

**PREVALENCE OF TICK INFESTATION IN FREE-ROAMING AND KENNELED DOGS
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ABSTRACT

Free-roaming and kenneled dogs are mostly infested with different species of ticks. The study was conducted to identify tick species infesting free-roaming and kenneled dogs and to compare their infestation rates on free-roaming and kenneled dogs in North Bank Makurdi. One hundred dogs were randomly selected and examined for tick infestation on their body. Tick identification was done using standard taxonomic keys. A total of 36 dogs were infested with different species of ticks out of the 100 dogs examined. One hundred and thirty nine (139) adult ticks were identified. *Rhipicephalus sanguineus* had the highest prevalence of 46.8%, *Dermacentor reticulatus* had prevalence of 33.1% and *Haemaphysalis* species had prevalence of 20.1%. Single and multiple infestations did not differ statistically. Infestation was significantly statistically ($P < 0.05$) on free-roaming than kenneled dogs. From this study, it was observed that environment and degree of freedom were among the main factors influencing the dog tick infestations.

KEYWORDS: *Rhipicephalus sanguineus*, *Haemaphysalis leachileachi*, *Dermacentor reticulatus*.**INTRODUCTION**

Dogs are the most successful canids, adapted to human co-habitation worldwide. They have contributed to physical, social and emotional well-being of their owners, particularly children (Dohoo *et al.*, 1998; Robertson *et al.*, 2000). However, in spite of the beneficial effects, close bond between dogs and humans remains a major threat to public health, with dogs harbouring a bewildering number of infective stages of disease causative agent transmissible to, man and other domestic animals (Molyneux, 2004).

Dogs are wonderfully amazing animals that do not live for themselves alone, but also for their owners, and they are regarded as friends by a lot of people across the globe. This is because dogs give benefits to their owners including hunting, walking and trekking. Some dogs save and protect their owners when faced with troubles in their daily activities. For example, the great sniffing ability of dogs has been of help in tracing a network of paths when the owner is lost in the forest or part of a town or city strange to him (Forest and smith, 2010).

Research works have shown that dogs have amazing power to boost up owners' health, as they are known to eliminate high blood pressure and risks of heart attack by bringing the owner out of stress, reducing anxiety disorder of the owner through cheerful playing and

barking indeed having dogs as pets will never be a wrong decision (Janet, 2010).

Free-roaming dogs are the ones that have not been put in cage or kennel; they have freedom to move about anywhere and time, not been controlled by the owner. Kenneled dogs however, are dogs that have been put in cage or kenneled, which move or roam about under the control of the owner.

Ticks are specialized group of mite and share many features with mites. They are tiny parasites arachnids, wingless and blood sucking in nature (Segden, 2009). Ticks can be considered as zoonotic risk because, not only can they be found out doors, but also in homes, where they come in contact with human beings while searching for favourable environmental conditions to subsist (Gaxiola *et al.*, 1997). Among different species of ticks infesting dogs, *Rhipicephalus sanguineus* (brown dog tick) is most commonly present (Agbolade *et al.*, 2008; Troyo *et al.*, 2009; Abd Rani *et al.*, 2011).

Ticks being ectoparasites live on the skin or outgrowths of the skin of its host for various periods and may be very detrimental to the letter (Hopta *et al.*, 1994). Members of the tick family are known to parasitize a wild range of hosts quite unlike ectoparasites that may be host specific in nature, example lice

(Fournier *et al.*, 2003; Gonzalez *et al.*, 2004; Gross *et al.*, 2005; Segden 2009).

Ticks are closely related to animals such as spider and insects. They belong to a group called the phylum Arthropoda. The ticks are within the order Acarina; this consists mostly of mites-which are parasites on mammals and birds. They are very similar to mites but are larger and all of them only feed as parasites. In the world, there are 866 species of tick that have been described. There are two main families of ticks, Argasidae or Argasidae consisting of all soft ticks, and Ixodidae or Ixodids consisting of the hard ticks (Gerald *et al.*, 2010).

MATERIALS AND METHODS

2.1 Study Area

The study was carried out in North-Bank, Makurdi, Benue State, Nigeria. Makurdi is located at the heart land of the tropical guinea savanna zone of central Nigeria and has an annual average rainfall of 1090mm (Amuta *et al.*, 2009). There are two distinct seasons: the rainy and dry seasons; the rainy season last from April to October and the dry season last from November to March. Makurdi has a temperature range between a minimum of 27.8°C to 28.2°C and a maximum of 30.1°C to 34.1°C. North-Bank is divided into Mission ward, Court-five, Federal Housing, Federal low-cost and Agan. The inhabitants are mainly civil servants, paramilitary, military, traders, fishermen, farmers and craftsmen.

2.2 Study Population

The tick specimens were collected from residential houses in North-Bank following standard procedures. Hand picking was used for the collection of the tick species. A total of one hundred randomly selected dogs were examined for ticks on the body - face, ears, neck, belly, back and inter-digital spaces of the limbs and the number of ticks per region were recorded as well as the number of ticks on kenneled and free-roaming dogs were recorded respectively.

2.3 Identification of Ticks

The tick species were identified using standard taxonomic key (Bristo university identification key (2012). Dogs on which at least one tick was found were; red positive.

2.4 Statistical Analysis

Prevalence values within each factor (kenneled dogs, free roaming dogs, and predilection site) were compared by chi-squared test at $P > 0.05$ significance level.

RESULTS

Table 1 show the prevalence of tick's infestation on dogs in the selected areas in North-Bank. Out of 100 dogs examined, 36 (36.0%) were infested with ticks, Mission ward and Court 5 recorded the highest infestation rate with 40.0% and 1.0%. The least infestation rate 25.0% was observed at federal housing. No significant difference was observed between the different location and the prevalence of tick infestation ($\chi^2_{tab} = 9.488, P > 0.05$).

A total of 139 adults ticks were collected with the following infestation rate: *R. sanguineus* 68 (48.9%) and *D. reticulatus* 44 (31.7%) and *Haemaphysalis* spp 27 (19.4%). It was found that 47 (33.8%) tick had a predilection for the ear with *R. sanguineus* having 22 (15.8%) *D. reticulatus* 16 (11.5%) and *H. spp* 9 (6.5%). Other predilection sites by ticks were the limbs (inter-digital space 43 (31.0%) and Back 22 (15.8%). Summary of the results is shown in Table 2. The comparison of tick infestation in free roaming and kenneled dogs is shown in Table 3. It was observed that out of 45 free roaming dogs, 23 (51.1%) were found infested with three species of ticks while of the 55 kenneled dogs, 13 (23.6%) were found infested but *R. sanguineus* (33.8%) was most prevalent in re ear followed by *D. reticulatus* (11.5%) and *H. spp* (6.5%) as shown in Table 4. There was significance difference in tick infestation between free-roaming and kenneled dogs ($\chi^2_{cal} = 8.109, df = 1, \chi^2_{tab} = 3.841, P > 0.05$).

Table 1: Prevalence of tick infestation on dogs in North-Bank, Makurdi.

Location	No. of dogs examined	No. of dog positive	Percentage (%)
Mission ward	25	10	40.0
Court-5	15	6	40.0
Federal housing	20	5	25.0
Federal low-cost	18	7	38.9
Agan	22	8	36.4
Total	100	36	36.0

($\chi^2_{cal} = 1.395, df = 4, \chi^2_{tab} = 9.488, P > 0.05$)

Table 2: Prevalence of difference species of ticks and their predilation sites on the dogs in North Bank, Makurdi (%)

Tick species	Face	Neck	Ear	Belly	Back	Limbs	Total
<i>R. Sanguineus</i>	0(0.0)	7(5.0)	22(15.8)	6(4.3)	12(8.6)	21(15.1)	68(48.9)
<i>D. reticulates</i>	0(0.0)	4(2.9)	16(11.5)	5(3.6)	6(4.3)	13(9.4)	44(31.7)
<i>H. spp.</i>	0(0.0)	2(1.4)	9(6.5)	9(2.2)	4(2.9)	9(6.5)	27(19.4)
Total	0(0.0)	13(9.3)	47(33.8)	14(10.1)	22(15.8)	43(31.0)	139(100)

($\chi_{cal} = 1.779, df = 10, \chi_{tab} = 18.307, P > 0.05$)

Table 3: Comparison of tick infestation between free-roaming and kenneled dogs in North Bank, Makurdi (%).

Negative	No. of dogs examined	No. of dog positive	No of Dogs
Kenneled	55	13	42
Free roaming Dogs	45	23	22
Total	100	36	64

($\chi^2_{cal} = 8.109$, $df = 1$, $\chi^2_{tab} = 3.841$ $P < 0.05$)

Table 4: Comparison of the infestation of ticks species between free roaming and kenneled Dogs.

Tick species	Kenneled Dogs	Free roaming Dogs	Total
<i>R. sanguineus</i>	20	45	65
<i>D. reclusatus</i>	11	35	46
<i>H. spp</i>	8	20	28
Total	39	100	139

($\chi^2_{cal} = 0.631$, $df = 2$, $\chi^2_{tab} = 5.991$ $P > 0.05$)

DISCUSSION

The result of this study indicated that there was a relatively high prevalence of tick infestation on dogs in North-Bank Mission ward and Court 5 which are known as slums had the highest number of infested dogs. These areas are densely populated mainly by farmers, fishermen, petty traders and craftsmen who keep dogs without proper care. The poor environmental sanitation prevailing in these areas, the common sights of garbage dumps where dogs frequently source for food and the presence of their susceptible animals (cattle, goats and sheep) in the communities could be major factors contributing to the survival and propagation of these ticks. The low prevalence of tick infestation observed in Federal housing could be attributed to the level of care and confinement of dogs by the owners.

The ears and inter-digital spaces of limbs were found to be the most predilection sites for ticks on dogs in the study area. The presence of ticks in these sites could be probably due to their exposure to the questing ticks as the dogs roam about. Preference for the ears and inter-digital space have been earlier reported on dogs in the USA and Mexico by (Koch, 1982) and (Tinoco-Gracia *et al.*, 2009). These areas are hiding places for the ticks and are less accessible to the dog to remove them by its paws compare with location such as the neck or the face. This also agrees with a previous report showing the ears and inter-digital space as preferred sites of the ticks on dogs (Duscher *et al.*, 2013). The low infestation observed on the face and belly could be due to the exposure of these parts to environmental factors, or the fact that the ticks are often more easily seen and removed by the dog owners. Similar reasons proffered for association of ticks and locations above are likely responsible for the significant observation between kenneled dogs (20%) and free-roaming dogs (51.1%). This is because free-roaming dogs are most common in mission ward and court five; it is also possible that as these free-roaming dogs were taken along to farm or for hunting they were further exposed. The free roaming dogs are owned by people who may not take dog both seriously, the ticks therefore find suitable environment to aggregate and multiply on the dogs.

This high rate of infestation in the free roaming dogs agrees with an earlier study conducted in Jos, Plateau State Nigeria (Etim, 1982), The infestation observed in the kenneled dogs could be as a result of their release and interaction with free-roaming dogs at night. It is possible for these dogs to become infested from the household compounds. On the other hand, the low rate of infestation observed in the kenneled dogs in the study area may be due to their degree of restriction which shields them from infestation, also owners of kenneled dogs are better income earners that would care to both the dogs and take them to clinics when necessary. Moreover, these dogs are closer to their owners who always care for them by removing any visible tick. This shows that in the study area, habitat and restriction are strong factors of on tick infestation on dogs.

Variation in the observations of this study shows that even free-roaming dogs are proven negative due to dry season. The highest rate of infestation will be experienced during rainy season as a result of the relatively high humidity, temperature and greenish environment observed at that time. The drastic decline in tick infestation during dry season attributed to a short break of rainfall which lead to a reduced humidity and increase in temperature. Most engorged female ticks are known to drop off their host during dry season when climatic conditions like temperature rises to the highest peak (34°C). Subsequently they move into shelters, such as crevices in floors, walls and shutters where they deposit enormous numbers of eggs which stop development until the onset of rains, characterized by suitable moisture and decrease in temperature thus favouring the hatching of eggs. Most of the dogs examined had mixed infection with different species of ticks.

In summary, *R. sanguineus* has been identified as the major tick species attacking dogs in North-Bank, Makurdi metropolis.

CONCLUSION

There was high prevalence of tick infestation in free-roaming dogs than kenneled dogs, this is because

free roaming dogs have freedom of movement therefore, are liable to get infested by contact with sequestered ticks on grass or other infested dogs and certain other animals like cattle, sheep goat and cat. In addition, free roaming dogs receive less care from their owners and lack close observation such that tick infestation could be detected by their owner and be removed. In contrast, kenneled dogs have less tick infestation because they lack freedom of movement had proper care from their owners and tick infestation can be easily seen and removed.

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