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Original Article

Prevalence of Gastrointestinal Parasites of Cattle in Suleja Local Government Area of Niger State, North Central, Nigeria

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ABSTRACT

A cross-sectional study was carried out from August 2024 to February 2025 to determine the prevalence of gastrointestinal parasites of cattle in Suleja Local Government Area of Niger State, Nigeria. A total of 384 faecal samples were collected from cattle and analyzed using centrifugal floatation and sedimentation technique. An overall prevalence of 63.28% was recorded with an epg/opg range of 100-900. Six (6) gastrointestinal parasites were detected namely, *Ascaris lumbricoides* (12.76), *Toxocara spp* (16.15%) *Strongyle spp* (17.19%), *Schistosoma spp* (5.21%), *Monieza spp* (7.81%) and *Entamoeba spp* (4.17%). Among the parasites detected, *Strongyle spp* had the highest prevalence (17.19%) while *Entamoeba spp* had the least prevalence of 4.17%. The study revealed that females (70.95%), Older cattle (70.11%), white fulani breeds (66.34%), pregnant females (82.50%) and wet season (90.75%) recorded the highest prevalence as compared to males (54.02%), young cattle (46.59%), red bororo breeds (51.85%), non-pregnant females (58.93%) and dry season (41.52%). There was a statistically significant difference ($P<0.05$) in the prevalence of infection between the sex, age, breeds, physiological status of the cattle and season. The findings of this study revealed that cattle are infected with different gastrointestinal parasites in the study area, hence a targeted control effort should be adopted to reduce the burden of gastrointestinal parasites of cattle in the study area.

Keywords: Gastrointestinal, Parasites, Research Prevalence, Cattle, Suleja

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INTRODUCTION

Foods sourced from animals like cattle account for 34% of the world's protein consumption and 18% of its energy consumption [1]. The worth of Nigeria's livestock is estimated to the tone of USD6 billion, and they contribute greatly to the agricultural components of the GDP of which, cattle production makes up to 40% [2]. However, despite the high population of these cattle in Nigeria, the quantity of meat obtained is far below the national demand due to many causes, including parasitic infections [3]. Gastrointestinal parasitism is a worldwide concern in cattle [4]. It is regarded as one of the key restrictions that hinder the expansion of cattle population [5]. The bovine Gastrointestinal tract is susceptible to parasitic infections. Among these, nematodes such as *Trichostrongyus spp, Oesophagustomum spp*, *Toxocara vitulorum* and *Strongyloides spp.*, Cestodes such as *Monieza spp.*; trematodes such as *Fasciola spp* and *Paramphistomum spp.*; and Protozoan infections particularly those caused by *Eimeria spp*, are prevalent in cattle [6]. Infected cattle may exhibit a range of clinical signs including diarrhoea, emaciation, anaemia and stunted growth [7] Gastrointestinal infections are the major cause of gastroenteritis in livestock and constitute a major impediment to livestock industry where all ages of cattle are affected [8]. Epidemiological surveys of gastrointestinal parasites are essential to avoid economic losses by informing them of effective control efforts [9]. Cattle in this study area are managed extensively and there is paucity of published literature on the prevalence and distribution of these parasites in the study area. Without proper knowledge of the prevalence and distribution of gastrointestinal parasites, it will be difficult to design effective prevention and control strategies. To address this knowledge gap, this present study was carried out to determine the prevalence of gastrointestinal parasites (GIP) of cattle in Suleja local Government area, Niger State, North Central, Nigeria, that will help design strategies for the effective management and control of gastrointestinal parasites of cattle in the study area.

MATERIALS AND METHODS

Study Area

This study was carried out in Suleja local Government area Niger State, North Central, Nigeria (Figure 1). Suleja lies between Latitude 9º10'15" and 9º12′1.17″N of equator and Longitude 7º10′20.25″ and 7º11′40.05″E of Greenwich meridian. It covers a land area of 136.33 km2 and had a population of 216,578 [10]. The area has gentle rocks, and the soils are derived from geological parent materials developed on sandstone formations. The soil is usually deep, red and enriched with clay sub-soil [11, 12]. Suleja has tropical climate with an average annual temperature of 26.3 °C and the average rainfall is 1405 mm. The driest month is December. The highest precipitation occurs in September; with an average of 272 mm. March is the warmest month of the year with an average temperature of 29.0 °C. The lowest average temperature is in August at 24.5°C [12].

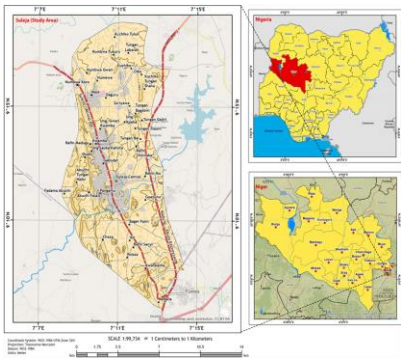


Figure 1: Map of Niger State showing Suleja local Government Area (Source: Adapted from [13]

Study Population and Sampling Method

The study Population were herds of cattle kept under traditional and extensive management system and owned by livestock farmers (herdsmen). A total of three hundred and eighty-four (384) faecal samples were collected randomly from cattle consisting of 210 females and 174 males. This was done by identifying the animals first and assigning identification numbers (ID) to the animals, the ID numbers were used to randomly select the cattle. The age of the cattle was determined by using eruption of permanent rostral teeth pattern by [14] and by owner's response. Cattle with the first pairs of rostral teeth (temporary inscisors) are known to have an average age of 23 months which is less than 2 years. Those with the second and third pair of rostral teeth are known to have an average age of 3-4 years while those with fully grown pairs have an average of 4.5 years and above. The sex of the cattle was determined by examining the reproductive organs. Breed's identification was done by using the keys of [15] for traditional livestock breeds of West Africa. The Physiological status of the female was categorized as pregnant, lactating and non-pregnant.

Collection of examination faecal samples

A total of three hundred and eighty-four fresh faecal samples was collected directly from the rectum of cattle from August, 2024 to February, 2025. The faecal samples collected were placed in a properly labelled sterile bottle and transported in cool ice box to Entomology and Parasitology laboratory, Faculty of Veterinary Medicine, University of Abuja for parasitological analysis. Risk factors such as age, sex, breeds season and physiological status of the animals were recorded.

The faecal samples were analyzed using centrifugal floatation technique [16] and Sedimentation technique [17]. Floatation technique was used to detect nematode, cestode eggs and protozoan oocyst in faecal samples as the parasites have a lower density than the floatation medium and hence float on the surface. Centrifugal sedimentation technique by [17] was used for detection of trematode eggs due to their heavy weight. Stoll's dilution technique was used to quantify the eggs of Gastrointestinal parasites. The degree of infection was identified as the total egg count per gram (epg) of faeces for Helminthe eggs and total oocysts count per gram (opg) of faeces for protozoan oocysts [18, 19]. The animals were then categorized as low (100-250epg), moderate (250-500epg) and high (>500epg).

Data Analysis

Data obtained from this study was analyzed using descriptive statistics and results presented in tables. The

percentage prevalence rate of parasites was calculated using the formular: number of positive samples /Number of samples examined multiplied by 100. The association between the prevalence of infection and sex, age, breeds, physiological status and season were analyzed using chi square test (χ^2). In all analysis, confidence level was held at 95% and value of $P<0.05$ was considered significant.

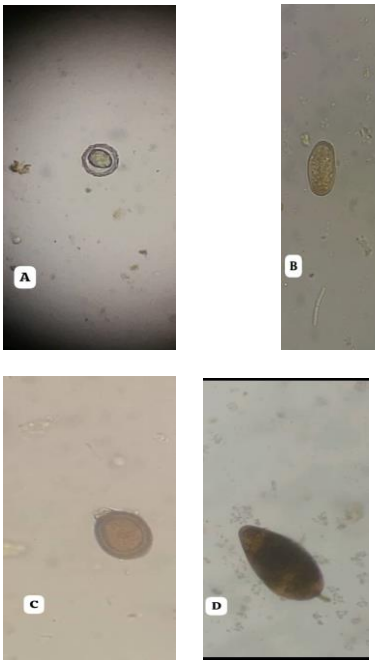
RESULTS

The Prevalence of Gastrointestinal parasites identified in cattle from the study area is shown in Table 1. Out of 384 samples examined from cattle, 243 were infected with various gastrointestinal parasites with an overall prevalence of 63.28%. A total of six (6) gastrointestinal parasites were identified (Plate I) Three nematode genera namely: *Ascaris lumbricoides* (12.76%) *Toxocara spp* (16.15%) and *Strongyle spp* (17.19%), one cestode genus namely: *Monieza spp* (7.81%), one trematode genus: *Schistosoma spp* (5.21%) one cestode genus *Monieza spp* (7.81%) and one protozoan parasite namely: *Entamoeba spp* cyst (4.17%). Among the parasites identified, Nematode species are the most dominant species with *Strongyle spp* having the highest prevalence of 17.19% followed by *Toxocara spp* (16.15%), *Ascaris lumbricoides* (12.76%), *Monieza spp* (7.81%), *Schistosoma spp* (5.21%) while *Entamoeba spp* had the least prevalence of 4.17%. The study revealed the mean egg per gram (epg) of faeces count of cattle ranging from 100-900 epg. *Ascaris lumbricoides* recorded the highest mean epg count of 206±22 with an epg range of 100-700, followed by *Toxocara spp* (190±26) with a infection range of 100-900 epg, *Strongyle spp* with a mean epg of 164±23 with an epg range of 100-900 while the least mean epg was recorded for *Entamoeba spp* (131±12). *Strongyle spp* and *Toxocara spp* had the highest epg range of 100-900 while *Entamoeba spp* had the least epg range of 100-200.

Table 1: Prevalence of Different Gastrointesinal Parasites of Cattle in Suleja Local Government Area of Niger State

Parasites genera	Parasites	No. infected	Prevalence (%)	Mean epg/opg SE	Epg/Opg range	Degree of infection
Nematodes	*Ascaris lumbrioides*	49	12.76	206±22	100-700	High
	Strongyle spp	66	17.19	164±23	100-900	High
	Toxocara spp	62	16.15	190±26	100-900	High
Cestodes	*Monieza spp*	30	7.81	153±16	100-400	Moderate
Trematodes	*Schistosoma spp*	20	5.21	165±16	100-300	Moderate

Protozoa	*Entamoeba spp*	30	4.17	131± 12	100-200	Low
Total		243	63.28	176±11	100-900	High



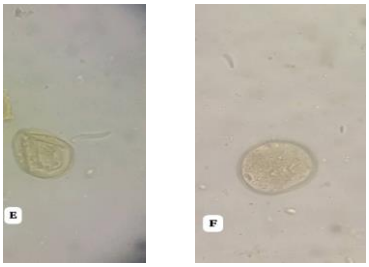


Plate I: Different Gastrointestinal parasites of cattle identified in the study area A (*Ascaris lumbricoides* egg), B (*Strongyle spp* egg), C (*Toxocara spp* egg), D (*Schistosoma spp* egg), E (*Monieza spp* egg) and F (*Entamoeba spp* cyst)

From Table 2, out of 210 female and 174 male cattle examined, 149 and 94 were infected respectively with a prevalence of 70.95% in females and 54.02% in males. The study revealed that females had the highest prevalence rate of infection as compared to males with a prevalence of 54.02% and the difference was statistically significant (P<0.05).

Table 2: Prevalence of Gastrointestinal Parasites (GIP) in relation to sex of Cattle in Suleja Local Government Area of Niger State

Sex	No. examined	No. infected	Prevalence (%)	χ^2	df	P-value
Female	210	149	70.95	11.737	1	0.0006*
Male	174	94	54.02			
Total	384	243	63.28			

*Significant. χ^2 = Chi square, df= degree of freedom.

The prevalence of Gastrointestinal Parasites in relation to age of cattle in the study area is shown in Table 3. Out of 88 (<2 years), 112 (3-4years) and 184 (>4 years) cattle examined, 41 (46.59%), 73 (65.18%) and 129 (70.11%) were infected respectively. Older cattle (>4years) had the highest prevalence of 70.11%, followed by 3-4 years (65.18%) while age <2 years had the least prevalence and the difference was statistically significant (P<0.05).

Table 3: Prevalence of GIP in relation to age of Cattle in Suleja Local Government Area of Niger State (n=200)

Age (years)	No. examined	No. infected	Prevalence (%)	χ^2	df	P-value
<2	88	41	46.59	14.415	2	0.001*
3-5	112	73	65.18			
>4	184	129	70.11			
Total	384	243	63.28			

*Significant. χ^2 =Chi square, df=degree of fredom

The prevalence of Gastrointestinal Parasites based on the physiological status of cattle is shown in Table 4. Out of 80 pregnant, 74 lactating and 56 non-pregnant female cattle examined, 66 (82.50%), 50 (67.57%) and 33 (58.93%) were infected respectively (Table 4). Pregnant females had the highest prevalence rate of 82.50% followed by lactating females with a prevalence of 67.57% while non-pregnant females (58.93) had the least prevalence and the difference was statistically significant (P<0.05).

Table 4: Prevalence of GIP of cattle in relation to the Physiological status in Suleja Local Government Area of Niger State

Physiological status	No. examined	No. infected	Prevalence (%)	χ^2	df	P-value
Pregnant (P)	80	66	82.50	9.51	2	0.009*
Lactating (L)	74	50	67.57			
Non-pregnant (NP)	56	33	58.93			
Total	210	149	70.95			

*Significant. χ^2=Chi Square, df=degree of fredom

The prevalence of Gastrointestinal Parasites in relation to breeds of cattle is shown in Table 5. Out of 303 white fulani and 81 Red bororo breeds of cattle examined, 201 and 42 were infected respectively. White fulani breeds had the

highest prevalence of 66.34% than Red bororo breeds with a prevalence of 51.85%%. There was significant association ($P<0.05$) between the occurrence of infection based on breeds of cattle examined

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Table 5: Prevalence of GIP in relation to breeds of cattle in Suleja Local Government Area of Niger State

Breeds	No. examined	No. infected	Prevalence (%)	χ^2	df	P-value
White fulani	303	201	66.34	5.771	1	0.016*
Red bororo	81	42	51.85			
Total	384	243	63.28			

*Significant. χ^2 =Chi square, df=degree of freedom

The study revealed seasonal influence of Gastrointestinal Parasites in the study area (Table 6). Out of 160 and 224 samples examined during the wet and dry season, 150 (93.75%) and 93 (41.52%) were infected respectively. The result of the study indicates that wet season had the highest prevalence of 93.75% while dry season had the lowest prevalence of 41.52% and the difference was statistically significant ($P<0.05$).).

Table 6: Seasonal prevalence of Gastrointestinal Parasites of Cattle in Suleja Local Government Area of Niger State

Season	No.examined	No.infected	Prevalence (%)	χ^2	df	P-value
Wet season	160	150	93.75	109.585	1	0.000*
Dry season	224	93	41.52			
Total	384	243	63.28			

* Significant. χ^2=Chi square, df=degree of freedo

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DISCUSSION

The result obtained from this study revealed the presence of various gastrointestinal parasites of cattle in Suleja local Government Area of Niger State Nigeria. Out of the three hundred and eighty-four (384) faecal samples examined from cattle, an overall prevalence of 63.28% was recorded. The prevalence recorded in this study is similar to different studies carried out in the same ecological zones in Nigeria such as 57.6% prevalence recorded by [3, 20] and 63.78% by [21]. The differences in prevalence rate recorded in this study may be due to differences in the environment, management practices, sample size and diagnostic methods. A total of six (6) gastrointestinal parasites were identified namely: *Ascaris lumbricoides* (12.76%) *Toxocara spp* (16.15%), *Strongyle spp* (17.19%), *Monieza spp* (7.81%),

Schistosoma spp (5.21%), *Monieza spp* (7.81%) and *Entamoeba spp* cyst (4.17%). Similar parasites have been reported by [22, 23]. This study recorded the highest prevalence among *Strongyle spp.* This agrees with the findings of [3, 7, 24] who recorded *Strongyle spp* as the most dominant gastrointestinal nematodes in the study. The high prevalence of *Strongyle spp* recorded in this study may be due extreme grazing systems, seasonal variations, inadequate veterinary services and favourable climatic conditions that facilitate the widespread of these infections as reported by [7, 22]. This study revealed that female cattle had the highest prevalence of GIP (70.95%) as compared to males with a prevalence of 54.02%. This is similar to the findings of [20, 24, 25] who recorded a higher prevalence of GIP in females as compared to males and the difference was statistically significant ($P<0.05$). The high prevalence of infection among female cattle may be due to stress and low immune status of the female during pregnancy and lactation [26]. This study revealed that older cattle (>4.5years) are more infected with a prevalence of 70.11% than 3-4years (65.18%) and <2years (46.59%) and the difference was statistically significant ($P<0.05$). The findings of this study is similar to the report of (20) who reported a higher prevalence of GIP among older cattle. This could be attributed to prolong exposure to infective larvae on contaminated pastures and the cumulative nature of helminthes infections in grazing animals [27]. This study revealed that pregnant females had the highest prevalence of 82.50% followed by lactating females (67.57%), while the non-pregnant females had the least prevalence of 58.93% and the difference was statistically significant ($P<0.05$). This is similar to the findings of [28] who reported the highest prevalence of infection among pregnant and milch cows. However, [29] reported that pregnant and milch cows had significantly higher odds of GIP infection, which may be due to immunological status during pregnancy and milking, along with missing anthelmintic dosing. This present study revealed that white fulani breeds had the highest prevalence of 66.34% while the least prevalence was recorded for Red bororo with a prevalence of 51.85% and the difference was statistically significant ($P<0.05$). This agrees with the findings of [30] who reported the highest prevalence among white fulani breeds of cattle. The different variation in the prevalence among the breeds examined in this study agrees with previous findings that indigenous breeds differ in their resistance or tolerance to parasitic infections [31, 32]. The study revealed seasonal prevalence of GIP in cattle with wet season having the highest prevalence of 93.75% while dry season had the lowest prevalence of 41.52% and the difference was statistically significant ($P<0.00$). This is similar to the findings of [33] who reported a higher prevalence of GIP among cattle during the rainy season.

Conclusion and Recommendations

The result of this study showed that cattle in this study area are infected with gastrointestinal parasites. Six (6) gastrointestinal parasites were identified namely *Ascaris lumbricoides, Toxocara spp, Strongyle spp, Schistosoma spp, Monieza spp, and Entamoeba spp* with *Strongyle spp* being the most dominant specie while *Entamoeba spp* had the least prevalence. Female cattle, older cattle, pregnant and white fulani breeds and

season recorded the highest prevalence as compared to males, young, non-pregnant and red bororo breeds and season. It is recommended that there should strategic deworming and education of farmers on the use of anthelmintics and improvement in the general management practices.

Declarations

Acknowledgement

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Authors contributions

AYA, AFN conceptualized and design the study. AAY, AFN and AF participated in the field work and data collection. AAY, AFN, FA, AK and LS performed data analysis and interpreted the result. FA, AK and LS prepared the first manuscript which was reviewed by AAY, AFN, and AF. All authors contributed to the development of the final manuscript and approved it's submission.

Conflict of interest

None

Ethical statement

No formal ethical clearance was obtained for this study. Permission was obtained from veterinary section under the Director of Agriculture, Suleja Local Government council, Niger State. This research involves non-invasive collection of faecal samples from cattle. However, samples were collected with minimal stress, pain and discomfort to the animals. Consent was sought from all cattle owners whose animals were used for this study. All guidelines regarding animal welfare were followed with strict compliance with local animal welfare regulations guiding the care and use of animals for research.

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