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High Prevalence of Gastro-Intestinal Parasites in Indigenous Goats of Nigeria

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ABSTRACT

A survey was undertaken on the prevalence and intensity of gastro-intestinal helminth infection of indigenous goats in Nigeria. Faecal samples were collected from each goat through finger probing. and analyzed using direct smear and concentration methods. The prevalence of the various parasite species isolated were 69.2% and 61.5% for Haemonchus contortus, 38.5% and 46.2% for Oesophagostomum columbianum, 30.8% and 15.4% for T. colubriformis, 84.6% and 71.8% for S. papilosus and 30.8 and 20.5% for Moniezia spp. The mean total egg output was 68.92 ± 6.43 EPG while the mean egg output for RS and WAD were respectively 68.26 ± 7.70 and 70.92 ± 11.72. The H. contortus had the highest EPG for RS (30.33 ± 6.00) and WAD (30.31 ± 8.82) while Moniezia spp had the least for both RS (0.72 ± 0.24) and WAD (1.0 ± 0.48). The implications of these findings is discussed.

Keywords : Goats, West African Dwarf, eggs per gramme, Nigeria

Introduction

Urban and peri-urban livestock keeping has been hailed as a source of livelihood by some households in cities around the world (Mireri et al 2007). Goats are known to contribute substantially to the supply of animal protein in most parts of the world particularly in developing nations. Goat keeping is known to increase the economic status of the rural poor. However, high mortality rates as a result of infections of gastrointestinal parasites remain major constraints to small ruminant production (Perry *et al,* 2002). Parasitism thrives in livestock in the tropics because of improper care, unhygienic environment, extreme climate and close contact and interactions between infected animals. As gastrointestinal parasite infection is the most important limiting factor of goat productivity, parasitism has a highly detrimental effect on the goat industry (Gadahi *et al*., 2009).

Different breeds of goats have been adapted to different environments, the Sokoto Gudali (SG) and West African Dwarf (WAD) breeds are the indigenous breeds found in most ecological zones of southern Nigeria. Although adapted to local climatic and nutritional conditions, economic production of goats is hampered by infectious and parasitic diseases coupled with inadequate management (Nawathe *et al.,* 1985).

The present research aimed at determining the prevalence and intensity of gastrointestinal parasites which could be of productivity and zoonotic consequences to the rearing of small mammals in the tropics.

MATERIALS AND METHODS

Study Area

The study area is Nsukka Urban in southeast Nigeria. The area lies between latitude $6^0 44^1$ and $7^0 00^1$N and longitudes 6^0 14 and $7^0 35^1$. The mean temperature in the area in the hottest month of February is about 87.16^0F (30.64^0C) while the lowest temperature occurs in the month of November reaching 60.54^0F (15.86^0C). The area has a tropical relative humidity with annual range between 40% and 80%. The daily and annual peaks occur very early in the morning and rainy seasons respectively (Okoye *et al.,* 2011).

Collection and Processing of Samples

Faecal samples were collected from each goat through finger probin. A 3–5g subsample of each faecal sample was kept in a well-labelled specimen bottle, preserved in 10% aqueous formaldehyde and returned to the Parasitology Laboratory of the University of Nigeria, Nsukka, for analysis within 12 hours, using the Kato–Katz method (WHO, 1994). Observed helminth ova in 41.7mg of sieved stool were identified using known structural and morphometric features (Soulsby, 1982; Bowman, 1999), and multiplied by a factor of 24 to convert to eggs/g of faeces (Katz et al., 1994). Kato–Katz is the method adopted by the World Health Organization (WHO, 1993) for quantitative and qualitative diagnosis of intestinal infections caused by helminthes.

The sampled animals were stratified by sex, age and breed. Those one year old and below were classified as young (or kids) while older ones were classified as adults.

Statistical Analysis
Data generated were analyzed using the Statistical Package for Social Scientists (SPSS) for Windows version 16 (SPSS Inc., Chikago, IL., USA). The association between independent factors (age, sex, breed) and continuous dependent variables (EPG) was calculated using one way analysis of variance (ANOVA). The association between the independent factors and the prevalence of the various parasites were evaluated using Chi-square statistic. Level of significance was set at P <0.05.

RESULTS

Helminth species and levels of infection

The prevalence of the various parasite species isolated for the Sokoto Gudali (SG) and West African Dwarf (WAD) goats respectively were 69.2% and 61.5% for *Haemonchus contortus,* 38.5% and 46.2% for *Oesophagostomum columbianum,* 30.8% and 15.4% for *T. colubriformis,* 84.6% and 71.8% for S. *papilosus* and 30.8 and 20.5% for *Moniezia* spp. The differences in the prevalence of the different parasite species per breed of goat was not significantly different (P>0.05, Fig. 1).

Sex related prevalence
The sex-related prevalence of the various species of parasites shows that *S. papillosus* had the higher prevalence for both breeds (males, 78.1% and females, 70.0%), while the least for males was *T columbriformis* (21.9%) and both *T columbriformis* and *O Columbianum* had the least prevalence for females (15% each) – Fig 2.

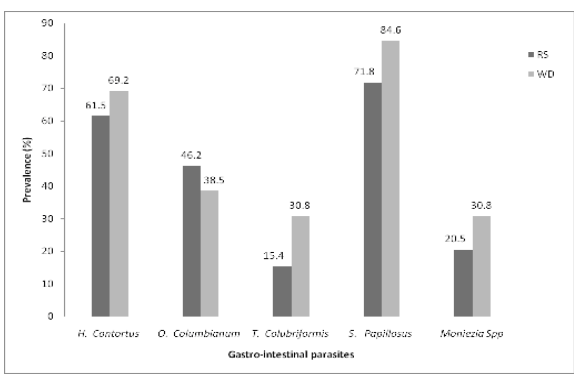

Fig. 1: Prevalence of Gastro-intestinal parasites in different breeds of goats
(RS = Red Sokoto Goat; WAD=West African Dwarf Goat)

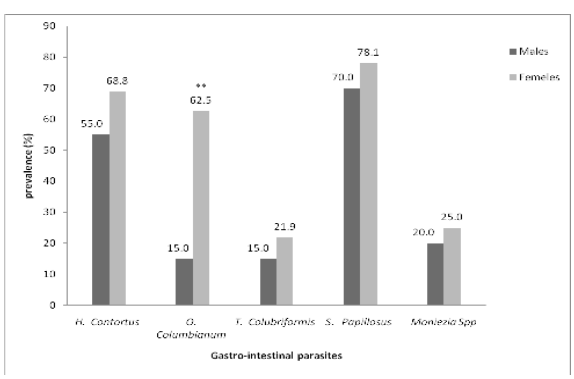

Fig 2: Sex related prevalence of gastrointestinal Parasites in goats

Age related prevalence
The age related prevalence of infection (Fig 3) showed that S papillosus was most prevalent for both Adults (76.0%) and the Young (74.1%) while *T colubriformis* had the least rate in Adult goats (20.0%) and the Young (18.5%). Young goats harboured more nematode parasites than Adults, but the difference in prevalence was not significant (P>0.05).

Intensity of Gastro-Intestinal Parasites
The mean total egg output in this study was 68.92 ± 6.43 EPG while the mean egg output for RS and WAD were respectively 68.26 ± 7.70 and 70.92 ± 11.72 (Table 1). H. contortus had the *highest EPG* for RS (30.33 ± 6.00) and WAD (30.31 ± 8.82) while *Moniezia spp* had the least for both RS (0.72 ± 0.24) and WAD (1.0 ± 0.48). No significant difference (P>0.05) was found in the egg output of the different gastro-intestinal parasites between the two breeds.

Table 1: Egg output of gastro-intestinal parasites stratified by breeds of goats

Egg output (EPG)	RS (n = 39)	WAD (n = 13)	P values †
H. contortus	30.33 ± 6.00	30.31 ± 8.82	0.998^{ns}
O.columbianum	22.13 ± 4.7	21.62 ± 9.97	0.963^{ns}
T. colubriformis	4.69 ± 2.6	7.54 ± 5.06	0.624^{ns}
S.Papillosus	13.15 ± 2.8	11.0 ± 3.45	0.632^{ns}
Moniezia Spp	0.72 ± 0.24	1.0 ± 0.48	0.606^{ns}
Total	**68.26 ± 7.70**	**70.92 ± 11.72**	**0.351^{ns}**

^{ns} No significant difference between breeds (P>0.05); †P value determined by T –test. RS = Red Sokoto Goat; WAD = West African Dwarf, n = number of goats examined

Sex related Intensity of Infection
Female goats had significantly higher (P< 0.05) total egg output (82.28 ± 7.71 vs. 47.56 ± 9.68 (EPG) than male goats. The mean number of *O. columbianum* and *T. colubriformis* eggs was also significantly higher in female goats than in male goats (Table 2).

Age related Intensity of Infection
Adult goats had statistically insignificant (P>0.05) more eggs in faeces than young goats. However, mean egg output of *S. papilosus* was significantly higher in adult goats (17.60 ± 4.17 EPG) than young goats (8.0 ± 1.63 EPG) (Table 3). No significant difference (P>0.05) was found in the mean egg output of other parasites comparing adult and young goats.

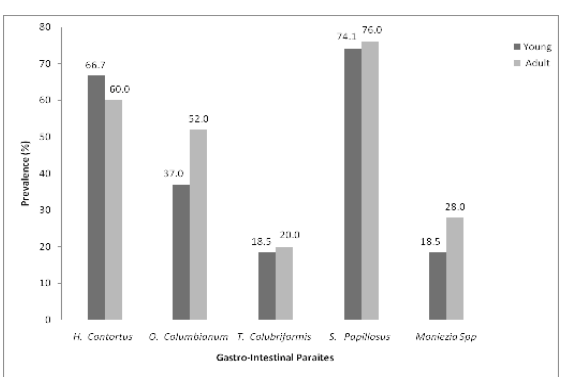

Fig. 3: Prevalence of gastro-intestinal parasites in young and adult goats

Table 2: Egg output of gastrointestinal parasites stratified by sex of goats

Egg output (EPG)	Sex Males (n = 20)	Females (n = 32)	P values†
H. contortus	35.30 ± 9.63	27.22 ± 5.44	0.434^{ns}
O.columbianum	10.00 ± 5.51	29.50 ± 5.70	0.025*
T. colubriformis	0.80 ± 0.47	8.28 ± 3.73	0.121^{ns}
S.Papillosus	5.55 ± 1.64	17.03 ± 3.31	0.012*
Moniezia Spp	0.65 ± 0.30	0.88 ± 0.30	0.616^{ns}
Total	**47.46 ± 9.68**	**82.28 ± 7.71**	**0.007***

**Significantly different (P<0.05); ^{ns} no significant difference between sex (P>0.05) †P value determined by T –test; n = number of goats examined*

Table3: Egg output of gastrointestinal parasites stratified by age of goats

Egg output (EPG)	Young (n = 25)	Adult (n = 27)	P values†
H. contortus	35.85 ± 7.53	24.36 ± 6.31	0.248^{ns}
O. columbianum	18.44 ± 6.04	25.84 ± 6.08	0.393^{ns}
T. colubriformis	4.0 ± 2.50	6.92 ± 0.33	0.546^{ns}
S.Papillosus	8.0 ± 1.63	17.6 0 ± 4.17	0.032*
Moniezia Spp	0.67 ± 2.82	0.92 ± 0.33	0.561^{ns}
Total	**62.56 ± 8.95**	**75.80 ± 9.22**	**0.308^{ns}**

** Significantly different (P<0.05); ^{ns} no significant difference between sex (P>0.05). †P value determined by T –test; n = number of goats examined*

DISCUSSION

The high prevalence rate of gastrointestinal parasites is consistent with the result of Tembely *et al. (*1998*)* in Kenya. The high prevalence rate could be due to the type of animal management system practiced. In this study area, large numbers of free-range animals are kept together in unhygienic environment. This could increase the degree of pasture contamination leading to higher prevalence of parasite infection (Nganga *et al.,* 2004). Poor veterinary infrastructure and medication could have also been causative factors here and in other places with similar high rate of gastro-intestinal helminth prevalence rate (Dagnachew *et al.,* 2011).

This condition could also be due to less or slow development of immunity in goats to gastrointestinal parasites compared with situations found in sheep and cattle (Urquhart et al., 1987). Other contributing factors to the high prevalence could be the favourable humidity and temperature which generally support parasite growth and development due to the established direct relationship between moisture and prevalence of parasites (Chiejiena and Behnke, 2011; Dagnachew et al., 2011).

The helminth parasites found in this study have also been reported by other researchers (Githigia et al., 2005; Waruiru et al., 2005). The most prevalent parasite in this study was S. papilosus, followed by *H. contortus*; contrary to some studies (Regassa et al., 2006; Dagnachew et al., 2011) that reported *H. contortus* to be most prevalent. *T. colubriformis* was the least prevalent gastrointestinal parasite recorded. The infective first instar larvae of this is not capable of active movement. Therefore, chance of infection of browser goats with *T. colubriformis* remains logically relatively low (Mohanta et al., 2007). The high prevalence of *S. papiliosus*, *H. contortus* and others in West African Dwarf goats despite its reported resistance to gastro-intestinal helminths suggest little or no worm control, intensive grazing, poor hygiene, malnutrition, concurrent infections with coccidiosis, ticks, lice, viruses and extensive mange mite infestations in the study area.

We recommend that the Health regulatory agencies should establish and run modern veterinary infrastructure with adequate medications to control gastrointestinal parasites. Animal breeders should be enlightened on the appropriate breeding methods to adopt, application of proper sanitation, effect of malnutrition, etc. Mite infestation should be controlled as they are vectors of the cestode parasite, *Moneizia* spp.

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