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ECTOPARASITE DIVERSITY ON FAUNA SPECIES OF ECONOMIC IMPORTANCE IN ONDO STATE, NIGERIA

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Abstract
Ectoparasites diversity was assessed on selected fauna species (Grasscutter Thryonomys swinderianus, Grey duiker Sylvicapra grimmia, and Pangolin Phataginus spp.), for their prevalence at dry season and rainy season, and to determine the animal species most suspectible to ectoparasite infestation. Isolated parasites from the fauna species were preserved in 70% ethanol until they were viewed under microscope for identification. All species of parasites were identified to genus level. Two species of ectoparasites (mites and ticks) were identified for all fauna species studied. A total of one hundered and thirty four (134) ticks were collected from the animals species and four (4) mites were identifed from the animals they infested. Twenty four (24) hosts belonging to the family Thryonomydae (14), Manidae (4) and Bovidae (6) were infested by ticks and mites during the study period (dry and wet season). The parasites were found at various parts of the body: ear, head region, tail and under the scale. Parasite mean intensity was higher for tick at both dry and wet seasons (8.55 and 1.5) respectively. On the basis of average number of parasites found on individual fauna species, Grasscutter appears most susceptible to infestation having a value of 4.78 which is significantly different from others at $p < 0.05$. Wet season favoured parasite infestation at a significant level. Further research is however needed to identify other types of parasite and possible impact on the under studied animal species and humans consuming these fauna species.

Key Words: *Wild fauna, Ectoparasites, Bushmeat, Season, Diversity*

Introduction

Parasitism is a relationship benefiting the organism (parasite) who lives in or on its host for its survival and reproduction. The host on the other hand suffers from the presence of the parasite in ways that reduce the general fitness of the host (Hatcher and Dunn, 2011). Ectoparasites are organisms that live on the surface of bigger animals upon which they depend for food, shelter and other basic needs to survive (Rechav and Nutall, 2000). The impact of ectoparasites on their hosts is not limited to the direct effects alone, but these parasites are also vectors and are capable of transmitting pathogens, thereby causing diseases for their hosts (Parola *et al.,* 2001). Ectoparasites generally are

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capable of causing significant loss in industries that use leather as raw materials because their significant effect on animal species include loss of hair, fur and poor skin condition (Vrededoe, 2002). Parasites should be of great economic concern since they can put the livelihoods of human populations at risk. Indeed, it is seldom appreciated that the extinction of vertebrate species also results in the extinction of all associated host-specific parasites (Evans *et al.,* 2003). Authors have reported that avian species suffer a number of sub-clinical infections and even death as a result of parasite infestation. These can have huge implication for the ecology of hosts, evolution and species and population's conservation (Whiteman and Parker 2005 and Cunha *et al.,* 2008). Since parasites are good vectors, their impact on their hosts could result into life threatening situation as observed by Cooper (2002), that Lanner Falcon (*Falco biarmicus*) suffered gross lesions, hemorrhage, and necrosis as a result of tick infestation at the area of the parasite attachment. Some of the ways in which parasites affect their hosts include changes in the daily activity of host, reduction in territoriality, loss of mate or difficulty in finding mate since hosts might lose their strength and attractiveness especially in the presence of huge parasite intensity, and overall fitness which includes: adaptation to environmental changes, growth, reproduction, survival and predator avoidance skills (Giorgi *et al.,* 2001). This can result in an overall decrease in body mass and the general health of an individual. Though, the knowledge is no longer new that ectoparasites pose serious direct and indirect threats to their hosts and to biodiversity at large as well as human beings, yet this field is not given adequate attention by ecologists and conservationists (Whiteman and Parker, 2005; Hatcher and Dunn, 2011). This study therefore seeks to identify ectoparasites of some selected wild animals utilized as "bush meat", Determine effect of season on ectoparasites' variation, availability and determine animal susceptibility to parasites.

Materials and Methods

Study Area

The study was carried out in Emure-ile, Ondo State. The state lies between the coordinates of 7.1667°N, and 5.0833°E. Its land area is about 15,500 square kilometers. The state is predominantly occupied by the Yoruba who speak various dialects of the language such as the Akoko, Akure Idanre, Ikale, Ilaje, Ondo and the Owo. The people of the state are mostly subsistence farmers, fishermen and traders. The tropical climate of the state is broadly of two seasons which are the wet season between April and October and dry season between November and March. A temperature throughout the year ranges between 21°C to 29°C and humidity is relatively high. The annual rainfall varies from 2,000mm in the southern areas to 1,150mm in the northern areas. Ondo State is characterized by lowlands and rugged hills with granitic outcrops in several places. The land rises from the coastal part of llaje/Ese-odo in the south, to the rugged hills of the north-eastern portion in Akoko area. Some of the more prominent hills found at Idanre and Akoko rise above 250 meters above sea level.

The vegetation is typical of rain forest, composed of many varieties of tropical tree species such as *Terminalia catappa, Diospyrus crassiflora, Piptadeniastrum*

africanum, Sterculia tragacantha, Funtumia elastica, Elaeis guineensis etc. In the northern part, the vegetation consists of woody savanna featuring such tree species as *Blighia sapida.*

Research Method

The study was carried out in Emure-Ile, Ondo State during rainy season and dry season in which the town was visited on days that they have high diversity of fresh bush meat and the study lasted 4months. Ectoparasites were obtained from the animals by direct picking using forceps. The fur and skin of the animals were critically examined using scalpel, this body screening was done in the opposite direction to the normal positioning of animal fur. Hand lens was used to help in the detection of parasites on animal body, ectoparasites were thereafter picked carefully using forceps so as to minimize loss of the mouth part, limbs and other parts of the parasite, since this will be critical in the parasites identification. The ectoparasites collected were preserved in different specimen bottles and labeled as necessary indicating the type of parasite, host where found, and season.

The specimens were then transferred to the laboratory of Ecotourism and Wildlife Management. The parasites species were left in open air for an approximate period of 5 minutes for the ethanol to dissipate from the parasites' body. The parasites were there after placed on a slide, viewed and captured under a light microscope (Premiere® Model SMJ-02) with 20X magnification. The parasites were viewed and captured under microscope for identification. The guide and key to ectoparasites identification (Walker *et al.,* 2003) was used to compare and identify the ectoparasites to genus level by a technician in Wildlife parasitology lab.

Data Analysis

Descriptive analysis was used to represent observations from the species of parasites encountered, where found on the body and host species. Welch test and Mann-whitney U test was used to compare means of parasite occurrence on hosts for susceptibility study and Mann-whitney U test for comparison between the two seasons for parasite occurrence. P values were corrected using Bonferroni method of correction.

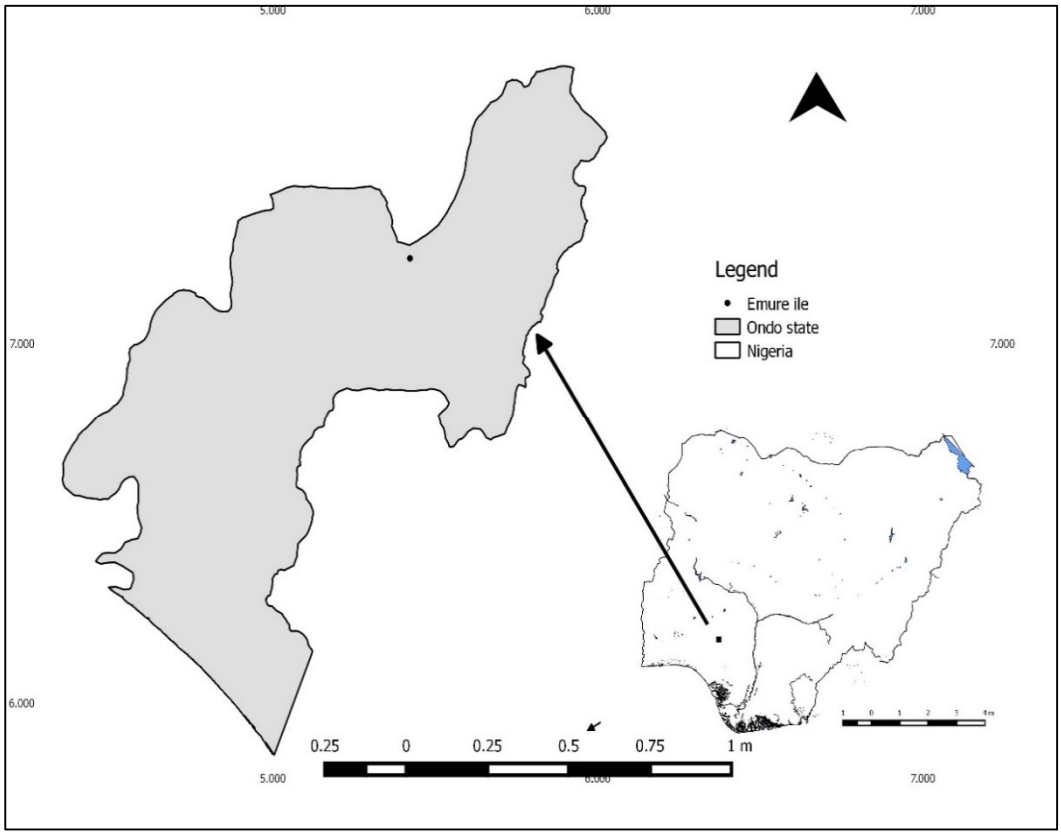

Fig. 1: Map of Ondo State showing the location of the study site.

Results

In this study ticks were the most common ectoparasites found infesting wild animals. Ticks (Ixodidea and Argasidae) and mites (Pyroglyphidae) encountered were observed in all parts of the animals especially around the ears, neck, head, body, legs, tail and under the scale for pangolins (table 1).

The mean intensity of parasite which is expressed here as: the total number of ticks and mites found across the three species (host) (Grasscutter, Duiker and Pangolin) studied / the total number of host infested by the parasites, as presented below (figure 1) shows that the values obtained are higher for ticks at both seasons. Average number of ticks and mites encountered on fauna species under study was used to determine susceptibility of the animals to parasite infestation. Grasscutter has the highest number of parasites which was significantly different from the values of other fauna species at $p < 0.05$. Encounter rate of ectoparasites was significantly higher during the wet season at a significant level of $p < 0.05$.

Discussion

The present study has documented only two parasites (ticks and mites) identified on the animal species during the dry season and wet season. The animal species infested by the parasites are Grasscutter (*Thryonomys swinderianus*), Pangolin (*Manis spp.*), Civet cat (*Civettictis civetta*) and Grey duicker (*Sylvicapria grimma*). Civet cat was excluded from the study after the species was not available for study at wet season.

The parasites were observed in nearly all parts of the animal's body especially around the ears, head, neck legs, tail and under the scales of pangolin. Ticks found on fauna species during this study appear to be thriving well in the animals' habitat due to their frequency and number on almost all the fauna species. This thriving ability is noted in a study by Adang et al., (2015) where prevalence was highest for ticks compared to other ectoparasites on domestic animals. Dominguez-penafiel et al., (2011) argued that better performance of ticks in relationship to host infestation is a form of successful adaptation of ticks to different hosts. Mites was observed on very few fauna species in this study. Their occurrence is relatively low, this agrees with previous studies documenting low mite's prevalence for some carnivorous species (Domínguez, 2004; Serrano, 2004; Fernández *et al*. 2001). Mite prevalence is also usually very low on different wild animal species such as rodents and antelopes, as well as domestic animals, where they (mites) are completely absent as documented in a study by Dominguez-Penafiel et al., (2011). Contrarily, a more recent study however showed more mites infestation on wild mammals (Sia Su et al., 2013). This however, could be as a result of number of environmental factors favoring lice development including host availability.

The results of this present study further confirms the past findings that found tick as the most common parasite found infesting the animals species (James-Rugu and Jidayi, 2004). This high occurrence of tick infestation could result in various diseases in wild animals. Past study, (James-Rugu and Iwuala, 2002) reported that ticks are vectors of a broad range of viral, bacterial, and protozoan pathogens, and there is a possibility of transfer of diseases from infested animals to humans handling or consuming the animal species.

Ticks are generally more favored in terms of frequency compared to mites, they adapt well to the body of grasscutter, making them important parasite of grasscutter as observed in this study. This could be explained with the understanding that any variation observed in parasite infestation could be linked to host effect in terms of the internal condition of the host body favoring parasite survival, and specific environmental factors required for parasite growth and reproduction (Viljoen et al., 2011). This above explanation also applies to the variation observed in seasonal occurrence of the parasites. Parasites occurrence is favored during the wet season as compared to dry season. The environmental requirement for parasites life cycle and host's presence which is obtainable at wet season are parts of contributing factors to parasite's development.

Conclusion

Ectoparasites are known vectors of several diseases infecting both man and human. While human beings in the local communities depend on protein derived from bush meat, care should be taken as to handling and processing of these fauna species to limit disease transfer.

The study clearly showed that there were only two parasites found on each animals that were infested which are ticks and mites. Ectoparasites were present on all the animal groups examined, which further shows host-parasite relationship is cordial. It was also revealed that the wet season favoured parasite infestation more than the dry season. The result of this study shows that ticks were more common

parasites found or identified on the animal species in Emure-Ile, Ondo State and Grasscutters (*Thryonomys swinderianus*) harbored the highest number of parasites.

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Table 1: Parasites found on different animal species in Emure-Ile, Ondo State

Species of parasite	**Family**	**Common name**	**Region found on the animal body**
Rhipicephalus spp Amblyomma spp.	Hard (Ixodidea)	Ticks	Under the scale, head, neck, ear, body and the tail of the animals
Sarcoptes spp.	Sarcoptidae	Mites	Head, ear, neck and the body of the animals

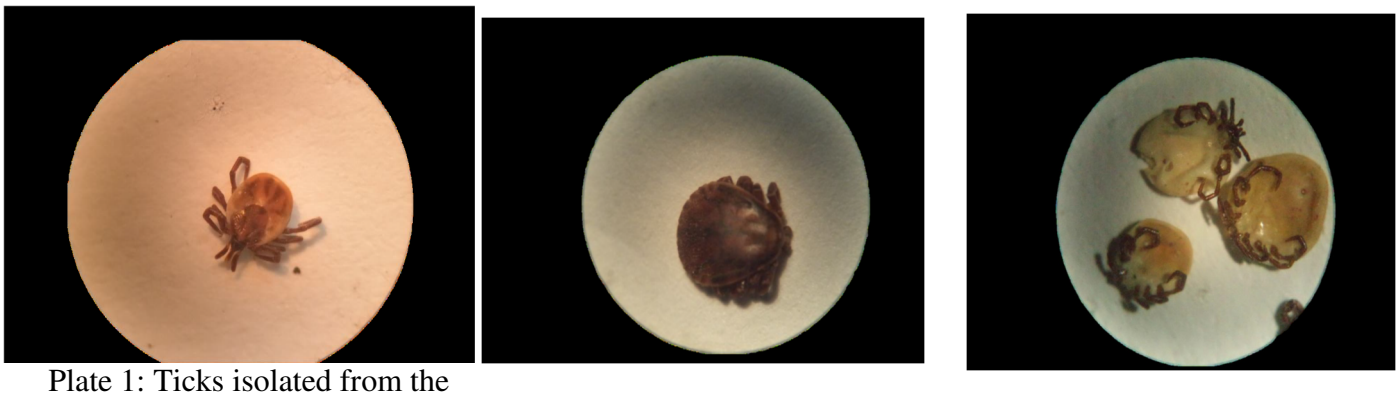

Plate 1: Ticks isolated from the study hosts (*Amblyomma spp.* and *Rhipicephalus spp.*)

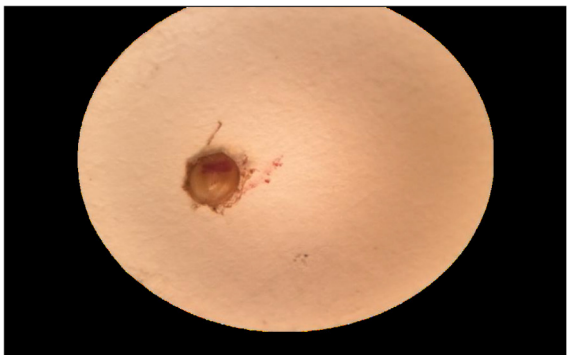

Plate 2: Mite isolated from the study hosts (*Sarcoptes spp.*).

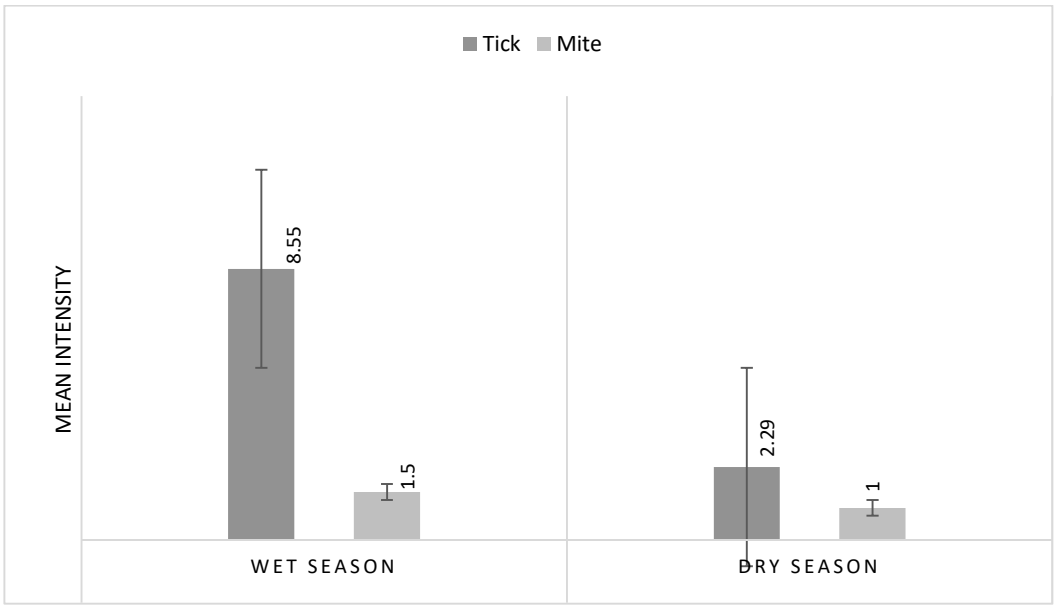

Fig. 1: parasites mean intensity at wet and dry seasons

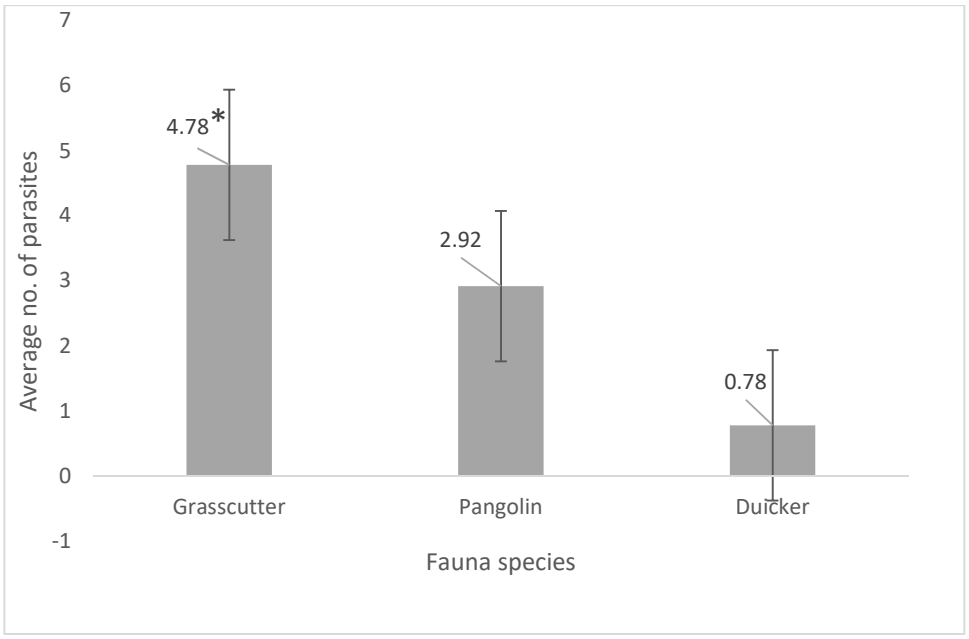

Fig. 2: Susceptibility of fauna species to infestation based on the average number of parasites found on the fauna species.

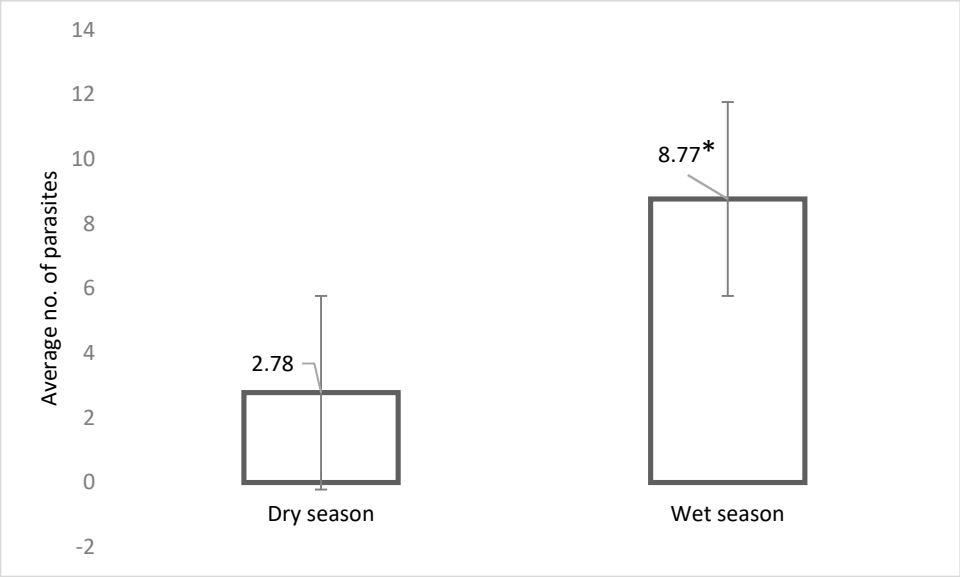

Fig. 3: Seasonal variation in the number of parasites encountered on fauna species.