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Ectoparasites of Some Livestock of Port Harcourt Metropolis, Nigeria

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Abstract

Domestic animal production contributes to the economic growth and well-being of families in developing countries but can be hampered by ecto-parasites depending on the severity of infestation. This research was conducted to investigate ecto-parasite species infesting domestic animals in Port Harcourt metropolis, Nigeria. African dwarf goats (*Capra hircus)*, Black Headed Dorper sheep (*Ovis aries*) and Free-range birds (*Gallus gallus domesticus*) were subjected to examination in this research. The birds were obtained from Oyigbo while the goats and sheep were kept at the Animal Farm of the Rivers State University, Port Harcourt. The animals were examined between October and December, 2021 using coat-brushing techniques on a white background. The fall-outs were stored in 70% ethanol and examined for parasites using standard methods while parasite identification was accomplished with appropriate keys. Parasite prevalence was computed using standard formula. Two ecto-parasites were isolated from the goats and sheep: the African goat louse, *Linognathus africanus*, infested all goats (100%) and one sheep (16.7%), while the scabies mite, *Sarcoptes scabei*, infested one sheep (16.7%). Four ecto-parasite species were isolated from the birds: *Dermatophagoides* sp., *Goniocotes gallinae*, *Ornithonyssus bursa* and *Dermanyssus gallinae* at a prevalence of 100%, 40%, 60% and 20%, respectively. Domesticated animals (goats, sheep and birds) within Port-Harcourt metropolis are infested by diverse ecto-parasitic species, which could affect growth and economic productivity of these animals. Agricultural extension services are required to assist farmers in the detection, control and treatment of these arthropod parasites.

Keywords: Poultry, animal husbandry, livestock, arthropod parasites, ecto-parasites, Nigeria

INTRODUCTION

It is common practice for households in sub-Saharan Africa to keep domesticated animals as small-holder farms. In some communities, it is unusual to find a family without one - poultry, goats, sheep, and/or cattle (Angyiereyiri *et al*., 2015). However, keeping of free-range birds is often regarded as less important when compared with livestock and crop farming (Shuaibu *et al*., 2020). Generally, these animals serve as sources of food (meat, eggs, milk, etc), hides and skin, and funds (Wahab and Okunlola, 2021) for the farmers.

The animals are often reared using traditional extensive systems that do not require much financial inputs; they could be kept in poorly constructed pens attached to a part of the family house. As a result, they are prone to a number of ecto- and endo- parasites and microbial diseases, sometimes with devastating impacts (Kebede, 2013; Melesse, 2014). Under the free range system, animals are allowed to move through the surroundings of homes, or entire villages, bushes and farms in search of food. This habit creates more opportunities for them to make contact with ecto-parasite contaminated grasses, soil or food particles, thereby resulting in very high prevalence of those parasites on the animals (Isaac *et al*., 2019).

The term 'ecto-parasite' is used to refer to arthropod parasites that are attached to the surfaces of animals, causing varying degrees of discomfort to such hosts (Tongjura *et al*., 2012). They include ticks, fleas, flies, lice and mite. Their impacts on animals can be far-reaching. For instance, both ticks and fleas feed on blood and are also reported to be vectors of some diseases, such as, anaplasmosis, babesiosis, rickettsiae and tungiasis, and mites cause skin irritations and destroy hides (El-Kammah *et al*., 2001; Amuta *et al*., 2010; Aubry and Geale, 2011; Tongjura *et al*., 2012). Similarly, the tick *Rhipicephalus microplus* is known to be the vector of *Brucella ovis* (Isaac *et al*., 2019). Ecto-parasites could lead to low production of meat, eggs or milk in domestic animals (Ahaotu *et al*., 2019). They could also result in skin diseases, skin rejection and mortality (Seyoum *et al*., 2015).

Examination for ecto-parasites of farm animals involves proper examination of the skin, fur, feathers and limbs. This may involve techniques referred to as 'forceps-picking and feather-brushing' (Angyiereyiri *et al*., 2015). In feather-brushing methods, a soft brush is used to brush through all sections of the skin or fur onto a white blotting paper (Hobbenaghi *et al*., 2012). Some ecto-parasites could also be picked out directly from the bodies of infected animals (Ahaotu *et al*., 2019).

In a recent research publication, Abah *et al*. (2022) reported the presence of ecto-parasites - *Caliseta* sp., *Demodex* sp., *Ixodes* sp., *Damalinia* sp. and *Ctemacephalides* sp. - in goats from the University of Port Harcourt Agricultural farm, Alakahia, Mile 3 and Rumuosi, locations in Rivers State, Nigeria. On poultry, Elele *et al*. (2021) reported lice, fleas, and mites from village chickens (*Gallus gallus domesticus*) in neighboring Bayelsa State, Nigeria.

Although research on the ecto-parasites of livestock and poultry are well documented, the prevalence and intensity of infection by these parasites are influenced by management systems, environmental and climatic factors (Urquhart *et al*., 1996). Changes in these factors therefore necessitate the examination of livestock and poultry for ecto-parasites, both to update existing literature and add new information. These will contribute to the selection of appropriate control measures against the prevailing parasites.

MATERIALS AND METHODS

Study Area: Sample examination was conducted in two study locations. Goats and sheep were examined at the Animal farm of the Rivers State University (RSU), Port Harcourt, Nigeria, from October 2021-December, 2021. The animal farm is located between 4°48.16' Latitude and 6°58.36' Longitude. Free-range birds were obtained from traders at Oyigbo market, Oyigbo (4°52'24.59" N 7°07'25.20" E), Rivers State, Nigeria. Both study locations are found in the Southern part of Nigeria, characterized by a tropical rainforest climate. The University animal farm is however, a more localized and quiet area while Oyigbo is a very densely populated part of Rivers State, Nigeria.

Study Animals: In this study, a total of 15 small ruminants comprised of nine West African Dwarf goats (6 females and 3 males) and six Black Headed Dorper sheep (4 females and 2 males) and five free-range domestic birds, *Gallus gallus domesticus*, were individually examined for ectoparasites. Each animal was labeled using a marker for the purpose of identification through the period of the research.

Collection and Identification of Ectoparasites and Computation of Prevalence of Infestation: After proper restraining, a coat brushing technique was applied to collect ectoparasites from hosts. Soft brushes were used to brush the coat or feathers of each animal; a new bristle brush was used for each animal under a white surface. Then the collected samples were placed in labelled universal bottles holding 70% ethanol and taken to the Entomology/Parasitology Laboratory, Rivers State University (RSU), Port Harcourt, Nigeria, for identification. The content of each universal bottle was emptied into a Petri dish and examined under a

microscope. On sighting an ecto-parasite, a pipette was used to pick it up and drop onto a glass slide with some of the fixative. It was then covered with a cover slip and viewed under the light microscope (x4 and x 10 objective lens). Ectoparasites were identified on the basis of their morphological structures using guides by Soulsby (1982) and Taylor *et al.* (2007). Strict precautions were observed to preserve the mouthparts and appendages of ectoparasites during collection. Parasite ecological parameters of prevalence and mean intensity of infestation were computed following Bush *et al*. (1997).

RESULTS

Ecto-Parasites Isolated from Livestock, RSU Farm, Port Harcourt, Nigeria: Two ecto-parasites were isolated from these animals, the African goat louse (*Linognathus africanus*) infested all goats and one sheep, while the scabies mite, *Sarcoptes scabei*, infested only one sheep host. All the goats examined were infested with *Linognathus africanus* accounting for 100% prevalence of infestation in the farm. The sheep were less infested as only one specimen was infested with *Sarcoptes scabei* in November, 2021, and another with *L. africanus* in December, 2021 (Table 1). A total of 652 samples of *L. africanus* were isolated from the nine infested goats accounting for a mean intensity of about 72 parasites per goat. However, over-dispersion of parasites was noted as some harbored more parasites than others.

Monthly Prevalence of Ecto-Parasites Isolated from Livestock, RSU Farm, Port Harcourt, Nigeria: Prevalence of infection varied slightly among the goats. In October, 2021, eight goats were infested with *L. africanus*, accounting for a prevalence of 88.9%; but in November, prevalence was 100.0%. By December, 2021, five goats were infested, two un-infested and two dead, resulting into a prevalence of 55.6% (Figure 1).

Among the sheep, all specimens were free in October, 2021. In November, one host was infested with *Sarcoptes scabei*, and in December, 2021, another was infested with *L. africanus*. This accounts for a prevalence of infection of 0.0% in October, and 16.7% in November and December, 2021, respectively (Figure 1).

Table 1: Infestation of Goats and Sheep by Ecto-parasites, Rivers State University Farm, Port-Harcourt, Nigeria

Farm Animal	Number Examined	Number Infected	Ecto-Parasite	Mean Intensity of Infestation	Prevalence (%)
West African Dwarf Goats	9	9	*Linognathus africanus*	72.0	100.0
Black Headed Dorper Sheep	6	1	*Linognathus africanus*	1.0	16.7
	6	1	*Sarcoptes scabei*	1.0	16.7

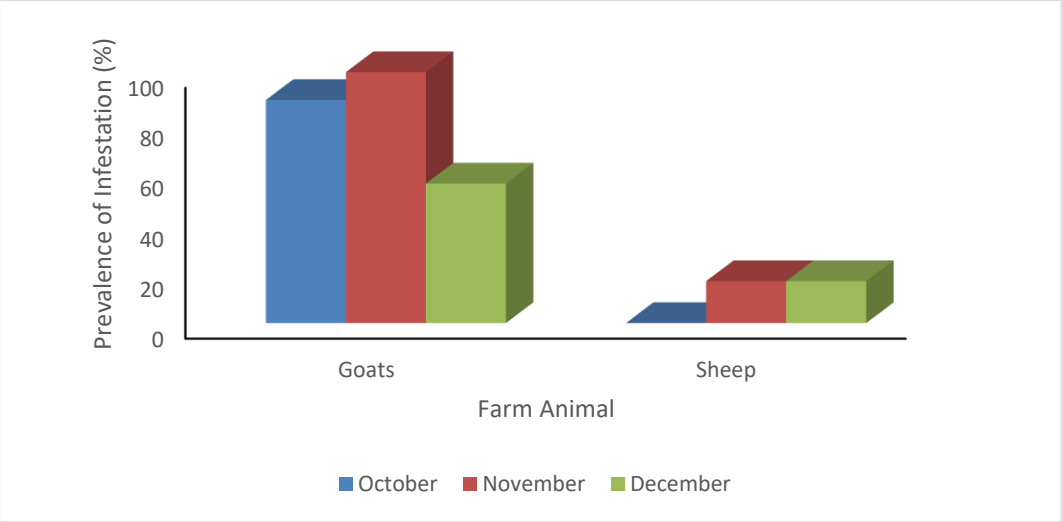

Fig. 1: Monthly Prevalence of Ecto-Parasite Infestation in Farm Animals, RSU Farm, Port-Harcourt, Nigeria, 2021

Ectoparasites Isolated from Free-Range Domestic Birds, Oyigbo, Rivers State, Nigeria: Four ectoparasites were isolated from the domestic birds examined. They were as follows: *Dermatophagoides* sp. was encountered in all the birds; *Dermanyssus gallinae* was isolated from one host; *Ornithonyssus bursa* was isolated from three hosts; and *Goniocotes gallinae* was isolated from two hosts. As such, *Dermatophagoides* sp. had the highest prevalence of infection (100.00%); *Goniocotes gallinae* and *Ornithonyssus bursa* reached a prevalence of 40.00% and 60.00%, respectively. *Dermanyssus gallinae* had the lowest prevalence of 20.00% (Table 2).

Mean intensity of infestation was about two parasites per infected host for *Dermatophagoides* sp., *Ornithonyssus bursa* and *Goniocotes gallinae*, and one parasite per infected host for *Dermanyssus gallinae*.

Table 2: Prevalence and Mean Intensity of Ectoparasites Isolated from Free Range Birds, *Gallus gallus domesticus*, Oyigbo, Rivers State, Nigeria

Parasites	Number of Infected Hosts	Prevalence (%)	Mean Intensity of Infection (± stdev)
Dermatophagoides sp.	5	100.00	2.2 ± 1.3
Dermanyssus gallinae	1	20.00	1.0 ± 0.0
Ornithonyssus bursa	3	60.00	2.3 ± 0.6
Goniocotes gallinae	2	40.00	1.5 ± 0.7

DISCUSSION

Two ecto-parasites were isolated from the goats and sheep examined in this research, the African goat louse (*Linognathus africanus*) and the scabies mite, *Sarcoptes scabei*. Some other authors (Tongjura *et al*., 2012; Wahab and Okunlola (2021) encountered a higher incidence of ticks on livestock than either mites or lice. These authors noted that the higher incidence of ticks could be due to the grazing habit of livestock stating that grazing in bushes exposed these animals to tick infestation. However, cattle are generally more infested with ticks than goats for the same reason of more grazing in standing bushes by cattle than goats which would normally graze close to human habitations (James-Rugu and Iwuala, 2002). The goats examined in this research were kept and managed in the Animal farm of Rivers State University, Port Harcourt. They do not go into the bush to graze, and this could be responsible for the absence of any tick infestation.

Isaac *et al*. (2019) reported on three lice and flea species each, and eight species of ticks on goats from parts of Edo State, Nigeria. These authors reported a higher prevalence of fleas than of ticks or lice. They isolated these lice species: *Bovicola ovis* (0.86% prevalence), *Damalinia caprae* (1.73% prevalence) and *Linognathus stenopsis* (1.73% prevalence). The higher number of parasites encountered could be linked to the larger number of locations and animals examined in their research.

The African goat louse (*Linognathus africanus*) causes itching and severe discomfort (Nizamov and Prelezov, 2020). Loss of blood and weight loss caused by *L. africanus* could lead to anemia and death. It was originally reported from Nigeria but has spread to other countries, including Bulgaria (Nizamov and Prelezov, 2020). Heavy infection in pregnant animals could lead to abortion (Underwood *et al*., 2015). Ivermectin, dichlorvos and some other insecticides have been reported to be effective against the lice infection (Underwood *et al*., 2015).

Sarcoptes scabei, also regarded as the itch mite or sarcoptic mange, is known to burrow into the skin and cause scabies (Arlian and Morgan, 2017). They could be spread from animal to animal or even to humans through direct contact, or contact with contaminated structures (such as, furniture, stalls etc) (Arlian *et al*., 1988). They have been shown to perceive the presence of a host (by perceiving the body odor, heat and carbon dioxide released by the host (Arlian and Morgan, 2017) when placed within few centimeters (4.2 cm – 4.9cm) away from the host, enabling them to move in the direction of the host to cause infection (Arlian *et al*., 1984). Bhojani *et al*. (2018) described infection with *S. scabei* as 'a contagious skin infection'. Poor husbandry, over-crowding and stress have been denoted as risk factors (Radostits *et al*., 2007). Bhojani *et al*. (2018) also reported its infestation is characterized by the presence of small reddish, itching papules which eventually results in the thickening and wrinkling of the skin. Ivermectin is effective in the treatment of this mange (Bhojani *et al*., 2018).

Infection of farm animals by parasites is largely determined by the presence of parasite infective stages in the habitat or food and by their degree of susceptibility to infection (Urquhart *et al*., 1996). The presence of these parasites in pasture is on the other hand, influenced by the prevailing sanitary, environmental and climatic conditions as well as the management system maintained by farmers (Urquhart *et al*., 1996; Isaac *et al*., 2019). The high prevalence of the African goat louse therefore entails that the University Animal farm where the animals are kept provide optimum conditions for

the parasite to complete its life cycle and establish infection in the hosts.

Domestic birds, especially the free-range or scavenging chicken, are important and easily-adaptable sources of funds, meat and eggs for rural women and youth in sub-Saharan Africa (Ajayi and Epundu, 2014; Melesse, 2014). In this research, mites and lice were isolated from the infected birds. The mites were the poultry red mite (*Dermanyssus gallinae*), house dust mite (*Dermatophagoides* sp.) and the tropical fowl mite (*Ornithonyssus bursa*); the louse encountered was the fluff louse (*Goniocotes gallinae*). In the report of Ahaotu *et al*. (2019), lice infestation was more prevalent, as opposed to the results obtained in this present research. These authors (Ahaotu *et al*., 2019) also reported the presence of mites, ticks and lice making up ten ecto-parasite species, including *Menopon gallinae*, *Goniodes gigas*, *Dermanyssus gallinae* etc. Isaac *et al*. (2019) reported more lice (*Menopon gallinae*, *Goniocotes dissimilis*, *Lipeurus caponis*, *Chelopistes meleagridis* and *Menacanthus stramineus*) than ticks (*Haemaphysalis spinigera*) and fleas (*Ceratophyllus columbae*) in the indigenous chickens they examined. Disparities between these reports could be as a result of differences in the prevailing ecological and husbandry conditions.

Ecto-parasites are ubiquitous being commonly reported in high prevalence by several researchers: Ahaotu *et al*. (2019) reported prevalence of 89 – 100% of ectoparasites in domestic birds (*Gallus gallus domesticus*); Aman *et al*. (2013) reported 83.85%; Elele *et al*. (2021) reported 85.71%. Ecto-parasites cause irritation and transmit infectious diseases to the birds which could reduce productivity (Ahaotu *et al*., 2019). They cause dermatitis in birds, and *Dermatophagoides* sp., *Dermanyssus gallinae* and *Onithonyssus bursa* are reported to cause gamasoidosis in man (Waap *et al*., 2020). They can travel several meters from where birds are kept to infect people in residential areas which gives them a public health concern (Waap *et al*., 2020).

Though several insecticides and anti-helminthic drugs have been found effective against these parasites (Underwood *et al*., 2015; Bhojani *et al*., 2018), most farmers are ignorant of their use. Agricultural extension services become, therefore, increasingly important to forestall the menace of ectoparasitic infestations in small-holder farms.

CONCLUSION AND RECOMMENDATIONS

Ecto-parasites are frequently encountered in farm animals kept under the extensive management system. In this research, the louse, *Linognathus africanus*, and the scabies mite, *Sarcoptes scabei* were isolated from goats and sheep kept at the Animal Farm of Rivers State University, Port Harcourt, Nigeria. Mites (*Dermatophagoides* sp., *Dermanyssus gallinae*, *Ornithonyssus bursa*) and the fluff louse (*Goniocotes gallinae*) were isolated from domestic birds obtained from Oyigbo, Rivers State, Nigeria. These parasites cause varying degrees of discomfort to farm animals and have the potential to transmit diseases to their hosts, while also establishing infection in man. Appropriate steps should therefore be taken to curb their spread through agricultural extension services and employment of veterinary doctors**.**

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