

## PERCEPTION, PREVALENCE AND DIVERSITY OF ECTOPARASITES OF SOME DOMESTIC ANIMALS IN LAGOS STATE, NIGERIA

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### ABSTRACT

*Ectoparasites cause great loss in livestock but little attention has been paid to identifying their prevalence on livestock in Lagos State, Nigeria. Assessment was therefore conducted using cattle, sheep, goats and dogs in selected farms at Ojo, Agege and Badagry Local Government Areas LGA), Lagos State, Nigeria to determine the prevalence of ectoparasites from March to May, 2021. Validated questionnaires were distributed to farmers to assess the prevalence of these ectoparasites on domestic animals in each LGA studied. Ticks and mites were also collected by handpicking from the animals to determine their prevalence and the assemblage of ectoparasites found in each study LGA. A total of 918 animals (consisting of 387 cattle, 207 sheep, 249 goats and 75 dogs) were examined for ectoparasites. The highest prevalence, 197 (21.46 %) was recorded for ticks being the most common ectoparasites found infesting domestic cattle. Species of ticks recorded were *Rhipicephalus (Boophilus) annulatus* (27.50 %), *Amblyomma variegatum* (8.20 %), *Rhipicephalus (Boophilus) microplus* (9.70 %), *Ixodes scapularis* (1.90 %), *Otobius megnini* (4.80 %), *Rhipicephalus sanguineus* (0.80 %), *Dermacentor albipictus* (0.90 %) and *Amblyomma cajennense* (1.70 %). Other ectoparasites were mites with prevalence of 111(12.09 %) in cattle. The infestations were mostly at the ear and mammary gland causing scab-like lesions on the ear, scrotum, mammary gland and tail, while annoyance and nuisance due to ectoparasite activities were also observed in infested animals. Treatment of affected animals with suitable methods and proper management practices are recommended for keeping away the ectoparasites from the livestock.*

**Keywords:** Livestock, Dog, Cattle, Goat, Sheep, Ectoparasites, *Rhipicephalus (Boophilus) annulatus*, *Amblyomma variegatum*

### INTRODUCTION

Domestic animals play a major role in food production, for example, cattle, sheep, goats and dogs provides meat and milk for

consumption, while sales of leather obtained from cattle serve as a means of earnings for farmers and it is also consumed as protein in several cuisines and delicacies (Nwosu *et al.*, 2007; Ijaz *et al.*, 2008; Shiferaw, 2018). There

is also a heavy reliance on cattle for milk production. Livestock animals also serve as important sources for hides and skin which are used in tanneries and the leather industry. In Nigeria, livestock animals such as cattle, sheep and goat are largely produced in the North (Lawal-Adebowale, 2012), a substantial part of these animals are moved to the Southern part including Lagos where they are held, maintained and sold off for consumption and other uses. However, poor productivity of animals due to pest and diseases has led to high losses in the livestock industries (Onu and Shiferaw, 2013).

Infestations of livestock by ectoparasites can impede their development and also reduce the value of the resources obtainable from them, skin deformation, reduction in wool quality and low meat and milk yield are common in heavily parasitized animals. Ticks and mites especially, bring about significant infestations in many types of domestic animals and therefore cause large economic losses which may occur as a result of selective slaughtering of the animals to avert sudden death and cost of treating and preventing the problem. They are also responsible for large pre-slaughter skin deformity, leading to the downgrading and rejection of small ruminant skins (Seyoum *et al.*, 2015). The ectoparasites can also predispose the animals to zoonotic infections which apart from their toll on the animals they also are of tremendous negative impact against public health (Rehman *et al.*, 2017). Nigeria has her fair share of these ectoparasites and this makes it necessary to update information on them especially in Lagos which receives many of these animals for consumption and yet with only a few livestock farmers. This study was therefore conducted to determine the prevalence of ectoparasites on goats, sheep, cattle and dogs in Lagos State as well as, identify major risk factors associated with the occurrence of these parasites on the study animals in Lagos State, Nigeria.

## MATERIALS AND METHODS

**Study Area:** This study was carried out from March – May 2021 in Agege (Latitude 6° 37' 11.39" N and Longitude 3° 19' 19.80" E),

Badagry (Latitude 6°24'54.07" N and Longitude 2°52'52.75" E) and Ojo (Latitude 6°27'59.99" N and Longitude 3°10'60.00" E) livestock farms respectively, in Lagos State, Nigeria.

**Population of the Study:** The study population consisted of 25 randomly selected livestock farmers whose farms were examined for ectoparasites of domestic animals in Ojo, Badagry and Agege Local Government Area of Lagos State. The farmer/breeder's knowledge on ectoparasites of domestic animals, mortality and losses due to infestation from these ectoparasites and farming practices used to control them, were investigated using structured questionnaires, which was administered to farmers.

**Questionnaire:** The research questions were coined from the research objectives. In order to maintain consistency, five-point Likert rating scale was used; always (A), very often (VO), often (O), not often (NO) and rarely (R). The questionnaire was face validated and pretested by conducting a pilot study and a Chronbach's alpha value of 0.85 was obtained to ensure that the questions were clear and appropriate to the level of the respondents' education. The questions sought the farmers' socio-demographic and farm enterprise size with emphasis placed on farmers awareness and management of these ectoparasites of domestic animals. Respondents were interviewed in either their local language or English Language or both. The questionnaire was tested with a pilot study consisting of twenty five livestock farmers

**Collection of Ectoparasites:** A thorough examination of the animals was conducted for 12 weeks from March to May 2021. On each visit, the animals were randomly selected and the skin was examined thoroughly by visual examination and inspection of the ear, tail, scrotum (in males) and mammary glands (in females) by combing the hairs against the grains to reveal the ectoparasites within. Ectoparasites encountered were carefully picked into glass bottles containing 70 % ethanol to avoid damage which may make identification difficult or impossible. The bottles were labeled indicating the date and time of collection, and part of the animal from which it was collected. Thereafter, they were transported to the Zoology

Laboratory, Lagos State University, Ojo Campus where they were identified and stored for further handling.

**Microscopic Examination:** Ectoparasites collected were placed on sterile glass slide and viewed by direct examination using microscope. Mites were examined under light microscope, while ticks were examined with the aid of a dissecting stereomicroscope and identification of parasites carried out as described by Strickland *et al.* (1976) and Gorham (1991).

**Data Analysis:** Survey data were analyzed using Statistical Package for Social Sciences (SPSS). Chi-square statistic was used to determine the significance differences between types of ectoparasites and their individual effect on the animals.

## RESULTS

**Farmers Socio-Demographic Data:** The study population comprised of more males (52 %) than females (48 %). All the farmers had some level of education with (40.00 %) of the farmers having ordinary diploma (NCE/OND) (Table 1).

**Table 1: General information on livestock farmers from Agege, Badagry and Ojo Local Government Areas of Lagos State**

Parameter	Number
<b>Level of education of farmers</b>	
Ordinary Level	24
NCE/OND	40
HND/BSC	36
MSC/MBA	0
<b>Percentage age range of farmers</b>	
Below 20 years	4
21 -30 years	28
31 – 40 years	40
41-50 years	12
50 and above	16
<b>Years of experience</b>	
Below 5 years	32
6 – 10 years	44
11-15 years	20
15 years and above	4

Most of the farmers were within the ages of 31 and 40 years, and four (4 %) of the respondents have been breeders of domestic animals for more than 15 years (Table 1). Most of the farmers visited operated an open range farming system in which major domestic animal kept in the farm facility was goat. Major predilection site of ectoparasites was found to be the abdomen.

**Farmers Perception on Ectoparasites:** The result of the study revealed that out of 25 respondents, three (12.00 %) believe that the parasites were major causes of disease outbreaks in farms (Table 2a).

**Table 2a: Farmers Perception on Ectoparasites in Agege, Badagry and Ojo Local Government Areas of Lagos State**

Parameters	Likert scale question response n(%)				
	A	VO	O	NO	R
Frequency of ectoparasites as main cause of disease outbreak	3(12)	6(24)	9(36)	1(4)	6(24)
Frequency of control of ectoparasites infestation	5(20)	9(36)	7(28)	0(0)	3(12)
Health of domestic animals affected due to ectoparasites infestation	6(24)	5(20)	4(16)	2(8)	7(28)
Cost and effectiveness of control	15(60)	2(8)	1(4)	3(12)	4(16)

A(Always); VO(Very Often); O(Often); NO(Not Often); R(Rarely)

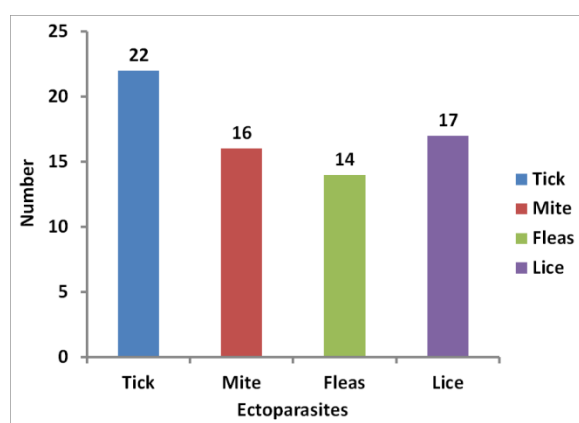
Five (20.00 %) of the farmers noted that since the establishment of the farm, there has always been a very high prevalence of ectoparasites which have affected the health of farmed animals (Table 2a). Four (16.00 %) of the farmers always control the ectoparasites, 12.00 % rarely control the ectoparasites, while twenty

(80.00 %) of farmers identified infested animals through itching sign and symptom (Table 2b).

**Table 2b: Specific signs and symptoms through which infested animals are identified by farmers from Agege, Badagry and Ojo Local Government Areas of Lagos State**

Signs and Symptoms	Number	Percent (%)
Itching	20	80
Anaemia	10	40
Low weight	22	88
Uneasiness	22	88
Lameness	15	60
Others	0	0

Fifteen (60.00 %) of farmers noted that ectoparasites control methods are very effective but expensive. The most commonly encountered arthropod ectoparasites according to most farmers was tick (30.99 %) (Figure 1).



**Figure 1: Farmer's perception of commonly encountered ectoparasites infesting animals from Agege, Badagry and Ojo Local Government Areas of Lagos State**

Twenty (80.00 %) farmers said itching was the most common symptom seen on infested animals. Ten (40.00 %) pointed anaemia as a sign of ectoparasites infestation on domestic animals, twenty-two (88.00 %) stated low weight of animal and fifteen (60.00 %) stated lameness as symptom of infested animal.

**Attitude of Farmers to Ectoparasites Infestation and Control:** The study revealed that out of twenty-five (25) respondents, six (24.00 %) regularly carried out health check on

their animals, while nine (36.00 %) of the farmers checked their animals for ectoparasites infestation at intervals. Most of the farmers often treat affected animals with acaricides to eliminate ectoparasites from animals (Table 3).

**Table 3: Attitude of farmers from Agege, Badagry and Ojo Local Government Areas of Lagos State towards application of ectoparasites control measures**

Parameters	Likert scale question response n(%)				
	A	VO	O	NO	R
Frequency of health check on domestic animals	6(24)	4(16)	7(28)	6(24)	2(8)
Checks are conducted on all animals	9(36)	0(0)	2(8)	9(36)	5(20)
Regular treatment of affected animals with acaricides to eliminates ectoparasites	6(24)	5(20)	4(16)	2(8)	7(28)
Simple disinfectants used to treat wounds on animals caused by ectoparasites	15(60)	2(8)	1(4)	3(12)	4(16)
Treatment of areas where animals graze or sleep	19(76)	1(4)	5(20)	0(0)	0(0)

*A(Always); VO(Very Often); O(Often); NO(Not Often); R(Rarely)*

Five (20.00 %) of the farmers use disinfectants to treat wounds on animals caused by these ectoparasites. Nineteen (76.00 %) of the farmers stated that areas where animals graze or sleep should be considered for treatment regularly for effective control.

**Ectoparasites Control Method adopted by the Farmers:** The use of chemical control method was adopted by 80.00 % of the

respondents, while 64.00 % of the respondents used biological method of control and 88.00 % of the sampled farmers made use of cultural control method. Other methods used by farmers to control ectoparasites are shown in Table 4.

**Table 4: Control methods adopted by farmers from Agege, Badagry and Ojo Local Government Areas of Lagos State against ectoparasites**

Control methods used	Number	Percentage (%)
Improved hygiene and sanitation	24	96
Proper feeding	23	92
Proper management practices	21	84
Proper veterinary care	20	80
Others	0	0

Twenty four (96.00 %) farmers reported that they control ectoparasites with improved hygiene and cultural practices. Twenty-three (92.00 %) farmers stated that other method of ectoparasites control they have adopted was to improve the feeding of the animals. Twenty (80.00 %) used proper veterinary care as a method of control.

#### Diversity of Ectoparasites of Domestic Animals in Three LGAs of Lagos State, Nigeria:

The results of ectoparasites identification showed that there were nine species of ectoparasites which comprised of eight ticks and one mite species collected from the studied animals (Table 5).

**Table 5: Relative abundance of species of ectoparasites (ticks and mites) from farms in Agege, Ojo and Badagry LG, Lagos State**

Ectoparasites	Relative Abundance (%)
<i>Rhipicephalus(Boophilus) annulatus</i>	252(27.5)
<i>Amblyomma variegatum</i>	75(8.2)
<i>Rhipicephalus(Boophilus) microplus</i>	89(9.7)
<i>Ixodes scapularis</i>	17(1.9)
<i>Otobius megnini</i>	44(4.8)
<i>Rhipicephalus sanguineus</i>	7(0.8)
<i>Dermacentor albipictus</i>	8(0.9)
<i>Amblyomma cajennense</i>	16(1.7)
<i>Androlaelaps casalis</i>	14(1.5)

The ticks were collected from all the sites surveyed and all the livestock studied (Table 6). Mites were not found on dogs in any of the study sites (Table 7).

It was observed that the domestic animals (cattle, sheep, goat and dog) were infested with species of ticks and mite in the three LGAs of Lagos State. Prevalence of tick infestation on cattle (21.46 %) was common than in sheep (14.71 %), goats (8.06 %) and dogs (11.98 %) (Table 6). Chi-square statistical analysis showed that there was statistical difference ( $p < 0.05$ ) in the distribution of ticks and lice among animals from the three LGAs.

The most common ectoparasite found infesting domestic animals were ticks, which were observed in all parts of the animals especially in hidden places such as the ears, trunk, mammary gland, tail and abdomen. Overall, the following tick species were encountered: *Rhipicephalus (Boophilus) annulatus* (27.50 %), *Amblyomma variegatum* (8.20 %), *Rhipicephalus (Boophilus) microplus* (9.70 %), *Ixodes scapularis* (1.9 %), *Otobius megnini* (4.80 %), *Rhipicephalus sanguineus* (0.80 %), *Dermacentor albipictus* (0.9 %) and *Amblyomma cajennense* (1.70 %) (Table 6). Based on species infestation and prevalence, tick infestation was highest in cattle 123(37.85 %), while sheep 51(15.69 %), dogs 45(13.85 %) and goats 18(5.54 %) were also infested by ticks in Agege LGA.

A particular species of mite, *Androlaelaps scasalis* made up 20.5 % of the infestation. The highest prevalence of Mite was recorded in Agege LGA with 18.46 % in cattle, 7.12 % in Ojo LGA in cattle 12.15 % in Badagry LGA in sheep (Table 7).

## DISCUSSION

This study assessed prevalence of ectoparasites on domestic animals in three Local Government Areas of Lagos State within the period of March 2021 to May 2021. From the results obtained, a higher percentage of farmers were NCE/OND holders and most were within the age group of 31 – 40 years.

**Table 6: Number of animals examined and population of ticks collected from Agege, Badagry and Ojo Local Government Areas of Lagos State, Nigeria**

LGA	Ectoparasites	Cattle	Sheep	Goat	Dog
Agege	Tick n=325	123(37.85)	51(15.69)	18(5.54)	45(13.85)
	Mite	60(18.46)	10(3.08)	7(2.15)	0(0.00)
Badagry	Tick n=214	29(13.35)	35(16.36)	36(16.82)	35(16.36)
	Mite	24(11.21)	26(12.15)	19(8.88)	0(0.00)
Ojo	Tick n=329	45(11.87)	49(12.93)	20(5.28)	30(7.92)
	Mite	27(7.12)	12(3.17)	11(2.90)	0(0.00)

Values in parentheses are percentages

**Table 7: Prevalence of tick and mite species affecting domestic animals in three local government areas of Lagos State, Nigeria**

Arthropods	Total Number	Number on Cattle	Number on sheep	Number on Goat	Number on Dog
<b>Tick Species</b>					
<i>Rhipicephalus(Boophilus) annulatus</i>	252(27.5)	123(31.8)	43(20.8)	21(8.4)	65(86.7)
<i>Amblyomma variegatum</i>	75(8.2)	40(10.3)	30(14.5)	5(2.0)	0(0)
<i>Rhipicephalus Boophilus microplus</i>	89(9.7)	21(5.4)	26(7.7)	40(16.1)	12(16.0)
<i>Ixodes scapularis</i>	17(1.9)	10(2.6)	0(0)	0(0)	7(9.3)
<i>Otobius megnini</i>	44(4.8)	1(0.3)	15(7.2)	2(0.8)	26(34.7)
<i>Rhipicephalus sanguineus</i>	7(0.8)	0(0)	7(3.4)	0(0)	0(0)
<i>Dermacentor albipictus</i>	8(0.9)	0(0)	8(3.9)	0(0)	0(0)
<i>Amblyomma cajennense</i>	16(1.7)	0(0)	16(7.7)	0(0)	0(0)
<b>Mite Species</b>					
<i>Androlepis casalis</i>	387	111(28.7)	48(23.2)	29(11.6)	0(0)

Values in parentheses are percentages

Farmers reported a number of ectoparasites affecting their animals which indicated that ectoparasites infestation on domestic animals was a recurring phenomenon.

Farmers exhibited some good knowledge of local ectoparasites control methods. However, a large number of the farmers reported that cultural practices and the use of chemical were the major control methods employed. This was similar to the result of Abang *et al.* (2014) when evaluating pest control techniques among farmers in Cameroon and reported that 92.00 % of the farmers used synthetic pesticides. In spite of the farmer's claim of use of acaricides, there was high prevalence of infestation in all the farms visited. The observation of high prevalence of ectoparasites infestation with no statistical significant difference between locations in this study was contrary to reports by Domínguez-Peñafiel *et al.* (2011), where wild animals recorded higher infestation than domestic animals.

This study also recorded that cattle had the highest infestation when compared to other animals studied. This was in agreement with the study of Rehman *et al.* (2017). Whereas sheep and cattle prefer to forage far into the wilds and as such come in contact with more vegetation hence they have more infestation, Goats prefer to graze just within the home hence they have less ectoparasites infestation. Dogs were the main host of *R. b. annulatus* with 86.70 % infestation recorded. This result was in consonance with that of Amuta *et al.* (2010) who reported high prevalence of tick infestation in dogs in Markurdi due to *Boophilus annulatus* (14.60 %). More so, in this study, tick infestation was the most outstanding with eight species of tick followed by a species of mite, *Androlaelap scasalis* (20.50 %). As indicated by Onu and Shiferaw (2013) ticks were the most prevalent ectoparasite of livestock in Maji Zone, Ethiopia. The timing of the study was also similar to that of Mereba (2005) which was

conducted during the wet season hence higher prevalence of ticks in the study areas.

*Rhipicephalus* species were well reported in the present study, this species of tick has been reported as a complex clades of about five species, (Rehman *et al.*, 2017). *Rhipicephalus (Boophilus) annulatus* was recorded as the tick species with the highest prevalence. This result was contrary to the report of Okwa and Alagangan (2007), who reported *Amblyomma variegatum* as having the highest prevalence. Similarly, *A. variegatum* have been reported to have the highest prevalence in studies conducted in Northern Nigeria (Abdullahi *et al.*, 2016; Ogo *et al.*, 2017). It is noteworthy that the study by Okwa and Alagangan (2007) was conducted in the same locality as the present study. Also, *R. annulatus* was never recorded by Okwa and Alagangan (2007), however the presence of this species may be due to the introduction of exotic animals from other parts of Africa into Lagos.

The tick vector, *R. microphilus* which was recorded as the 3<sup>rd</sup> most predominant species in this study has been known to vector *Babesia* spp. and Rickettsial pathogens, therefore the farmers need to ensure better methods of control, Similarly, *Rhipicephalus sanguines* were also reported in this study, although with least prevalence.

It is well documented that the feeding habits of ticks is quite stressful for animals and the bites can lead to blood losses which can cause weight loss, as well as damage to body parts and products including hide and skins, decreased milk production, udder and teats sore and eventually death in extreme cases (Biegelmeier *et al.*, 2015) and these leads to substantial economic losses (Rehman *et al.*, 2017).

The infestation by ticks is also capable of promoting bacterial and fungal infection some of which may be zoonotic and cause other diseases in humans and animals, and other forms of parasitism like screw-worm attack due to wounds emanating from tick bites in the animal skin. In addition to the foregoing, ticks act as vectors of numerous disease causing parasites of cattle resulting in tick-borne infections including *Anaplasma*, *Babesia* and

*Theileria* which are responsible for anaplasmosis, babesiosis and theileriosis respectively and also serve as reservoirs of other disease causing organisms like bacteria, rickettsia and viruses (Piper *et al.*, 2009). The ticks and mites are capable of reducing the market value and products produced from the hides and skins of these animals.

**Conclusion:** The results of this study indicated that cattle, sheep, goats and dogs were infested by ticks and mites in the three LGAs investigated. The economic and health implications of these ectoparasites are enormous, deserving urgent attention by government and nongovernmental organizations to give farmers better value for their livestock. This study therefore recommends regular check and treatment of animals and grazing areas for ectoparasites. Also, there is need for further studies to establish the vectorial capacity of the ectoparasites that have been identified in this study.

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