

Incidence of Gastrointestinal Parasites in Zebu and N'dama Breeds from Cattle Ranches in Jos Plateau, Nigeria

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Abstract

The incidence of gastrointestinal parasites in Zebu and N'dama breeds known to be trypanotolerant cattle from some ranches in Jos Plateau was investigated at the peak of the raining season, August to October, 2018. A total of 150 cattle from some Ranches in Jos Plateau were randomly selected for faecal sampling out of which 85 were Zebu (*Bos indicus*) and 65 were N'dama (*Bos taurus*) breeds respectively. The samples were analyzed for ova of gastrointestinal parasites using the simple flotation and sedimentation techniques and the results were interesting. The strongyloids, *Oesophagostomum radiatum* had the highest incidence of 4.7% followed by the *Trichostrongylus* species with 4%. *Fasciola gigantica* and *Haemonchus placei* both were 3.3%. Then *Paramphistomum cervi* 2%; bovine hook worm, *Bunostomum phlebotomum* 1.3%, *Taenia saginata* 1.3%, *Schistosoma bovis* 1.3% and *Nematodirus spathiger* 0.7%. The incidence of nematodes, cestodes and trematodes in this study in the raining season was significant ($p < 0.05$) and could pose production and economic threat to institutional farms and ranches in the development of livestock and dairy industries in Nigeria. There should be a strong policy on the control of gastrointestinal parasites in the country for farmers to benefit from their contribution in ensuring food security.

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Introduction

Cattle, the most prominent domesticated livestock in Nigeria, represent a valuable asset in both traditional and modern agriculture. In addition, they also provide meat, milk, skin and draught power for farming [1]. In some traditional settings, they also play an essential role in the socioeconomic system, representing family wealth or they can be regarded as a survival kit by nomadic people [2]. In Nigeria, the livestock sector contributes 5.2% of the gross domestic product (GDP), while cattle production solely contributes 50% of the total meat [3]. Meat is one of the most important livestock products, although there could be losses due to various diseases including helminth infections. The quantity of meat and revenue obtained from domestic livestock is far below the national demand due to factors such as death and ill health with associated reduced productivity and increased cost of treatment [4].

Helminths are known to be a major constraint to ruminant's well-being and productive performance [5,6,7]. Gastrointestinal helminths are ubiquitous parasitic agents of livestock, especially ruminants and are known to limit cattle production in many areas and countries [5,7]. Mortality of animals due to parasitic diseases may not be alarming at times but their indirect effects on livestock productivity and their zoonotic impact on human health are considerably greater [8,9,10]. Indirect losses associated with helminth infections include the reduction in productive potentials such as decreased growth rate, weight loss, diarrhoea, anorexia and sometimes anaemia [11,12,13].

The most important predisposing factors of helminth infections are grazing habit, climate, nutritional deficiency, immunological status, vector, presence of intermediate host and the number of infective larvae and eggs in the environment [14,15]. The effect of helminth infections is determined by a combination of factors, of which the susceptibility of the host-parasite interaction and the infective dose are the most important [15,16].

This current study aims at determining the incidence of gastrointestinal helminths of cattle ranches in Vom District of Jos South Local Area of Plateau State, Nigeria. This is with the view of providing a baseline epidemiological data on this group of parasites in an ongoing study in Nigeria.

Materials and Methods

Study Area

The study was conducted in Vom, located in Jos South Local Government Area (LGA) of Plateau State. This was during the peak rainy season between August and October, 2018. Fecal samples from 150 cattle were collected from various ranches in the Local Government Area (located in Kaduna Vom and Dashe Chugi villages respectively). Samples from K-Vom were collected from the National Veterinary Research Institute (NVRI) and National Institute for Trypanosomiasis Research, (NITR). The remaining samples were collected from surrounding ranches in Dashe and Chugi villages of Jos South LGA. The cattle from the above mentioned institutes are grazed intensely within the confines of the institutes while ranches in Dashe and Chugi villages are grazed in the countryside using the free-range pattern.

Sample Collection

The cattle screened were of Zebu and N'dama breeds of age ranging from six months to three years. The Zebu cattle are the humped, longer-horned large Fulani breed, while the N'dama are hump less, short-horned dwarf cattle. Fecal samples were collected using sterile disposable hand gloves (A.J. Seward®). The gloves having been worn; two fingers were inserted into the rectum of the cattle to extract stool samples very early in the morning (prior to the day's grazing). The fecal samples were tied up and transported to Parasitology Laboratory for analysis. A total 150 stool samples were collected, 65 of which belong to the N'dama breed and 85 belonging to Zebu breed.

Screening Procedure

The screening of the sample was carried out in the Parasitology Laboratory of the Federal College of Veterinary and Medical Laboratory Technology (FCVMLT), National Veterinary Research Institute, Vom, Plateau State, Nigeria according to standard procedures.

Briefly, the flotation procedure was used to analyze as follows:- fecal samples were transferred into a white porcelain mortar and loosed in a concentrated salt solution (saturated sodium chloride with specific gravity of 1.8) using a pestle. The fecal solutions were then pour across a wire-mesh sieve into cylindrical flotation tube to eliminate vegetable debris in the fecal samples, ensuring clarity of viewing under the microscope. The flotation medium was then introduced

into each of the tubes until convex meniscus formed. Clean cover slips were placed on each tube. After a period of 15 minutes, the cover slips were carefully removed and placed on microscope slides for examination.

Furthermore, the sedimentation method was applied on the fecal samples to detect heavier eggs as follows:- 80% of the fecal solution in each tube was poured out as supernatant and plain water used to fill the tubes to the brim. This was left for about 10 minutes, after which about 80% of the supernatant was decant, the tubes refilled with plain water and left for about 10 minutes. This step was repeated once again. Finally, about 90% the top layers of the fecal solutions in each tube was decant into an empty 100 Mls container, leaving the sediments at the bottom. With the use of Pasteur pipette, the sediments was mixed gently, extracted and transferred onto microscope slide and cover slips placed. The slides were immediately examined for operculated eggs using binocular microscope. For each method described, the slides were examined under a x10 and x40 objectives magnification.

Data Analysis

The data obtained were converted to percentages presented in les. Data analysis was performed using Statistical Package for Social Science (SPSS) version 23.0. The statistical methods employed were Chi-Square and paired t-Test. $p < 0.05$ was considered significant.

Results

In this study, the results of the 150 cattle screened are as follows; for helminths, 33 (21.9%) were positive the various classes of helminth. The class nematoda was highest [21] representing 14.0% followed by the class trematoda [10] representing 6.6%. Only 2 (1.3%) cattle were positive for cestodes. Tables 1 - 6

The different species of nematode, cestode and trematode parasites detected in the stool samples of the 150 cattle are as presented in Table 2.

Discussion

This study was carried during raining season of 2018 to identify the worms that are responsible for gastrointestinal helminthiasis in Zebu and N'dama cattle ranches in Vom District of Plateau State, Nigeria. This is

aimed at determining the incidence of the concerned helminthic parasites in the study area. The findings of this study shows that a number of gastrointestinal parasites including nematodes, cestodes and trematodes affect Zebu and N'dama cattle in ranches and by extension, other cattle on free range. This provide a baseline information on the gastrointestinal parasites that are often responsible for both direct and indirect reduction productivity in cattle industry such as decreased growth rate, weight loss, diarrhoea, anorexia, and sometimes anaemia and subsequently, death. The incidence of nematodes (14%) in this study is higher owing to the fact that five parasites were detected including *Oesophagostomum radiatum* (4.7%), *Trichostrongylus* spp. (4.0%), *Haemonchus placei* (3.3%), *Bunostomum phlebotomum* (2.4) and *Nematodirus spathiger* (1.2%). The high incidence of these *Oesophagostomum radiatum* and *Trichostrongyle* worms is in agreement with work previously done in Plateau (15 and 16), Benue [17] States and the Federal Capital Territory, Abuja, Nigeria [18]. The high prevalence, according to these studies may be associated the raining season and with the life cycle of these parasites as they do not require intermediate hosts in their transmission and the suitable environment for the multiplication of eggs. As seen in this study, parasitic gastrointestinal parasitism is due mainly to these nematode parasites and routine, timely deworming is advocated seriously

Conclusion

This investigation have shown that bovine gastrointestinal helminthiasis in Vom District has not reached alarming level but could have some indirect economic negative impact on the ranches in spite the sub-clinical infection rates. N'dama and Zebu cattle species registered equal susceptibilities to helminth infections and this is to our knowledge the first report in these ranches involving the Zebu and N'dama breeds on the Jos Plateau.

Recommendation

Further research work should be carried out to improve on grazing habits, nutritional status, pasture management and immunological status of cattle in Cattle Ranches in Vom District on the Jos Plateau as often these factors seemed neglected by ranchers.

Table 1. Helminth infection rates in Zebu and N'dama cattle screened for gastrointestinal parasites in Vom Ranch.

Class of helminths	Number of cattle infected	Percentage infection (%)
Nematodes	21	14
Cestodes	2	1.3
Trematodes	10	6.6
Total	33	21.9

Table 2. Individual helminthic parasites detected in Zebu and N'dama cattle screened for gastrointestinal parasites in Vom Ranch.

Helminth	Number of cattle infected	Percentage infection (%)
Nematodes		
<i>Bunostomum phlebotomum</i>	2	1.3
<i>Trichostrongylus</i> spp.	6	4.0
<i>Haemonchus placei</i>	5	3.3
<i>Oesophagostomum radiatum</i>	7	4.7
<i>Nematodirus spathiger</i>	1	0.7
Cestodes		
<i>Taenia saginata</i>	2	1.3
Trematodes		
<i>Fasciola gigantica</i>	5	3.3
<i>Paramphistomum cervi</i>	3	2.0
<i>Schistosoma mansoni</i>	2	2.0
Total	33	21.9

(P<0.05)

Table 3. Helminth infection rates in the 85 Zebu cattle screened for gastrointestinal parasites in Vom Ranch.

Class of helminths	Number of cattle infected	Percentage infection (%)
Nematodes	15	17.7
Cestodes	2	2.4
Trematodes	6	7.0
Total	23	27.1

Table 4. Infection rates of helminthic parasites on the 85 Zebu cattle screened for gastrointestinal parasites in Vom Ranch.

Helminth	Number of cattle infected	Percentage infection (%)
Nematodes		
<i>Bunostomum phlebotomum</i>	2	2.4
<i>Trichostrongylus</i> spp.	5	5.9
<i>Haemonchus placei</i>	3	3.5
<i>Oesophagostomum radiatum</i>	4	4.7
<i>Nematodirus spathiger</i>	1	1.2
Cestodes		
<i>Taenia saginata</i>	2	2.4
Trematodes		
<i>Fasciola gigantica</i>	5	5.8
<i>Paramphistomum cervi</i>	0	0
<i>Schistosoma mansoni</i>	1	1.2
Total	23	27.1

(P<0.05)

Table 5. Helminth infection rates in 65 N'dama cattle screened for gastrointestinal parasites in Vom Ranch.

Class of helminths	Number of cattle infected	Percentage infection (%)
Nematodes	6	9.2
Cestodes	0	0
Trematodes	4	6.1
Total	10.0	15.3

Table 6. Infection rates of helminthic parasites on the 65 Zebu cattle screened for gastrointestinal parasites in Vom Ranch.

Helminth	Number of cattle infected	Percentage infection (%)
Nematodes		
<i>Bunostomum phlebotomum</i>	0	0
<i>Trichostrongylus</i> spp.	1	1.5
<i>Haemonchus placei</i>	2	3.1
<i>Oesophagostomum radiatum</i>	3	4.6
<i>Nematodirus spathiger</i>	0	0
Cestodes		
<i>Taenia saginata</i>	0	0
Trematodes		
<i>Fasciola gigantica</i>	0	0
<i>Paramphistomum cervi</i>	3	4.6
<i>Schistosoma mansoni</i>	1	1.5
Total	10	15.3

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