JIVS JOURNAL OF ISTANBUL VETERINARY SCIENCES

Gastrointestinal helminths: Prevalence and associated risk factors among slaughtered cattle in Ogbomoso, Nigeria

Fiwasade Adejoke Rom-Kalilu[1], Azeemat Odunayo Uthman[1], Michael Olaoluwa Ogunyemi[2], Besong Paul Nyenti[3], Idiat Modupe Sanda[4]

Research Article

Volume: 9, Issue: 3
December, 2025
Pages: 158-163

1. Department of Animal Production and Health, Faculty of Agricultural Sciences, Ladoke Akintola University of Technology, P.M.B. 4000, Ogbomoso, Nigeria. **2.** Coventry City Council, One Friargate, Coventry, CV1 2GN, United Kingdom **3.** Department of Veterinary Medicine, Faculty of Agriculture and Veterinary Medicine, University of Buea, P. O. Box 63, Buea, Cameroon. **4.** Department of Veterinary Parasitology and Entomology, Faculty of Veterinary Medicine, University of Ilorin, P.M.B. 1515, Ilorin, Nigeria. Rom-Kalilu F.A. ORCID: 0009-0004-1700-5585, Uthman A.O. ORCID: 0009-0009-3902-5903, Ogunyemi M.O. ORCID: 0009-0007-8650-6465, Nyenti, B.P. ORCID: 0009-0002-8201-4619, Sanda, I.M. ORCID: 0009- 0000-6145-6421.

ABSTRACT

Gastrointestinal helminths adversely affect animal productivity, causing huge economic loss to the livestock sector globally. This cross-sectional study was conducted to determine the epidemiology of gastrointestinal helminths of cattle slaughtered in Ogbomoso, Nigeria. Two hundred and fifty faecal samples were randomly collected from slaughtered cattle. With simple floatation and formol-ethyl acetate sedimentation methods, the samples were analysed, and the eggs were identified according to standard procedures. A total of 86.80% of cattle examined had at least one helminth species. Eleven helminth species, including all three classes, were observed (eight nematodes, two trematodes, and one cestode). *Haemonchus* spp. (78.80%, 95% CI = 67.80-83.90) was found to have the highest prevalence, followed by *Trichostrongylus* spp. (66.80%, 95% CI = 56.67-72.64), *Bunostomum* spp. (25.20%, 95% CI = 18.98-30.58) with *Toxocara* spp. (1.20%, 95% CI = -0.16-2.55) being the lowest. The sex, age, and breed of the cattle did not influence the prevalence of gastrointestinal helminth infection in the study area ($p > 0.05$). Nonetheless, this study has established a high prevalence of gastrointestinal helminths in slaughtered cattle in Ogbomoso. Therefore, sustainable preventive and control measures in cattle are highly recommended through interventions such as strategic anthelmintic treatment, pasture management, and improved farm hygiene

Article History

Received: 28.10.2025
Accepted: 17.12.2025
Available online: 31.12.2025

Keywords: cattle, epidemiology, helminth infections, Ogbomoso, Nigeria

DOI: https://doi.org/10.30704/http-www-jivs-net.1592623

To cite this article: Rom-Kalilu, F. A., Uthman, A. O., Ogunyemi, M. O., Nyenti, B. P., & Sanda, I. M. (2025). Gastrointestinal helminths: Prevalence and associated risk factors among slaughtered cattle in Ogbomoso, Nigeria, *Journal of Istanbul Veterinary Sciences, 9*(3), 158-163. **Abbreviated Title: J. İstanbul vet. sci.**

Introduction

Cattle production holds significant importance in the Nigerian livestock sector, making it the largest producer of livestock in sub-Saharan Africa. This sector contributes about 5.2% to the national gross domestic product (GDP) with an estimated value of about 6 billion USD (Karshima et al., 2018). Likewise, cattle production employs approximately 1.3 billion people globally and directly supports the livelihoods of 600 million smallholding farmers in developing countries (Kassenbayev et al., 2024). While cattle represent an important source of animal protein in different parts of the world, they also provide hides and skin, employment, a source of income, farm power, and manure, among others (Adem, 2019). This is reflected in the country's GDP, where cattle production makes up approximately 40% of its agricultural component (Akande et al., 2010). Unfortunately, several studies have established that parasitic infections are among the primary reasons for a decline in livestock productivity and output (Tiele et al., 2023). Helminthosis ranks among the common livestock infections farmers are very familiar with, and it is implicated as one of the health problems constraining productivity in cattle (Sylvia, 2015). Although mortality associated with parasitic infections in livestock is often considered relatively low, the indirect effects on animal

*Corresponding Author: Fiwasade Rom-kalilu
fromkalilu@lautech.edu.ng

productivity, economic returns, and public health risks remain substantial (Strydom et al., 2023). Economic losses associated with gastrointestinal helminth infections occur because of anorexia, weight loss, diarrhoea, stunted growth, and death, resulting in a diminished supply of animal protein, reduced draught power, poor quality of hides and skin, and increased treatment costs, to mention a few (Yahaya and Tyav, 2014; Ola-Fadunsin et al., 2020). Studies have confirmed the public health significance of some helminths, which have been reported to have entered the food chain in Nigeria, causing diarrhoea, retarded growth, intellectual and cognitive retardation in infected humans (Odeniran et al., 2016; Karshima et al., 2016).

Gastrointestinal helminths are ubiquitous, and the most important predisposing factors influencing their prevalence are grazing habits, climate, nutritional deficiency, pasture management, immunological status, the presence of an intermediate host, and the number of infective larvae and eggs in the environment (Adedipe et al., 2014). Their ubiquitous occurrence, with varying prevalence levels, has been reported worldwide and in different parts of Nigeria (Lemy and Egwunyenga, 2017; Obi et al., 2020; Ola-Fadunsin et al., 2020; Rom-Kalilu et al., 2025).

Epidemiological data on gastrointestinal helminths are essential for developing effective parasite control programmes. However, there is a dearth of information about helminths infecting cattle in the present study area. This study was therefore conducted to determine the prevalence of gastrointestinal helminths and associated predisposing factors among cattle slaughtered in Ogbomoso, Nigeria.

Materials and Methods

Study area

The study was conducted in Ogbomoso, Oyo State, Nigeria. Ogbomoso is one of the major towns in Oyo State and comprises the Ogbomoso South, Ogbomoso North, Ogo-Oluwa, Orire, and Surulere local government areas. It lies at the intersection of roads from Oyo, Ilorin, Osogbo, and Ikoyi. It is located between longitude 4°15' East of Greenwich meridian and latitude 8°15' Northeast of the equator. Ogbomoso is about 145km northeast of Ibadan, the capital of Oyo State. The altitude is between 800 and 600mm above sea level, and the mean annual temperature is about 27°C. The mean annual rainfall is 1247mm, and the vegetation is derived savannah (Ameen et al., 2015). The main slaughter slab in Ogbomoso was visited for this study. Cattle slaughtered here are primarily sourced from various cattle-rearing regions across Nigeria, predominantly from northern Nigeria. The study took place from May to July 2024.

Study design and sample size determination

A cross-sectional study was conducted. The sample size was determined using the Thrusfield formula at an estimated prevalence of 79.92% (Ola-Fadunsin et al., 2020):

Sample size = $Z^2 \times P (1-P)/d^2$

Where Z is a 95% confidence interval (1.96), P is the expected prevalence (79.92%), and d is the desired absolute precision (5%).

The sample size obtained was 246.6, which was rounded up to 250.

Sample collection

A simple random sampling technique was used to select cattle for sample collection at the slaughter slab. Information such as the breed, age, and sex of the cattle was recorded. A total of 250 faecal samples were collected. About 5g of the faecal samples were randomly collected per rectum using sterile gloves into well-labelled airtight plastic bags. The samples were transported immediately to the Veterinary Parasitology Laboratory, University of Ilorin, for processing using ice packs.

Sample analysis

The samples were subjected to simple floatation and formol-ethyl acetate sedimentation techniques as described by Taylor et al. (2015) and Ola-Fadunsin et al. (2019). Briefly, for the simple floatation technique, about 2g of the faecal sample (individual) was thoroughly mixed with 10 ml of saturated sodium chloride solution. It was sieved into a test tube to the brim, and a coverslip was carefully placed on it. The mixture was then allowed to stand for about 15 minutes, and the coverslip was removed and placed on a clean glass slide. The slide was examined for eggs under the microscope at 10× and 40× magnifications. For the formol-ethyl acetate sedimentation technique, about 2g of faeces was dissolved in 10% formalin. About 7 ml of the mixture was sieved into a test tube, and 3 ml of ethyl acetate was added. The tube was shaken vigorously for 1 minute by hand and then centrifuged at 3000rpm for about 5 minutes. The supernatant was decanted, and the entire sediment was examined on a glass slide under the microscope at 10× and 40× magnifications. The helminth eggs were identified based on their morphological features as described by Soulsby et al. (1982) and Taylor et al. (2015).

Statistical analysis

The data were subjected to descriptive statistics to estimate prevalence using percentages. Associations between gastrointestinal helminth prevalence and sex, breed, and age were analysed using the Chi-square

test, while logistic regression was used to identify the predictors of infection. All analyses were conducted using the Jamovi Project (2022), and results were summarised and presented in tables. Statistical significance was set at $p < 0.05$.

Results

Of the 250 faecal samples collected and examined, 217 were positive for one or more gastrointestinal helminth eggs, yielding an overall prevalence of 86.80%. Eleven helminth species, including eight nematodes (Haemonchus, Nematodirus, Strongyloides, Toxocara, Bunostomum, Oesophagostomum, Cooperia, and Trichostrongylus spp.), two trematodes (Fasciola and Paramphistomum spp.), and one cestode (Moniezia spp.) were recorded (Figure 1). The helminth species identified, and their corresponding prevalence, are shown in Table 1. Where Haemonchus spp. (78.80%) had the highest prevalence, while Toxocara spp. (1.20%) had the lowest.

No significant association was observed between sex and helminth infection ($\chi^2 = 0.09$, $p = 0.76$), as males and females showed almost similar odds of infection (OR = 1.25, 95% CI = 0.15-10.31). Similarly, the difference identified between young (92.1%) and adult (85.4%) cattle was not statistically significant ($\chi^2 = 1.10$, $p = 0.29$), with similar odds of infection (OR = 1.86, 95% CI = 0.54-6.47). There was also no statistically significant difference ($\chi^2 = 1.07$; $p = 0.30$) in the prevalence rates between the White Fulani (86.6%) and Sokoto Gudali (66.7%).

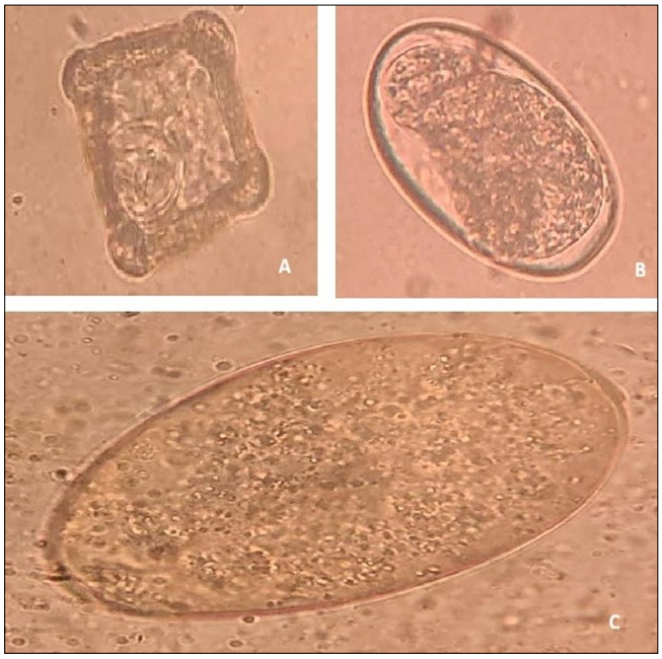

Figure 1. Micrograph of Moniezia spp. (A), Strongyloides spp. (B), and Fasciola spp. (C) eggs obtained from slaughtered cattle in Ogbomoso, Nigeria (magnification ×40)

Table 1: Prevalence of gastrointestinal helminths in cattle slaughtered within Ogbomoso, Nigeria

Helminth Species	Number Examined	Number Infected	Prevalence (%)	95% CI	Overall Prevalence (%)
Toxocara spp.	250	3	1.20	-0.16-2.55	86.80
Nematodirus spp.	250	14	5.60	2.67-8.45	
Bunostomum spp.	250	62	25.20	18.9-30.5	
Oesophagostomum spp.	250	115	46.00	37.5-52.1	
Cooperia spp.	250	47	18.80	13.4-23.6	
Trichostrongylus spp.	250	167	66.80	56.6-72.6	
Haemonchus spp.	250	196	78.80	67.8-83.9	
Strongyloides spp.	250	60	23.60	17.5-28.8	
Fasciola spp.	250	30	12.40	8.03-16.4	
Paramphistomum spp.	250	25	9.60	5.76-13.2	
Moniezia spp.	250	9	4.00	1.52-6.43	

CI = Confidence Interval

Table 2. Prevalence and risk factors associated with gastrointestinal helminth infection in cattle by sex, age, and breed

Variable	Number Examined	Number Infected	Prevalence (%)	Odds Ratio (95% CI)	χ^2	P Value
Sex						
Male	10	9	90.00	1.25 (0.15-10.31)	0.09	0.76
Female	240	208	86.67	1.00		
Age						
Young	38	35	92.10	1.86 (0.54-6.47)	1.10	0.29
Adult*	212	182	85.85	1.00		
Breed						
White Fulani	247	215	87.04	3.08 (0.27-35.12)	1.07	0.30
Sokoto Gudali*	3	2	66.7	1.00		

CI = Confidence Interval; χ^2 = Chi-square; * = Reference Category

Discussion

Helminth infections have been established as one of the longest-standing obstacles to global livestock production, especially ruminants. This present study revealed that 86.80% of slaughtered cattle examined within Ogbomoso were infected with one or more helminth species. This result aligns with previous findings, including 79.90% obtained in Ilorin, 87.40% in Aba, and 74.30% in Bauchi, Nigeria, as reported by Ola-Fadunsin et al. (2020), Okike-Osisiogu et al. (2016), and Yuguda et al. (2018), respectively.

However, the 86.80% prevalence observed in this study differs from the findings of Ameen et al. (2015) and Bolaji et al. (2023), who reported 3% and 65% in Ogbomoso, as well as Shitta and James (2013), Lemy and Egwunyenga (2017), and Obi et al. (2020), who documented prevalences of 34.90% in Taraba, 51% in Delta, and 57.60% in Southeastern Nigeria, respectively. These variations may be attributed to differences in sample size, climatic conditions, study period and duration, geographical location, worm management practices, and the availability of intermediate hosts, among other factors (Obi et al., 2020).

A total of eleven helminth species were detected during this study, which falls within the range of 4 to 18 species reported in previous studies conducted in Nigeria and other parts of the world (Yahaya and Tyav, 2014; Ola-Fadunsin et al., 2020; Tiele et al., 2023). This diversity highlights the significance of helminth infections as a major concern among cattle in the study area and across Nigeria. Among the eleven helminth species identified, nematodes had the highest prevalence, followed by trematodes and cestodes. This finding builds on existing evidence of nematodes being the most prevalent class of helminths affecting cattle globally (Adedipe et al., 2014; Bisimwa et al., 2018; Ola-Fadunsin et al., 2020; Tiele et al., 2023). This, however, contradicts the findings of Nwigwe et al. (2013), who reported trematodes as the most prevalent helminth in Southern Nigeria. Similarly, Haemonchus spp. happened to be the most prevalent helminth consistent with the reports of Okike-Osisiogu et al. (2016), Lemy and Egwunyenga (2017), and Ola-Fadunsin et al. (2020). Gastrointestinal nematodes have a direct life cycle and require no intermediate host, which may contribute to their high prevalence in the study area and other regions globally.

Although the breed is an essential index in the epidemiology of helminth infections (Ola-Fadunsin et al., 2020), both breeds (White Fulani and Sokoto Gudali) encountered during this study had equal infection likelihood, as the difference in prevalence was not statistically significant. This supports the findings of Adedipe et al. (2014) and Abubakar et al. (2022), who argue that a non-significant difference between the cattle breeds and infection prevalence could be due to equal exposure of these animals to the same sources of pollutants, e.g. water, soil, and pasture. This contradicts reports showing that certain breeds are more at risk of infection than others (Ola-Fadunsin, 2017; Ola-Fadunsin et al., 2020; Umar et al., 2021). Furthermore, males and females had similar odds of infection with no statistically significant difference. Therefore, the prevalence of GI helminths in the study area was not influenced by the sex of the cattle. Telila et al. (2014), Umar et al. (2018), and Ola-Fadunsin et al. (2020) reported higher prevalence in males, attributing it to their aggressive nature when feeding, causing them to pick up more helminth eggs on the pasture, thus, making them more susceptible to helminth infection. Age was not significantly associated with helminth infections in this study, consistent with reports by Abubakar et al. (2022) and Ola-Fadunsin et al. (2020). However, age-related susceptibilities have been reported elsewhere, for example, Umar et al. (2021) suggested that younger cattle may be more vulnerable to helminth infections due to early exposure to contaminated pastures and an underdeveloped immune system.

Conclusion

This study has demonstrated a high prevalence of gastrointestinal helminths among cattle slaughtered in Ogbomoso, Nigeria. All classes of helminths were detected, with nematodes being the most prevalent. This suggests a significant concern for cattle, with considerable economic and public health implications. Therefore, it is pertinent to educate farmers on the impact of gastrointestinal helminthosis and promote the adoption of preventive and sustainable control measures. These should include a veterinarian-designed deworming schedule, effective pasture management, and good management practices. Additionally, efforts to raise public health awareness should be intensified.

Nonetheless, there were methodological limitations that likely contributed to the statistical analysis yielding no significant association between infection and the breed, sex, and age of cattle in the study area. The differences in sample sizes across categories contributed to an imbalance in the statistical analysis, reducing power to detect actual differences. Additionally, the study was conducted over a relatively short period, representing just one season, while helminth infections in cattle have been identified to fluctuate with climatic conditions and pasture

availability. Finally, all samples for this study were collected from a single slaughter slab, hence, the results might not represent the wider cattle population in the region. Future research should include more locations and an extended study period that accounts for the full life and transmission cycles of helminths.

References

Abubakar, B. M., Amos, V., Moi, I. M., and Gagman, H. A. (2022). Epidemiological studies of gastrointestinal helminths affecting cattle in Bogoro Local Government Areas of Bauchi State, North-east Nigeria. Gadau *Journal of Pure and Allied Sciences, 1* (2), 115-120.

Adedipe, O. D., Uwalaka, E. C., Akinseye, V. O., Adediran, O. A., and Cadmus, S. I. B. (2014). Gastrointestinal Helminths in Slaughtered Cattle in Ibadan, South-Western Nigeria. *Journal of Veterinary Medicine, 2014*(1), 923561.

Adem, M. (2019). Production of hide and skin in Ethiopia; marketing opportunities and constraints: A review paper. *Cogent Food & Agriculture,* 5(1), 1565078.

Akande, F. A., Takeet, M. I., and Makanju, O. A. (2010). Haemoparasites Of Cattle in Abeokuta, Southwest Nigeria. *Science world journal, 5*(4).

Ameen, S. A., Adedokun, R. A. M., and Akinola, S. O. (2015). Prevalence of gastro-intestinal parasites of cattle in Ogbomoso, Oyo State. *International Journal of Applied Agriculture and Apiculture Research, 11*(1-2), 22-26.

Bisimwa, N. P., Lugano, R. M., Bwihangane, B. A., Wasso, S. D., Kinimi, E., Banswe, G., and Bajope, B. (2018). Prevalence of gastro-intestinal helminths in slaughtered cattle in Walungu territory, South Kivu Province, Eastern Democratic Republic of Congo. *Austin Journal of Veterinary Science and Animal Husbandry, 5*(1), 6.

Bolaji, O. S., Adekunle, O. C., Ajayi, A. A., Adeyemo, A. T., Ojewuyi, A. R., Ibrahim, A. A., ... and Adeyeba, O. A. (2023). Prevalence of Pathogenic Intestinal Parasites and Enteropathogenic Bacteria in Faecal Samples Obtained from Abattoirs in Ogbomoso, Oyo State, Nigeria. *Alexandria Journal of Veterinary Sciences, 77*(2).

Karshima, N. S., Bata, S. I., and Bobbo, A. A. (2016). Prevalence, risk factors and economic losses associated with fasciolosis in slaughtered cattle in Bauchi, north-eastern Nigeria. *Alexandria Journal for Veterinary Sciences, 5*0(1).

Karshima, S. N., Maikai, B. V., and Kwaga, J. K. P. (2018). Helminths of veterinary and zoonotic importance in Nigerian ruminants: a 46-year meta-analysis (1970–2016) of their prevalence and distribution. *Infectious diseases of poverty, 7*, 1-15.

Kassenbayev, G., Kerimova, U., Rakhimzhanova, G., and Shalgimbayeva, K. (2024). Animal husbandry market in Kazakhstan: Dynamics and prognosis. *Scientific Horizons, 27*(4), 176-188.

Lemy, E. E., and Egwunyenga, A. O. (2017). Epidemiological study on some parasitic helminths of cattle in Delta North, Delta State, Nigeria. *Journal of Animal Health and Behavioural Science, 2*(1), 1-4.

Nwigwe, J. O., Njoku, O. O., Odikamnoro, O. O., and Cosmas U. A. (2013). Comparative study of intestinal helminths and protozoa of cattle and goats in Abakaliki metropolis of Ebonyi State, Nigeria. *Advances in Applied Science Research, 4*(2),223–227,

Obi, C. F., Akata, M. C., and Ezubelu, O. J. (2020). Prevalence of gastrointestinal helminth parasites of trade cattle in Aguata and Orumba South Local Government Areas, Southeastern Nigeria. Journal *of Parasitic Diseases, 44*, 546-552.

Odeniran, P. O., Jegede, H. O., and Adewoga, T. O. (2016). Prevalence and risk perception of adult-stage parasites in slaughtered food animals (cattle, sheep and goat) among local meat personnel in Ipata abattoir, Ilorin, Nigeria. *Veterinary Medicine and Animal Sciences, 4*(1), 1.

Okike-Osisiogu, F. U., Arinze, A. G., and Ekaiko, M. U. (2016). Prevalence of intestinal parasites in cattle slaughtered in Aba. *Journal of Agricultural and Research, 2*(2), 20-27.

Ola-Fadunsin, S. D. (2017). Retrospective occurrence and risk factors associated with cattle parasitic infections in Osun State, Nigeria. *Nigerian Veterinary Journal, 38*(3), 193-207.

Ola-Fadunsin, S. D., Ganiyu, I. A., Rabiu, M., Hussain, K., Sanda, I. M., Baba, A. Y., ... and Balogun, R. B. (2020). Helminth infections of great concern among cattle in Nigeria: Insight to its prevalence, species diversity, patterns of infections and risk factors. *Veterinary World, 13*(2), 338.

Ola-Fadunsin, S. D., Uwabujo, P. I., Sanda, I. M., Ganiyu, I. A., Hussain, K., Rabiu, M., ... and Alayande, M. O. (2019). Gastrointestinal helminths of intensively managed poultry in Kwara Central, Kwara State, Nigeria: Its diversity, prevalence, intensity, and risk factors. *Veterinary World, 12*(3), 389.

Rom-Kalilu, F. A., Daniel, E. A., Tijani, M. T., Ogunyemi, M. O., Oyetoro, B. A., Ogunbayode, S. T., Ahmed, S. O., Nyenti, B. P., and Hammed, O. O. (2025). Prevalence, risk factors, zoonotic significance, and infection patterns of gastrointestinal helminths in pigs in Ogbomoso, Nigeria. Brazilian *Journal of Science, 5*(1), 23-31.

Shitta, K. B., and James-Rugu, N. N. (2013). Prevalence of gastro-intestinal helminths of slaughtered cattle at Wukari abattoir Taraba state, North-Eastern Nigeria. *Nigerian Journal of Parasitology, 34*(2), 55-9.

Soulsby, E. J. L. (1982). Helminths, Arthropods and Protozoa of Domestic Animals. 7th ed. Bailliere Tindall Publishers.

Strydom, T., Lavan, R. P., Torres, S., and Heaney, K. (2023). The economic impact of parasitism from nematodes, trematodes and ticks on beef cattle production. *Animals, 13*(10), 1599.

Sylvia, O. U., Stephen, O. A., Oladeji, M. H., Abdulhakeem, A. A., Micheal, A. O., and Friday, E. U. (2015). Gastrointestinal helminth infections in a ruminant livestock farm in Abeokuta, SouthWestern Nigeria. *Annual Research & Review in Biology,* 8(4), 1 -8.

Taylor, M. A., Coop, R. L., and Wall, R. L. (2015). *Veterinary parasitology*. John Wiley & Sons.

Telila, C., Abera, B., Lemma, D., and Eticha, E. (2014). Prevalence of Gastrointestinal Parasitism of cattle in East Showa Zone, Oromia regional state, Central Ethiopia. *Journal of Veterinary Medicine and Animal Health, 6*(2): 54-62.

The jamovi project (2022). jamovi. (Version 2.3) [Computer Software]. Retrieved from https:// www.jamovi.org.

Tiele, D., Sebro, E., H/Meskel, D., and Mathewos, M. (2023). Epidemiology of gastrointestinal parasites of cattle in and around Hosanna Town, Southern Ethiopia. *Veterinary Medicine: Research and Reports*, 1-9.

Umar, M., Abubakar, B. M., Gagman, H. A., and Yusuf, A. S. (2021). The Occurrence of Gastrointestinal Helminths in Slaughtered Cattle in Azare, North-East Nigeria. *Journal of Zoological Research, 3*(1), 1-8.

Umar, Y. A., Babayo, S. A., and Mao, P. S. (2018). Gastrointestinal helminths of slaughtered cattle in Bauchi Central Abattoir, Bauchi state, Nigeria. *GSC Biological and Pharmaceutical Sciences,* 4(2).

Yahaya, A., and Tyav, Y. (2014). A survey of gastrointestinal parasitic helminths of bovine slaughtered in abattoir, Wudil Local Government Area, Kano state, Nigeria. *Greener Journal of Biological Sciences, 4*(4), 128-34.

Yuguda A. U., Samaila A. B., and Panda S. M. (2018). Gastrointestinal helminths of slaughtered cattle in Bauchi Central Abattoir, Bauchi State, Nigeria. *GSC Biological and Pharmaceutical Sciences, 4*(2), 58-65.