

## **Gastrointestinal Parasites of Goats in a Semi – Arid Zone of Nigeria: Its Prevalence and Economic Significance**

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**Abstract:** Parasitic gastroenteritis is a major constraint in livestock production nationwide. There is paucity of information on these infections in the study area. Thus, the prevalence of gastrointestinal parasites occurring in goats in the Bauchi area of Bauchi State Nigeria was studied. Faecal samples collected from a total of 451 animals were assayed for parasitic ova/oocyst. Eggs of parasites encountered were identified by reference to egg morphology as described by JANSSEN PHARMACEUTICA (1974) and Soulsby (1982). 252 (55.9%) of the samples were infected with one or more parasites. Altogether, six parasite species were recovered including *Eimeriapallida*, *Trichostrongylus colubriformes*, *Haemonchus contortus*, *Oesophagostomum columbianum*, *Strongyloides papillosus* and *Monezia expansa*. Female goats were significantly more infected than males ( $p < 0.05$ ). Younger animals were similarly more infected than older ones but the observed differences were insignificant ( $p > 0.05$ ). Of the breeds examined the West African Dwarf goats were significantly more infected than the Kano Brown breed ( $p < 0.05$ ). This research had revealed that goats in the study area were susceptible to infection by gastrointestinal parasites. Their control is therefore necessary in order to enhance livestock production in the area.

**Keywords:** Gastrointestinal parasites, Goats, Semi-Arid Zone, Nigeria.

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### **I. Introduction**

Small ruminants like goats are one of the most common livestock raised in northern Nigeria. They are kept primarily as sources of food (milk and meat) as well as income from sale of its various products (skin and bones). Thus, majority of households in the region engage in goat rearing. These animals are usually raised through semi-intensive or agro-pastoral system thereby exposing them to various factors inimical to profitable production. Out of these factors, parasitic gastroenteritis stands out as a major health problem that causes production losses. Estimates have been made of production losses due to gastroenteritis in small ruminants alone in Nigeria to at least N60 million, which was then equivalent to \$40 million annually [1].

While information on the occurrence and economic importance of parasites of goats is available for some parts of Nigeria notably on the Jos Plateau, Plateau State [2], Zaria area of Kaduna State [3], Ikwu area of Ebonyi State [4], Maiduguri area of Borno State [5] and in Cross River State [6], there is scarcity of similar information for Bauchi and environs, a semi-arid area of northern Nigeria where goat rearing is a major economic activity of majority of households in both urban and rural communities.

An investigation into the prevalence of these parasites in the area will undoubtedly provide complementary data necessary for control of these infections leading to enhanced livestock production in the area and in Nigeria at large.

### **II. Materials And Methods**

#### **The study area**

The area of study is Bauchi, Bauchi Local Government Area of Bauchi State, north eastern, Nigeria. It is situated around latitude 10°17'N and longitude 9°49'N. It is a semi-arid area of northern Nigeria experiencing dry season of about seven months (October – April) and a shorter rainy season of about five months (May – September). It receives a mean annual rainfall of 1015mm. Temperatures are generally high over the entire area. The hottest months are March and April when temperatures often reach an average of 40.6°C while the coldest months are December and January which is the harmattan season when range in mean minimum temperature is between 6.1°C and 7.1°C. The mean annual maximum and minimum temperatures are approximately 32.4°C and 18.3°C respectively.

### Sample collection

A total of 451 faecal samples were collected directly from the rectum of goats whose sex, age and breed were noted using disposable hand gloves. Samples were then kept in polythene bags that were appropriately labeled indicating sex, age and breed of goats. Faecal samples were then brought to the parasitology laboratory at the AbubakarTafawaBalewa University, Bauchi, Nigeria for further analysis.

### Sample treatment

Each faecal sample was subjected to saturated salt floatation technique and simple sedimentation technique respectively in order to recover both light and heavy ova/oocysts. Specimens were then examined under a microscope at x100 magnification. Eggs, oocysts and larvae recovered were identified on the basis of morphological characteristics with reference to the standard keys produced by JANSSEN PHARMACEUTICA (1974) as well as <sup>7</sup>.

### Statistical analysis

Data with respect to prevalence of parasitic eggs on basis of age, sex and breed were analysed using the student T-test in SPSS computer software version 21 (2012).

## III. Results

Out of the 451 faecal samples examined, 252 (55.8%) were positive for various parasites out of which 176 (69.8%) were cases of single infection whereas the remaining 76 (30.2%) were cases of mixed infections. Onthewhole, six different parasitic species were recovered during the study as shown in Table no 1.

**Table no 1:** Prevalence of parasites encountered among goats examined in Bauchi and environs

Parasite Types	No. of goats infected N = 252	% Prevalence
<i>Eimeriapallida</i>	133	52.8
<i>Trichostrongyluscolubriformis</i>	19	7.5
<i>Haemonchuscontortus</i>	14	5.6
<i>Oesophagostomumcolumbianum</i>	9	3.6
<i>Monieziaexpansa</i>	1	0.4
<b>Total</b>	<b>176</b>	<b>69.8</b>

The coccidian, *Eimeriapallida* was the most frequently encountered parasite occurring in 52.8% of all infected animals. The cestode, *Moneziaexpansa* was the least occurring parasite having been isolated in only one goat. Infection with nematodes were less common than the cestodes and by far much less than the coccidian. Cases of mixed infections encountered are indicated in Table no 2.

**Table no 2:** Prevalence of mixed parasitic infections encountered among sampled goats in the study area

Parasite Combination	No. of goats infected N = 252	% Infection
<i>Eimeriapallida</i> + <i>Trichostrongyluscolubriformes</i>	28	11.1
<i>Eimeriapallida</i> + <i>Oesophagostomumcolumbianum</i>	15	6.0
<i>Eimeriapallida</i> + <i>Haemonchuscontortus</i>	8	3.2
<i>Eimeriapallida</i> + <i>Monieziaexpansa</i>	3	1.2
<i>Haemonchuscontortus</i> + <i>Oesophagostomumcolumbianum</i>	2	0.8
<i>Trichostrongyluscolubriformes</i> + <i>Monieziaexpansa</i>	2	0.8
<i>Trichostrongyluscolubriformes</i> + <i>Haemonchuscontortus</i>	1	0.4
<i>Oesophagostomumcolumbianum</i> + <i>Strongyluspapillosus</i>	1	0.4
<i>Trichostrongyluscolubriformes</i> + <i>Oesophagostomumcolumbianum</i>	1	0.4
<i>Eimeriapallida</i> + <i>Trichostrongyluscolubriformes</i> + <i>Monieziaexpansa</i>	3	1.2
<i>Eimeriapallida</i> + <i>Trichostrongyluscolubriformes</i> + <i>Haemonchuscontortus</i>	3	1.2
<i>Eimeriapallida</i> + <i>Haemonchuscontortus</i> + <i>Monieziaexpansa</i>	3	1.2
<i>Eimeriapallida</i> + <i>Oesophagostomumcolumbianum</i> + <i>Monieziaexpansa</i>	2	0.8
<i>Eimeriapallida</i> + <i>Haemonchuscontortus</i> + <i>Oesophagostomumcolumbianum</i>	2	0.8
<i>Eimeriapallida</i> + <i>Trichostrongyluscolubriformes</i> + <i>Oesophagostomumcolumbianum</i>	1	0.4
<i>Trichostrongyluscolubriformes</i> + <i>Haemonchuscontortus</i> + <i>Oesophagostomumcolumbianum</i>	1	0.4
<b>Total</b>	<b>76</b>	<b>30.2</b>

Apparently, infection by a combination of *E. pallida* and *T. colubriformes* was more common than combinations involving the other parasites. Table no 3 highlights the prevalence of infection based on sex of goats examined where females were found to be significantly more infected than the males ( $p < 0.05$ ).

**Table no 3:** Sex distribution of gastrointestinal parasites among goats examined during the study.

Sex	No examined	No infected	(%) infected
Male	223	119	53.4
Female	228	133	58.3*
Total	451	252	55.9

\* = Infection rate significant at  $P < 0.05$

However, age wise disposition to infection presented in Table no 4 did not reveal any significant difference from each other ( $p > 0.05$ ).

**Table no. 4:** Age distribution of gastrointestinal parasites encountered among goats examined during the study.

Age	No examined	No Infected	(%) infection
Young (below one yr)	79	59	74.7 NS
Adult (above one yr)	372	193	51.9 NS
Total	451	252	55.9

NS= Not significant at  $p > 0.05$ .

The prevalence of parasitic infection based on breed is depicted in Table no 5.

Whereas more Sokoto Red breed were examined, the West African Dwarf breed which had the fewest number examined were the most infected. Comparatively, the Kano Brown goats were the least infected breed with infection between breeds being significantly different from each other ( $p < 0.05$ ).

**Table no. 5:** Prevalence of gastrointestinal parasites encountered among goats examined based on breed.

Breed of Goats	No examined	No Infected	(%)* Infection
Sokoto Red (Maradi)	303	161	53.1
Sahel	104	66	63.5
Kano Brown	25	12	48.0
West African Dwarf	19	13	68.4
Total	451	252	55.9

\* = Infection rate significant at  $P < 0.05$

#### IV. Discussion

The six parasites encountered in this study are common parasites of domestic animals which have been shown to have a country wide distribution in Nigeria<sup>8</sup>. Although there is no baseline information for the Bauchi area to enable a reasonable comparison, studies elsewhere in the northeastern sub region of the country by<sup>9</sup> in Maiduguri reported similar array of parasites. All the parasites encountered in this study are of great economic significance. They are known to jointly cause colossal damage due to feeding activities of the adults which attach to the intestinal walls and larval migrations in case of the helminths as well as diarrhea in protozoan infections. Their combined action result in hypoproteinaemia, impaired digestive efficiency, pathogenic complications such as anaemia, diarrhoea, oedema, and reduction in feed intake, low milk production, miscarriage, progressive weight loss, stunted growth and death. Therefore, the occurrence of these parasites in the study area is of great concern. The combined pathogenic effects induced by parasitism will no doubt negatively affect the farmers forcing them to remain impoverished occasioned by production losses.

The high prevalence of infection (69.8%) recorded in this study is consistent with the report of<sup>9, 10</sup> that the incidence of parasitic gastroenteritis of ruminants is usually high especially among those kept under traditional methods of husbandry with insidious effects that undermine host health particularly when compounded by additional stress caused by malnutrition.

The finding of *Eimeria* and the strongyles as the most common parasites of goats in the Bauchi area is in conformity with similar works elsewhere in Nigeria where they were reported as the most incriminated gastrointestinal parasites of domestic ruminants<sup>9, 11, 12</sup>.

The significantly higher prevalence of infection in females than their male counterparts is consistent with the reports of<sup>13, 14, 15, 16</sup>, who similarly recorded significant disparity between the sexes. Usually when females are pregnant or lactating, they experience hormonal changes which lowers their immunity and resistance to parasitic invasion with the resultant establishment of high worm burdens. This situation could have probably

been responsible for the current findings as most of the females were noted to be either pregnant or lactating during the study.

It is rather unusual that although more young goats were infected than adults, there was no significant difference in prevalence of infection between them. This contrast with the reports of<sup>17,18,19,20,21</sup> Richard *et al* (1990), who showed that susceptibility to infection was influenced by a factor of age. The reason for the situation in this study is therefore unclear.

The significant disparity observed between the breeds of goats examined is interesting. Prolankarn<sup>22</sup> had shown that susceptibility to infection is influenced by breed of goats. Raza<sup>23, 24</sup> have stated that resistance of breeds to infection may be attributed to heritable genetic traits of hosts. Disparity in infection had also been associated with feeding habits of hosts<sup>24</sup>. While potential hosts could avoid some food items that are close to their droppings thus, reducing the chance of picking up infection, some breeds may graze close to the ground and also to their droppings which increases the probability of the uptake of either eggs/oocysts or larvae. Although the genetic makeup of the breeds of goats in the study was not examined and no special attention was paid to feeding habits in the present study, both genetic traits and feeding habits may account in part for the differences observed among the breeds. It would therefore appear more profitable to farmers to keep the Kano Brown and Sokoto Red Breed of goats because of their resistance to parasitic infection as oppose to the more susceptible West African Dwarf breed.

## V. Conclusion

In conclusion, this study has revealed that gastrointestinal parasites are highly prevalent in the study area. Owing to the attendant economic consequences of these parasites, their control has become imperative. Although effective chemotherapy is available for most gastrointestinal parasites, their complex epizootiology makes it extremely difficult to control such diseases<sup>25</sup> especially under semi-intensive management system practiced in the Bauchi area. Paradoxically, better control may be achieved by treating individual animals showing signs and symptoms of infection as well as improved nutrition.

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