Survey of Strongyloides infection in Maiduguri cattle abattoir, Nigeria

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ABSTRACT

Gastro-intestinal infection constitutes major constraint to viable livestock industries. The study revealed information on the prevalence of Strongyloides infection in cattle in Maiduguri and environs with reference to sex, age and breeds of cattle in the study area. The result revealed the prevalence of 51 (25.5%) cases after examining 400 faecal samples using faecal sedimentation technique. The result of Strongyloides species infection recorded according to sex of cattle was higher in females with a prevalence of 40 (20.0%) compared to males with a prevalence of 11 (5.5%). The prevalence of infection based on age of cattle revealed higher percentage of 14 (7.0%) after examining 48 cattle in the age bracket of seven (7) years. A lower prevalence of 5 (2.5%) was recorded in cattle within the age bracket of 4 years after examining 36 samples. Breed-wise distribution of infected cattle indicated that Abore was more susceptible, followed by Ambala and Bakoloji breeds with prevalence of 20.5%, 4.5% and 0.5% respectively after examining 150, 36 and 11 faeces from respective breeds. Wadara appeared non-susceptible and therefore had no records of infection after examining low number of three samples from the breed. Bovine Strongyloides infection in Maiduguri and environs was established as a common finding and farmers should therefore be educated on proper use of antihelmintics and with emphasis on strategic antihelmintic medication. Good management practices including improved general hygiene and supplementary feeding of animals during periods of low grazing will have immunity boosting role in control of the parasite.

Keywords: Strongyloides, parasites, infestation, cattle, abattoir

INTRODUCTION

Cattle have a wide distribution range in Nigeria with about 90% of the population in the north (Lawal *et al*., 2012). According to Aliyara *et al*. (2012), Nigeria has a large population of domestic ruminants with cattle accounting for up to 13.1 million. It dominates the livestock industry as it supplies the bulk of meat, milk and hides constituting 56.6% of the Nigerian livestock population. These claims were also cited by FAO (1982) and Jahnke (1982). In many parts of the world, cattle production is profitable because of the high demand for dietary animal protein (Anaeto *et al*., 2009). The population in Borno state is predominantly Abore, Ambala, Bakolojl and Wadara breeds. A seasonal change in the relative proportion of these animals in various ecological zones of the country has also been reported.

Livestock production is faced with so many obstacles, which in the long run result in low productivity and reduced profitability (Anon 2006). According to Biu *et al*. (2006) amongst the livestock production obstacles are diseases. Animal diseases constitute major obstacles to economic development as well as health problems. The disease causes a gradual deterioration of animals' performance and has been known to be a major cause of economic losses in livestock in the tropics generally and Nigeria in particular (Kudi *et al*., 2001). Gastrointestinal infection constitutes a major constraint to the development of economically variable livestock industries in terms of pathology and economic importance (Gates *et al*., 2003). The helminths infections of ruminants are mostly caused by nematodes such as Strongyloides species (Zalid *et al*., 2005). According to Regassa *et al*. (2006), ruminants infected by helminths parasites cause loss to farmers through low milk production, low fertility, reduced work capacity, involuntary culling, treatment cost, mortality and reduction in the market value of infected animals. Gastro intestinal nematodes were almost universally present in animals examined (Keyyu *et al*., 2005).

There are more than 800 species of gastrointestinal parasites in Nigeria (Guobadia, 1991), and the prevalence of Bovine helminthiasis has been studied and reported (Mshelia *et al*., 1999). Nematode infections are a worldwide problem for both large and small-scale farmers, as economic losses are

caused by nematodes in a variety of ways. De Haan and Burke estimated that in sub-saharan Africa endoparasite causes annual mortality and production losses and about more than 80% of the cattle in Nigeria are owned by predominantly pastorialist and are frequently involved in the nomadic system of management which probably influences the epizootiology of the gastrointestinal parasite (Nwosu *et al.*, 1996). In cattle helminthiasis is a polyethiologic condition with varying rates of effects brought about by hardship leading to mortality with high economic losses, hence the great need to control or possibly eradicate debilitating disease (Blood *et al.*, 1995).

Stronyloides species are a major cause of losses in the livestock industry because they impair weight gain and increase mortality in cattle, especially in temperate areas (Stancampianol 2007). Strongyloides species also called threadworms are common haematophagous parasitic nematodes of cattle worldwide (Theodoropoulous 2010). Species recognised as pathogenic in cattle include *Strongyloldes poppillosus* (Eberhardt 2008). These parasites are known to be widespread in Nigeria and limit ruminant production in many areas of the country (Keyyu *et al.*, 2005) and cause a wide range of health problems to both human and animals (Colley *et al.*, 2001). The parasite occupies niches within their mammalian host ranging from intestine and even intracellular sites and they are responsible for substantial loss of productivity in the livestock industry (Littlewood *et al.*, 2001).

Strongyloides species are among the intestinal parasites affecting cattle in Nigeria and other African countries (Yohanna *et al.*, 2012) and have been associated with great economic losses to farmers throughout the world. These parasites are very ubiquitous and have also remained the major constraint hindering the efficiency of rearing cattle successfully (Khin-Khin, 2007). This disease also infects human beings and the infection is caused by 2 species of the parasite as the most important pathogenic species are *Strongyloides stercolaris* and *Strongyloides fuelleborni* and are found sporadically in Africa and other parts of the world such as southeast Asia, Colombia, tropical section of Brazil and temperate section of Spain (Glinz *et al.*, 2010). The disease is estimated to affect 100-200 million people worldwide in 70 countries. The international prevalence of larva tcurrents among parties with Strongyloides varies with rate in the range of 30-90% in Southeast Asia. High rates of larvae current are also reported in Latin America. The study sought for information on the occurrence of Strongyloides species infection in cattle in Maiduguri and environs with peculiarities of assessing sex, age and breeds of cattle most commonly affected by these parasites.

MATERIALS AND METHODS

STUDY AREA

The study was carried out in Maiduguri also called Yerwa by its locals, which is the capital of Borno State, Nigeria. Maiduguri lies between latitude 10.2^0N and 13.4^0 N and the longitude of 9.8^0E and 14.4^0E. Maiduguri is popularly called ''Home of Peace" and the city sits along the seasonal Ngadda River which disappears into the Firki swamps in the areas around Lake Chad. Maiduguri was founded in 1907 as a military outpost by the British and has since grown rapidly with a population exceeding 1 million by 2007 (NPC, 2009). Maiduguri harbours diverse tribes including Kanuri, Shuwa, Bura, and Fulani ethnic groups among others (Anonymous, 2007). The state covers an area of 69,436sq km and is the largest state in the federation of Nigeria in terms of land mass (Musa and Pindar, 2005). It is located in the Northern-eastern region of the country and occupies the greatest part of the Lake Chad. It shares a border with republic of Niger to the North Lake Chad (Republic of Chad) to the North-east and Cameroon to the East, on the south and west it borders the Nigerian states of Adamawa Gombe and Yobe (Musa and Pindar, 2005). Maiduguri is the second-largest state in the federation in terms of land mass.

The climate of the area is characterized by dry and wet seasons. The dry season lasts from October to April. The average annual temperature is about 28°C with a maximum of 42°C in March and a minimum of 15°C during the dry harmattan season. The annual rainfall ranges from 750-1000mm. Agriculture is the major occupation of the people and about 70% to 80% of the people engage in farming activities which are predominantly subsistence (NiMET, 2022).

EQUIPMENT AND REAGENTS

Beakers and plastic containers were used for holding chemicals and reagents, tea strainer or cheesecloth cloth were used for sieving or filtering homogenized samples, measuring cylinder for measuring chemicals and other solutions, stirring devices (fork, tongue blade) for mixing of reactants, test tube for keeping chemicals and reagents, test tube rack for holding test tubes, micro slide for mounting samples, coverslips for covering samples on slides, balance for weighing of samples and reagents, teaspoon also used for measurement of salts, washing sponge for scrubbing wares and instruments during cleaning and a microscope for viewing of magnified objects. Methylene blue, normal saline, tap water, antiseptic liquid and detergents are all chemicals, water and detergents for one process or the other.
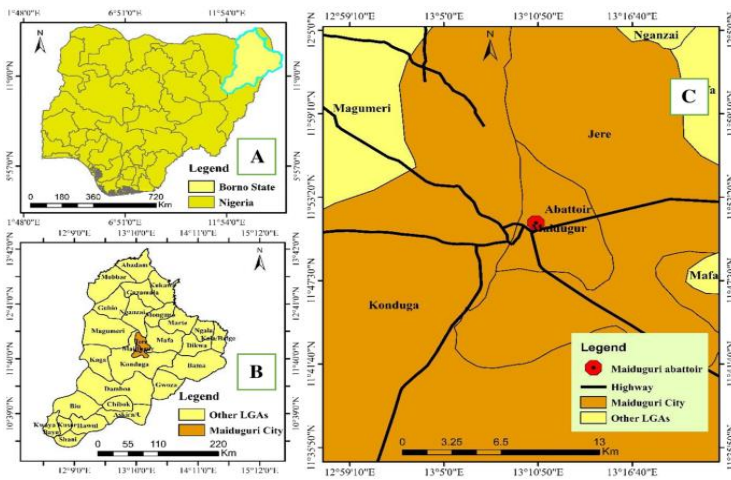
Figure 1: Map of Borno State, Nigeria Showing the Study Area (Maiduguri Abattoir)

METHODOLOGY

SAMPLE COLLECTION

Visits were made to the abattoir on each day of the sample collection during the study period as early as 6.00 am when the animals were usually taken to be abattoir. The animal breeds and sexes were identified and labelled accordingly and as male or female, and their ages were also estimated. A total of 200 fresh faecal samples were collected directly from the rectum of slaughtered cattle using a pair of hand gloves into clean labelled polythene bags. The samples were transferred to parasitology laboratory in the Department of Veterinary Medicine, University of Maiduguri, Borno state, Nigeria for investigations. Each faecal sample was tested for helminth parasite (Strongyloides) using sedimentation techniques.

PROCEDURE

Approximately 3g of faecal sample was weighed and measured and poured into container number 1. To the sample, 40 - 50ml of tap water was added into the container number 1. Then the mixture was stirred thoroughly with a fork a stirring device. The faecal suspension was filtered through a tea strainer which is a double-layer of cheesecloth into a container number 2. The filtered material was poured into a tube and allowed to sediment for 5 minutes, then the supernatant was very carefully removed using a pipette and the sediment was re-suspended in 5ml of water and was allowed to sediment for 5 minutes again. The supernatant was discarded very carefully and stained the sediment by adding one drop of methylene blue, and then the sediment was transferred to a micro-slide and covered with a cover slip. It was then examined under the microscope to view (Zajac *et al.*, 2006).

STATISTICAL ANALYSIS

Simple percentages and means of total number of values recorded for each item were the statistical tools used in these studies.

RESULTS

Out of four hundred (400) faecal samples collected from different sexes, age groups and breeds of cattle examined for parasitological analyses one hundred and two (102) were recorded as positive for Strongyloides species infection. This accounted for the prevalence of twenty-five and a half (25.5%) of the recorded cases as shown in Table 1.

The Prevalence of Strongyloides infection in cattle recorded according to sex of cattle was higher in females with 80 (20.0%) cases after examining 326 females when compared with the results of records in males where the prevalence of 22 (5.5%) cases were detected after examining 72 bulls as depicted in Table1.

The prevalence of Strongyloides infection was recorded based on the age distribution of affected cattle. A higher prevalence of infected cattle falls within the age bracket of seven (7) years with 28 (7.0%) cases of occurrence. These were followed by 20 (5.0%), 12 (3.0%), 12 (3.0%), 10 (2.5%), 10(2.5%), and 10(2.5%) respectively for the prevalence of Strongyloides infection in cattle within the ages of 5 years, 1 year, 2 years, 3 years, 4 years and 6 years after examining 98, 38, 52, 20, 72 and 16 number of cattle respectively.

Breed-wise distribution of infected cattle indicated that Abore breed was more susceptible with a prevalence of 82 (20.5%) cases, followed by Ambala and Bakoloji breeds with a prevalence of 18 (4.5%) and 2(0.5%) cases of infection respectively. Wadara appeared non-susceptible to Strongyloides infection as no positive detection was made after examining although a very low number of faecal samples from only 6 cattle of this breed as shown in Table 3.

Table 1: Prevalence of Strongyloides Species infection by sex of Cattle in Maiduguri and Environs

Sex	Number of Samples Collected	Number of Positive Samples	Percentage of Positive Samples
Male	74	22	05.5%
Female	326	80	20.0%
Total	**400**	**102**	**25.5%**

Table II: Age Distribution of Strongyloides Species Infection in Cattle in Maiduguri and Environs

Age (years)	Number of Collected Samples	Number of Positive Samples	Percentages of Positive Samples
<1	06	00	00.0%
1	38	12	03.0%
2	54	12	03.0%
3	20	10	02.5%
4	72	05	02.5%
5	98	20	05.0%
6	16	10	02.5%
7	96	28	07.0%
8	02	00	00.0%
Total	**400**	**102**	**25.5%**

Table III: Prevalence of Strongyloides Species infection according to Breeds of Cattle in Maiduguri and Environs

Breeds	Number of Samples Collected	Number of Positive Samples	Percentages of Positive Samples
Abore	300	82	20.5%
akoloji	22	02	00.5%
Ambala	72	18	04.5%
Wadara	06	00	00.0%
Total	**200**	**102**	**25.5%**

DISCUSSIONS

An abattoir survey of Strongyloides species infection in cattle in Maiduguri revealed the prevalence of 102 (25.5%) cases recorded after examining two hundred faecal samples. This finding corroborated with the assertions of Nwosu *et al.* (1996) who reported that nematode infections are worldwide problems for both large and small-scale farmers and linked it to serious economic losses due to damages caused by the parasites. Similar research conducted in Nigeria revealed a high prevalence of helminths infections reported with several other species of nematodes including infections with Strongyloides species (Yohanna *et al.*, 2012). In another survey reported by Ajayi *et al.* (1987), Strongyloides species has been shown/ its among the common intestinal parasites affecting cattle in Jos and its environs. These observations therefore supported the findings of the present study that Strongyloides species infections were common in Maiduguri and its environs.

The findings of the present study with the prevalence of up to 102 (25.5%) cases of recorded Strongyloides infection differed from the results of an array of researchers from Nigeria's academia who because of some differences in geographical disposition in the different regions recorded mostly lower prevalence rates. Typical of such was Pam *et*

al. (2013) who recorded the prevalence of 0.94% of Strongyloides species infection in cattle in Jos metropolis. This was considerably lower when compared with the findings of the present study. Similarly, Aliyara *et al.* (2012) recorded an infection rate of 5.55% of cases of Strongyloides infection in cattle faeces from Yola and environs. This also represented a lower prevalence as compared with the findings of the present study but relatively higher than the findings of Pam *et al.* (2013) whose studies were from Jos metropolis. Kingsley *et al.* (2013) also reported the occurrences of a lower prevalence prevalence's of 7.3% of Strongyloides infection in cattle in Port-Harcourt after examining faecal samples from cattle. Similarly, Edosomwan *et al.* (2012) reported the prevalence of 11.14% of Strongyloides infections in cattle in Benin, South-South region of Nigeria. Although this was higher compared with the findings of earlier reported cases of Nigerian researchers as discussed earlier, the result was still lower than the findings of the present study.

In a related development, Rafiullah *et al.* (2012) reported a record of 3.4% prevalence of Strongyloides infection in cattle from Pakhtunkhwa region of Pakistan and although the findings were lower as compared to the records of the present study where the prevalence of 102(25.5%) Strongyloides infection was recorded after examining 400 faecal samples from cattle in Maiduguri, Nigeria. Cox (2004) reported that age difference in the distribution of Strongyloides parasites infection in a related survey was common and revealed that the prevalence of Strongyloides infection was higher in young calves characterized by weight loss and diarrhoae compared to lower prevalence of the disease in adults. However, it was a contrary opinion going by /based on the findings of the present investigations which recorded a higher prevalence of 28 (7.0%) cases of Strongyloides infections in adults of up to 7 years of age compared to 0 (0.0%) cases and 12 (3.0%) cases of recorded prevalence respectively from calves of less than 1 year of age and of 1 year of age as the age bracket of young cattle that are called calves. This observation validates that irrespective of age differences, infection with Strongyloides species does occur and it was a common finding, although the records of the findings in the present studies affirmed that the occurrences are more common in adult than the young. The observations of Springverlang (2006) who reported a higher prevalence of Strongyloidiasis in female cattle than in the males and attributed it possibly to the longer time females are kept for breeding purposes and milk production than the males agreed with the findings of the present study where a higher prevalence of 80 (20.0%) cases of Strongyloides infection was recorded in female cattle as compared with 11(5.5%) cases recorded in males.

The findings of Rafiullah *et al.* (2011) who reported the seasonal prevalence of gastro- intestinal helminthes infection was higher in the summer season attributed it to high temperature and moisture content which favour the growth and development of larvae on pasture resulting in increased contact between the host and the parasites. The timing of the present studies which coincided with that of Rafiullah *et al.* (2011) affirmed the claim stipulated by the later research team.

CONCLUSIONS

Bovine Strongyloides infection in Maiduguri and environs was common and therefore farmers should be enlightened about the importance of regular and effective preventive and control measures. And as such farmers should be shown to practice strategic antihelmintic medications. A high standard of sanitation should be observed. Good management practices such as improved general hygiene and provision of supplementary feeds to animals during periods of low grazing to complement feeding will be helpful in the success of control of the parasites.

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CONFLICT OF INTEREST

The authors have declared no conflict of interest.

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