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Gastro-Intestinal and Hepatic Parasitic Infections of Cattle and Goat in Abraka and Environs, Delta State

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Abstract
This s this study examined a total of 750 faecal and 212 gall bladder samples for helminthes parasites in Abraka. Sedimentation technique and Formalin Ethyl Acetate concentration were used to detect the presence of helminth eggs in the samples. Analysis of variation (ANOVA) was used to establish the relationship between the results obtained. A total of 213(56.8%) were positive for cattle while 197(52.5%) samples were positive for goat. Rainy season recorded higher level of helminth parasites prevalence of 135(63.4%) and 109(55.3%) for cattle and goats respectively. From the one hundred and eighteen (118) gall bladder samples collected from cattle, 87(73.7%) were positive to helminth parasites. Also, from the ninety four (94) gall bladder samples obtained from goat, 63(67.0%) had at least a helminth infection in the gall bladder. There was significant difference in the prevalence of helminth parasites for goat and cattle samples. Histological sections of liver samples were cut at a thickness of 4.0µm, stained by hematoxylin-eosin and analyzed using conventional light microscopy. Macroscopical examination showed that there is centrilobular hepatocellular necrosis and inflammation in the liver lesion. Also, the liver showed a random hepatocellular degeneration. Based on the results, constant and regular de-warming should be carried out by herd owners and farmers to control the rate of prevalence of helminth parasites in these economically important animals.

Keywords: Feacal samples, Gall bladder Gastro-intestinal parasites, Hepatic parasites, Ruminants

Introduction
Gastrointestinal parasites are ubiquitously distributed and prevalence studies have been variously carried out in different geographical regions of Nigeria (Adedipe *et al.*, 2014; Oluwole *et al.*, 2016; Karaye *et al.*, 2018; Lemy and Egwunyenga, 2017).

These parasitic infections poses a serious health threat to livestock in terms of rearing (Nwosu *et al.*, 2007). Also, most of these parasitic infections are zoonotic and thus could pose a deleterious threat to public health. The economic importance of internal parasites, such as gastrointestinal worms and lungworms, in cattle has been a controversial topic. It is known that internal parasitism can decrease an animal's productivity.

The primary parasites involved are gastrointestinal worms, such as *Ostertagia ostertagi* (brown stomach worm), *Cooperia spp.* (small intestinal worm or cattle bankrupt worm), *Trichostrongylus* (hair worms), and *Nematodirus helvetianus* (thread-necked or thin-necked worm). In certain areas, lungworms (*Dictyocaulus viviparus*) may also be present. It is reported that reduction occurred in farmer profit up to 16% and decrease in weight up to 50% is because of gastrointestinal parasitic infections. Studies on the prevalence of helminth parasites of ruminants have showed that these parasites are prevalent with various species which are capable of causing deleterious effects on their health (Adedipe *et al.*, 2014; Oluwole *et al.*, 2016; Karaye *et al.*, 2018).

Parasitic infections affecting cattle and goats causes severe economic losses (Mellau *et al.*, 2010) and are the most serious impediments affecting livestock production (Kabir *et al.*, 2010). These parasites alters the liver resulting in pathological alterations in the liver. The most common diseases or disease conditions of liver found in slaughtered food animals are fascioliasis, hepatitis, tuberculosis, hydatidosis, cysticercosis, abcesses, necrosis and cirrhosis in Brazil (Mendes *et al.*, 2007), Tanzania (Mellau *et al.*, 2010), Sudan (Mohamed, 2021).

Study of the prevalence and abundance of helminth species in ruminant is aimed at documenting the severity of these parasites with the hope that preventive measures could be adopted to curb the associated effects of high burden of helminth infections. This study tends to document the prevalence of helminth parasites of ruminants in the study area. The study also examined the presence of parasites on the gall bladder and possible damages which these parasites pose to the liver via histological analysis. These data in relation to helminth prevalence by seasons (wet and dry) is important for development of grazing pattern to prevent helminth infection and treatment routine capable of reducing the burden of these parasites.

MATERIALS AND METHODS

Study Area and Design

This study was conducted in Abraka, located in forested wetland, along the margin of the River Ethiope within the Ethiope East and its environs in Delta State, Nigeria. Abraka town has an estimated population size of 56,851. It is comprised mainly of indigenous inhabitants, traders, civil servants and students which hold the larger make-up of the estimated population (Ilondu and Nweke, 2016). Weekly visits for a period of twelve (12) months (from July, 2022 to June, 2023) was made to various abattoirs in Abraka and its surrounding communities (Benin Road: Station 1; Abraka Bridge: Station 2; Urhuovie: Station 3) to collect faecal samples, gall bladder and bile for this study.

Sample Collection

Visits were made to the abattoir weekly for sample collection during the study period for collection of the specimens/samples for the investigation after slaughtering the animals by the slaughters. Fecal samples were collected directly from the rectum of each cattle and goat, using disposable plastic gloves and placed in clean universal bottle. Bile and gall bladder were also obtained from same cattle and goat, and each sample was labelled with identification number, sex and date. Samples were placed in 10% formalin containing sterile vials labelled with unique identity numbers, transferred to the

laboratory at Department of Animal and Environmental Biology, Delta State University, Abraka for laboratory analysis.

Parasitological Examination

Two different types of qualitative analyses, namely sedimentation technique and Formalin Ethyl Acetate Concentration were used to detect the presence of helminth eggs in the sample materials. For sedimentation technique, two grams (2g) of faeces in a test tubes was dissolved with 3 ml distilled water and strained to give a suspension into a corresponding cleaned labeled Petri dish. The filtrate was poured into corresponding test tubes. 1 mL of 10% formalin was added and allowed to stand for 5 minutes. Diethyl-ether (1 mL) was added after 5 minutes. The test tubes was corked and centrifuged at 2000 rpm for 8 minutes. The supernatant was decanted leaving few of it with the sediment. Drops (1-2) of the sediment was placed on a glass slide, covered with cover slip, and viewed under microscope using ×100 magnification. For the Formalin Ethyl Acetate Concentration technique, 2mL of the bile was collected using 18-gauge hypodermic needle from the gall bladder into a labeled test tube and 1mL of 10% formalin was added and allowed to stand for 5 minutes. Diethyl-ether (1 mL) was added in the test tube after 5 minutes and centrifuged at 2000 rpm for 10 minutes. The supernatant was decanted leaving few of it with the sediment. Drops (1-2) of the sediment was placed on a glass slide and covered with a cover slip and viewed under microscope using ×100 magnification.

Liver Histological Examination

Samples of liver from cattle and goats were obtained separately during the study period. Samples of liver obtained from goat and cattle were placed in sampling bottles and preserved using formo-saline solution (10%) and transported to the Histology Laboratory of the Faculty of Basic Medical Sciences, Delta State University, Abraka, for histological examinations. Using the method of Lima *et al.* (2019), samples fixed with 10% formaline were dehydrated in graded alcohol, clarified in xylene and embedded in paraffin. Histological sections were cut at a thickness of 4.0µm and stained by hematoxylin-eosin (H&E), and the sectioning were analyzed using conventional light microscopy for the presence of helminth and other parasites.

Statistical Analysis

The data obtained from the study were analyzed using Graphpad Instat version 3 statistical software. The significance of association between variables was tested using Analysis of Variation (ANOVA) to establish relationship between intestinal helminths infection and prevalence at 0.05 level of prevalence.

RESULTS

Prevalence Helminth Parasites in Cattle and Goats at various Abattoirs in Abraka and Environs

The distribution of helminth parasites in cattle and goats for both feacal samples and gall bladder samples respectively are shown in Tables 4.1 and 4.2. The results showed that a total of two thousand four hundred and seventy six (2476) individual species of helminth which cut across three different helminth belonging to species of trematode and nematode for both cattle and goat feacal samples and gall bladder samples respectively. *Toxocaria* sp. recorded a total of eight hundred and nineteen (819) individual species for cattle which cut across feacal samples (624) and gall bladder samples (195). *Dicrocoelium* sp. recorded a total of two hundred and twenty four (224) individual species which cut across feacal samples (163) and gall bladder samples (61). Also, *Fasciola* sp recorded a total of four hundred and sixty one (461) individual species for cattle which cut across feacal samples (312) and gall bladder samples (149) (Table 4.1).

Also, the distribution of helminth species for feacal samples and gall bladder samples observed from samples showed that *Toxocaria* sp. recorded a total of four hundred and sixty four (464) individual species which cut across feacal samples (279) and gall bladder samples (185). *Dicrocoelium* sp. recorded a total of one hundred and fifty (150) individual species which cut across feacal samples (103) and gall bladder samples (47). Also, *Fasciola* sp recorded a total of three

hundred and fifty eight (358) individual species which cut across feacal samples (211) and gall bladder samples (147) (Table 4.2).

Table 4.1: Distribution of Helminth Parasites in Cattle at various Abattoirs in Abraka and Environs

Samples	Number	Species of Parasites		
Cattle	**Positive**	***Toxocaria* sp.**	***Dicrocoelium* sp.**	***Fasciola* sp.**
Feacal Sample	213	624	163	312
Gall Bladder	87	195	61	149
Total	300	819	224	461
F-value		1.347	0.2198	0.6107
P-value		0.43	0.687	0.520

Table 4.2: Distribution of Helminth Parasites in Goats at various Abattoirs in Abraka and Environs

Samples	Number	Species of Parasites		
Goat	**Positive**	***Toxocaria* sp.**	***Dicrocoelium* sp.**	***Fasciola* sp.**
Feacal Sample	197	279	103	211
Gall Bladder	63	185	47	147
Total	260	464	150	358
F-value		1.553	0.5737	0.4355
P-value		0.351	0.559	0.599

Seasonal Prevalence of Helminth from Feacal Samples of Cattle and Goat at Various Abattoirs in Abraka and Environs

The seasonal prevalence of helminth from feacal samples obtained from cattle and goat at various abattoirs in Abraka and environs are presented in Figure 1. The results showed that rainy season recorded higher level of helminth parasites prevalence of 135(63.4%) and 109(55.3%) for cattle and goats respectively. While dry season recorded lower prevalence. The results showed that the values recorded differed significantly across both season. Also, the results showed that *Toxocaria* sp. was the most prevalent in rainy season from feacal samples obtained from the different locations followed by *Fasciola* sp. and *Dicrocoelium* sp. respectively. The most prevalent species recorded for dry season was *Fasciola* sp., this was followed by *Toxocaria* sp. and *Dicrocoelium* sp. respectively.

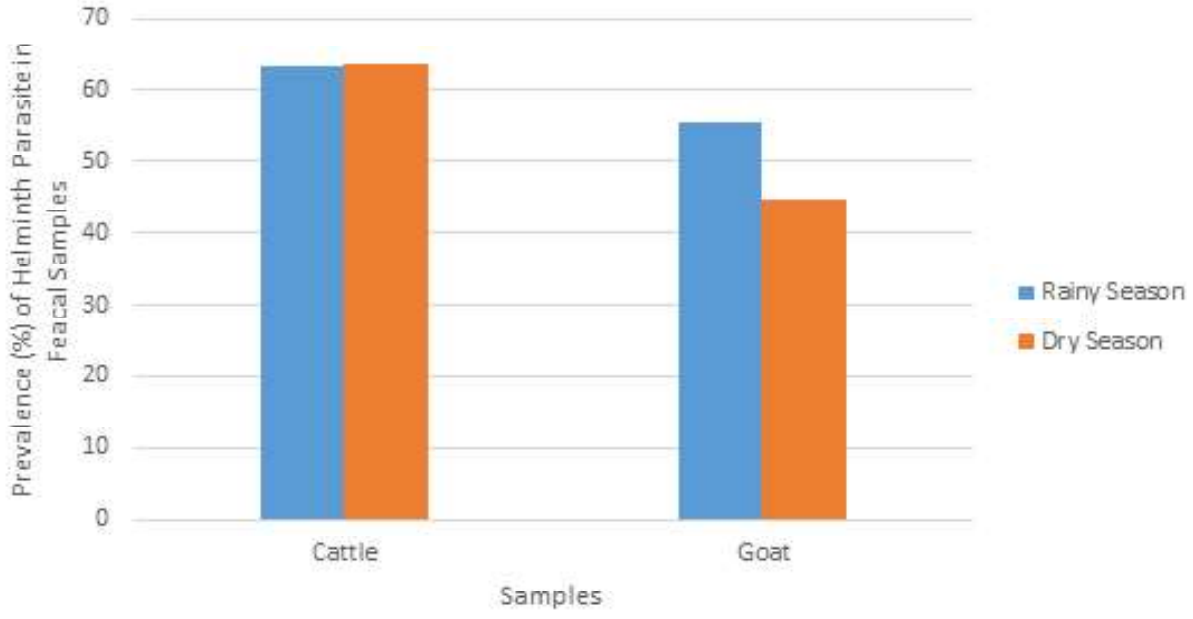

Figure 1: Seasonal prevalence of helminth from feacal samples of cattle and goats at various abattoirs in Abraka and Environs (July, 2022 to June, 2023)

Seasonal Prevalence of Helminth from Gall Bladder Samples of Cattle and Goats at Various Abattoirs in Abraka and Environs

The seasonal prevalence of helminth from gall bladder samples obtained from cattle and goats at various abattoirs in Abraka and environs are presented in Figure 2. The results showed that rainy season recorded higher level of helminth parasites prevalence of 50(57.5%) and 38(60.3%) for cattle and goat respectively. While dry season recorded lower prevalence. The results showed that the values recorded differed significantly across both season. Also, the results showed that *Toxocaria* sp. was the most prevalent in rainy season from feacal samples obtained from the different locations followed by *Fasciola* sp. and *Dicrocoelium* sp. respectively. The most prevalent species recorded for dry season was *Fasciola* sp., this was followed by *Toxocaria* sp. and *Dicrocoelium* sp. respectively.

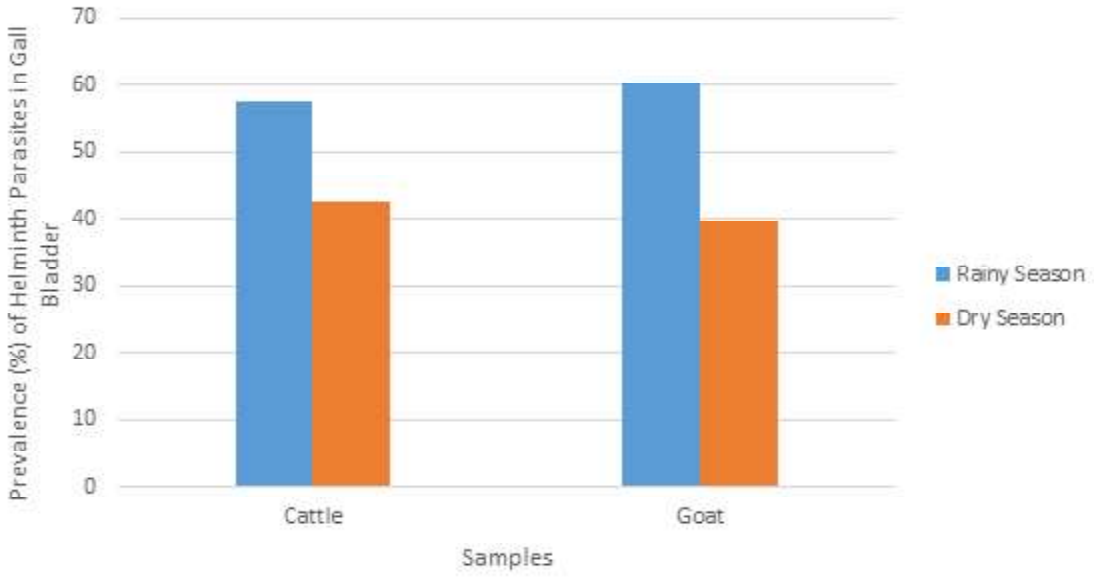

Figure 2: Seasonal prevalence of helminth from gall bladder samples from cattle and goats at various abattoirs in Abraka and Environs (July, 2022 to June, 2023)

Histopathological Studies

Macroscopical examination from the study of liver section obtained from cattle showed that there is centrilobular hepatocellular necrosis and inflammation in the liver lesion. Also, the liver showed a random hepatocellular degeneration. The examination from the study of liver section obtained from goat shows evidence of portal hepatocellular necrosis and inflammation. Macroscopical examination shows that the liver appeared to be slightly swollen, with pale colourations and some irregular whitish areas which indicates fibrosis over the parietal surface. Microscopic investigation also showed that changes in cellular structure were observed in the liver of both cattle and goat which is attributed to the activities of parasitic helmints.

Discussion

The study reported a high prevalence of helminth infection for both cattle and goat with 56.8% and 52.5% prevalence respectively. The prevalence reported in this study for both cattle and goat were higher than the value of 4.30% in Nigeria by Amuzie *et al.* (2018) and 32.20% in Uganda as reported by Kagendah and Angwech (2018). Also, the results were lower compared to 87.41% in Nigeria Okike-Osisiogu *et al.* (2016) and 78.02% recorded by Bushra *et al.* (2013) and Nath *et al.* (2016) in cattle in Bangladesh. Similarly, Solomon-Wisdom *et al.* (2014) reported 53.64% prevalence of helminth parasites in samples obtained from goats within abattoirs in Abuja metropolis, Nigeria. Also, Aliyu *et al.* (2020) reported prevalence of 80.0% of parasitic helminthes in samples obtained from goats within Lafia, Nasarawa State, Nigeria.

The results obtained from this study showed that the prevalence of gastrointestinal parasites of 56.8% recorded for cattle was slightly higher than

52.5% recorded for goats. This may be due to inability to develop a protective immune response against infection (Ngoka, 1983). Also, this variation may be due to different management system. This result was concordant with that recorded by Arafa *et al*., (2007) and Ibrahim *et al*., (2008). The increase in overall rate of gastrointestinal parasites may be attributed to the variation in climate which necessary for development of infective larvae. The prevalence and intensity of helminth parasites has been reported to vary due to several factors (Adebimpe, 2011).

The results also showed that rainy season recorded higher level of helminth parasites prevalence of 135(63.4%) and 50(57.5%) for feacal samples and gall bladder samples respectively. While dry season recorded lower prevalence for cattle samples. Similarly, the results showed that rainy season recorded higher level of helminth parasites prevalence of 109(55.3%) and 38(60.3%) for feacal samples and gall bladder samples respectively. While dry season recorded lower prevalence. The seasonal variations recorded in this study is similar to the results obtained Adedokun *et al.,* (2008) who found higher prevalence of the flukes during wet months. The wet season provides a suitable climatic and environmental condition for the growth and development of the snail intermediate hosts. The wet season also provides a suitable environment for the survival of liver fluke intermediate stages and the cercaria of *Fasciola* species has a poor survival rate in the dry season (Adedokun *et al.,* 2008).

The histology of liver samples obtained from both cattle and goats at the study areas showed that there were effects of the activities of these helminthes on the liver. The examination showed that there is centrilobular hepatocellular necrosis and inflammation in the liver lesion. Also, the liver showed a random hepatocellular degeneration in cattle samples. The examination shows evidence of portal hepatocellular necrosis and inflammation in goat samples. The various liver damage such as centrilobular hepatocellular necrosis, inflammation and random hepatocellular degeneration have been reported by Okoye *et al.* (2015) to be caused by the activities of *Fasciola* species. Similar observations were made by Ahmedullah *et al.* (2007).

Conclusion

This study analyzed feacal and gall bladder samples obtained from cattle and goats at various abattoirs in Abraka and environs in Delta State for the presence of helminth parasites. It also carried out histological analysis of liver lesion for possible damages caused by the activities of helminth infections. The study reported prevalence of helminth infection for both cattle and goat with 56.8% and 52.5% prevalence respectively. The prevalence reported in this study for both cattle and goat falls within the prevalence of parasitic helminths in cattle which has been reported by previous authors. The study showed that three species of helminthes parasites belonging to the species of trematode and nematode including *Dicrocoelum* sp., *Fasciola* sp. and *Toxocaria* sp. were recorded to be prevalent in both cattle and goats within the study area.

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