Journal of Natural Sciences Research
ISSN 2224-3186 (Paper) ISSN 2225-0921 (Online)
Vol.3, No.2, 2013

A Survey on the Ectoparasites and Haemoparasites of Grasscutter (*Thryonomys Swinderianus*) Reared under Captive Conditions

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Abstract:
The survey of ectoparasites and haemoparasites of grasscutter (*Thryonomys swinderianus*) was carried out using ten grasscutters housed in a two-tier cage hutch and fed with a compounded diet of forage and agricultural by-products. The examination of the grasscutters body for ectoparasites was done carefully by brushing the fur of each grasscutter into a clean white calico material and close monitoring of their skin. The parasites brushed out were collected from the white calico material for examination using a pair of blunt forceps. The parasites collected were identified in the laboratory. The ectoparasites identified were *Ixodes aulacodi„ Rhipicephalus sanguineus* and X*enopsyllacheopis* with *Ixodes aulacodi* being the most prevalent (50% infection) and *Xenopsylla cheopis* being the least prevalent (20% infection). The haemoparasites were identified in the laboratory through parasitological diagnosis using Giemsa stained thin and thick films and Delafield's haematoxylin stained thick film preparation. The blood samples were subjected to a saline wet mount as well as microhaemocrit concentration technique. The haemoparasites identified were *Plasmodium* and *Trypanosoma* species with equal prevalence of 10%. The result of this experiment was subjected to statistical analysis using chi-square test and this showed a significant difference ($P > 0.05$) in prevalence between male and female grasscutters. It is hereby recommended that farmers should seek veterinary services to ensure good health of the animals, high productivity and to avoid cross infection to humans.
Keywords: Ectoparasite, Haemoparasites and Grasscutter

1. Introduction:

Parasitic diseases have been with animals since time immemorial and it would be erroneous to believe that all the possible parasites have been discovered. The majority of parasites are invertebrates. Mostly arthropods typically parasitize livestock of which grasscutter is one. The grasscutter is an herbivorous rodent found mostly in the savanna and woodland areas in sub-Saharan Africa. It is characterized by its massive body size, bristle fur, small ears and eyes, continuously growing incisor, short limbs and a good sense of smell (Abioye 2010). It belongs to the class mammalian, order rodentia, family thryonomidae, genus thryonomys and has two species *Thryonomys swinderianus* and *Thryonomys gregorianus* (Rosevear 1969).

The initial discovery of parasites was without the aid of microscope and was possible because of the sufficiently big size of the organisms (in the case of macroparasites). But the isolation of microparasites has been made easy by the invention of high power microscope and other tools (Radostits, 1994).

Ectoparasites affect livestock in several ways and are known to be vectors of pathogen causing diseases. This might result to dermatitis, skin necrosis, blockage of orifices, ricket and loss blood which can lead to reduced weight gain. This can also lead to epizootic abortion, paralysis, damage to carcass and fleece, discomfort and uneasiness in the infected animal (Adu 2002). Ectoparasites of grasscutter mainly include ticks and fleas (Adu 1999, Yeboah and Simpson 2004, Mpoame 1994). The ticks are found in all regions of the body of the grasscutter with the anterior part of the body having the highest infestation. Fleas are mostly seen on dead grasscutters. Some of the naturally occurring haemoparasites grasscutter include; *Trypanosoma congolense, Trypanosoma vivax* and *Trypanosoma simiae* (Nanso and Okaka 1998). Other haemoparasites include *Plasmodium* and *Babesia* species (Opara and Fagbemi 2010).

It is established that most animals show much tolerance to certain infestation due to their genetic make-up. This innate factor seen in grasscutters help suppress certain diseases and at certain times in the animals' life they tend to be more vulnerable to the effect of parasitoids. More so, infestation by one parasite may expose the animals to a second infestation due to change in the blood indices (Opara and Fagbemi 2010).

2. Materials and Method:

2.1 Study site:

The research was carried out at May and Jay farms, Ahocol Estate Phase II Awka, Anambra State, Nigeria. The farm falls within the humid area of the South-Eastern part of Nigeria with almost equal duration of rainfall and dry season.

2.2 Study animals:

The experiment was carried out using ten grasscutters procured from Idama farms, Asaba in Delta State. They were transported to the laboratory in perforated mental boxes measuring 50x40x30cm with dry grasses on the floor to provide good ventilation and conducive environment for the animals on transit. In the laboratory they were randomly allocated to their compartments and acclimatized for two weeks to reduce the transportation stress before the experiment commenced.

2.3 Survey of ectoparasites:

The ectoparasite study was done using hand brush, white calico material, hand lens, microscope, a pair of blunt forceps, specimen bottles and 70% alcohol for preservation of parasites. The limbs of the grasscutters were bound with twine and their mouth held with mouth guard as in Soulsby (1982). The fur was brushed onto the white calico material. The brushing was done from the posterior to the anterior in a unique manner to ensure that the ectoparasites were collected. With the aid of the hand lens and a pair of blunt forceps the parasites were sorted and transferred to the microscope slide for identification after which they were preserved in specimen bottles with 70% alcohol.

2.4 Haemoparasitological examination:

A total of ten venous blood samples were collected from the grasscutters by nibbling off the terminal portion of their tails with surgical scalpel and stored in EDTA bottles and taken to the laboratory for diagnosis. The blood samples not processed immediately were stored at a temperature of 20^{o}C until used. Microscopic examination of blood samples were done by using the following techniques; saline wet mount technique, Giemsa stained thin and thick films, Delafield's' haemotoxylin stained thick films and microhaemocrit concentration method. The procedures for the above techniques were strictly adhered to in line with W.H.O (1991). The mounting, making of films, concentration of blood and principle of microscopy for each was done using a Nikon electric microscope as regards oil immersion and specified objective lens. Proper laboratory safety precautions were also taken in order to get an unbiased result. The identification of the haemoparasites were done using the information and structures provided by W.H.O (1991) on parasitized red blood cells.

The results obtained from the ectoparasite examination were subjected to statistical analysis as provided by Bush *et al* (1997) where the prevalence, mean abundance and mean intensity of the parasites were tested for and expressed as follows; Prevalence (N) = N_1/N_2 X 100/1

Where N = Percentage prevalence
N_1 = Number of host infected
N_2 = Total number of hosts examined for the parasite

Mean abundance (MA) is the ratio of the total number of a particular parasite species in a particular host to the total number of the hosts examined.

Mean intensity (Mi) is the ratio of total number of a particular species found in a sample to the number of hosts infected.

3.0 Result and Discussion:

3.1Result

The result of the survey of ectoparasites and haemoparasites of the glasscutters studied revealed that six were infected with a prevalence of 60%. Out of the six infected, two concomitantly had haemoparasite infestation (Table 1). Also, of the six infected, each had either one or more of the recovered ectoparasites. A total of sixteen ectoparasites belonging to two arthropod taxa – *Acarina* and *Siphonaptera* were recovered, two species of *Ixodid* tick namely; *Ixodes aulacodi and Rhipicephalus sanguineus* and one Siphonaptera (Flea) *Xenopsylla cheopis*.

The infestation status, predilection site and ectoparasites abundance on each grasscutter are presented in Table (1) and (3). For ticks, five (38.5%) were found on the head, 6 (46.2%) on the neck and 1 (7.6%) was found on the abdomen and 1 (7.6%) was found on the limbs. The fleas were recovered around the chest (Table 1).

3.2 Discussion:

Of the ten grasscutters examined for ectoparasites, six were infected with ectoparasites belonging to two taxa of arthropods – Tick with two species *Ixodes aulacodi* and *Rhipicephalus sanguineus* and one fleas species *Xenopsylla cheopis* (Table 2). The most common was the *Ixodes aulacodi* with 50% prevalence, abundance of nine and mean intensity of 1.8 (Table 2). These findings confirm to the work of Yeboah and Simpson (2004) that in the array of ectoparasites of grasscutter, the Tick is the most prevalent. This high prevalence of the Tick may be due to adhesive mechanism to the host. The low prevalence of the Flea is due to its ability to escape from the host by flying. It was

also noted that the predilection sites of the parasites was highly concentrated on the anterior region (Head, neck and chest) and low at the posterior region. This could be attributed to the exposure of the animal having its sense organs not usually covered well by fur at the head region. It is worthy of note that the Ixodid Tick though species may vary as a result of the region in which the research was carried out are the most prevalent ectoparasites of grasscutter. It would therefore appear that transmission of ectoparasites is going on between grasscutters and other livestock. The Ticks were also found to be more concentrated on the head region as reported by Yeboah and Simpson (2004).
The results of the haemoparasite survey reveal the infestation of the red blood cells of the grasscutter by plasmodium species and trypanosome species. The plasmodium species was detected in the thin film because the red blood cells were not lysed thus permitting their visibility and detection. The observation of trypanosome through thick film technique was as a result of sensitive nature of thick film in detecting parasites since the red blood cells are lysed. The result was in line with that of Opara and Fagbemi (2008) who reported the infestation of the red blood cells of the grasscutter with plasmodium species, though due to lack of biochemical techniques the parasites could not be identified to species level. The result of the present study confirms the report of Ntekim and Braide (1981) who observed few cases of naturally occurring blood parasites in the grasscutter. The observation of these haemoparasites in the grasscutter implies that humans living or working close to the breeding and rearing farm of the grasscutter could possibly get infected through the bite of the vectors like the mosquitoes and the tsetse fly.

4.0 Conclusion
The result of the present study shows that glasscutters' play an important role in the epidemiology of certain zoonotic diseases.

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Table 1: Infestation status, predilection sites and abundance of ectoparasites on each grasscutter.

GRASSCUTTER	INFESTATION STATUS	PREDILECTION SITE										TOTAL
		TICK					FLEA					
		H	N	A	L	T	H	N	A	L	T	
1		+1	1	0	0	0	0	0	0	0	0	2
2	+	1	1	0	0	0	0	0	0	1	0	3
3	-	0	0	0	0	0	0	0	0	0	0	0
4	+	0	1	1	0	0	1	1	0	0	0	4
5	-	0	0	0	0	0	0	0	0	0	0	0
6	+	0	1	0	0	0	0	0	0	0	0	1
7	-	0	0	0	0	0	0	0	0	0	0	0
8	-	0	0	0	0	0	0	0	0	0	0	0
9	+	1	1	0	0	0	0	0	0	0	0	2
10	+	2	1	0	1	0	0	0	0	0	0	4
TOTAL		**5**	**6**	**1**	**1**	**0**	**1**	**1**	**0**	**1**	**0**	
GRAND TOTAL		**13**					**3**					**16**

(Where H = Head, N = Neck, A= Abdomen, L = Limbs, T = Tail)

Table 2: The prevalence, Abundance and intensity of the two taxa of ectoparasites On the grasscutters examined.

PARASITES	TICK	FLEA
Number examined	10	10
Number infected	6	2
Number of species recovered	13	3
Prevalence (%)	60	20
Abundance	13	3
Mean intensity	2.2	1.5
Mean abundance	1.3	0.3

Table 3: Prevalence, abundance, mean abundance and mean intensity of the different species of ectoparasites (Tick and Flea) recovered.

Parameters	*I. aulacodi*	*R. sanguineus*	*X. cheopis*
Number of Grasscutters examined	10	10	10
Number infected	5	3	2
Prevalence of each species (%)	50	30	20
Abundance of different species	9	4	3
Mean abundance	0.9	0.4	0.3
Mean intensity	1.8	1.3	1.5

Table 4: Shows the infection parameters of the haemoparasite

Parasite	Number Examined	Number infected	prevalence (%)	Abundance	Mean Abundance	Mean Intensity
Plasmodium Sp.	**10**	**1**	**10.00**	**2**	**2.0**	**0.2**
Trypanosome Sp.	**10**	**1**	**10.00**	**1**	**1.0**	**0.1**

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