

The Prevalence of Giardiasis in White Fulani Cattle (A Case Study of Chanchaga Local Government Area of Niger State, Nigeria)

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ABSTRACT

This research was carried out in Chanchaga Local Government Area of Niger state to determine the prevalence of giardiasis in cattle in the study area. A total of 200 cattle faecal sample were collected from eleven (11) districts in Chanchaga Local Government Area. The samples were collected based on the sizes of the eleven (11) districts of the study area. 18 faecal samples were collected from sabon-gari districts, 17 from Nassarawa A, 18 from Nassarawa B, 18 from Nassarawa C, 18 from Minna central, 18 from Makera, 19 from Limawa A, 18 from Limawa B, 19 from Tudun-wada North, 18 from Tudun-wada south and 19 from Minna south. The cattle faecal samples collected were examined using direct smear and faecal float method. The data obtained was analyzed using percentage, mean, frequency and bar-chart. The result obtained revealed that 39 faecal samples obtained out of 200 faecal samples collected altogether were infected with giardial species and 74 of the faecal samples were infected endoparasites exclusive of giardia species. From the percentage analysis of giardia infection, Sabon-gari district has 7.7%, Nassarawa A has 10.3%, Nassarawa C 5.1%, Minna Central 12.8%, Makera 12.8%, Limawa A 7.7%, Limawa B 7.7%, Tudun-wada north 7.7%, Tudun-wada south 5.1% and Minna south has 12.8%. The prevalence of giardiasis in total faecal samples collected was 19.5%, and this showed that the prevalence of giardiansis in the study area is low.

Keywords: Faecal Sample, Giardia, Chanchaga, White Fulani Cattle.

Introduction

Giardia is an intestinal flagellate protozoan which commonly cause diarrhea in animals and human worldwide. It's a parasite with a single protozoan cell, which possess a broad throat and exist at a very prevalence rate, particularly in places with poor water sanitation (Fayer, 2000).

Giardia is also prevalent in day care setting (it can be passed through fecal and ingested orally). It has been found even in municipal water supplies and caused local epidemics. It affects many animals as well. It is clear that human can contact the infection from animals and it is also clear that human infection is highly contagious from one person to another (Olson *et al.*, 2004).

The genus Giardia consists of six species and they are distinguished on the basis of their trophozoite, morphology and ultra-structure (Adams, 2011). *Giardia duodenalis* (syn *Giardia intestinalis*) affecting humans, although they exhibits a wide host range being found in many other mammals. *Giardia duodenalis* is the etiological agent of giardiasis, a gastrointestinal infection in cattle ranging from a symptomatic to severe diarrhea as well as chronic disease (Buret, 2008).

Lifecycle of Giardia

- Step 1:** The lifecycle of Giardia alternates between the cyst and the trophozoite forms. They are found in feces cysts are more often found in non-diarrhea feces and they are the infectious stage of the parasite. The cyst are hardy and resistant to standard concentrations of chlorine in cold, moist environment.
- Step 2** Infection begins when a new host ingest cyst in contaminated food. Water vomits or fecal orally, Mature cyst are able to survive the acidic environment of the stomach and migrate to the small intestine of the host.
- Step 3** Exposure to stomach acid trigger a process called excystation, during which trophozoites are released from cyst. Each quadrinuclear cyst give rise to two binuclear trophozoite.
- Step 4:** The trophozoites multiply sexually by binary fission in the small intestine, either as free floating bodies in the disease causing stage of the parasite and they colonize the small intestine by attaching to the intestine mucosa using the ventral sucking disks. Trophozoites are largely noninvasive and do not invade other organs; however, at times they might penetrate down into the secondary tubules of the mucosa and be found in gallbladder and the biliary drainage.
- Step 5:** As trophozoites migrate toward the large intestine, they retreat into the cyst form in a process called encystation. Bile salts and

intestinal mucous were found to enhance trophozoites multiplication and encystation. Trophozoites if excreted in faeces cannot survive in the environment and are therefore non-infectious. The cyst in excrements will quickly become infectious and will begin a new cycle of infection if ingested by a naïve host.

The incubation period of *Giardia* might appear in this form; symptoms usually begin 1 to 2 weeks (average 7 days) after and individual becomes infected. In otherwise, health, individuals, symptom may last 2 to 6 weeks.

Mode of Transmission

Giardia has a simple lifecycle comprising of rapidly multiplying non-invasive, trophozoites on the mucosal surface of the small intestine, and the production of environmentally resistant cysts that are passed with the host faeces. Infected cysts are transmitted by the faecal-oral routes, either by direct or by ingestion of contaminated food or water (Adams, 2011). Illness from this parasite arises through infection in two broad settings: Outbreaks and (sporadic) endemic transmission. Venereal transmissions happen through faecal-oral contamination (Saviolit *et al.*, 2006). *Giardia* is the causative agent of a disease called giardiasis it's caused by the ingestion of infective cyst. There are multiple modes of transmission including person-to-person transmission account for major of *Giardia sp* (Linnane *et al.*, 2001). Additionally, diaper changing and inadequate hand washing are risk factors for transmission from infected children. Food borne epidemics of *Giardia* have developed through contamination of food by infected food handlers.

Control Measures of Giardiasis

Elimination of the sources of environment contamination, the uses of chemotherapeutic agents for the control of giardiasis in cattle provide the opportunity to enhance the performances, to reduce clinical signs and to prevent environmental contamination. Chlorine disinfectants are largely ineffective against *Giardia* cysts at lower temperatures. Consumption of water from field ponds during spring run off could also negate any benefit; water treatment has reducing water-borne transmission of this parasite (Handley *et al.*, 2001).

Materials and Methods

Study Area

Chanchaga Local Government Area is located at latitude 07° 09'N and longitude 08° 12'S of the equator. It has annual rainfall of about 600mm - 800mm and

temperature of about 23°C – 30°C in the day and 19°C – 23°C at night. The soil is sandy-loam and the vegetation is typically Guinea Savannah (Anonymous, 2011).

Material Used in the Direct Faecal Smear Method

1. Faecal samples
2. Light microscopes
3. Sides
4. Cover slips
5. Normal saline
6. Applicator sticks
7. Hand gloves
8. Laboratory coat.

Procedures for Faecal Sample Collection

- The cattle were properly restrained and the tails were raised up.
- All the fingers of chosen hand (right hand) were put inside the polythene leather.
- Per rectum faecal sample was scooped out and faeces were out into the polythene leather.
- Each sample was labeled, carrying the breed, sex, age and area collected.

Materials Used for Faecal Float Method

- Faecal samples
- Light microscopes
- Slides
- Cover slips
- Applicator
- Hand gloves
- Sodium nitrate
- Laboratory coat

Procedures for Direct Faecal Smear Method

This test is used more often to find parasites that are too small or do not float well enough to collect using the faecal float method.

- i. 1-2 drops of normal saline was dropped on the slide
- ii. A little of the faecal sample on the top of an applicator stick was added
- iii. The faecal sample was emulsified.
- iv. The slide was cover with the cover slip and examined with 10x objective lens.

- v. The examination was done with x40 objective lens which help in the detection of the organism.

Result

From the findings, results of 200 faecal samples of cattle were analyzed by direct smear method and faecal float method. *Gairdia sp* /cyst and other endoparasites e.g *Ascaris sp*, *Bonostomum sp*, *Coccidian sp*, *Strongyle sp*, *Heamonchus sp*, *Fasciola sp*, and *Cryptosporidium sp* were identified as contained in (Table 1-2), been represented by frequency, mean percentage and bar chart in (Table 3-5). 39 cattle faecal samples were positive for other endoparasites Ova or Oocyst. In the study, the prevalence of Giardiasis in total faecal samples collected was 19.5%

Table 1: Showed the Number of Examined Faecal Samples of Cattle Collected from The Study Area and the Percentage of Infection and non Infection Condition of the Cattle from the Eleven (11) District in Chanchaga Local Government Area of Niger State

S/N	Location	Number of Samples Examined	Number of Infected Cattle	Percentage (%)	Number of non-infection cattle	Percentage (%)
1	Sabon-Gari	18	3	7.7	15	9.3
2	Nassarawa`A`	17	4	10.3	13	8.1
3	Nassarawa`B`	18	4	10.3	13	8.1
4	Nassarawa`C`	18	2	5.1	16	9.9
5	Minna Central	18	5	12.8	13	8.1
6	Makera	18	5	12.8	13	8.1
7	Limawa`A`	19	3	7.7	16	9.9
8	Limawa`B`	18	3	7.7	15	9.3
9	Tudun-wada North	19	3	7.7	16	9.9
10	Tudun-wada South	18	2	5.1	16	9.9
11	Minna South	19	5	12.8	16	8.1
	Total	200	39	100	61	100

Table 2: Prevalence of Giardiasis Bases on the Sex and State of Development (Age) of Cattle Which the Samples Were Collected

Overall Numbers Examined	Total Number of Sample Examined	Number of Infected	Percentage (%)	Number of Non-Infected Cattle	Percentage (%)
Male	121	22	56.4	98	60.9
Female	79	17	43.6	63	39.1
Total	200	39	100	161	100

Table 3: Showed the Stage of Growth and Development(Age)

Stage of Growth	Total Number of Sample Examined	Number of Infected	Percentage (%)	Number of Non-infected Cattle	Percentage (%)
Adult	152	32	82.1	120	75
Young	48	7	17.9	41	25
Total	200	39	100	161	100

Table 4: Showing the Significant Difference Between the Treatment

Location Area	Percentage (%)
Sabon-gari	7.7
Nassarawa `A`	10.3
Nassarawa `B`	10.3
Nassarawa `C`	5.1
Minna Central	12.8
Makera	12.8
Limawa `A`	7.7
Limawa `B`	7.7
Tudun-wada North	7.7
Tudun-wada South	5.1
Minna South	12.8

Table 5: Showing Endoparasites Exclusive of *Giardia sp* or Cyst Identified from the Faecal Samples of Cattle from the Eleven (11) District in Chanchaga Local Government Area of Niger State

S/N	Helminthes Identified	Frequency	Means	Percentage (%)
1	Ova of <i>Ascaris vitulorum</i>	42	0.7	56.8
2	Ova of <i>Coccidian sp</i>	5	0.7	6.8
3	Ova of <i>Bunostomum sp</i>	1	0.7	1.4
4	Ova of <i>Strongyle sp</i>	2	0.7	2.7
5	Ova of <i>Haemonchus contotus</i>	8	0.7	10.8
6	Ova of <i>Fasciola sp</i>	13	0.7	17.6
7	Ova of <i>Cryptosporidium sp</i>	4	0.7	5.4
	Total	74	0.7	100

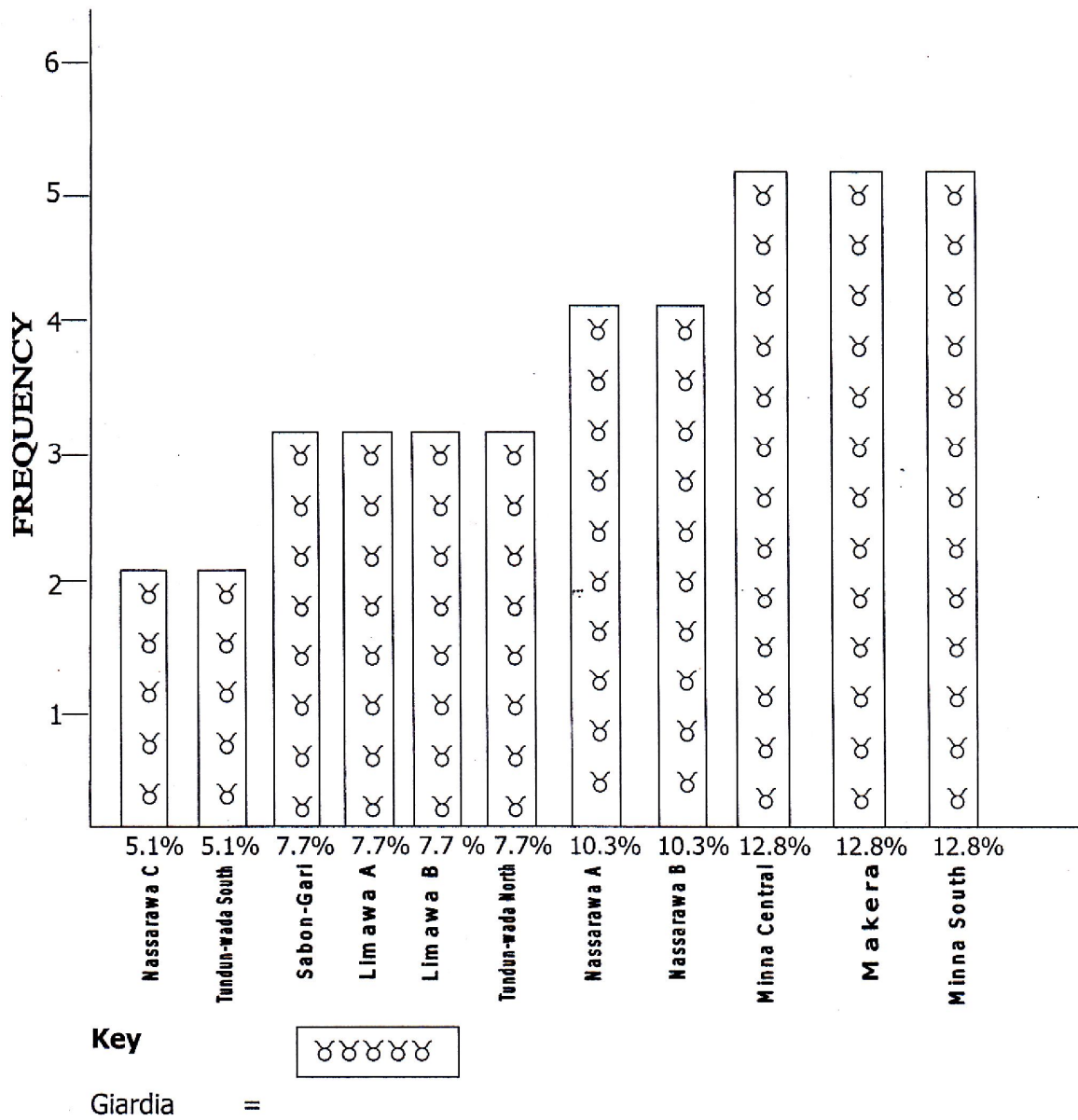


Figure 1: A Bar Chart Showing the Frequency of Giardia Infected Cattle and the Percentages from the Eleven (11) Districts in Chanchagal Local Government Area

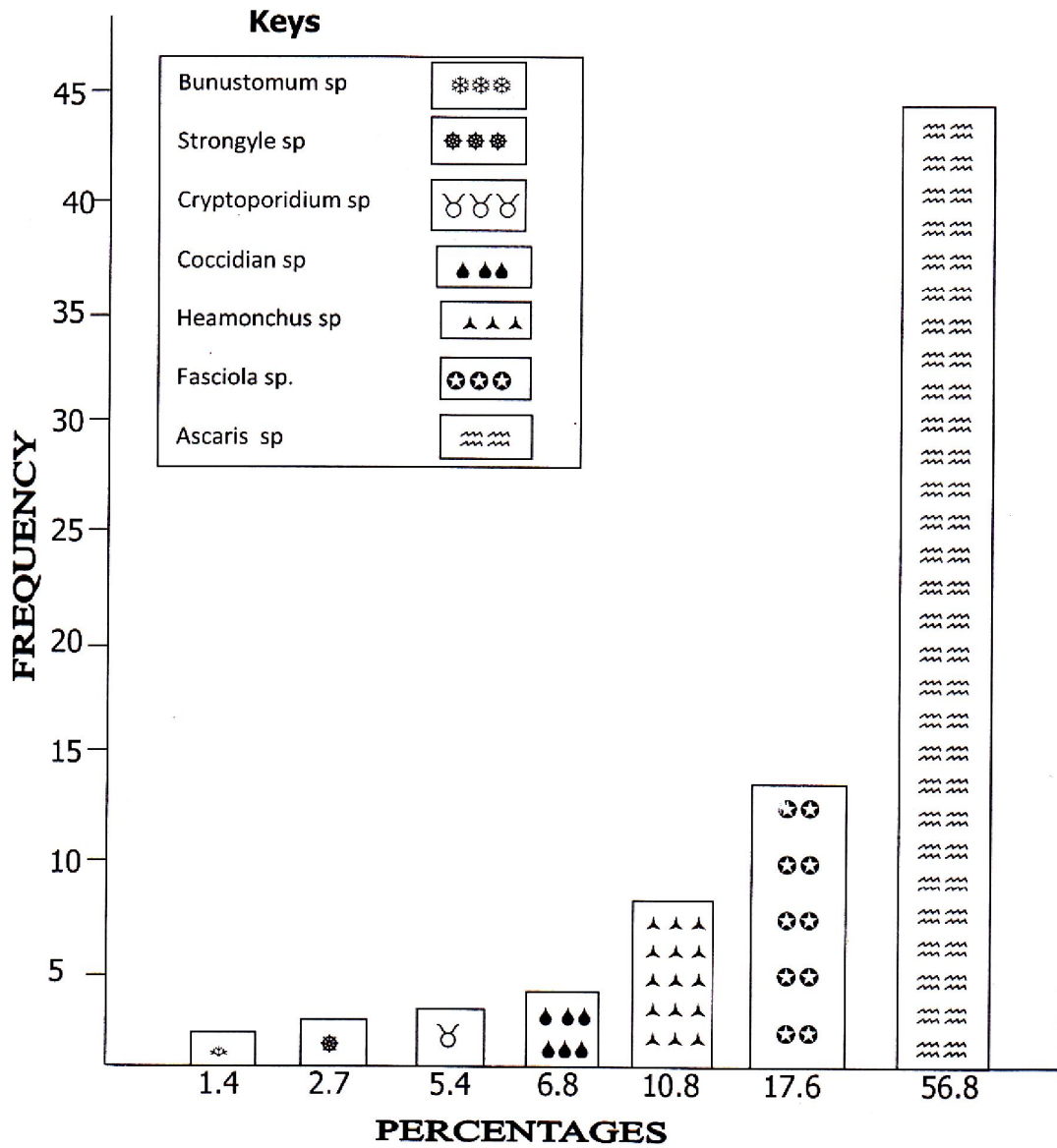


Figure 2: Endoparasites Exclusive of Giardia sp/cysts Identified from Cattle faecal Samples Collected from the Study Area.

Discussion

A total number of 200 faecal samples of cattle were collected from eleven (11) districts in Chanchaga Local Government area of Niger State; 18 faecal samples were collected from Sabon-gari district, 17 from Nassarawa A, 18 from Nassarawa B, 18 from Nassarawa C, 18 from Minna central, 18 from Makera, 19

from Limawa A, 18 from Limawa B, 19 from Tudun-wada North, 18 from Tudun-wada south and 19 from Minna south. The result of the analysis of the data collected in table 1 showed the frequency and the percentage of Giardia prevalence in the study area. The laboratory finding showed that Sabon-gari has the prevalence incident of Giardia infection to be three (3), with 7.7%, Nassarawa `A` has 4 frequency of occurrence and 10.3%, Nassarawa `B` has 4 with 10.3% Nassarawa C has 2 with 5.1%, Minna central has 5 with 12.8%, Makera has 5 with 12.8%, Limawa `A` has 3 with 7.7%, Limawa `B` followed suite with 3 frequency of occurrence and 7.7%, Tudun-wada North also has 3 with 7.7%, Tudun-wada south has 2 with 5.1% and lastly, Minna south has 5 frequency of occurrence and 12.8% of Giardia infections. And from the result of the analysis it showed that Minna central, Makera and south has the highest percentage of Giardiasis in the study area.

Table 2 showed the result of the prevalence of giardiasis in the study area based on the sex of the animals. The result showed that the male cattle have 56.4% of Giardia infection while female has 43.6% of Giardia prevalence in the study area. The finding showed that the male cattle have the highest number of Giardia infection in the study area.

Table 3: Showed the Giardia infection in cattle based on their ages; the adult cattle have 82.1% while the young cattle has 17.9% of Giardia infection which implies that the adult cattle has more percentage of Giardia infection than the young ones in the study area.

Table 4: Showed the significant difference between the treatments using the percentage in the infection as discussed in table one. Table 5 showed the endoparasites exclusive of Giardia sp or cyst identified from the faecal samples of cattle from the eleven (11) districts in the study area. Ova of *Ascaris spp.* has 56.8% of infection, Ova of *Coccidian spp.* has 6.8%, Ova of *Bunostomum spp.* has 1.4%, Ova of *Strongyle spp.* has 2.7%, Ova of *Haemonchus spp.* has 10.8%, Ova of *Fasciola spp.* has 17.6 and 5.4% has Oocyst of *Cryptosporidium spp.* in the study area. The result showed that *Ascaris spp.* has the highest percentage of infection which is 56.8% followed by *Fasciola spp.* which has 17.6%.

Conclusion

Conclusively, the research was prevalence of *Giardia species* in 200 faecal samples collected from cattle. The samples collected were examined for Giardia and other endoparasites using direct smear method and faecal float method. It was observed that 37 out of the 200 samples collected were infected with

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Giardia parasite and a number of 74 endoparasites exclusive of *Giardia species* were identified and the remaining 89 were free of Giardia and other endoparasites, therefore *Giardia species* are present in cattle in the study area, but the prevalence is low.

Recommendation

The following recommendation should be considered

- Management system of animals should be considered, that is; housing, feeding and health.
- Farmers should purchase their animal from a recognized farm where the records and date of meat inspection, hygiene rules and regulations are followed before buying or consuming.
- The animals should be properly vaccinated against Giardiasis and should be de-wormed at recommended interval basis to reduce the human Helminthes infection especially the Ascaris which is in the high rate of infection in the study area.

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