Original Research Article

GASTROINTESTINAL HELMINTHS PARASITES OF CATTLES SLAUGHTERED IN GWAGWALADA ABATTOIRS

ABSTRACT

A survey was conducted to determine the prevalence of gastrointestinal helminth parasites in cattle slaughtered in Gwagwalada abattoirs, and a total of 165 gastrointestinal helminth parasites belonging to four genera were reported. *Ascaris lumbricoides*, *Fasciola gigantica*, *Taenia saginata*, and *Trichuris trichiura* are the four genera and four species of helminth parasites found. The abattoir at Angwandodo recorded twenty-seven (27) *Ascaris lumbricoides* intestinal helminth parasites, six (6) *Fasciola gigantica* parasites, and three (3) *Taenia saginata* parasites. Similarly, (21) *Taenia saginata* was identified, followed by (12) *Ascaris lumbricoides*, and (9) *Trichuris trichiura* and Fasciola gigantica were reported at the Gwako abattoir. Furthermore, the abattoir in Giri was home to (18) Ascaris lumbricoide, (15) Taenia saginata, twelve (12) Trichuris trichiura, and three (3) Fasciola gigantica. Taenia saginata and Ascaris lumbricoide each recorded nine (9) samples, while Trichuris trichiura and Fasciola gigantica each recorded six (6) samples from an abattoir in Kutunku. From the total of one hundred and sixty-five (165) gastrointestinal parasites observed in cattle slaughtered in abattoirs, sixty-six (66) were Ascaris lumbricoide, fifty-one (51) were Taenia saginata, twenty-seven (27) were Trichuris trichiura (16.36 percent), and twenty-one (21) were Fasciola gigantica, the least parasites observed with a 12.73 percent prevalence. There was a significant difference in the prevalence of gastrointestinal helminths in cattle slaughtered in Gwagwalada abattoirs (p 0.05). There is a need to monitor intestinal parasites of cattle to promote animal production and public health in Nigeria.

Key word: Gastrointestinal helminthes; *Ascaris lumbricoide*; Prevalence; Parasites.

Comment [MPS1]: The correct way to spell it is lumbricoides, not lumbricoide

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INTRODUCTION

Cattle, Nigeria's most common domesticated livestock, are an asset in both traditional and modern agriculture. Furthermore, they provide meat, milk, skin, and draught power for farming (Tewe 2017). In Nigeria, the livestock sector accounts for 5.2 percent of the GDP, while cattle production accounts for 50 percent of total meat production (Adedipe et al. 2016). Helminthes are well-known to be a major impediment to ruminant well-being and productivity (Rajput et al. 2016; Hesterberg et al. 2017). Gastrointestinal helminths are common parasitic agents of livestock, particularly ruminants, and are known to limit cattle production in a variety of areas and countries (Keyyu et al. 2015).

At times, the mortality of animals due to parasitic diseases may not be alarming, but their indirect effects on livestock productivity and the way they are passed from animals to humans are considerably greater (Ekong *et al.* 2015). Indirect losses associated with helminth infections include the reduction in productive potential, such as decreased growth rate, weight loss, diarrhea, anorexia, and sometimes anemia (Swai *et al.* 2016). Radostits et al. (2014) discovered that grazing habits,

climate, nutritional deficiency, pasture management, immunological status, vector, presence of intermediate host, and the number of infective larvae and eggs in the environment are the most important predisposing factors for helminth infections. The effect of helminth infections is determined by a combination of factors, of which the varying susceptibility of the host species, the pathogenicity of the parasite species, the host and parasite interaction, and the infective dose are the most important (FAO 2011). However, helminth zoonotic diseases do not only involve animals but are also considered a major health problem in many countries. There is a need to carry out this study on the intestinal helminths parasites of cattle slaughtered in Gwagwalada to know the prevalence of the helminthic parasites responsible for cattle diseases in Gwagwalada.

MATERIALS AND METHODS

Study Region

This study was carried out at the Biology laboratory of the Department of Biological Sciences at the University of Abuja, Gwagwalada, FCT-Abuja, Nigeria. Gwagwalada is one of the five municipal councils of the Federal Capital Territory of Nigeria, together with Abaji, Kuje, Bwari, and Kwali. The FCT also includes the City of Abuja. Gwagwalada is also the name of the main town in the Local Government Area, which has an area of 1,043 km2 and a population of 157,770 at the 2016 census and is located between latitudes 8° 55° and 8° 60° North and 7° 05 and 7° 11 East (Awowole-Browe and Francis 2017). The Gwagwalada abattoirs are located in different areas, which include Agwandodo, Gwako, Giri, and the New Kutunku ward of the town, beside one of the tributary streams of the river Usuma, which drains through the town. It has a recorded annual temperature that ranges from 30 degrees Celsius to 37 degrees Celsius and a total annual rainfall of about 1650 mm. Gwagwalada abattoir is located in a high-density residential area and consists of three sections; the slaughtering sections, processing sections, and dumping sections.

Study population

At Gwagwalada, FCT Abuja abattoirs, the butchers only slaughter adult male cattle; therefore the research was based only on male cattle. A total of 160 fecal samples of freshly slaughtered cattle were randomly collected from the rectum, with 40 samples each from four (4) different abattoirs located in Gwagwalada; FCT Abuja. Fecal samples were collected from the abattoirs at Kutunku, Agwandodo, Gwako, and Giri with five (5) samples per week for eight (8) weeks.

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Sample collections

The samples were collected in sterile plastic containers and taken to the parasitological laboratory of the Veterinary Medicine at the University of Abuja, Gwagwalada FCT-Abuja- Nigeria, for the study of helminthic parasites in the intestinal tract of the cattle. The samples were analyzed on the day of collection.

Evaluation of helminthic parasites

The fecal sample was spread on a dissecting board and visible worms to the naked eye were picked up using thumb forceps and then stored in 10% formalin before identification. About one gram (1 g) of the fecal sample was dissolved in a sterile test tube containing 10 mL of sterile distilled water. The mixtures were agitated for 3 min by shaking and then centrifuged at 4000 rpm for 10 min. The supernatant was decanted and the sediment was examined for helminthic parasites (Nwigwe *et al*. 2013).

Identification of helminthic parasite

Cheesebrough (2016) used dichotomous keys to identify the helminthes parasites. Microscopic examination of the helminthic parasites was done at X40 magnification. The parasites were identified based on their shape, size, and color.

Statistical analysis

The prevalence of intestinal helminthes parasites was statistically analyzed using one-way ANOVA and the F-test statistic from Microsoft Excel Statistics at a P = 0.05 level of significance.

RESULT

Prevalence of gastrointestinal helminth parasites in slaughtered cattle

Table 1 shows the prevalence of gastrointestinal helminth parasites in cattle slaughtered in abattoirs in the Gwagwalada Area Council. Four genera and four species of helminth parasites were observed and included *Ascaris lumbricoide*, *Fasciola gigantica*, *Taenia saginata*, and *Trichuris trichiura*, respectively, as seen in Table 1. Twenty-seven (27) of the intestinal helminth parasites were *Ascaris lumbricoide* and *Fasciola gigantica*, six (6), while three (3) *Taenia saginata* were recorded for the abattoir in Agwandodo. Similarly, twenty-one (21) *Taenia saginata* was recorded, followed by twelve (12) *Ascaris lumbricoide*, which were also recorded, while *Trichuris trichiura* and *Fasciola gigantica* were nine (9) each, for the abattoir in Gwako. Furthermore, eighteen (18) *Ascaris lumbricoide* were recorded, followed by fifteen (15) *Taenia saginata* and *Trichuris trichiura*, and only three (3) *Fasciola gigantica* were recorded for the abattoir in Giri. Also, *Taenia saginata* and *Ascaris lumbricoide* recorded nine (9) each, while *Trichuris trichiura* and *Fasciola gigantica* recorded six (6) each, for samples collected from an abattoir in Kutunku, as seen in Table 1.

Table 1: **Prevalence of gastrointenstinal helminth parasites in cattle slaughtered in Gwagwalada abattoirs**

Abattoirs locations	Number of Sample	Parasites Species	Frequencies of Occurrence
Agwandodo	40	*Fasciola gigantica*	3
		Taenia saginata	6
		Ascaris lumbricoide	27
Gwako	40	*Taenia saginata*	21
		Trichuris trichiura	9
		Fasciola gigantica	9
		Ascaris lumbricoide	12
Giri	40	*Taenia saginata*	15
		Trichuris trichiura	12
		Fasciola gigantica	3

Comment [MPS5]: As it is statement here, the authors only looked for adults, buy not for eggs, why is this?

Comment [MPS6]: These sections should be fused into one as they describe the same method: how they obtain and identified the helminth species.

Comment [MPS7]: In which case the authors used the one-way ANOVA and the F-test? Also, how the authors tested the assumptions of these statistical assays? This information should be addressed, because the authors use a parametric test meant to normal distribution, but your variable is a percentage which by it´s nature is limited. Thus, it is rare that this variable has a normal distribution.

Comment [MPS8]: This Table does not contain the prevalence, but the frequency of each helminth parasite found. The authors should rectify this.

		Ascaris lumbricoide	18
		Taenia saginata	9
Kutunku	40	*Trichuris trichiura*	6
		Fasciola gigantica	6
		Ascaris lumbricoide	9
Total	**160**		**165**

Frequency and percentage of gastrointestinal helminth parasites in cattle slaughtered in abattoirs

From overall total of one hundred and sixty-five (165) gastrointestinal helminth parasite observed in cattle slaughtered in the abattoirs, sixty-six (66), equivalent to 40 % of the total number of parasites observed which was the highest number, were *Ascaris lumbricoide* and fifty-one (51) of them which is equivalent to 30.91 % were *Taenia saginata* while twenty-seven (27) were *Trichuris trichiura* (16.36 %) and only twenty-one were *Fasciola gigantica* being the least parasite observed with 12.73 % as seen in Table 2.

Table 2: **Percentage of occurrence of ~~intenstinal~~intestinal helminth parasites in cattle slaughtered in abattoirs in Gwagwalada Area Council**

Parasite species	Frequencies	Percentages (%)
Ascaris lumbricoide	66	40
Taenia saginata	51	30.91
Trichuris trichiura	27	16.36
Fasciola gigantica	21	12.73
Total	**165**	**100**

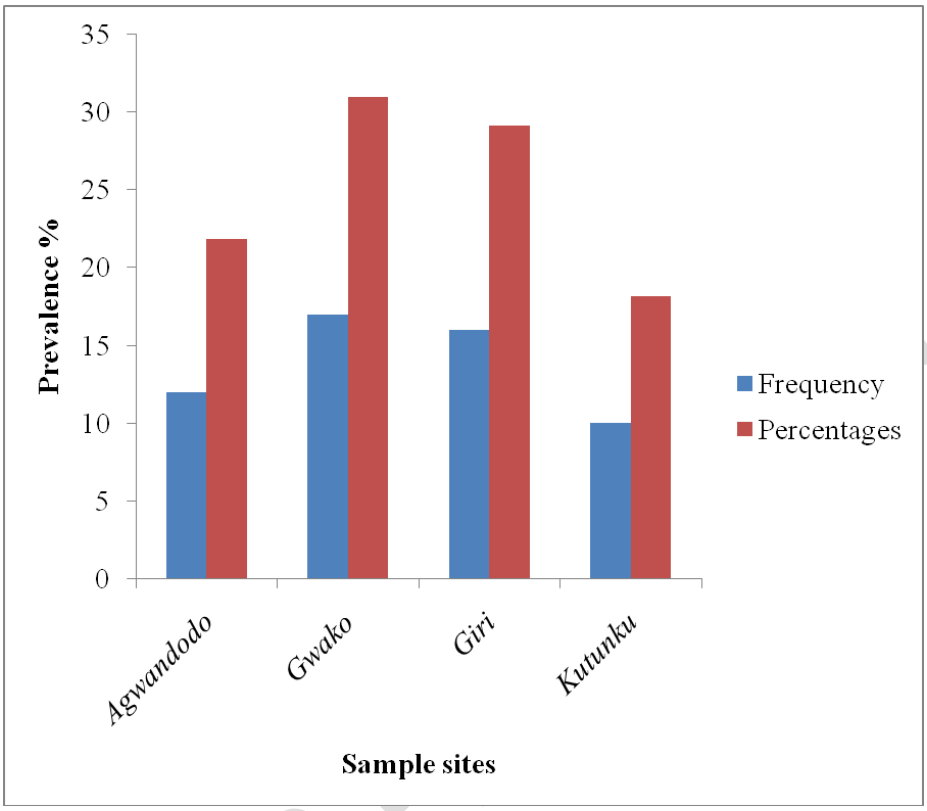

Figure 1: Total ~~intenstinal~~intestinal helminth parasites in cattle slaughtered different abattoirs in Gwagwalada

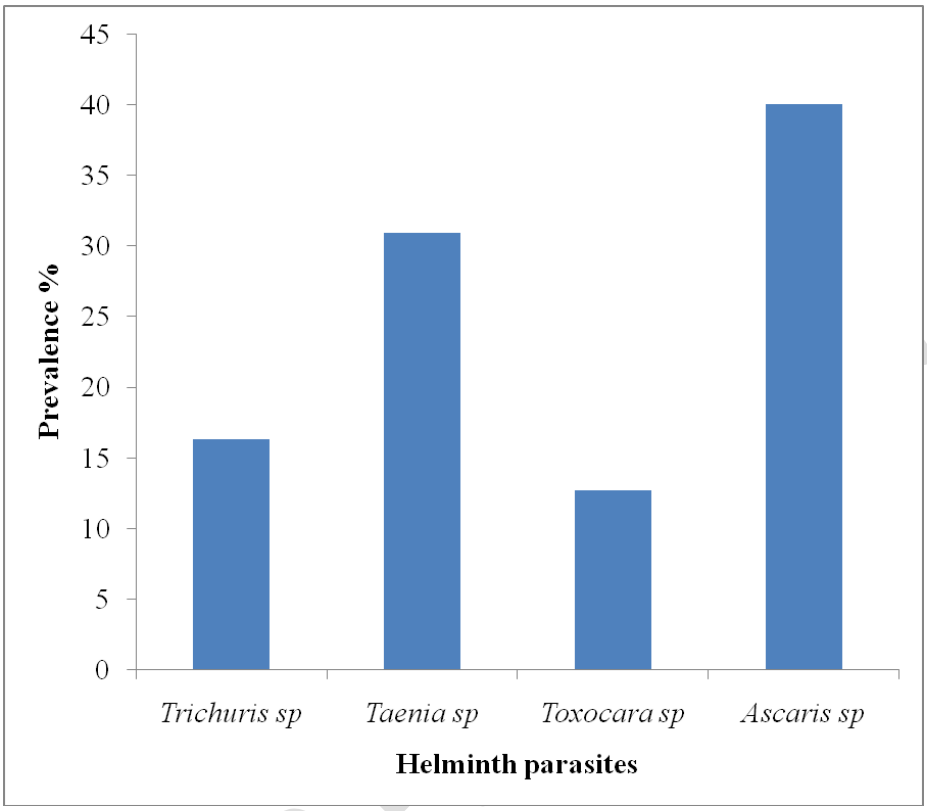

Figure 2: Overall Prevalence of ~~intenstinal~~intestinal helminth parasite in cattle slaughtered different abattoirs in Gwagwalada

DISCUSSION

The findings of this study show that all the cattle screened had helminth infection, thus providing valuable information on the burden of helminths among cattle in Nigeria, since animals slaughtered in this abattoir are representative of cattle in the country. The overall prevalence of helminth infection obtained in this study is similar to that of Edosomwan and Shoyemi (2012), who reported a prevalence of 167.1% in the south-south region of Nigeria but higher than the 50.8% and 62.1% earlier reported by (Nwigwe et al. 2013) in south-eastern and south-southern Nigeria, respectively. The differences observed could be due to the periods or seasons in which the studies were conducted as well as the sources of cattle sampled in the various regions. The most prevalent helminth parasite observed in cattle slaughtered was *Ascaris lumbricoide* with sixty-six (66), equivalent to 40% of the total number of parasites observed, and fifty-one (51) of them, which is equivalent to 30.91% were *Taenia saginata*, while twenty-seven (27) were *Trichuris trichiura* (16.36%), and only twenty-one were *Fasciola gigantica*, the least parasite observed with 12.73% as seen in Table 2. (Dantanko and Idris 2014) also reported the prevalence of *Taenia* sp, *Ascaris* sp; and *Trichuris trichiura* in livestock slaughtered in Dei-Dei Abattoir,

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F.C.T Abuja. Furthermore, this finding revealed that nematodes and cestodes were the most prevalent among the helminths. However, this is at variance with previous reports by (Haliu *et al*. 2011; Mir *et al*. 2013. Nwigwe *et al*. 2013) reported nematodes as the most prevalent helminths in studies carried out in India, Ethiopia, and eastern Nigeria, respectively. This difference could, however, be associated with differences in geographical and/or climatic conditions and ecology. Again, the helminths identified in this study were similar to those identified by (Edosomwan and Shoyemi 2012. Elele et al. 2013) in earlier studies carried out in Benin and Port Harcourt, south-south Nigeria. It can therefore be suggested that the similarity in the helminth profile indicates exposure of these animals to common conditions (e.g., ecology, pasture, and humidity) which are prevalent in northern Nigeria, where most of these animals are sourced from before being transported to different abattoirs in Nigeria. One major factor that would have accounted for this is the fact that cattle in the local setting in Nigeria are exposed to poor feeding and veterinary care, factors accountable for equal susceptibility to helminth infections. The difference in the prevalence obtained could be attributed to the existence of favorable environmental factors necessary for the prolonged survival and development of the infective larval stage of most helminths. Furthermore, the management system of animals could also be accountable for the difference in prevalence. Cattle with a moderate body condition score had a higher prevalence of intestinal helminths when compared to those that were emaciated. Possible explanations for this include the fact that those with moderate body condition tolerated helminth infections better for a variety of reasons, including good nutrition, or that both host and parasite had reached a state of equilibrium and were asymptomatic at the time of sample collection.

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Comment [MPS12]: The authors attribute the prevalence differences found in their study with those reported earlier to poor feeding and veterinary care. However, little is said (or described) about the origins of the cattle: do the animal have access to garbage? What are the hygiene conditions in these places? Were animals breed up by small farmers?
I suggest the authors to provide more information regarding the origin of the animals.

Comment [MPS13]: I suggest the authors to back up their statements with bibliography because there are reports suggesting that a poor nutrition condition led to a higher parasite burden because the immune system is negative affected by this condition:
https://pubmed.ncbi.nlm.nih.gov/33468010/
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CONCLUSION

The result of this study showed a moderately high prevalence of intestinal helminth infection of both economic and zoonotic importance among trade cattle slaughtered in abattoirs in Gwagwalada, Nigeria. This has a negative impact on both animal production and public health. Therefore, to mitigate these problems, appropriate anthelminthic regimens and control measures (i.e., comprehensive parasite control programs, pasture management, and environmental sanitation) in cattle and public health awareness should be encouraged. Finally, there is a need to monitor intestinal parasites in cattle to promote animal production and public health in Nigeria.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

REFERENCES

Adedipe, N.O., Bakshi, J.S., Odegbaro, O.A. and Aliyu, A. (2016). ”Study on gastrointestinal helminth infections in small-scale dairy cattle farms of Jimma town Ethiopia”,. *Journal of Applied Sciences and Technology*, 34: 45-65.
Awowole, B. and Francis (2017). "*This is a waste*". Daily Sun The Sun Publishing Limited, Lagos.*NewJournal*.10-23.

Cheesbrough, M., (2016). “District Laboratory Practice in tropical countries”. PartII low price edition.Cambridge University PressJournal , London.P 105.

Dantanko, H. and Idris, H. S. (2014). “Helminthosis in Livestock Slaughtered in Dei-Dei Abattoir”, F.C.T Abuja. Global Advanced Research Journal of Agricultural Science, 3 (9): 304-309.

Edosomwan, E.U. and Shoyemi, O.O. (2012). Prevalence of gastrointestinal helminth parasites of cattle and goats slaughtered at abattoirs in Benin City, Nigeria. African Scientist, 13 (2): 109–114.

Ekong, P. S.; Juryit, R.; Dika, N.M.; Nguku, P; and Musenero, M. (2012). “ Prevalence and risk factors for zoonotic helminth infection among humans and animals”, Jos, Nigeria. The Pan African Medical Journal, 11: 22-6.

Elele, K., Owhoeli, O. and Gboeloh, L.B. (2013). “Prevalence of species of helminths parasites in cattle slaughtered in selected abattoirs in Port Harcourt, south-south, Nigeria”. International Research on Medical Sciences, 1 (2): 10–17.

Food and Agricultural Organisation, (2011). “Distribution and impact of helminth diseases of livestock in developing countries, in FAO Corporate Document”. Repository Agriculture and Consumer Protection, 22: 45-66.

Hailu, T., Cherenet, A., Moti, Y. and Tadele, T. (2011).” Study on gastrointestinal helminth infections in small-scale dairy cattle farms of Jimma town, Ethiopia”. Ethiopian Journal of Applied Sciences and Technology, 2 (1): 31–37, 2011.

Hesterberg, U. W., Bagnall, R., Perrett, K., Horner, R. and Gummow, B. (2017). “A questionnaire survey of perceptions and preventive measures related to animal health amongst cattle owners of rural communities in KwaZulu-Natal, South Africa”. Journal of the South African Veterinary Association, 78 (4): 205–208.

Keyyu, J.D.; Monrad, J.; Kyvsgaard, N.C. and Kassuku, A.A. (2015). “Epidemiology of Fasciola gigantica and amphistomes in cattle on traditional, small-scale dairy and large-scale dairy farms in the southern highlands of Tanzania”. Tropical Animal Health and Production, 37 (4): 303–314.

Mir, M. R., Chishti, M. Z. and Rashid, Z. (2013). “Point prevalence of gastrointestinal helminthiasis in large ruminants of Jammu, India”. International Journal of Scientific and Research Publications, 3 (8): 2013.

Nwigwe, J.; Njoku, O. O.; Odikamnoro, O.O; and Uhuo, C.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.

Radostits, O.M.; Blood, D.C. and Gay, C.C. (2014). "Diseases caused by helminth parasites, in Veterinary Medicine": A Textbook of Diseases of Cattle, Sheep, Pigs, Goats and Horses. BaillereTindall, London, UK, Journal 8th edition. pp. 1223–1230.

Rajput, Z.I.;Hu, S.W.' Chen, J., Arijo, A.G. and Xiao, C.W. (2016). "Importance of ticks and their chemical and immunological control in livestock". Science Journal of Zhejiang University, 7 (11): 912–921.

Swai, E. S.; Mtui, P.F.; Mbise, A.N.; Kaaya, E., Sanka, P. and Loomu, P.M. (2016). "Prevalence of gastro intestinal parasite infections in Maasai cattle in Ngorongoro District, Tanzania", Livestock Research for Rural Development, 18: 8.

Tewe, O.O. (2017). "Sustainability and Development": Paradigms from Nigeria's Livestock Industry, Inaugural Lecture series. University of Ibadan Press, Ibadan, Nigeria. Pp. 97.