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## SEASONAL VARIATION IN THE ABUNDANCE AND DISTRIBUTION OF IXODID TICKS ON MONGREL, ALSATIAN AND MIXED BREEDS OF DOGS (*Canis familiaris*) IN JOS, IN PLATEAU STATE, NORTH-CENTRAL NIGERIA

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### Abstract

A study was conducted to determine the variation, abundance and distribution of ticks on 300 Mongrels, Mixed and Alsatian breeds of dogs (*Canis familiaris*) in Jos, Plateau State, Nigeria. Ticks were gently removed from the body of infected dogs with forceps. The population of ticks was higher during the rainy months than the dry months. A total of 1,146 ticks of three species, belonging to the family Ixodidae were identified of which Mixed breed recorded 425 ticks, Mongrels had 408 while the Alsatian breed had 313. In order of abundance *Rhipicephalus sanguineus* recorded 40.58%; *Boophilus decoloratus*, 33.50% and *Haemaphysalis leachii*, 25.92%. Chi-squared analysis showed that abundance and distribution of different tick species varied significantly ( $P < 0.05$ ) between Jos North and South LGAs and between seasons. Infestation by ticks did not differ ( $P > 0.05$ ) among different breed of *Canis familiaris*. Of 154 male dogs examined 70, (45.16%) and 146 female dogs 85, (54.84%) were infested with ticks. Adolescent dogs were more susceptible to tick infestation, 47.10% than the adult hosts 30.90% when compared to young dogs or puppies, 22.00%. Statistical analysis showed that infestation rate between sexes of dogs and among tick species differed significantly ( $P < 0.05$ ) but no such difference was observed in ages of dogs and tick species ( $P > 0.05$ ). Any strategy intended to mitigate the problems of tick infestation of dogs in Jos plateau should take into account the identified tick species and their season of abundance.

**Keywords:** *Rhipicephalus sanguineus*, *Boophilus decoloratus*, *Haemaphysalis leachii*, *Canis familiaris*.

### Introduction

Dog, *Canis familiaris* serves as meat in different parts of the world, they are trained and used to unravel criminal intelligence by law enforcement agents while some are kept as pets due to their tremendous potential to contribute significantly to the security requirements of the teaming population of Nigeria especially in the Jos plateau that is recently faced with security challenges. As vector of important haemo parasitic disease, ticks surpass all other arthropods, apart from mosquitoes, as disease agents [1]. However, ticks and tick-borne diseases such as *Babesia canis* and *Haemobatonella* sp constitute some notifiable disease that act as impediment towards achieving this goal [2 and 3] besides their public health significance. Ticks and tick-borne diseases have in addition to other socio-economic parameters, constituted major set backs to the

development of an economically viable livestock industry in Africa and other parts of the world [3] [4], [5], [6], [7] such as reduction in growth and meat production [8 and 9]. In particular this has let to considerable losses to the livestock economy in Jos, Plateau [10]. Preliminary information about the ticks infesting dogs is crucial for the planning and implementation of an effective tick control strategy. This study was conducted to determine the tick species infesting different breeds of dogs at different times of the year in Jos, Plateau State, evaluate their prevalence and distribution by sex and age of dogs as to assist dog owners or keepers, government and other relevant agencies in planning control measure.

### Methods and Materials

#### Study area

The study was conducted in Jos North and Jos South Local Government Areas (LGAs) of Plateau State between January – October, 2009. Plateau State is located at the North Central zone of Nigeria and lies on 9° 55' 0" N, 8° 54' 0" E and occupies about 53,585KM<sup>2</sup> (Plateau State Diary, 2004). ECWA and Plateau veterinary clinics, one located in each LGA were used for the sample collection.

### Sampling methods

Three hundred, male and female of Mongrels, Mixed and Alsatian breeds of dogs between the ages of one and eight were presented to the Clinics during the study period to examine the presence of and infestation by ticks. Dogs under two years were regarded as puppies, between two and five years as adolescent and above five as adults. Ticks observed on the body of dogs were gently removed and transferred to labelled bottles containing 70% ethanol. Smaller ticks were warmed and cleared of debris in a test tube containing 3mls of Potassium Hydroxide, it was rinsed with distilled water and dehydrated through grades of ethanol, 26 - 96%. Ticks were cleared in Xylem and mounted in Canada Balsam.

### Identification of ticks

All ticks collected were carefully identified using taxonomic keys produced by [1], [11], [12], [13], [14], [15], [16] after examining the characteristic features visually with the help of a dissecting microscope (Nikon).

### Meteorological data

Temperature, relative humidity and rainfall data were obtained from the University of Jos meteorological center located within the Bauchi Road Campus of the University of Jos.

### Statistical analysis

Data collected in the study were subjected to Chi-square test for significant difference between seasons, LGAs, sexes of dogs and among tick species and breeds of dogs using the GraphPad Instat 3 Statistical Package.

### Results

A total of 1,146 ticks all of the Family ixodidae were collected from the three breed of dogs. The population of ticks were higher during the rainy season with peak periods between the months of August and September, 2009 (Fig. 1). Fewer ticks were collected in January and February which coincided with low rainfall. Mixed breed had the highest collection of ticks, 425 followed by the mongrels 408 and Alsatian recorded the least collection, 313 ticks (Tables 1). In order of abundance, *Rhipicephalus sanguineus* was the most prevalent (40.58%), followed by *Boophilus decoloratus* (33.50%) and the least was *Haemaphysalis leachii* (25.92%). Jos North recorded higher number of ticks, 672 compared to Jos South, 474 with *Rhipicephalus sanguineus* showing higher preference, 266 when compared to *Haemaphysalis leachii*, 117. Statistical analysis showed significant association,  $P = 0.00496$  (Table 2).

Of the 154 male dogs examined, 70 (45.16%) were infested with ticks and of 146 female dogs, 85 (54.84%) were infested; and infestation rate was higher in females than males (Table 3). Infestation of tick species in relation to the age of dogs showed that adolescent dogs were more susceptible to tick infestation (47.10%) than the adult dogs 30.90%. Young dogs were the least infested were the least infested (22.00%) (Table 4). Infestation was highest in August in Mongrels when compared to the Mixed and Alsatian dogs, this however correlated positively (Fig. 2). Distribution of ticks among dog breeds showed high significant difference  $P = 0.0175$  (Table1).

**Table 1. Distribution of Ixodid ticks on different breed of dogs**

Tick species	No. of tick Collected (%)	Breed		
		Mongrels	Mixed	Alsatian
<i>Rhipicephalus sanguineus</i>	465 (40.58)	175	169	121
<i>Haemaphysalis leachii</i>	297 (25.92)	115	116	66
<i>Boophilus decoloratus</i>	384 (33.50)	118	135	126
Total	1,146	408	420	313

$\chi^2 = 11.978$ ,  $P = 0.0175$ ,  $df = 2$

**Table 2. Distribution of Ixodid ticks by Local Govt Areas**

Tick species	No. Collected (%)	Jos North (%)	Jos South (%)
<i>Rhipicephalus sanguineus</i>	465	266	199
<i>Haemaphysalis leachii</i>	297	180	117
<i>Boophilus decoloratus</i>	384	226	158
Total	1146	672	474

$X^2=6.008$ ,  $P = 0.0496$ ,  $df = 2$

**Table 3. Infestation of Ixodid ticks in relation to sex of dogs**

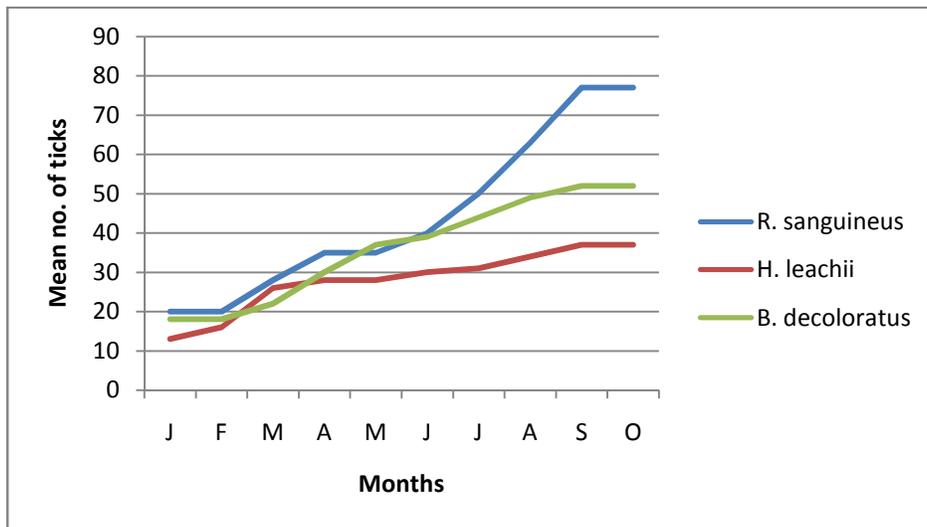
Sex of dog	No. of dogs examined	No. of dogs Infected (%)	<i>Rhipicephalus sanguineus</i>	<i>Haemaphysalis leachii</i>	<i>Boophilus decoloratus</i>	Total ticks
Male	154	70(45.16)	185(2.64)	145(2.07)	187(2.67)	384(2.47)
Female	146	85(54.84)	280(3.30)	152(1.80)	197(2.32)	629(7.40)
Total	300	155(51.67)	465(3.0)	297(1.90)	384(2.47)	1146(7.40)

**Significance:**  $X^2=4.890$ ,  $P = 0.0135$ ,  $df = 1$ . **Independence:**  $X^2=8.974$ ,  $P = 0.0113$ ,  $df = 2$ . **Trend:**  $X^2=7.114$ ,  $P = 0.0076$ ,  $df = 1$ , Figures in parenthesis are per cent values

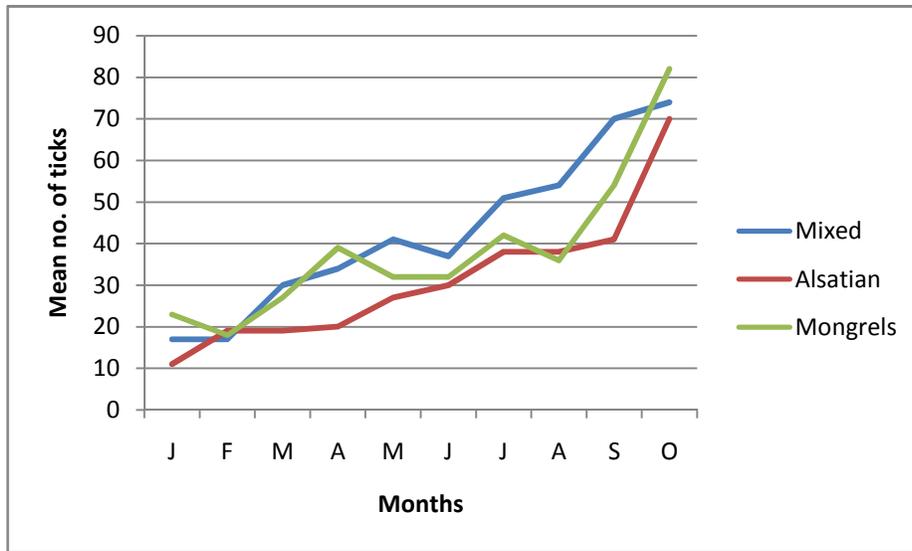
**Table 4. Infestation of Ixodid ticks in relation to age of dogs**

Sex of dog	No. of dogs examined	No. of dogs Infected (%)	<i>Rhipicephalus sanguineus</i>	<i>Haemaphysalis leachii</i>	<i>Boophilus decoloratus</i>	Total ticks
Young	60	34 (22.0)	145(4.30)	80(2.35)	114(3.35)	399(10.0)
Adolescent	148	73(47.1)	168(2.30)	120(1.64)	137(1.90)	425(5.82)
Adult	92	48(30.9)	152(3.17)	97(2.02)	133(2.77)	382(8.0)
Total	300	155(51.67)	465(3.00)	297(1.90)	384(2.47)	1146(7.40)

**Significance:**  $X^2=0.9353$ ,  $P = 0.6265$ ,  $df = 2$ . **Independence:**  $X^2=2.603$ ,  $P = 0.6263$ ,  $df = 2$ . **Trend:**  $X^2=0.1730$ ,  $P = 0.6775$ ,  $df = 1$ , Figures in parenthesis are per cent values



**Fig 1. Monthly distribution of Ixodid ticks collected from dogs**



**Fig 2. Monthly distribution of Ixodid ticks on different breed of dogs**

## Discussion

The ticks collected in this study were *Rhipicephalus sanguineus*, *Boophilus decoloratus* and *Haemaphysalis leachii* all belong to the family ixodidae with *Rhipicephalus sanguineus* being dominant. Earlier [13] had reported that ixodid ticks are entirely mammalian parasites. This finding agrees with the reports of [7], [8] [9], [17], [18], [19]. Collection of these species of ticks as ectoparasites of dogs in Jos therefore corroborates their finding. Analysis of the composition of ticks in different months of sampling revealed that infestation of ticks was higher during the rainy season than during the dry season. This might be due to availability of vegetation cover which provides a conducive habitat for the ticks during the rainy season as they are noted to drop off host to moult and wait on blades of vegetation to infest host that come in contact with them during grazing or movement. Also, the relatively low temperature during the rainy season may probably encourage high fecundity in ticks. This finding is in conformity with the work of [7], [8], [9], [17], [20] that reported relatively high numbers of ticks on dogs during the rainy season than the dry season.

Ticks were found on dogs through out the monitoring period, although, higher loads of ticks were collected during rainy months than during dry months. Monthly maximum and minimum environmental temperatures appeared to affect the

tick population, although it was difficult to isolate the effect of temperature from that of rainfall. Greater loads of ticks per dog were observed during the periods with lower maximum and higher minimum temperatures. The mongrels showed higher infestation compared to the mixed and alsatian breeds. This finding conform to the works of [7 and 10] who reported higher infestation of ticks in the local breed of dogs than the exotic breeds. This could possibly due to the fact that Alsatian dogs are kept by high income earners that provide attention, sanitation and health care to the exotic breeds, also the economic value of alsatian dogs are higher than others due to its efficient services and intelligence. Most mongrels and mixed breeds are free-ranging, a situation which exposes them to frequent contact with ticks, than the exotic breeds.

With respect to sex, female dogs were more infested than the male hosts. This might be due to the fact that female dogs usually form a sedentary habit during care of their new born or offspring where they are easily infested by ticks. Similarly, [20] reported that female dogs are highly susceptible to tick infestation than the male animal. The infestation was higher in adolescent dogs than the adult hosts and young dogs were the least infested animals. This finding is in line with the report by [2] who reported that adult and adolescent dogs were more infested by ticks than the young animals. This might be due to much attention and care given to the young dogs than the adult and adolescent which are left to roam

indiscriminately predisposing them to contact with ticks.

The overall result indicated that three species of ticks commonly infest dogs in the study area. This suggests that tick control measures for dogs should be concentrated on the dominant tick species. Frequent dipping of these animals in acaricides, grooming and restriction of movement especially in peak periods is recommended to help reduce tick burdens and subsequently tick-borne infections.

### Acknowledgement

The authors are indebted to Drs. David Ayika, Paul Akut and Magdalene Aba for their useful advice; to Deborah Joseph, Francis Wamtas, Simon A. Ogwos and Mrs Esther A. Reny for their technical support.

### References

1. **Hoogstraal, H., Kohls, G. M. and Parrish, D. W. (1968).** Studies on South Asian *Haemaphysalis* ticks (ixodoidea: ixodidae) *H. Kaiseriana susphilippensis* sp. N., A parasite of Luzon and Mindanao Boars. *Journal of Parasitology*, 54:616-621
2. **James-Rugu, N.N. (2001).** A study of the haemoparasites of dogs, pigs and cattle in Plateau State, *Nigerian Journal of Science and Technology*, 7:20-27.
3. **Zeleke, M. and Beleke, T. (2004).** Species of Ticks on Camels and their seasonal population dynamics in Eastern Ethiopia. *Tropical Animals Health and production*, 36:225-231
4. **Mohammed, A.N. and Agbede, R.I.S. (1980).** Control of ectoparasites on ruminants in Nigeria. In: Proceedings of National seminar on "The current problem facing the Leather industry in Nigeria. LERIN, Zaria, September, 24-26.
5. **De-Castro, J.J. (1997).** Sustainable ticks and tick-borne disease control in livestock improvement in developing countries. *Veterinary Parasitology*, 71:77-97.
6. **George, B.D.J (2003).** Comparative study of Haemocyte populations in Babesia sp. Infected and unaffected *Boophilus decoloratus* (koch) Ticks. *Nigerian Journal of Entomology*, 20:49-55.
7. **James-Rugu, N.N. and Idu, M.E. (2008).** Ectoparasites of some domestic animals in Makurdi metropolis, Benue State, Nigeria. *Journal of Pest, Disease and Vector Management*, 8:471-477.
8. **Iwuala, M. O. E. and Okpala, I. (1978a).** Studies on the Ectoparasitic fauna of Nigerian Livestock I: Types and distribution patterns. *Bulletin of Animal Health and Production in Africa*, XXVI (4): 339-350
9. **Iwuala, M. O. E., and Okpala, I. (1978b).** Studies on the Ectoparasitic fauna of Nigerian Livestock II: Seasonal infestation rates. *Bulletin of Animal Health and Production in Africa*, XXVI (4): 351-359
10. **James-Rugu, N.N. (2002).** Studies on ticks and tick-borne parasites of dogs in Jos, Plateau State. *Zuma Journal of Pure and Applied Sciences*, 4(2):29-35.
11. **Nuttall, G. H. F. and Warbuton, C. (1911a).** Ticks: A monograph of the ixodoidea part II. Ixodidae: Cambridge, Cambridge University Press 1-348
12. **Nuttall, G. H. F. and Warbuton, C. (1911b).** Ticks: A monograph of the ixodoidea part III. Ixodidae: the genus *Haemaphysalis*. Cambridge, Cambridge University Press 1-550
13. **Hoogstraal, H. (1956).** *Ticks of the Sudan*. U.S. Naval Medical Research Unit (3) Cairo, Egypt, 1110pp
14. **Hoogstraal, H. (1958).** Notes on African *Haemaphysalis* ticks iv. Description of Egyptian population of the yellow tick *H. leachii leachii* (Audoin 1827) (ixodoidea: ixodidae). *Journal of Parasitology* 44:548-558
15. **Hoogstraal, H. (1964).** Notes on African *Haemaphysalis* ticks vi. *H. Spinulosa* Neumann and relation to biological and nomenclatorial problems in the *H. leachii*, group of Africa and Asia (ixodoidea, ixodidae) *Journal of Parasitology*, 50(6): 786-792
16. **Soulsby, J. I. (1982).** Helminths, arthropods and protozoa of domesticated animals, 7<sup>th</sup> Edition William and Wilkins Company, Baltimore. USA 121-155
17. **James-Rugu, N. N. and Iwuala, M.O.E. (1992).** Seasonal abundance in ixodid ticks from some livestock in Plateau State. *Technology and Development* 2(1):61-67
18. **James-Rugu, N.N. and Iwuala, M.O.E. (1994).** Attachment sites of ticks on some livestock in Plateau State Nigeria. *Journal of Innovations in life Science*, 1(1):179-184.

19. **James-Rugu, N.N. and Iwuala, M.O.E. (1995).** The prevalence of ectoparasites of the family ixodidae on livestock in Jos and environs. *Journal of Pest, Disease and Vector Management*, 1(1):29-32.
20. **Tanwia, N. N. A. (1989).** Aspects of the biology and ecology of ticks of livestock in parts of Plateau State. *Ph.D. Thesis, Department of Zoology, University of Jos.*