact of these parasitic infections on camel productivity and to develop evidence-based, sustainable parasite control strategies tailored to the specific challenges faced by camel herders in Nigeria and similar ecological zones.

CONFLICT OF INTEREST

The authors have no relevant financial or non-financial interests to disclose.

AUTHORS CONTRIBUTIONS

Concept - MOE; Design – MOE, SA, BM, JOE, MNP; Supervision - SA, BM; Resources – MOE, JOE; Materials – JOE, JSE, SYI; Data Collection and Processing -JAA, SYI, JSE, OOA; Analysis and Interpretation – JOE, MNP, OOA, JAA; Literature Search – MOE, JAA OOA; Writing Manuscript -, MOE, JOE, OOA; Critical Review - MOE, SA, BM, JOE, JSE, SYI, MNP.

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PREVALENCA GASTROINTESTINALNIH PARAZITA I PRIDRUŽENI RIZIKO FAKTORI KOD DROMEDARA IZ KLAONICA U KANOU, SJEVERNA NIGERIJA

SAŽETAK

Paraziti igraju ključnu ulogu u zdravlju životinja zbog mnogobrojnih izazova koje predstavljaju kako za zdravlje tako i za dobrobit životinja. Prevalenca i distribucija gastrointestinalnih parazitskih infekcija kod kamila dromedara s tržišta u Kanou, glavnom središtu trgovine kamilama u Sjevernoj Nigeriji, nisu dovoljno dokumentirane. Ovo istraživanje koje identificira gastrointestinalne parazite do razine roda i procjenjuje udružene riziko faktore kod kamila u glavnoj klaonici Kanoa, u Nigeriji, doprinosi razvoju učinkovitih strategija kontrole parazita kako bi se poboljšali zdravlje i produktivnost kamila. U presječnom istraživanju je pregledano ukupno 115 kamila na gastrointestinalne parazite, pri čemu je korištena metoda fekalne flotacije i sedimentacije. Ukupna prevalenca gastrointestinalnih parazita je iznosila 84.4%, pri čemu je 76.3% inficiranih kamila imalo miješanu parazitsku infekciju. Identificirano je sedam različitih tipova parazita koji su pripadali nematodama (jaja *Strongyle*-tipa, *Trichuris* spp., *Strongyloides* spp.), cestodama (*Anoplocephala* spp.), trematodama (*Fasciola* spp.) i kokcidijama (*Eimeria cameli*, *Eimeria rajasthani*). Najvišu prevalencu su imali paraziti sa jajima *Strongyle*-tipa (12.4) i *Trichuris* spp. (7.2%). Riziko faktori signifikantno povezani sa prevalencom parazita su bili: spol (mužjaci 93.3%, ženke 74.5%) i konzistencija fecesa (pastozni 100%, peletirani 80.9%). Tjelesni skor i prisustvo sluzi u fecesu nisu pokazali signifikantnu povezanost. Srednji broj jajašaca u fecesu je iznosio 162.7 po gramu, sa 92.6% inficiranih kamila koje su imale blagu infekciju. Ovo istraživanje naglašava visoko opterećenje kamila gastrointestinalnim parazitima u regiji, kao i potrebu za poboljšanjem strategija kontrole parazita.

Ključne riječi: Gastrointestinalni paraziti, kamile, prevalenca, Sjeverna Nigerija