

## A Parasitological and Histological Survey on Common Gut Parasites of Goats Slaughtered in Calabar Metropolis

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### Abstract

Gastrointestinal parasites are either helminths or Protozoa that inhabit the gastro-intestinal tract (GIT), causing diseases in humans and other animals, especially the domestic goat. A parasitological and histological survey on common gut parasites of goats slaughtered in Calabar Metropolis was carried out between July and October 2016. Four Hundred (400) goats' faecal samples (270 from male and 130 from female goats), comprising 120 West African Dwarf, 135 Borno Sahel White and 145 Red sokoto breeds. Also 400 liver tissues from male and female goats of the aforementioned breeds were collected from goats in abattoirs within Calabar. The faecal samples and liver tissues were examined for parasites using microscopic, formol ether concentration technique, and histological processing techniques respectively. Out of the 400 faecal samples examined, 85(21.3%) were positive for intestinal parasites. The Red sokoto breed had a higher prevalence of 41(28.3%), the Borno Sahel white 30(22.2%) while West African dwarf breed had the lower prevalence of 14(11.7%). Male goats had a prevalence of 47(17.4%), while female goats had a prevalence of 38(29.2%). The gastro intestinal parasites detected were; *Strongyloides* spp, *Ostertagia* spp, *Haemonchus contortus*, *Fasciola hepatica*, *Coccidia* spp, *Echinococcus granulosus* and *Trychostrongylus* spp. Among the Helminths, *Strongyloides* spp had the highest prevalence of 22(5.5%), while *E. granulosus* had the lowest prevalence of 5(1.3%). The prevalence of larval forms of *F. hepatica* in 400 liver tissues of goats' examined, showed a slightly higher prevalence of 19(38%) in male goats, and 16(32%) in female goats. Of the 35 liver positive samples examined histologically, Red sokoto breed still had the highest prevalence of 16(45.7%) followed by West African Dwarf with 11(31.4%) and Borno breed had the lowest prevalence of 8(22.9%). The prevalence of infections by gender and breed were statistically significant ( $X^2 = 6.43, P < 0.05$ ), ( $X^2 = 4.81, P < 0.05$ ) respectively; also the prevalence of parasites in the liver tissues examined histologically by gender and breed studied were also statistically significant ( $X^2 = 7.779, P < 0.05$ ). ( $X^2 = 5.612, P < 0.05$ ) respectively. This study has confirmed the high prevalence of helminths infection of goats in Calabar, Cross River State.

### Introduction

Intestinal parasites are either helminthes or Protozoa. They inhabit or populate the intestinal tracts of both humans and animals (Ubom *et al.*, 2012). This implies that some intestinal parasites found in humans, are also found in goats and other domesticated animals (Zajic, 2006). Among the phylum protozoa, gut parasites of veterinary importance predominant in Nigeria include; The Amoebae (*Entamoeba histolytica*), *Flagellates* (*Giardia lalmbli*a), and *Coccidian* spp (rarely; *Cryptosporidium parvum*) (Arora *et al.*, 2010).

In Nigeria, important killer diseases and high morbidity in small ruminants especially goats are caused by the helminthes i.e. (nematodes, trematodes and cestodes) (Larsen, 1999; Debela, 2002). Helminthes commonly detected in goats include the following; *Haemonchus contortus*, *Strongyloides* spp, *Trichostrongylus* spp, *Fasciola* spp and *Moniezia benedeni*, *Ostertagia* spp, *E. granulosus* etc (Aliu *et al.*, 2001; Van Wyk *et al.*, 2004).

*E. histolytica* causes intestinal and extra intestinal amoebiasis in goats (Arora *et al.*, 2010). *E. histolytica* has a worldwide geographical distribution with a particularly high prevalence in Bangladesh, Myanmar, China, India, Iraq, Republic of Korea and Vietnam (Arora *et al.*, 2010). Amoebiasis is also a problem in Mexico and other Latin American countries (Arora *et al.*, 2010). *Giardia lamblia* causes giardiasis which is cosmopolitan in its geographical distribution, with its highest prevalence occurring in the tropics and subtropics, where sanitation is poor (Arora *et al.*, 2010). Goats found in countries of tropical Africa, Mexico, Russia, Southeast Asia and Western South America, are at high risk of acquiring giardiasis (Arora *et al.*, 2010). In developing countries, *G. lamblia* is one of the most significant pathogens that infect goats, with a peak prevalence rate of 20% (Arora *et al.*, 2010). *Cryptosporidium parvum* is also linked with gastrointestinal infections in goats but it is more pathogenic in sheep and other small ruminants (Arora *et al.*, 2010).

Helminthiasis is one of the most important causes of mortality and morbidity of goats in tropical and sub-tropical regions of the developing world, especially where adequate water sanitation is lacking (De Silva *et al.*, 2003; Amadi *et al.*, 2010). In the Southern parts of Nigeria (including Calabar in Cross River State), *Fasciola spp*, *Strongyloides spp*, are the constant feature of Gastrointestinal parasitism in goats, especially during the rainy season (Van Wyk *et al.*, 2002; Okoli *et al.*, 2006). Members of the family Taenidae (e.g *Ecchinococcus granulosus* and taenia species have both veterinary and public health importance and are common intestinal parasites of goats and sheep (Urzuhart *et al.*, 1996). All trematode species that are parasitic in goats and sheep, belong to the sub class *Digenea*(Arora *et al.*, 2010), and the most important species in Africa are the liver flukes *Fasciola hepatica*, *Fasciola gigantica*, *Dicrocoelium species* and rumen flukes *Paraphistomium species* (Anon, 1994; Hansen *et al.*, 1994). Fascioliasis, which is an infestation of the liver by the liver fluke *Fasciola hepatica* causes liver damage sometimes through liver rot (Oxford dictionary, 2014 edition). Fascioliasis occurs worldwide in acute, sub-acute and chronic forms (Arora *et al.*, 2010). Large numbers of young flukes may cause acute parenchymal hepatitis in which the serous capsule of the liver may be sprinkled with haemorrhages and covered with fibre (Adejinmi *et al.*, 2015). Gastrointestinal parasites are common in both temperate and tropical countries, but more prevalent in warm countries, where sanitation is poor and standard of living is very low (Adejinmi *et al.*, 2015).

The most common protozoan gut parasites of goats are acquired through faecal-oral transmission, primarily by ingestion of contaminated feeds, vegetables and water, enhanced by poor hygiene in livestock farms (Gertongi, 1996; Zijac, 2006), while the gut helminthes are usually acquired by the ingestion of the infected eggs or larvae or by larval penetration through the skin (Githigia *et al.*, 2001; Nwoke *et al.*, 2013). It is common to find gastrointestinal parasites in goats of all age groups, but the infection may be more prevalent in kits, because they do not possess fully developed immunity against parasitic infection (Bowman, 1999). Kits can also be born with gut helminth infections and therefore must be de-wormed soon after birth. These infections may also be transmitted to kits through colostrum during breast feeding (Meleod, 2009). Symptoms associated with gut helminth infection may include; anaemia, diarrhoea, weight loss, oedema, recumbences, liver parenchymal damage, liver necrosis, splenomegaly, emaciation, and even death of the goat (Perry *et al.*, 1999; Abubakar, 2002). In overcrowded goat farms that are poorly managed, gastro intestinal infections are of greater impact, as they are often acute and lethal (Mondal *et al.*, 2000). Gut worms in goats cause economic and nutritional hardship in poor livestock farming communities, as a result of lack of sound knowledge of animal care, prevention and eradication of diseases (Fakae, 1990). Majority of infected goats may have worm egg load of around 500 eggs/gramme of faeces. A

high population of small ruminants (goats and sheep), shed *Strongyloides* eggs during the post parturient period and studies show that mixed infection are more prevalent (Fakae, 1990).

The common clinical signs and symptoms of GIT parasitic infections in goats may include: nausea, vomiting, fever, weight loss, anaemia, dull hair coat, hair loss, and sudden death (Shalaby *et al.*, 2010). Although losses due to parasitic gastroenteritis have been estimated and reported in some parts of Nigeria (Akaerjola *et al.*, 1979), very few studies have been conducted in Calabar and its environs in Cross River State. Paradoxically, this is a major livestock consuming area which consumes about 25% of the of goats and sheep coming in from the North-East Region of Borno State, Nigeria (Bourn *et al.*, 1994).

The aim of this study was to examine the faeces of goats microscopically and liver histologically for the oresence of intestinal parasites

### **Materials and Methods**

The study was carried out within Calabar Metropolis of Cross River State, Nigeria, Specimens were collected from the animals at the point of slaughter at various abattoirs located in the city.

A total of 400 faecal samples and 400 liver tissues were collected from adult (male and female) goats of different breeds at abattoirs located Gbogobiri, Marian market, Akim market, Atimbo, Anantigha, Mami market, Yellow duke, and Atakpa.

The consent of the abattoir Chairman and head butchers at various abattoirs was sought and then specimens were randomly collected from (400 goat faeces and 400 liver samples were collected from both apparently sick and asymptomatic healthy looking goats brought for slaughter.

Faecal samples were collected from each slaughtered goats by squeezing out the gut contents from the rectal area as the intestines were prepared for washing. The faecal specimens were collected into dry clean, leak-proof universal containers containing 10mls of 10% formol saline solution. Each universal container was properly labelled and the sex of each goat and place where the specimen was collected. Liver tissue sections from each goat were similarly collected and placed individually in universal containers containing 10% formal saline. Both faecal specimens and liver sections were processed for microscopy and haematoxylin and Eosin (H&E) staining at the parasitology and histopathology laboratories of the University of the University of Calabar Teaching Hospital.

### **Processing of stool specimens**

Each faecal sample was examined macroscopically for consistency and presence of abnormalities such as blood, mucous, adult parasites and segment of parasites.

Microscopic examination was done using saline and iodine wet mount preparations using x10 and x40 objective lens for confirmation of morphology and identity of parasites.

Formol-ether concentration technique was also carried out to concentrate any parasites present in the stool specimens.

### **Processing of liver sections**

Goat liver sections were cut into representative sections, each measuring about 4mm thick. Each section was then washed in physiological saline, placed separately in well labelled tissue cassettes and then fixed again in 10% formol- saline for 24hours.

The liver tissues were processed and sectioned using

Rotary microtome. Then it was stained in order to reveal structural details using routine Haematoxylin and Eosin (H&E) staining technique. Microscopy was done using X10 and X40

objective lenses. Larval forms of parasites were detected as burrows made in the liver tissues appearing as large spaces

## Results

**Table: 1 Total Number of goats with parasites according to gender**

Gender	Number Examined	No (%) positive for parasites
Males	270	47(17.4)
Females	130	38(29.2)
<b>Total</b>	<b>400</b>	<b>85(21.3)</b>

**Table: 2 Parasitological survey of goat's faeces by breed**

Breed	Total number Examined	Number (%) +ve for parasites
West African Dwarf	120	14(11.7)
Borno Sahel White	135	30(22.3)
Red Sokoto	145	41(28.3)
<b>Total</b>	<b>400</b>	<b>85(21.3)</b>

**Table: 3 Prevalence of larval forms of parasites in the liver tissues of goats by breed**

Breed	Total number Examined	Number (%) +ve for parasites found in liver
West African Dwarf	120	9(7.5)
Borno Sahel White	135	7(5.2)
Red Sokoto	145	18(12.4)
<b>Total</b>	<b>400</b>	<b>34(8.5)</b>

**Table 4: Prevalence of gastrointestinal parasites by Breed**

Breed	Total Number examined	Parasites detected				
		<i>Strongyloides spp</i>	<i>Ostertagia spp</i>	<i>Haemonchus spp.</i>	<i>Faschiola hepatica</i>	<i>Coccidia spp.</i>
West African Dwarf	120	2	-	1	3	-
Borno sahel	135	1	1	2	1	-
Red sokoto	145	-	1	1	7	2
<b>Total</b>	<b>400</b>	<b>3</b>	<b>2</b>	<b>4</b>	<b>11</b>	<b>2</b>

**Table 5: Prevalence of gastrointestinal parasites in the liver of goats**

Breed	Total Number examined	Parasites detected				
		<i>Strongyloides spp</i>	<i>Trychostrongylus spp</i>	<i>Haemonchus spp.</i>	<i>Faschiola hepatica sp</i>	<i>Coccidia spp.</i>
West African Dwarf	120	2	-	1	6	1
Borno sahel	135	1	1	2	2	4
Red sokoto	145	-	1	1	1	1
<b>Total</b>	<b>400</b>	<b>3</b>	<b>2</b>	<b>4</b>	<b>11</b>	<b>6</b>

**Table 6 :Prevalence of parasites in the liver of goat by gender**

gender	Number examined	No. (%) of positive For parasites in liver
males	270	19(7.03)
Females	130	18(13.8)
<b>Total</b>	<b>400</b>	<b>35(8.8)</b>

The results of the parasitological survey of goats by gender is presented in table 1. Of the 400 faeces of goats examined, 270(67.5%) were from male goats while 130 (32.5%) were from female goats. The prevalence rate of parasites in male goat faeces was 47(17.4%) while that of females was 38(29.2%). The overall prevalence of parasites detected in goat faeces was 85(21.3%).

Table 2 shows the parasitological survey of goat's faeces by breed. The Red Sokoto had the highest prevalence rate of parasites with 41(28.3%) followed by the Borno Sahel breed with 30(22.2%) and lastly the West African Dwarf with 14(11.7%).

The Prevalence of larval forms of parasites in the liver tissues of goats by breed is presented in table 3. The liver of Red Sokoto still had the highest number of larva found with 18(12.4%) followed by the West African Dwarf with 9(7.5%) and lastly with the Borno Sahel breed with 9(5.2%).

The prevalence of gastro intestinal parasites by breed is shown in Table 4. *Faschiola hepatica* 11(2.8%) was the highest parasite found, followed by *Trychostrongylus spp* 7(1.8%) and lastly *Ostertagia spp* and *Coccidia spp* with 2(0.5%) each.

Table 6 shows the prevalence of parasites in the liver of goats by gender. The liver of female's goats harboured more parasites 18(13.8%) than that of males 19(7.03%).

## Discussion

The results of this study showed that goats slaughtered in Calabar metropolis were infected with a variety of gastro intestinal parasites, including; *S. papiillosus*, *Ostertagia spp*, *H. contortus*, *Coccidia spp*, *F. hepatica* and *Trichostrongylus (Strongyle spp) etc.* This agrees with the reports of (Adejinmi et al., 2015 and differ with that of Nwoke et al., 2015 who reported the presence of *Strongyloides species*, *Oesophagostomum species*, *Trichostrongylus species*, *Haemonchus species*, *Ostertagia species*, *Bunostomum species*, *Gongylonema species*, *Giageriaspecies*, *Ascaris species* and *Trichuris species* . The overall prevalence of parasites in this study was 85(21.3%) with male goats having a prevalence of 47(17.4%) and Female goats 38(29.2%). These results agrees with the work done by Nwoke et al., 2015 in Kogi where a survey of common gut helminthes of goats slaughtered at Ankpa abattoir was carried out and of the 162 samples examined, 47(76%) samples from males goats were positive while 49(79%) were positive for females goats samples. These results also agree with that Nwoke et al., 2015 that female goats were more infected than males. The liver tissues of goats were examined histologically and females goats still had the higher percentage 18(13.8%) while liver from male goats had 19(7.03. %)

About eight species of gastro-intestinal parasites were identified in the faeces and liver of the West African Dwarf (WAD), Borno and Red Sokoto breeds with a total prevalence of 85(21.5%). The prevalence of these intestinal parasites observed in these goats is in agreement

with the findings of Aliu, 2001 and Van Wyk, 2004, who in their independent studies reported that helminth parasites were dominant in goats and are among the successful parasites of animals because of their efficient life cycles ranging from the very simple to the extremely complicated stage. And also in line with the study carried out in Kogi by Nwoke *et al.*, 2015. The presence of these parasites in the goats might be due to the system of management that these goats were subjected to as they were always left to wander about scavenging and feeding indiscriminately on anything they come in contact with and then return to their poorly kept sheds. These findings agree with the work of Adejinmi *et al.*, (2015) who stated that animals were exposed to massive helminth infections when they were maintained in an unhygienic environment, and also when fed with contaminated food and water.

The prevalence of protozoan infections recorded in this study may be due to overcrowding, poor management and lack of hygiene. This is in accordance with the work of Adejinmi *et al.*, (2015), who reported that an increased rate of protozoal infections was as a result of overcrowding and poor hygienic practices which greatly encouraged the spread of parasites. These animals become carriers of intestinal protozoa parasites and continually contaminate the environment with eggs and oocytes of the parasites. It is therefore paramount to note that during rainy season in tropical countries like Nigeria, environmental factors like temperature, humidity and moisture are favorable for the survival of the developmental stages of these gastro intestinal parasites. We therefore suggest that measures and good management practices in the form of environmental sanitation. Prompt diagnosis and treatment with anthelmintic and antiprotozoal drugs be implemented to reduce the risks of infections. However, resistance to the drugs by parasites has recently been observed and this should be avoided by discouraging self-medication by animal owners.

## Conclusion

It is important that some control measures for gastrointestinal parasites in small ruminants be undertaken to reduce parasite burden. Grazing fields should be kept free from contamination with faeces and urine of animals. Education of goat owners on method of transmission and effect of these parasites on the productivity of the animals should be carried out from time to time.

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