



Prevalence of Gastrointestinal Parasites of Goats Fed to Captive Animals at the University of Ibadan Zoological Garden, Nigeria.

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SUMMARY

Zoological gardens showcase wild animals for aesthetic, educational and conservation purposes. Parasitic diseases had been described to be a big threat to animals in captivity, leading to high mortality in some cases. This study was carried out to determine the prevalence of gastrointestinal parasites in goats fed to animals in the University of Ibadan Zoological Garden between May and September, 2011. Methods used include the Egg floatation and McMaster Egg Counting Technique for parasite egg identification and counts respectively while Petri Dish-Filter Paper Slant was for larval recovery. Descriptive Statistics and chi square was employed and significance was set at $p < 0.05$. Parasites recovered were *Haemonchus contortus*, *Paramphistomum* spp, *Nematodirus* spp, *Trichostrongylus colubriformis*, *Trichuris caprice*, *Toxocara vitulorum* and *Strongyloides papillosus*. By egg floatation technique, *Trichostrongylus colubriformis* was more prevalent [12 (10.8%)], compared to *Haemonchus contortus* [11 (9.91%)], while the least prevalence was observed for *Strongyloides papillosus* [2 (1.80%)]. The differences observed in parasite prevalence were statistically significant ($\chi^2 = 34.45$). The mean egg intensity and larvae recovery showed that the prevalence of *Haemonchus contortus* was significantly higher (2358.3 ± 546 ; 66.9%; $\chi^2 = 109.97$) than all other gastrointestinal helminths. This study highlights that *Haemonchus contortus* was the most prevalent

gastrointestinal parasite in goats fed to animals in the University of Ibadan Zoological Garden.

Key words: Prevalence, Gastrointestinal parasites, Goats, Captive animals, Zoological Garden, Ibadan, Nigeria

INTRODUCTION

Zoological gardens are meant to exhibit wild animals for aesthetic, educational, research and conservation purposes (Varadharajan and Pythal, 1999). In tropical countries, parasitic diseases constitute one of the major challenges causing mortality in captive wild animals (Adedokun et al., 2002, Emikpe et al., 2002a, b, 2007). Since goats are often used in feeding captive carnivores, the health status including parasitic burden of such goats is important for effective zoo management. Africa is said to have a population of 174 million goats, representing 31% of the world total with Nigeria accounting for 34.5 million (Onakpa et al., 2010). The goat population in Nigeria makes it the second most important livestock species. Goats often serve as a source of meat, milk, skin and wool. In Nigeria, there are three main varieties of goats recognized, the Sahel, desert or West African long-legged goat, the red Sokoto goat and the West African dwarf goat (Aliyu, 1990). The red Sokoto goat is usually found throughout the sub-humid and semi arid zones of Nigeria and is the most important goat breed that accounts for about 70% of the estimated 34.5 million Nigerian goat

populations (Osuhor, *et al.*, 1998). In the University of Ibadan zoological garden, the goats often used are procured from the northern part of Nigeria and the parasitic status of such animals need to be ascertained since gastrointestinal parasite infestations constitute serious health challenges and limitations to the productivity of not only goats but captive carnivores in most developing tropical countries (Githiori, *et al.*, 2006). This is primarily due to warm temperatures, poor management practices and inadequate health control measures (Akhtar, *et al.*, 2000). These are factors that facilitate parasites transmission. The impact of helminths is often manifested through morbidity, mortality (Mahusoon, *et al.*, 2004) and the cost of treatment and control measures against the helminths (Nwosu, *et al.*, 2007).

This study was carried out to identify the helminths of goats fed to animals in the University of Ibadan Zoological garden and thereby inform necessary precautions in safeguarding the health of the captive animals.

METHODS

Study site

The study was carried out in the University of Ibadan Zoological Garden. Lions, striped & spotted hyenas, jackals and foxes are some of the carnivores kept in the zoo. The Zoological Garden is located on latitude 7°26' 33" North and 3°53' 43" East. In terms of its aerial extent, it lies between latitudes 7°46' 29" north to 7°26' 36" north and between longitudes 3°53' 39" east to 3°53' 48" east.

Goats meant for feeding the captive carnivores were procured from the northern parts of Nigeria. The study spanned through May to September, 2011. Animal consignments in groups of 14 were received twice in a week and all groups were screened for gastrointestinal parasites.

Collection of faecal samples

Faecal samples were collected from the rectum of goats using gloved index finger and kept in labeled Petri-dishes and transported to the

Veterinary Parasitology laboratory, University of Ibadan for examination

Faecal Examination

Qualitative egg identification was done by direct smear and egg floatation technique while quantitative analysis, egg per gram of faeces was determined using McMaster Egg Counting Technique (MAFF, 1977) and larva culture was done using the Petri Dish- Filter Paper Slant culture technique (modified Harada- Mori Technique) as described by Garcia (Garcia, 2001). Some quantity of each faecal sample was cultured for 10 days (Soulsby, 1982) to harvest and identify helminth larvae. Larvae that emerged were subsequently recovered for identification using typical morphological features (Jansen Animal Health, 2010).

Statistical analysis

Data analysis was based on descriptive statistics while chi-squares was used to compare proportions using Microsoft office excel 2007 with p values equal to or less than 0.05 regarded as significant.

RESULTS

The ova and larvae/miracidia of parasites found in the stool samples analyzed include *Haemonchus contortus*; *Paramphistomum* spp; *Nematodirus* spp; *Trichostrongylus colubriformis*; *Trichuris caprice*, *Toxocara vitulorum* and *Strongyloides papillosus*.

Overall prevalence of infection was 43 (38.74%), *Trichostrongylus colubriformis* was more prevalent [12 (10.81%)], followed by *Haemonchus contortus* [11 (9.91%)] and the least was *Strongyloides papillosus* [2 (1.80%)]. The differences observed in parasite prevalence were statistically significant ($\chi^2=34.45$; $df=5$; $p<0.05$) (Table 1).

Table 1 also shows the larvae recovery of samples. The variation in their percentage occurrences showed a statistical significance ($\chi^2=109.97$; $df=3$; $p<0.05$). *Haemonchus contortus* was recovered from 72 (64.86%) of the faecal samples, followed by *Paramphistomum* spp 40 (36.04%) while the least percentage prevalence was observed in

Nematodirus spp 4 (3.60%).

Table 2 shows larvae recovery from samples that were cultured only. *Haemonchus contortus* had the highest percentage recovery (66.9%),

followed by *Paramphistomum* spp (16.7%). This variation in percentage prevalence was significant ($\chi^2=35.56$; $df=3$; $p<0.05$).

TABLE I: Prevalence of gastrointestinal parasites in faecal samples of goats fed to animals in the university of Ibadan zoological garden

Parasite species	No examined	Ova identification			Larval identification	
		No infected	Prevalence %	Egg per gram	No infected	prevalence
<i>Haemonchus contortus</i>	111	11	9.91	2358.3±546	72	(64.86)
<i>Paramphistomum</i> spp	111	4	3.6	211.5±23	40	(36.04)
<i>Trichuris caprice</i>	111	10	9.01	184.0±17	-	-
<i>Strongyloides papillosus</i>	111	2	1.8	346.4±34	9	(8.11)
<i>Toxocara vitulorum</i>	111	4	3.6	141.4±23	-	-
<i>Trichostrongylus colubriformis</i>	111	12	10.81	816.4±46	-	-
<i>Nematodirus</i> spp.	111	-	-	-	4	(3.60)
<i>Total</i>	111	43	38.74			

Table 2: Larvae recovery from faecal samples of goats fed to animals in the University of Ibadan zoological garden

Parasites	Number examined	Number of samples with larva	% larval recovery
<i>Paramphistomum</i> spp.	239	40	16.7
<i>Haemonchus contortus</i>	239	160	66.9
<i>Strongyloides papillosus</i>	239	20	8.4
<i>Nematodirus</i> spp.	239	12	5.0
<i>Trichostrongylus colubriformis</i>	239	11	4.6

DISCUSSION

This study has shown an overall prevalence of 38.7% for gastrointestinal parasites of goats fed to animals in University of Ibadan Zoological Garden. The period of this study coincided with heavy rains in Ibadan when nematodes had been reported to be abundant. This may be attributed to the temperature and humidity of wet season, which are suitable for the development of endoparasites. Similar observations on availability and abundance of nematode larvae during the rainy season have also been made by Dorny *et al.*, (1995) and Amarante and Barbosa (1998). The high prevalence of GIT helminthes, which comprised more of strongyles agrees with Rossanigo and Gruner, (1995) and Opara *et al.* (2010) who opined that nematodes are responsible for most of the helminth diseases of veterinary importance. The high prevalence encountered in this survey may be explained by the existence of favourable climatic conditions (Magona and Musisi, 1999), which support prolonged survival of infective nematode larvae on pasture possibly due to favourable humidity and temperature (O'Connor *et al.*, (2007). In terms of egg burden, *Trichostrongylus* spp was more prevalent [12 (10.81%)], followed by *Haemonchus contortus* while in terms of larval prevalence *Haemonchus contortus* was the highest when the Petri dish- Filter Paper Slant Technique was employed. This agrees with Fakae (1990) on the epidemiology of helminthiosis in small ruminants under the traditional husbandry system in Eastern Nigeria. He reported the highest prevalence for *Haemonchus contortus* (87.10%), with others as *Trichostrongylus* spp (63.80%), metacestodes of *Taenia hydatigena* (30.20%), *Oesophagostomum columbianum* (22.40%), *Strongyloides* spp (18.80%), *Cooperia* spp (17.20%), *Trichuris ovis* (3.50%) and *Paramphistomum* spp (0.90%).

The highest prevalence observed in *Haemonchus contortus* could be due to the fact that this nematode has a relatively short generation interval and ability to take

advantage of favourable environmental conditions. The plausible reason why *Paramphistomum* spp was observed in this study could be the rainfall pattern which could have created a conducive environment for the survival of its snail intermediate host which in turn enhances the transmission of the parasite.

CONCLUSION

Goats fed to captive animals at the University of Ibadan zoological garden were infected with helminthes which could have an impact on the health of the garden animals hence there is a need for the deworming of goats used as feed for zoo animals and acquisition of goats from farms practicing intensive animal care system as against free range methods, under which animals used in this research were kept.

REFERENCES

- ADEDOKUN, O.A., ADEDOKUN, R.A.M., EMIKPE, B.O., OHORE, O.G, OLUWAYELU, D. O., AJAYI, O. L. (2002) Concurrent Fatal Helminthosis and Balantidosis in red monkey (*Erythrocebus patas*) in Ibadan, Nigeria. *N. V.J.* **23** (2): 56-59.
- AKHTAR, M.S., IQBAL, Z., KHAN, M.N. and MUHAMMAD, L. (2000): Anthelmintic activity of medicinal plants with particular reference to their use in animals in the Indo-Pakistan subcontinent – A Review. *Small Ruminant Res.* **38**: 99-107.
- ALIYU, S. U. (1990): Sheep and Goat Production Extension Bulletin 45, Livestock Series. (8): 35 - 37.
- AMARANTE, A.F.T. and BARBOSA, M.A. (1998): Comparison between pasture sampling and tracer lambs to evaluate contamination of sheep pastures by nematode infective larvae. *Rev. Brasil. Parasitol. Vet.* **7**: 95-9.
- DORNY, P., SYMONS, C., JALILA, A., VERCRUYSSSE, J. and SANI, R. (1995): Strongyle infections in sheep and goats under the traditional husbandry system in Peninsular Malaysia. *Vet. Parasitol.* **56**: 121-36.
- EMIKPE, B. O., AYOADE, G. O., OHORE, O.

- G., OLANIYAN, O. O., AKUSU, M.O. (2002): Fatal trichuriasis in a captive baboon (*Papio anubis*) in Ibadan Nigeria: A case report. *Tropical Vet.* **20** (1): 36–39
- EMIKPE, B.O., OHORE G.O, OLUWAYELU D.O., EYAREFE, O.D. [2002]: Pasteurellosis in a captive antelope [*Antelope cervicapra*] in Ibadan Nigeria. *Tropical Vet.* **20** [4]: 238-242.
- EMIKPE, B.O., ADENIRAN, G.A., ALAKA, O.O., OHORE, O.G., ANTIA, R.E., AJAYI, O.L. and OMOBOWALE, O.T. (2007). Valvular endocarditis in a captive monkey in Ibadan, Nigeria: a case report. *N. V. J.* **28** (3): 49-52.
- FAKAE, B.B. (1990): The epidemiology of helminthiasis in small ruminants under the traditional husbandry system in eastern Nigeria. *Vet. Res Commun.* **1495**: 381-391.
- GARCIA, L. S. (2001): *Diagnostic Medical Parasitology*, 4th ed. p. 786- 795. ASM Press, Washington, D.C.
- GITHIORI, J. ., ATHANASIADOU, S. and THAMSBORG, S.M. (2006): Use of plants in novel approaches for control of gastrointestinal helminths in livestock with emphasis on small ruminants. *Vet. Parasitol.* **139**: 308-320.
- JANSEN ANIMAL HEALTH. (2010): <http://www.janssenanimalhealth.com>. Retrieved 10th May, 2011.
- MAFF, (1977): Manual of Veterinary Parasitological Laboratory Techniques. Technical Bulletin No. 18, Ministry of Agriculture, Fisheries and Food, London, 129pp.
- MAGONA, J.W. and MUSISI, G. (1999): Prevalence and infections levels of gastrointestinal nematodes in Ugandan goats in different agro climatic zones. *Bull. Anim. Health Prod. Afr.* **47**:49-56.
- MAHUSOON, M.M., PERERA, A.N.F., PERERA, E.R.K. and PERERA, K.A. (2004): Effect of molybdenum supplementation on circulating mineral levels, nematode infection and body weight in goats as related to season. *Trop Agr Res.* **16**: 128-136.
- NWOSU, C.O., MADU, P.P. and RICHARDS, W.S. (2007): Prevalence and seasonal changes in the population of gastrointestinal nematodes of small ruminants in the semi-arid zone of north-eastern Nigeria. *Vet. Parasitol.* **144**:118–124.
- O'CONNOR, L.J., KAHN, L.P. and WALKDEN-BROWN, S.W. (2007): Moisture requirements for free living development of *Haemonchus contortus*: Quantitative and temporal effects under conditions of low evaporation. *Vet. Parasitol.* **150**:128-138.
- ONAKPA, M.M., ONIFADE, K. and UMAR, M.A. (2010): Effects of Diminazene Aceturate and Ivermectin Administration on Semen and Serum Parameters of the Red Sokoto Buck. *J. Adv. Sci. Res.* **1**(2); 61-65.
- OPARA, M.N., OSUJI, C.T. and OPARA, J.A. (2010): Gastrointestinal Parasitism in Captive Animals at the Zoological Garden, Nekede Owerri, Southeast Nigeria. Report and Opinion. **2**(5): 21-28.
- OSUHOR, C.U., ALAWA, J.P. and LUFADAJU, E.A. (1998): Overnight manure production from Red Sokoto goats in Zaria, Nigeria. Proceedings of the Silver Anniversary Conference of NSAP and Inaugural Conference of WASAP, March 21-26, Abeokuta, Nigeria, pp: 53-54.
- ROSSANIGO, C.E. and GRUNER, L. (1995): Moisture and temperature requirements in feces for the development of free living stages of gastrointestinal nematodes of sheep and cattle and deer. *J. Helminthol.* **67**:357-362.
- SOULSBY, E.J.L. (1982): Helminthes, arthropods and protozoa of domesticated animals. 7th edition, Bailliere Tindall, London, UK.
- VARADHARAJAN, A. and PYTHAL C. (1999): A preliminary investigation on the parasites of wild animals at the zoological garden, Thiruvananthapuram, Kerala. *Zoos' print journal.* **I-XIV** (3-12); 159-164.