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OCCURRENCE AND PREVALENCE OF ECTO- AND GASTROINTESTINAL PARASITES IN WILD CANE RATS' *(TRYONOMYS SWINDERIANUS)* FROM OYO STATE, SOUTH-WESTERN NIGERIA

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ABSTRACT

A study was carried out to determine the prevalence of ecto- and gastro-intestinal parasitic infections in wild cane rats (T. swinderianus) in Oyo State, south-western Nigeria. Four hundred (400) grasscutters were examined for ectoparasites while the gastro-intestinal tracts of thirty (30) species were removed and examined for endoparasites. One hundred and twelve, 112 (28.0%) of the cane rats were found to harbour ectoparasites comprising Ixodes sp and Rhipicephalus sp. Fifty-five 55(13.75%) of the cane rats were infested with Rhipicephalus sp only, 37(9.25%) with Ixodes sp only, while 20(5.0%) were infested with both Ixodes sp and Rhipicephalus sp. Rhipicephalus sp infestation was significantly higher ($P<0.05$) compared to Ixodes sp. Infestation was highest at the lateral regions (12.24±0.21) for Ixodes sp and (15.39±0.02) for Rhi picephalus sp and lowest at the neck region (0.00±0.00) for both species. Prevalence of ticks' infestation was higher in females (52.45%) than in males (39.07%). Gastrointestinal parasites were found in 100% of the cane rats and composed of Nematodes such as Trichuris sp. (96.7%), Globocephalus sp. (86.7%), Squamostrongylus sp. (70%), Strongylus sp. (83.3%), Strongyloides sp. (93.3%), Trichostrongylus sp. (100%), and Castorstrongylus sp. (83.3%). The small intestine harboured the highest number of parasites. Accordingly, this study concludes that wild cane rats harbour much parasites and that rearing can reduce the intensity of infection and increase the market value since the domesticated ones will be regularly de-wormed.

Keywords: Cane rat, *Thryonomys swinderianus*, Ecto-parasites, Gastrointestinal Parasites, Prevalence.

INTRODUCTION

Cane rat (Grasscutter) meat constitutes an important food for many Africans. The animals are mostly caught and eaten by families, but some are sold in markets and especially in roadside stalls. Many families depend exclusively on selling bush-meat, particularly that of grasscutters [4]. Cane rat is a wild hystricomorphic rodent widely distributed in the African sub region and exploited in most areas as a source of animal protein [16]. Being the most preferred [13] and most expensive meat in West Africa including Nigeria, Togo, Benin, Ghana and cote d'voir [5] [3], it contributes to both local and export earning of most West African Countries [16] [5] [17] and is therefore hunted aggressively. Food composition of cane rat has been analysed and its protein value has been rated very high

[1]. Cane rat and African giant rat (*Cricetomys gambianus*) have been found to be more favoured in terms of social acceptance among people of West Africa [14].

There are few literatures on the parasites of cane rat. However information is available on the parasites of other rodents such as rats and mice. [15] surveyed the ecto-and endoparasites of murid rats (Rodentia) in Samaru, Zaria. On examination, 70.7% of the rats were found to habour ectoparasites comprising lice (*polyplax* sp., ticks (*Haemophysalis* sp., and fleas (*Xenopsylla* sp.). Endoparasites were found in 33.0% of the rats and comprised cestodes *Hymenolepis* sp., *Meggittina* sp., *Raillietting* sp.; nematodes *Heterakis* sp., *Trichuris* sp., *Ascaridia* sp., and an acanthocephalan *Macracanthorgnchus* sp.

Arthropod parasites of New World rats and mice have also been studied. This is due in part to their importance as vectors of zoonotic diseases and to interest shown by zoologists in the fascinating rodents. [10] recorded botfly larvae in 17 of 54 (31%) Eastern Wood rats from the Ordway preserve in Putman Country during 1988 – 89. The larvae were located in the neck region, the face, ears, front legs, and back. Some of the arthropod parasites of rodents are of significance due to their role as vectors and/or intermediate hosts of other parasites or disease agents that infect humans or other animals. Ticks bite causes irritation, itching, burning, redness and blood sucking of parasites leads to anemia, weakness, paralysis, and fever. They transmit pathogens causing Babesiosis, Erhlichiosis, Tularemia, Lyme disease, Ricketsia disease along with their saliva during feeding and their forceful removal may lead to lesion or myasis [18].

Rodents have a high predisposition for getting infested and infected with parasites because of their euryphagic food habits. For example, rats have been known to habour *Trichinella, Schistosoma, Trypanosoma*, and many other endoparasites [15]. Heisch cited by [15] isolated *Trypanosoma gambiense* from *Galagos. Galagos sp.*, which had ingested *I. gambiense* infested rats. Rats are associated with the transmission of certain emerging zoonotic organisms such as viruses and nematodes such as *Capillaria philipenensis* [19]. Studies on the parasites of rats are therefore, important because rats serve as reservoirs and vectors of human and animal diseases [19]. Such studies are also compelling as humans eat rats (especially cane rats), some of which may be infested with parasites.

This research work is aimed at investigating the agents of cane rat infection in order to reduce morbidity and mortality. This will in effect increase the meat or protein production of the animal in the nation.

MATERIALS AND METHODS

Cane rats ticks were collected from Asejire dam in Egbeda Local Government Area and Odo – Ona Kekere in Oluyole Local Government Area between May, 2007 and February, 2008. The ectoparasites were removed from carcasses that were infested and taken to the laboratory for identification. The gastro-intestinal tract (GIT) of thirty grasscutters were removed and taken to the laboratory for examination. The samples were taken to the laboratory in a plastic container containing normal saline (9gm of salt dissolved in 1 litre of water). Most of the samples were observed immediately to avoid the deterioration of the gastro-intestinal parasites. The samples that were not examined immediately were frozen in a deep freezer to avoid deterioration till when examination was carried out.

Isolation and Preservation of Ectoparasites

The body surface of each animal was searched for ectoparasites using forceps and hand lens. Each ectoparasite was removed with a pair of forceps. The parasites recovered were preserved in labeled vials containing 70% alcohol. The ectoparasites were prepared for identification by first relaxing and dehydrating them in 70% alcohol and later mounting on a dissecting microscope at a magnification of 200 and 600. Parasites recovered from each cane rat were identified using keys and atlases produced by [7] [19] and [6] and counted.

Isolation and Preservation of Gastrointestinal Parasites

The gut was separated into stomach, caecum, small and large intestines. The small and large intestines were unfolded by detaching them from the mesentery. Each of the various parts of the gut was then cut open along its length and the contents were scrapped into a specimen bottle containing normal saline (0.9% Nacl). The linings of the sections were also washed in the saline to remove any parasite, which could still be stocked in the lining.

The mixture was washed through a sieve (250μ) and re-suspended in 0.9% Nacl. The contents were searched to remove visible worms. Aliquots were also taken and examined under the dissecting microscope to remove

microscopic worms. The adult worms recovered were then preserved in specimen bottles containing 70% alcohol. The sampled worms were identified using Systema Helminthum Volume (III) by [20].

RESULTS

Ectoprasites Encountered

A total of 112(28%) out of 400 cane rats examined for ectoparasites were infested with hard ticks, *Ixodes sp* and *Rhipicephalus sp*. Fifty-five, 55(13.75%) cane rats were infested with *Rhipicephalus sp* only, 37(9.25%) with *Ixodes sp* only while 20(5.0%) cane rats were infested with both *Ixodes sp* and *Rhipicephalus sp*. *Rhipicephalus* sp infestation was significantly higher ($P<0.05$) compared to *Ixodes sp*.

Infestation was more prevalent in the raining season than in the dry season. Between the months of May and August, greater number of the cane rats harboured the *ectoparasites* while scanty parasites were sampled between September and February. The parasites were located in the head region, ear, dorsal region, abdominal region, lateral region, and anal/pelvic regions. Some were seen crawling on the body of the grasscutters carcasses while others buried their heads into the skin of the grasscutters.

Ticks were distributed in different parts of the body of cane rats (Table 1). Infestation was highest at the lateral regions (12.24±0.21) for *Ixodes* sp and (15.39±0.02) for *Rhipicephalus sp* and lowest at the neck region (0.00±0.00) for both species. Distribution of ticks by sex of cane rats is shown in (Table 2). Prevalence of infestation was higher in females (52.45%) than in males (39.07%) (Table 2).

Table 1: Distribution of ectoparasites (ticks) on different body parts of cane rats.

Predilection site	Ixodes sp (X±S.D)	Rhipicephalus sp (X±S.D)
Head Region	3.96±0.18	3.32±0.02
Ear Region	4.21±0.04	4.20±0.01
Neck Region	0.00±0.00	0.00±0.00
Dorsal Region	5.22±0.01	2.45±0.15
Lateral Regions	12.24±0.21	15.39±0.02
Abdominal Region	9.50±0.16	7.51±0.01
Anal/pelvic Regions	10.29±0.01	13.20±0.01

Table 2. Distribution of ectoparasites (ticks) by sex of cane rats

	Male		Female	
Predilection site	Ixodes sp.	Rhipicephalus sp	Ixodis sp	Rhipicephalus sp
	(X±S.E)	(X±S.E)	(X±S.E)	(S±S.E)
Head region	1.00±0.01	0.12±0.01	3.07±0.04	3.13±0.88
Ear region	2.22±0.01	3.20±0.01	1.76±0.28	1.00±0.01
Neck region	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00
Dorsal region	1.10±0.06	0.35±0.01	4.13±0.08	2.00±0.06
Lateral region	7.20±0.01	6.36±0.01	5.40±0.01	9.04±0.03
Abdominal region	3.40±0.01	3.04±0.01	6.10±0.06	4.50±0.01
Anal/pelvic region	5.02±0.01	6.06±0.04	5.30±0.01	7.02±0.01

Gastrointestinal Parasites

A total of 30 grasscutters belonging to *Thryonomys swinderianus* (15 males and 15 females) were examined for gastro-intestinal parasites. The study showed that all the grasscutters examined were infested with gastro-intestinal parasites.

Figure 1 shows the distribution of worms in the different sections of the gastro-intestinal tract (GIT). The stomach harboured a total number of 4232 parasites, the small intestine harboured a total of 5590 parasites, and the large intestine harboured a total of 287 parasites while the caecum harboured 236 parasites. All the gastro-intestinal parasites sampled were nematodes. The small intestine had the highest worm burden followed by the stomach, large intestine, and caecum. That is, the caecum had the least worm burden.

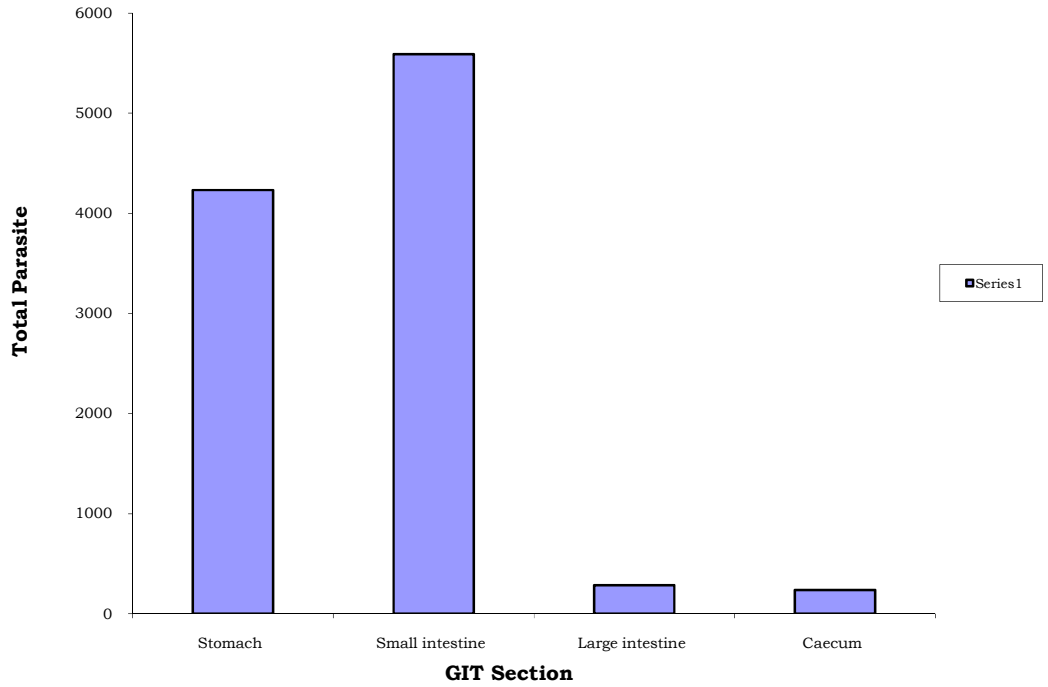

Figure 1: Distribution of parasites in the GIT section of Cane rats

The intensity of infection by sex of cane rats is shown in Table 3. The total number of parasites harboured by the 15 male grasscutters was 5094 while the 15 females harboured a total number of 5275 gastro-intestinal parasites. The mean intensities of the parasite sampled in both male and female grasscutters were 339.6 and 351.7 respectively (Table 3). The mean intensity of gastro-intestinal parasites infection shows that infection is greater among the female cane rats compared to the males. This suggests that the severity of the parasitic diseases could be more pronounced in the females than in the males.

Intensity of infection by weight of cane rats was also determined. Grasscutters within the range of 6.0 – 6.9(kg) had the highest intensity of parasites with mean intensity of 597.7 parasites while grasscutters within the range of 3.0 – 3.9(kg) had the least intensity of parasites with mean intensity of 221.4 parasites (Table 4).

Table 3: Intensity of infection by Sex of Cane rats

Sex	Total number examined	Total parasites harboured	Mean intensity	Geometric mean intensity
Male	15	5094	339.6	245.5
Female	15	5275	351.7	275.4

Table 4: Intensity of Infection by Weight of Cane rats

Group	Weight range (kg)	Number examined	Number infected (prevalence)	Intensity of infection	Mean intensity
1	1 – 1.9	2	2	662	331.0
2	2.0 – 2.9	3	3	818	272.7
3	3.0 – 3.9	8	8	1771	221.4
4	4.0 – 4.9	5	5	1650	330.0
5	5.0 – 5.9	7	7	3174	453.4
6	6.0 – 6.9	3	3	1793	597.7
7	7.0 – 7.9	2	2	418	240.5

Table 5: Prevalence of Infection by Sex of Cane rats

	Number Infected (Prevalence in %)	
Parasite Species	Male	Female
Trichuris sp.	14 (93.3%)	15 (100%)
Globocephalus sp.	12 (80%)	14 (93.3%)
Strongylus sp.	12 (80%)	13 (86%)
Squamostrongylus sp.	9 (60%)	12 (80%)
Strongyloides sp.	13 (86%)	15 (100%)
Trichostrongylus sp.	15 (100%)	15 (100%)
Castorstrongylus sp.	14 (93.3%)	11 (73.3%)

The infection rate (i.e. prevalence) of *Trichuric sp* is higher (100%) in females than in males (93.3%). Out of the 15 females examined, 14(93.3%) of them were infected with *Globocephalus sp* while 12(80%) of the males harboured the parasite. The infection rate of *Trichostrongylus sp* was 100% in both sexes. The least gastrointestinal parasite harboured by the males was *Squamostongilus sp* (60%) while the least in females was *Castostrongilus sp* (73.3%) (Table 5).

DISCUSSION

Result from ecto-parasitic infection showed that *Rhipicephalus sp* were more abundant than the *Ixodes sp*. The infestation was more prevalent in the raining season than in the dry season. This could be due to the fact that ticks are more active during the raining season than in the dry season. [9] reported that adult ticks lay eggs on the ground in spring. Raining season is also the season ticks attach themselves most on their host for blood meal since the females depend on blood for egg production. According to [9], “deer ticks live on the blood of their hosts for several days, then detach and fall back onto the ground. This most commonly occurs in the month of August.” The lowest degree of parasitism (ectoparasite infection) was in the dry season (October to February). This observation indicates that parasitic infection is lowest in the dry season, and highest in the wet season.

Male *Ixodes* were rarely encountered during the period of sampling. This observation agrees with the findings of [12] that males of several species of *Ixodes* do not feed on blood and thus are less commonly encountered on host than are females. The Genus *Rhipicephalus* occurs in numerous tropical and temperate regions of the world (between 50N and 35S latitudes and is common is South America, Southern Europe, and Africa [11].

Ticks are important not only because their bite cause discomfort and loss of blood but because they are vectors of several important pathogens [8]. Because of its long hypostome, the possibility of the mouthparts remaining in the host after the tick is removed is greater for *Ixodes* than for most other ticks. When this happens, persistent, severe irritation results, often with secondary bacterial infection [12]. The predilection sites of ticks on the body of wild cane rats were, head region, ear region, neck region, dorsal region, lateral region, abdominal region and anal/pelvic regions. Ticks took preference of the lateral region. This could be attributed to the fact that cane rats furs are heavier at the lateral regions than any other part of the body. The heavy furs at the lateral region give the ticks a shield thereby preventing easy dislodgment from external factors. On the other hand, the short arms of cane rats hardly reach the lateral regions to dislodge ticks even when they feel the discomfort accrued to blood sucking.

This study reports (100%) overall prevalence of GIT parasites of wild cane rats in Oyo Ste. This finding agrees with [2], who reported a prevalence of 96% while working with cane rats in Abia State. The cane rats in this study area were caught in the wild where they feed on grasses contaminated with human and some domestic animal faeces. The predilection sites of the helminthes were, stomach, large intestine, small intestine and caecum. The small intestine has the highest worm burden followed by the stomach, large intestine, and caecum. That is, the caecum has the least worm burden. All the species of helminthes were found in the stomach and small intestine of cane rats. This agrees with the findings of [21]. The small intestine having the highest parasite load may be due to the fact that the small intestine contains digested food materials, which can be absorbed directly into the body of the parasites. Helminthes worms generally do not have digestive system, thereby depending solely on digested food materials from their host. Thus, the small intestine provides digested food which the worms can absorb into their body for nourishment.

The mean intensity of gastro-intestinal parasites infection shows that infection is greater among the female cane rats compared to the males. This suggests that the severity of the parasitic diseases could be more pronounced in the

females than in the males. No particular explanation could be attributed to the fact that the females were more parasitised than the males since both sexes are exposed to the same environmental conditions in the wild.

Intensity of infection by weight of cane rats showed that the larger and heavier cane rats have the highest intensity of parasites.

CONCLUSION

It has also been discovered that some species of ecto- and endo-parasites parasitize grasscutters. Parasites are known to cause several health problems to their host organisms. In severe cases, the impact on the host can result to death. Ticks are important in veterinary medicine because they transmit some of the most important infectious diseases of animals, because they remove considerable quantity of blood from their host, and because the wounds, which they produce, are not only irritating in themselves but also open to secondary infections.

In view of these problems that parasites can cause to their host grasscutters, rearing/domestication of grasscutters should be encouraged the more. In the course of rearing/domestication, parasites would be eliminated since the animals will be kept under adequate hygienic conditions and proper treatment such as deworming and inoculation. Hence maximum yield shall be enhanced.

Our survey therefore points to the need for more intensive study on the entire body of the species to fully comprehend the general parasites composition of the animal.

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