



Research Article

Survey on the Prevalence and Burden of Gastrointestinal Helminths Infections of Cattle Slaughtered at Dutse Modern Abattoir, Jigawa State, Nigeria

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ABSTRACT

An abattoir cross sectional survey was carried out to determine the prevalence of gastrointestinal parasitic helminths in slaughtered cattle at Dutse Local Government Area, Jigawa State, Nigeria. A total of 288 fecal samples were tested. Gastrointestinal helminths' eggs were detected in 219 samples tested giving an overall prevalence of 76.04%. The prevalent helminthes species identified were *Cooperia* sp., *Fasciola* sp, *T. saginata*, *Tricostromylus* sp, *Ostertagia*, and *Paraphostimum* sp. High prevalence of gastrointestinal helminths in cattle slaughtered was observed during the wet season; with *T. saginata* 106(35.2%) having highest prevalence and the least prevalent species *Paraphostimum* sp. with 11(3.7). There is significant association of increasing parasitic infection with months of wet season $p=0.001$; $\chi^2=80.36$. However, there was no significant association was observed during dry season $p=0.35$; $\chi^2=21.74$. the distribution of gastrointestinal helminths according to age group of the animals were found to be 77.14% in Cattle less than 2 years, 76.27% in young and 70.59% in adults. These findings implied that the majority of cattle brought for slaughter in Dutse abattoir were highly infested with several internal helminthes parasites that may present a public health problem and an important epidemiological implication. Therefore, an effective chemotherapy, an appropriate meat inspection, and famers education of proper use of anthelmintic to prevent infestation of human and to enhance food sufficiency not only in quantity but also in quality.

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INTRODUCTION

The livestock production sector in Nigeria contributes immensely to the economic well-being of the nation and over 80% of the population is in a way involved in agriculture (Otuma and Uchewa, 2009). The cattle population in Nigeria has been estimated to be 15.3 million (Tibi and Aphunu, 2010) with 80% of this managed by the pastoralists (Okoli *et al.*, 2012) who practice an extensive production system which is the traditional method of grazing cattle in Africa (Kanyari *et al.*, 2009). Cattle are the major source of animal protein in Nigeria. It contributes more than seventy per cent (70%) of total protein consumed (Takeet *et al.*, 2016). In Nigeria, the majority of these cattle are in the hand of pastoralists who take their cattle on free-range grazing and thus exposing them to various disease-causing agents including parasitic helminths and protozoans (Takeet *et al.*, 2016). Cattle are the single most important livestock species in Nigeria in terms of supply of animal protein, value and biomass. They provide meat and milk, hide, bones, blood, horns and draught usage; and are of great genetic diversity being adapted to stressful environmental conditions of poor nutrition, inclement weather and a myriad of diseases (Raji *et al.*, 2007).

The gastrointestinal parasites mainly helminths and some protozoans are responsible for clinical and subclinical diseases of livestock and this has been a major constraint to livestock production in Nigeria (Biu and Adindu, 2004). The three major classes of helminths that are of veterinary importance that often affect the gastrointestinal tract of cattle include the nematodes (e.g. *Nematodirus* spp, *Ascaris* sp, *Stroglyoides* sp), trematodes (e.g. *Paraphistomum* sp, *Schistosomum* sp) and cestode (e.g. *Moniezia* sp.) (Onaga *et al.*, 2009). These gastrointestinal parasites have caused direct production loss to livestock and indirectly by retarding growth, lowering productivity and increasing the susceptibility of animals to other

infections (Yadav *et al.*, 2006). Other indirect economic losses include lowered fertility, reduced work capacity, involuntary culling and treatment cost (Zahid *et al.*, 2005). Geoclimatic conditions and poor GIP awareness by livestock farmers contribute towards a conducive environment for the development and growth of parasites (Raza *et al.*, 2007).

Some gastrointestinal parasites (GIP) of cattle like *Shistosomum* sp and *Fasciola* sp have the potentials of infecting humans and the increasing resistance of GIP to several anti-helminthics (Albonico *et al.* 2004) are major challenges that require swift solutions. Notably, the increasing gastrointestinal helminth infections in cattle due to continuous re-infection from persistent exposures to infected grazing lands have a way of aggravating the challenge of helminths' resistance to dewormers. This is due to the traditional method of grazing cattle in Nigeria, which predisposes them to ingest infective stages of GIP during grazing and/or use of communal water sources (Adelakun *et al.*, 2020).

Helminth infection is a cosmopolitan disease affecting ruminant animals, especially in places of poor hygiene and feeding (Faye *et al.*, 2003). Gastrointestinal parasites are known to be widespread in Nigeria (Adedipe *et al.*, 2014; Owhoeli *et al.*, 2014; and Jegede *et al.*, 2015). Therefore, the present study is aimed at determining the prevalence and public health burden of Gastrointestinal Helminth Infections of cattle slaughtered at Dutse Modern Abattoir, Jigawa State

MATERIALS AND METHODS

Study Area

The study was conducted in Dutse Municipal Abattoir, a major abattoir located in Dutse Local Government Area (11° 46' 39" North, 9° 20' 3" East), Jigawa State.

Inclusion Criteria

All cattle that were presented for slaughter at abattoir during the study periods were

considered as study animals for the presence of gastrointestinal parasite.

Sources of the Subjects

Cattle slaughtered in the selected abattoir were mostly sourced from different cattle rearing regions of Nigeria (mainly northeastern Nigeria) and some neighboring African countries including Burkina Faso, Cameroon, Chad, Mali, and Niger. Hence, it serves as a good source of sentinel survey for diseases (including helminthic infections) from different regions of Nigeria and beyond.

Population, Sampling Methods, and Sample Size

The population of the study targeted all cattle that were presented for slaughter at the abattoir. However, the study adopted census data i.e. by direct counting/sampling and including all the cattle presented for slaughter during the period of the study. The study animals were 288 cattle comprising 103 males and 185 females.

Sample Collection

Sample collection was done fortnightly, during the study period (July, 2018 to June, 2019) as early as 6:00 am when the animals are usually taken to the abattoir. A total of 288 samples of fresh faecal samples (directly from the rectum of slaughtered cattle, one sample per animal) from cattle were collected using a pair of hand gloves into clean-labeled plastic container. The samples were dispatched to Biological Science Laboratory, Federal University Dutse, Nigeria for investigation. Each Faecal sample was tested for helminth parasite by formol ether technique (Ballweber, 2006).

Sample Analysis and Examination

The Formol-ether sedimentation technique was used in analyzing the samples because the techniques used solutions of lower specific gravity than the parasitic organisms, thus concentrating the latter in the sediment. It also takes advantage of the high specific gravity of protozoan cysts and helminth eggs compared to water. Their natural tendency to settle out in

aqueous solutions was accelerated by light centrifugation. And finally, Formalin fixes the eggs, larvae, oocysts, and spores, so that they are no longer infectious, as well as preserves their morphology.

Morphological Identification of the Parasites Eggs

Eggs were identified on the basis of their morphological features as described by Soulsby (1982).

Morphological Identification of Parasites

The organisms observed were identified based on the morphological characteristics using the standard keys.

Data Analysis

Prevalence were determined using descriptive statistics and were expressed as percentage using microsoft excel (version 2019 for windows 10). Chi-squared test of association was used to analyze possible associations between the risk factors of infection among age group of cattle and possible association of parasitic infections with months of wet and dry season using SPSS version 23. Value of $p \leq 0.05$ was considered significant throughout the study and analyses.

RESULTS

Prevalence of gastrointestinal helminths infection

Out of the total 288 faecal samples of cattle were examined and 219 (76.04%) were positive for gastro intestinal helminth eggs and/or parasites. Several helminths were observed which include *Cooperia* sp., *Fasciola* sp, *T. saginata*, *Tricostromylus* sp, *Ostertagia*, and *Paraphostimum* sp. With their respective parasitic mean infection (Table 1.0)

Prevalence and Association of Parasitic Infections with months of Wet and Dry Season

High prevalence of gastrointestinal helminths in cattle slaughtered was observed during the wet season; with *T. saginata* 106(35.2) having highest prevalence and the least prevalent species *Paraphostimum* sp. with 11(3.7) (table

2.0). There is significant association of increasing parasitic infection with months of wet season $p=0.001$; $\chi^2=80.36$ while no significant association was observed during dry season $p=0.35$; $\chi^2=21.74$ (Table 3.0).

Prevalence of gastrointestinal helminths according to age group

Table 4.0 provided the distribution of gastrointestinal helminths according to age group of the animals, the prevalence of gastro intestinal helminths found to be 77.14 in Cattle less than 2 years, 76.27% in young and 70.59% in adults.

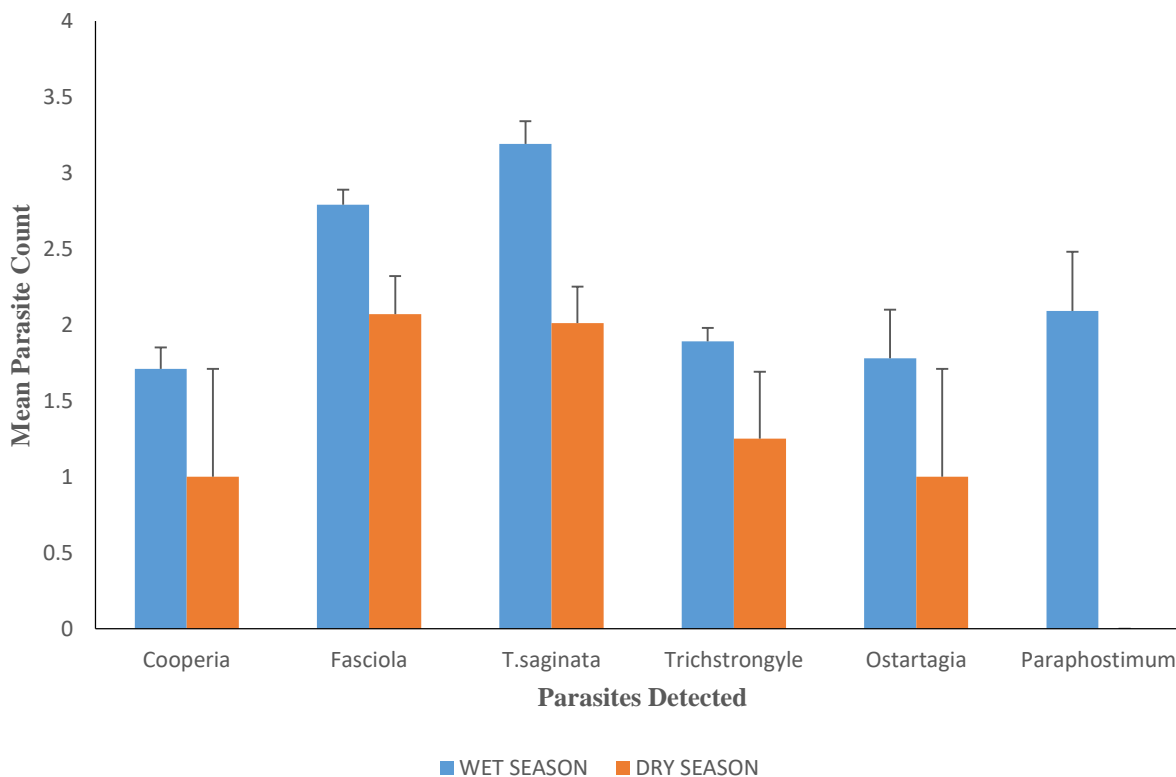


Figure I: The Mean Parasitic occurrence in Wet and Dry Seasons

Table 1.0: Mean Parasitic Infections in Wet and Dry Seasons

Parasitic Infection	Seasons (Mean ±SE)	
	Wet	Dry
None	9.94±0.55	3.34±0.24
<i>Cooperia</i> sp.	9.32±0.29	2.00±0.00
<i>Fasciola</i> sp	9.14±0.14	3.32±1.82
<i>T. saginata</i>	9.14±0.14	3.44±0.21
<i>Tricostrongylus</i> sp.	9.17±0.51	2.13±0.44
<i>Ostertagia</i>	9.08±1.08	1.00±0.00
<i>Paraphostimum</i> sp.	9.18±1.08	-----

Table 2.0: Prevalence and Association of Parasitic Infections with months of Wet Season

Parasitic infection	% Prevalence					
	July	August	September	October	November	Total
None	5(11.6)	0(0.0)	0(0.0)	4(4.4)	7(18.4)	16(5.3)
<i>Cooperia</i> sp.	4(9.3)	11(19.6)	3(4.1)	9(10.0)	7(18.4)	34(11.3)
<i>Fasciola</i> sp	17(39.5)	22(27.0)	20(27.0)	32(35.6)	13(34.2)	104(34.6)
<i>T. saginata</i>	17(39.5)	17(30.4)	24(32.4)	39(43.3)	9(23.7)	106(35.2)
<i>Trichostrongylus</i> sp.	0(0.0)	1(1.8)	13(17.6)	4(4.4)	0(0.0)	18(6.0)
<i>Ostertagia</i>	0(0.0)	3(5.4)	7(9.5)	1(1.1)	1(2.6)	12(4.0)
<i>Paraphostimum</i> sp.	0(0.0)	2(3.6)	7(9.5)	1(1.1)	1(2.6)	11(3.7)
Total	43(14.3)	56(18.6)	74(24.6)	90(29.9)	38(12.6)	
p-Value						0.001**
χ^2						80.36

** Significant, $p < 0.05$ **Table 3.0:** Prevalence and Association of Parasitic Infections with months of Dry Season

Parasitic infection	% Prevalence					
	July	August	September	October	November	Total
None	10(28.6)	15(21.4)	10(21.4)	11(31.4)	7(21.9)	53(25.9)
<i>Cooperia</i> sp.	0(0.0)	2(2.9)	0(0.0)	0(0.0)	0(0.0)	2(1.0)
<i>Fasciola</i> sp	11(31.4)	24(34.3)	10(30.3)	11(31.4)	12(37.5)	68(33.2)
<i>T. saginata</i>	9(25.7)	26(37.1)	11(33.3)	13(37.1)	13(40.6)	72(35.1)
<i>Trichostrongylus</i> sp.	3(8.6)	3(4.3)	2(6.1)	0(0.0)	0(0.0)	8(3.9)
<i>Ostertagia</i>	2(5.7)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	2(1.0)
<i>Paraphostimum</i> sp.	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
Total	35(17.1)	70(34.1)	33(16.1)	35(17.1)	32(15.6)	
p-Value						0.35*
χ^2						21.74

* Not significant, $p < 0.05$ **Table 4.0:** Prevalence of gastrointestinal helminths according to age group

Age Group(years)	No. Examined	No. Infected	(%) Infected
<2 Years	35	27	77.14
3-5 Years	236	180	76.27
>5 Years	17	12	70.59

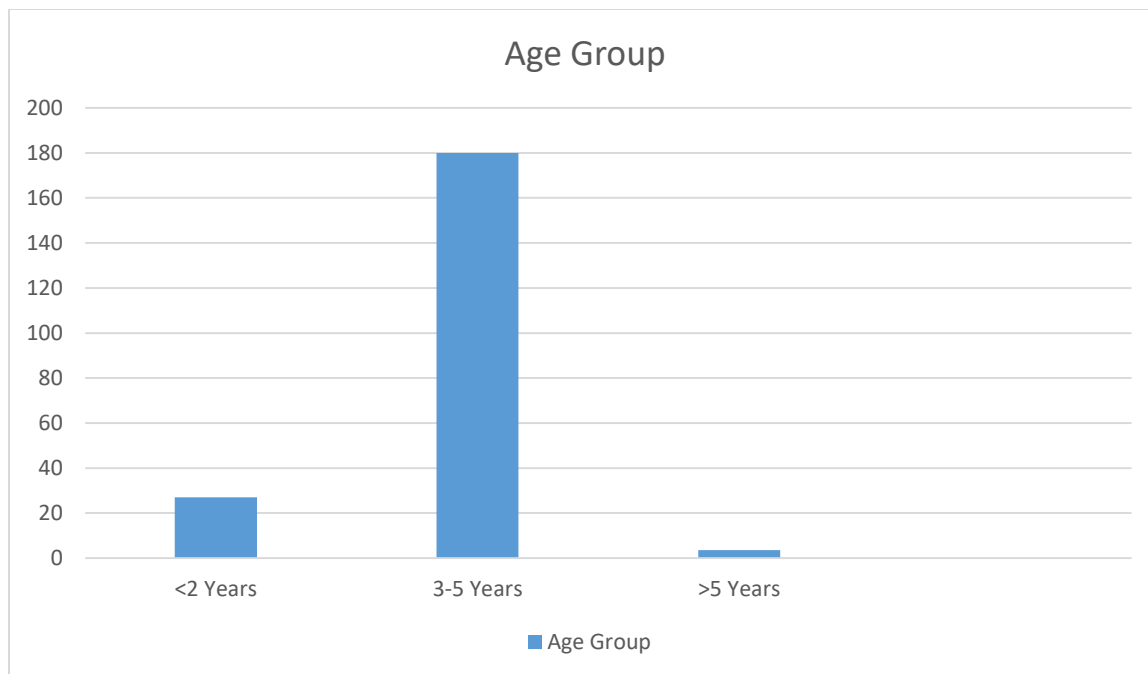


Figure II: Prevalence of gastrointestinal helminths according to age group

DISCUSSION

The findings of this study show that 76.04% (219/288) of the cattle screened had helminth infection, thus providing valuable information on the burden of helminths among cattle in Jigawa state since animals slaughtered in this abattoir are representative of cattle in the state. Precisely, *T. saginata* infections were particularly high, as they accounted for 35.2% (106) during the wet season and 35.1% (72) during dry season. This finding corresponds to the similar studies by Umar et al. (2018), who found 74.3% prevalence of gastrointestinal helminths in cattle slaughtered at Bauchi central abattoir, Bauchi State Nigeria. Similarly, the study conforms to the findings of Owheili et al., (2014), who reported as high as 62.1% prevalence rate of helminths in Port Harcourt, South-South, Nigeria and in Umuahia South Local Government Area, Abia State, Nigeria. However, the findings of Shitta (2013), indicated a lower prevalence of 34.9% among the cattle slaughtered at Wukari abattoir, Taraba State, Nigeria.

The results also indicated a significant prevalence and association of parasitic infections with months of wet season $p=0.001$. During the rainy (wet) season, the higher prevalence observed could be attributed to the high moisture content and lower temperature which favour the growth and development of helminths larvae on pasture, and in turns favours, contact between the host and parasites. Higher parasitic infection by gastrointestinal helminthes during rainy season was reported in in separate studies of Wadhwa et al., (2011) and Ohaeri (2012), in Cattle and buffaloes in Bikaner, Rajasthan, India and Cattle slaughtered in abattoir in Umuahia South Local Government Area, Abia State, Nigeria respectively.

Generally, susceptibility to GIP infection might be influenced by varying factors such as age, breed, health status, pregnancy and history of early infection (Pfukenyi and Mukaratirwa, 2013). However, in this study, age was the factor that significantly affected the prevalence of GIP. A relatively high GIP infection was observed in cattle <2 years of age compared to the adult cattle. This age prevalence of GIP is similar to

the findings of Tilak et al. (2016). The higher GIP infection in cattle less than 2 years could be because cattle, older than 2 years, are more resistant to GIP, while the cattle <2 years are more susceptible to infection (Pfukenyi et al., 2007), being new and just coming to the pasture.

CONCLUSION

These findings testify that the majority of cattle brought for slaughter in Dutse abattoir were highly infested with several internal helminthes parasites that are known to adapt easily even to harsh conditions. Most of these infected cattle

are slaughtered to produce meat that is consumed by human population. These may present a public health problem and an important epidemiological implication since they can serve as source of infection for calves. Therefore, an effective chemotherapy, an appropriate meat inspection, regular control measures are needed as well as famers education in the proper use of anthelmintic to prevent infestation of human and to enhance food sufficiency not only in quantity but also in quality.

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