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INCIDENCE OF GASTROINTESTINAL HELMINTHS OVA OF NIGERIAN LOCAL DOGS (*CANIS FAMILIARIS*) RESIDENT ON UNIVERSITY OF MAIDUGURI CAMPUS, MAIDUGURI, NIGERIA

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ABSTRACT
An incidence study of gastrointestinal helminth parasites of dogs (*Canis familiaris*) resident on the University of Maiduguri Campus was conducted between June and September, 2009. Faecal samples collected from 138 dogs were processed using the saturated salt floatation technique and faecal egg counts made using the Modified Mac Master technique. Out of the One hundred and thirty eight (138) dogs sampled, 77 (55.8%) were infected with *Ancylostoma caninum* 40 (51.9%), *Toxocara canis* 21 (27.3%), *Filaroides osleri* 12 (15.6%) *Spirocerca lupi* 2(2.6%), *Ligula serrata* 1 (1.3%) and *Toxocara leonina* 1(1.3%) ($p<0.05$). Significant differences ($p< 0.05$) in incidence and intensity of infection were also recorded based on the age, sex, mode of life and feeding methods of the dogs studied.

INTRODUCTION
Dogs harbor a variety of gastrointestinal parasites, some of which can also infect humans (Craig and Macpherson, 2000). It is common to observe intestinal parasites in dogs of all ages and many canine gastrointestinal parasites eliminate their dispersion elements (eggs, larvae, oocysts) by the faecal route (Rinaldi *et al,* 2006 and Khante *et al,* 2009). Following single or mixed gastrointestinal parasite infections clinical signs such as unthriftiness, anaemia, diarrhoea, dehydration, electrolyte inbalance and mortality has been reported in both pet and stray dogs worldwide (Ogunkoya *et al,* 2006;Sowemimo and Asaolu, 2008). Apparently more Nigerians today have developed the habit of keeping dogs as pets or for guard purposes but majority are stray in habit (Dusai and Vakuru, 1992), and have been reported to be afflicted with endoparasitic infections by Ogunkoya *et al.*, (2006) in Zaria, Sowemimo and Asaolu, (2008) in Ibadan and Kutdang *et al.,* (2010) in Jos. However, there is a dearth of information on canine gastrointestinal helminthosis in this study area, hence this work was conducted to describe it.

MATERIALS AND METHODS
Faecal samples were obtained using hand gloves by picking freshly laid deposits from the ground and directly from the rectum of 138 dogs resident on the University of Maiduguri campus in Maiduguri, Borno State, Nigeria between June and September, 2009. Each sample was put into a universal bottle containing 10% formalin as a preservative and taken to the Parasitology Laboratory of the University of Maiduguri for examination using the floatation and sedimentation techniques as described by Soulsby (1982). Egg per gram (epg) of faeces was determined using the Mac Master egg count techniques and identification of ova of parasites was by morphological characteristics such as shape, size, nature of shell and the

use of plate keys (Soulsby, 1982).The number of infected cases was recorded as percentage for age, mode of feeding, habit and sex of dogs with variations analyzed statistically using the Chi- square test. Associations were considered significant when $p \leq 5x10^{-2}$. Faecal egg counts as a measurement of intensity of infection was expressed as mean ± standard deviation (SD).

RESULTS

Gastrointestinal helminths were recorded in 77 (55.8%) of the 138 dogs examined, and a total of 6 species were indentified as *Ancylostoma caninum* 40(51.9%), *Toxocara canis* 21(27.3%), *Filaroides osleri* 12(15.6%), *Spriocerca lupi* 2(2.6), *Ligula serrata* 1(1.3%) and *Toxocara leonina* 1(1.3%) ($p<0.05$) (Table1). Table 2 shows the incidence and intensity of helminthosis based on the sex and age of dogs. More of male dogs (57.1%) were infected than female (52.5%) ($p<0.05$); and also more of younger dogs (0-1½yrs) (54.0%) than older ones (4-5½yrs) (30.0%) ($p<0.05$). Also both male and younger dogs also possessed a higher mean intensity of infection presented as 964.2±1343.5 and 952.5±1343.5 respectively ($p<0.05$). Table 3 shows the incidence and intensity of dog helminthosis based on their mode of life and feeding methods. Free roaming dogs were more infected (59.3%) than those housed (53.3%) and in-and–out dogs (50.0%) ($p<0.05$). Also those dogs that scavenge had a higher incidence (59.1%) than those on prepared food (48.1%) or both as scavengers and on prepared food (57.3%) ($p<0.05$). However, there is no significant variation in incidence and intensity of dogs helmnthosis based on the residential areas examined ($p>0.05$) (Table 4).

Table 1: Incidence of helminthosis among dogs examined

Parasites Isolated	No (%) dogs Infected	P=0.05
Toxocara canis	21(27.3)	
Ancylostoma caninum	40(51.9)	
Filaroides osleri	12 (15.6)	p<0.05
Spirocerca lupi	02 (2.6)	
Ligula serrata	01 (1.3)	
Toxocara leonina	01 (1.3)	
Total	77(55.8)	

Table 2: Incidence and intensity of helminthosis based on the sex and age of dogs examined

	No. of dogs Examined	No (%) infected	Meant ± SD EPG (intensity)
Overall	138	77(55.8)	964.2±1343.5[a]
Sex:			
Male	98	56(57.1)[a]	880.7±1202.1[b]
Female	40	21(52.5)[b]	
Age group (years)			
0-1½	87	47 (54.0)[c]	952.5±1343.5[c]
2-3½	40	27(67.5)[d]	940.0±1202.1[d]
4-5½	10	03(30.0)[e]	900.0± 636.4[e]

NB: Columns with different superscripts are statistically significant

Table 3: Incidence and intensity of helminthosis based on mode of life and feeding methods of dogs examined

Mode of life and Feeding methods	No of dogs examined	No (%) infected	Mean ±SD (intensity)
Mode of life:			
Free roaming	81	48(59.3)[a]	919.1±1343.5
In- and- Out	15	8 (53.3)[b]	750.0± 7071.1
Housed	42	21 (50.0)[c]	687.7± 1202.1
Feeding methods:			
Scavenging	22	13(59.1)[a]	1050.0±1272.8
Prepared food	27	13(48.1) [b]	692.0±7071.1
Both given	89	51(57.3)[c]	729.5±1202.1

NB: Columns with different superscripts are statistically significant

Table 4: Incidence and intensity of helminthosis among residential areas studied

Residential Areas on Campus	No. of dogs examined	No. (%) infected	Mean ±SD (Intensity)
JS line	17	10(58.8)	302.7± 369.7
SSTC & SSTH29	21	(72.4)	273.3 ±343.6
G – Line	16	08(50.0)	327.7 ± 513.1
R – Line	19	13(68.4)	387.2 ±362.0
J. Line	17	11 (64.7)	293.7±381.7
H. Line	22	11 (50.0)	248.8± 428.6
NH- Line	18	03(16.7)	108.3 ± 185.5

NB: P=0.9272>0.05= Not significant

DISCUSSION

This coprological study on dog helminthiosis has revealed a high incidence of 55.8% with most of the helminths encountered previously reported in Nigeria by Ogunkoya *et al*., (2006) in Zaria Northern Nigeria, Sowemimo and Asaolu, (2008) in Ibadan, Western Nigeria., Kutdang *et al,* (2010) in Jos, Plateau State, Nigeria, and elsewhere by Komtangi *et al*., (2005) in Cameroon, Khante *et al*, (2009) in Nagpur City India., Garedaghi and Safar (2011) in Tabriz, Iran and Hailu *et al*., (2011) in Jimma, Ethiopia. These workers attributed the disease to poor management and irresponsible ownership as primary factors as well as high relative humidity and heavy rainfall as bioclimatic factors that favour their development and transmission, and higher prevalence is associated with stray dogs which increases their chances of exposure to infection especially those observed to feed from garbage. Moreso most canine gastrointestinal parasites eliminate their dispersion elements (eggs, larvae and oocysts) by the faecal route. Ancylostomosis and toxocariasis were most common in this study. This agrees with earlier reports Nigeria by Egbe – Nwiyi., (1993) in Maiduguri, Sowemimo and Asaolu, (2008) in Ibadan, Kutdang *et al*., (2010) in Jos., and Khante *et al*., in India. These parasites have been reported to affect all breeds of dogs irrespective of region leading to haemorrhagic anemia; and both are also of significant public health problem worldwide, particularly in developing countries that are socioeconomically disadvantaged with poor levels of hygiene and overcrowding, together with lack of veterinary attention and zoonotic awareness, which exacerbates the risk of disease transmission (Sowemimo and Asaolu, 2008). *A. caninum* larvae causes lesions of bullae with indurated edges which may burst to become inflamed; and *T. canis* causes petit-mal-like convulsions, bronchitis and granulomatous lesions in the eye (Komtangi *et al*., 2005). Male and younger dogs had a higher incidence and intensity of helminthosis than female adult dogs in this study, which agrees with the findings of Khante *et. al.,* (2009) and Kutdang *et. al.,* (2010) that male dogs usually wander around more often in search of female dogs for mating, thus increasing the risk to parasitosis. Also higher prevalence have been reported in younger

dogs (10-12months) especially puppies due to the fact that certain modes of transmission (transplacental and transmammary routes) are exclusive to newly whelped or neonates, and lack of acquired immunity (age- dependent) in young dogs (Sowemimo and Asaolu, 2008; Mbaya *et al*., 2008; Hailu, *et al*, 2011). Self cure phenomenon may also account for the low prevalence in adult dogs as a result of parasite specific immunity acquired with age and by single or repeated exposure (Little, 2005; Hailu, *et al*., 2011). The mode of life and feeding methods of dogs examined in this study also influenced the incidence and intensity of infection. Free roaming and scavenging dogs acquired higher incidence and intensity of helminthosis, which agrees with Komtangi *et al,* (2005) that higher rates of infection are associated with stray dogs especially those observed to feed from garbage and dogs maintained under poor sanitary conditions. In conclusion, the dog helminths in this study area are of epidemiological significance since dogs are reservoirs of some uncommon human zoonoses, especially in children due to their exposure to puppies, contaminated soils from out-door playground (Minnar and Krecek, 2001). It is recommended that routine dewoming and public education on dangers associated with indiscriminate disposal of dog faeces in the environment be emphasized as control measures.

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