Journal of Sustainable Veterinary & Allied Sciences
P-ISSN-2695-2661 e-ISSN: 2811-1346
JoSVAS 2025 September Vol. 7 Issue 3: 328-333

Original Research Article

TICK INFESTATION ON DOGS IN THE FEDERAL CAPITAL TERRITORY, NIGERIA AND THEIR RISK FACTORS

[1*]OBETA, S.S. & [2]NATALA, A.J.

[1]*Department of Parasitology and Entomology, Faculty of Veterinary Medicine, University of Abuja, Nigeria*, [2]*Department of Parasitology and Entomology, Faculty of Veterinary Medicine, Ahmadu Bello University, Zaria, Nigeria*

[*]*Correspondence:* sylvester.obeta@uniabuja.edu.ng; +2348035954639

ABSTRACT

Ticks hold considerable veterinary and public health significance, owing to their role in causing blood loss, dermal injury, paralysis, and as vectors of pathogenic organisms. This study investigated tick infestations on dogs in Federal Capital Territory (FCT), Nigeria, and the associated risk factors. Four hundred and eighty asymptomatic dogs were randomly screened for tick infestation within the six area councils of the FCT. Location, sex, age, breed, use, season and attachment sites were recorded. Ticks were identified morphologically using stereomicroscope. Results showed 52.9% (254/480) dogs were tick infested. From a total of 2043 ticks collected, 99.0% (2041) were *Rhipicephalus sanguineus* while 1.0% (2) was *Amblyomma variegatum*. The prevalence was highest (57.5%) in Gwagwalada Area Council 57.5% while Abaji Area Council recorded the least (47.5%). Male dogs had higher (56.8%) infestation than female (49.4%). Younger dogs (≤ 12 months) had higher (60.2%) infestation than older dogs (>60 months) with (14.3%). Local breeds had higher (64.9%) infestation than cross breed (53.5%) and exotic (3.2%). Hunting dogs had higher (69.0%) infestation than guard dogs (51.6%) and pet dogs (7.1%), respectively. Months of rainy season showed higher (58.8%) infestation rate than months of dry season (47.1%). Preferential site of tick attachment was highest (45.9%) in the ear region and least (2.0%) in the scrotal and mammary regions. These findings emphasize the necessity of better tick control strategies and awareness of their potential health and economic implications.

Keywords: Dog, Federal Capital Territory, Prevalence, Risk factors, Tick infestation

INTRODUCTION

Ticks of the family Ixodidae are haematophagus arthropods that can transmit several pathogens, including but not limited to bacteria, viruses, and protozoans, that cause diseases in humans and animals, known as tick-borne diseases (TBDs) (Nuttall, 2021). Like Cullicidae, Ixodidae are poikilothermic and are unable to control their internal body temperature. Therefore, as environmental temperatures rise due to climate change, there's increase in their distribution and spread of their pathogen worldwide (Ogden *et al.*, 2021). Common tick-borne pathogens reported include *Anaplasma* spp., *Rickettsia* spp., *Ehrlichia* spp., *Babesia* spp., *Theileria* spp., *Coxiella burneti* tick-borne encephalitis virus, *Borrelia* spp., and Crimean-Congo haemorrhagic fever virus (Körner *et al.*, 2021). Copious studies on ticks of dogs exist in various regions of the country and have shown that *Rhipicephalus*, *Boophilus*, *Hyalomma*, and *Amblyomma* species can infest dogs (Konto *et al.*, 2014).

Dogs are ubiquitous companions in human settlements worldwide, serving vital functions in the society. In Nigeria, dogs are kept as pets, guards, for hunting, herding, and breeding, as well as a source of animal protein among some ethnic groups (Hambolu *et al.*, 2014). Among domestic

http://doi.org/10.54328/covm.josvas.2025.304

animals, dogs are notably susceptible to tick infestations, which can lead to direct health issues like anaemia and skin irritation, as well as indirect effects through the transmission of various tick-borne pathogens. Despite the recognized importance of tick and associated diseases, there remains a paucity of comprehensive studies addressing the prevalence, species distribution, and risk factors associated with tick infestation on dogs in the FCT. Understanding these parameters is crucial for developing effective control strategies and mitigating the public health risks posed by ticks and tick-borne pathogens. The current study examined dog ticks in the Federal Capital Territory and the risk factors that are linked to them.

MATERIALS AND METHODS

STUDY AREA

The study was conducted in the six area councils (Abaji, Bwari, Gwagwalada, Kwali, Kuje, and Abuja municipal) of the FCT. Federal Capital Territory is located in the center of Nigeria, approximately between latitudes 8.77°N and 9.20°N and longitudes 7.20°E and 7.40°E. The city has a land area of approximately 8,000 square kilometers. Abuja has a tropical savannah climate, characterized by two distinct seasons: the dry season (November to April) and the rainy season (May to October). The temperature ranges from 24°C to 30.8°C, with an average annual rainfall of around 1,500 mm. It is bordered to the north by Kaduna State, to the east by Nasarawa State, to the south by Kogi State, and to the west by Niger State. As the capital city of Nigeria, Abuja has a diverse population with over3.2 million people, according to Knoema (2016).

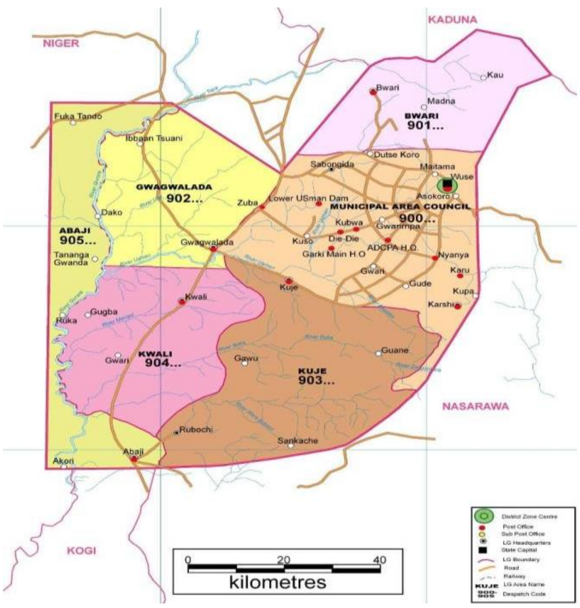

Figure I: Map of FCT showing the six area councils; https://www.researchgate.net/publication/318653677

STUDY DESIGN AND SAMPLED ANIMALS

In a cross-sectional design, 480 asymptomatic dogs were randomly sampled for ticks (80 dogs/area council) for a period of one year. Information regarding dog's age, breed, sex, utility, presence or absence of ticks, season as well as attachment sites of tick on dogs were recorded.

COLLECTION OF TICKS

Ticks were removed with steel forceps to grip it firmly over its scutum and mouth-parts as close to the host skin as possible and the forceps was turned over unto its back and then pulled strongly and directly out from the skin and stored in 70% ethanol with 5% glycerol until analysis. A systematic technique was employed to ensure consistency in evaluating tick burden for the subjects. Each dog enlisted in this study was restrained and thoroughly examined for ticks on five defined anatomical regions: (a) the head and ears, (b) the neck and chest, (c) the back and abdominal areas, (d) the tail and perineal region, and (e) the legs including inter-digital spaces. The entire body of each dog was visually examined for the presence of ticks. Tick infestation was assessed by counting the number of ticks present in each of the five regions. The degree of infestation was classified according to the following scale: No ticks = (−), 1–5 ticks (Mild) = (+), 6–10 ticks (Moderate) = (++), 11–20 ticks (High) = (+++), More than 20 ticks (Very High) = (++++) (Odeniran *et al.* (2021). This approach provided a systematic method for evaluating tick burden and identifying potential patterns related to infestation severity.

TICK IDENTIFICATION

Individual tick was examined using a stereomicroscope at X400 magnification. The sex and species were morphologically identified according to Walker *et al*. (2014), and the data sets were recorded in Microsoft excel. Photographs were taken with an Olympus digital camera.

DATA ANALYSES

The data obtained were expressed as percentages and presented in the form of tables and charts. Chi-square analysis was used to evaluate the prevalence distributions on the basis of sample site, sex, age, breed, utility, and season and ANOVA was used to obtain mean difference across attachment sites. Differences were considered significant when *P*-value was <0.05. Other statistical packages used were Statistical Package for Social Science (SPSS, Chicago, IL, USA, and Version 20) and Python.

RESULTS

Out of the 480 dogs screened for ticks, 52.9% (254/480) were tick infested. A total of 2043 ticks collected belonged to 2 species; *Rhipicephalus sanguineus* (99%) and

Amblyomma variegatum (1.0%). Infestation of ticks on dogs in the different locations showed the following prevalence of Abaji (47.5%), Abuja Municipal (55.0%), Bwari (52.5%), Gwagwalada (57.5%), Kuje (55.0%), and Kwali (50.0%). No statistically significant difference (*p*-value (0.825) > 0.05), was observed.

Male dogs had a higher infestation rate (56.8%) than females (49.4%).No statistically significant difference (*p*-value (0.125) > 0.05) was observed. Dogs less than 1 year old had the highest infestation rate (65.9%) and decreased with age, to 22.7% in dogs older than 5 years. Dogs of aged 3–<5 years had significantly lower odds of infestation (OR = 0.26, 95% CI: 0.82–6.42), while those under 1 year had increased odds, although not statistically significant (OR = 0.58, 95% CI: 0.28–1.78).

Mongrels had the highest (64.9%) infestation rate, followed by cross breeds (53.5%) as compared to exotic breeds (3.2%). Breed showed a significant association with infestation (*p*< 0.001).Hunting dogs recorded the highest infestation (69.0%), followed by guard dogs (51.6%), while pet dogs showed (7.1%) infestation.

Dog utility, had a strong association to tick infestation (*p*-value (0.001) <0.05). Guard dogs were over 2.59 times more likely to be infested than pets (OR = 2.59, 95% CI: 1.17–5.78).Seasonal variation was significantly associated (*p*-value (0.014) <0.05), with infestation higher in the wet season (58.8%) compared to (47.1%) for the dry season. Dogs were about twice as likely to be infested during the wet season (OR = 2.08, 95% CI: 0.56–1.62) as shown in Table I.

The monthly prevalence of tick infestation showed August had highest 75% (30/40) prevalence while February recorded the lowest 35% (14/40). There was statistical significant difference at (X^2 = 0.022, P>0.05) with higher infestation in the months of wet season and lower in months of dry season (Table II)**.**

The groupings done by the post-hoc test from ANOVA analysis led to the inference that group A (ear) is the dominant site for tick attachment, with a significantly higher tick count than all other sites. Group B (neck and inter-digital) showed moderate tick presence and forms the next level of preference. Group C (thoracic, perineum, and inguinal) represents areas of intermediate attachment. Group D (abdomen, facial, mammary, and scrotal areas) has the lowest tick counts, indicating minimal tick preference. There was a statistically significant difference in mean tick counts across different attachment sites (p (0.0001) <0.05) as shown in Table III.

TABLE I: SUMMARY OF TICK INFESTATIONS AMONG DOGS EXAMINED IN FCT BY RISK FACTORS

Risk Factor	Category	No. Sam.	No. Infes.	Odds Ratio 95% CI	P-value
Location	Kwali	80	40	2.20 [0.99 – 3.56]	0.825
	Bwari	80	42	2.80 [0.99 – 4.23]	
	Gwagwalada	80	46	3.00 [1.22 – 5.17]	
	Kuje	80	44	3.20 [1.02 – 4.99]	
	Municipal	80	44	1.60 [0.43 – 3.33]	
	Abaji	80	38	1.00	
Sex	Male	227	129	1.35[0.94-1.93]	0.125
	Female	253	125	1.00	
Age	<1	170	112	0.58 [0.28 – 1.78]	0.000
	1–<3	194	104	1.00	
	3–<5	94	33	0.26 [0.82 – 6.42]	
	>5	22	5	0.72 [0.62 – 3.40]	
Breed	Exotic	62	2	1.00	0.000
	Mongrel	248	161	—55.52[13.25-232.63]	
	Cross	170	91	34.56[8.18-145.96]—	
Utility	Guard	395	204	2.59 [1.17 – 5.78]	0.000
	Hunting	71	49	2.57 [0.98 – 3.74]	
	Pet	14	1	1.00	
Season	Wet	240	141	2.08 [0.56 – 1.62]	0.014
	Dry	240	113	1.00	

TABLE II: MONTHLY DISTRIBUTION OF TICK INFESTATIONS AMONG DOGS EXAMINED IN THE FCT

Months	No of dogs Sampled	No of dogs infested	OR	Lower CL	Upper CL
May	40	22	0.14	0.74	4.34
October	40	26	0.21	1.17	5.78
September	40	30	0.21	1.17	5.78
August	40	28	0.21	1.17	5.78
November	40	18	0.14	0.74	4.34
February	40	14	1.00	0.00	0.00
June	40	25	0.18	0.84	4.98
March	40	16	0.08	0.55	4.26
April	40	18	0.08	0.55	4.26
July	40	22	0.11	0.66	5.05
December	40	19	0.11	0.66	5.05
January	40	16	1.1	0.22	4.32

Ref = Reference group for odds ratio calculation (February = month with the lowest prevalence); OR = Odds ratio; CI = Confidence interval

TABLE III: ATTACHMENT SITE WITH REASSIGNED DUNCAN-STYLE GROUPING

Attachment Site	Tick Count	Mean Ticks	Approximate Group
Ear	934	6.93	A
Neck	244	4.81	B
Inter digital	182	3.72	B
Thoracic	142	5.05	C
Perineum	102	4.90	C
Inguinal	81	3.96	C
Abdomen	61	4.25	D
Head	61	3.79	D
Mammary	41	5.07	D
Scrotal	41	4.93	D

Figure II: *Amblyomma variegatum* (A) and *Rhipicephalus sanguenius* (B) collected from dogs in the FCT

DISCUSSION

The current study provides insights to the prevalence, species distribution, and risk factors of tick infestation on sampled dogs in the Federal Capital Territory. The relatively high prevalence reported was similar to that of Odeniran *et al.* (2021) and Kachalla *et al.* (2021), who observed 56.2% tick infestation on dogs from Ibadan, southwest and 58.1% from Kano, northwest Nigeria, respectively. However, the report was lower than 65.4% and 80% prevalence, reported from Jalingo and Ilorin respectively (Wama *et al*., 2021; Ola-Fadunsin *et al*., 2025). The hot climate of these regions, with average environmental temperatures above 30°C, that encourage tick survival, reproduction and spread (Ogden *et al*., 2021), could be responsible.

In this study, *Rhipicephalus sanguenius* was the predominant tick species recorded, representing 99.0 %. This finding concurs with that of Opara *et al.* (2017); who reported *R. sanguenius* as the only tick encountered on local breed of dogs and attributed it to the higher temperature (20-35℃) and relative humidity (35-95%) of the area. Also, Gruenberger *et al.* (2023), reported *R. sanguineus sensu lato as* the main tick species infesting dogs in Nigeria, with a widespread presence across different climates, from tropical to subtropical and Mediterranean regions. However, the findings differs from earlier report of Konto *et al.* (2014), who recorded *Boophilus* spp. (88%), *Rhipicephalus sanguineus* (10.8%), *Hyalomma* spp. (0.9%), and *Amblyomma variegatum* (0.3%) on stray dogs in Maiduguri metropolis, and Kachalla *et al*. (2021), who reported *Boophilus* spp. (91.6%) and *Rhipicephalus* spp. (8.3%) in local and exotic dogs from Kano Municipal. Also, Kamani *et al*. (2019) studied ticks from dogs in 10 Nigerian states and reported *Rhipicephalus* spp (95.2%), *Haemaphysalis* spp. (3.7%), and *Amblyomma* spp. (1.2%). However, in a recent large-scale survey of tick abundance on dogs in the UK, *Ixodes ricinus*, *I. hexagonus*, and *I. canisuga* were identified, with *I. ricinus* being the most prevalent species and representing the greatest risk of bites to humans, livestock, and companion animals (O'Neill*et al.*, 2024).

In the current study, tick infestations varied across the sampled locations, with the highest infestation observed in Kuje, Gwagwalada, and Bwari. These areas could provide more suitable environments for tick proliferation, due to greater populations of stray and semi-domesticated dogs, vegetation cover, and poor tick control measures. The Municipal Area council showed low infestation rate, possibly, due to better veterinary care, urbanization, and controlled pet ownership practices.

The higher tick infestation rate observed in male is consistent with previous report of Akande *et al.* (2018) in Ogun State southwest and Kachalla *et al.* (2021) in Kano Northwest. This could be attributed to their tendency to roam and scavenge more, in search of mates and establish territories. However, it contradicts that of Odeniran *et al.* (2021), who reported higher tick infestation on female dogs. Other studies reported that sex was not associated with tick infestation, and attributed it to probably some level of selection bias may have accounted for these differences.

In this study, the odds of tick infestation decreased with increasing age, as infestation was highest among dogs less than 1 year old (65.9%) and decreased with age, to 22.7% in dogs older than 5 years. This is consistent with the findings of Abdulkareem *et al*. (2018, Odeniran *et al*. (2021 and could be associated to progressive immunity development, increased exploratory behaviors and less developed grooming efficiency. However, age alone doesn't reliably predict tick infestation risk, as other factors like husbandry, veterinary care and environments likely interact with age to influence risk.

In the current study, higher tick infestations among local dogs aligns with the report of Kachalla *et al*. (2021), and could be attributed to exotic breeds receiving more care, including better nutrition and medication than the local breeds that often receive less care and roam freely.

The relative high infestation reported in hunting dogs was consistent with the report of Akande *et al*. (2018), and could be probably be due to poor care, poor living conditions, and lack of proper management, which can stress the dogs and increase their susceptibility. This pattern is expected, as guard and hunting dogs spend more time outdoors, increasing their exposure to tick-infested vegetation, other animals, and less frequently grooming than pet dogs that receive regular veterinary care.

In the current study, the odds of tick infestation increased in the months of the wet season of August, September, and October, but decreased in dry season months of February and March. The warm, humid climate of wet season creates ideal conditions for ticks to thrive (Soulsby, 1982). The combinations of high temperatures and suitable humidity during the early and late wet season are favourable to rapid tick multiplication, resulting in larger tick populations. This is probably due to increased humidity and vegetation, which provide an optimal environment for tick survival and reproduction.

In the current study, the ear, neck and inter digital spaces were the most preferred attachment sites in the study area. This collaborates with the earlier reports of Odeniran *et al.* (2021) which stated that the head, neck, and leg as the most preferred sites of tick attachment in decreasing order. The high tick burden in the ears and neck is likely due to the thin skin and ample blood supply, making these sites ideal for feeding. Similar findings have been reported in previous studies where ticks exhibited site preferences that facilitate easier access to blood and protection from host grooming behaviours compared with other sites of the body (Dantas-Torres & Otranto, 2011; Saleh *et al*., 2019). The low level of infestation found on the head and belly may be the result of environmental variables affecting these areas or the fact that dog owners can typically notice and remove ticks more quickly.

CONCLUSION

This study highlights the widespread nature of tick infestations among dogs in the FCT, with variations observed on the basis of anatomical attachment site, seasonal patterns, geographical location, age, breed, and utility. These findings emphasize the need for regular tick control measures, particularly in high-risk locations and among vulnerable dog populations such as mongrels, guard dogs, and younger animals. The implementation of strategic tick management practices, including routine veterinary care, acaricide treatments, and environmental modifications, will be crucial in reducing tick burdens and associated health risks in dogs and their owners.

ACKNOWLEDGEMENT

This study was sponsored by the Tertiary Education Trust Fund (TETF) Study Fellowship of the University of Abuja, Nigeria. We thank Mr. Benjamin, Mr. Simon Otobo, and Mallam Yahaya of the Veterinary Entomology Laboratory, Ahmadu Bello University, Zaria, for their expertise and assistance.

REFERENCES

Abdulkareem, B.O., Christy, A.L. & Ugbomoiko, S.U. (2019). Prevalence of ectoparasite infestations in owned dogs in Kwara State, Nigeria. *Parasite Epidemiology and Control, 4,* e00079.

Akande, F.A, Adebowale, A.F., Idowu, O.A. & Sofela, O.O. (2018). Prevalence of ticks on indigenous breed ofhunting dogs in Ogun State, Nigeria *Sokoto Journal of Veterinary Sciences,* 16(3), 66-71.

Bhowmik, P., Islam, S., De, A., Tamuly, S. & Bouragohain, L. (2024). Prevalence and molecular characterization of ticks infesting dogs in Agartala, Tripura .*Indian Journal of Animal Sciences, 94*(8), 669–673.

Dantas-Torres, F. & Otranto, D. (2011). *Rhipicephalus sanguineus* on dogs: relationships between attachment sites and tick developmental stages. *Experimental & Applied Acarology, 53*(4), 389–397.

Gruenberger, I., Liebich, A.V., Ajibade, T.O., Obebe, O.O., Ogbonna, N.F., Wortha, L.N., Unterköfler, M.S., Fuehrer, H.P. & Ayinmode, A.B. (2023). Vector-borne pathogens in guard dogs in Ibadan, Nigeria. *Pathogens (Basel, Switzerland),* 12(3), 406.

Hambolu, S.E., Dzikwi, A.A., Kwaga, J.K., Kazeem, H.M., Umoh, J.U. & Hambolu, D.A. (2014).Dog ecology and population studies in Lagos State, Nigeria. *Global Journal of Health Science,* 6(2), 209–220.

Kachalla, A.M., Mohammed, B., Falmata, K., Larema, M.M., Aliyu, G. & Sadiya, B.U. (2021).Assessment of tick infestation rate among local and exotic dog breeds in Kano Municipal, Kano State, Nigeria. *International Journal of Veterinary Sciences and Animal Husbandry,* 6(2), 35-38.

Kamani, J., González-Miguel, J., Mshelbwala, F.M., Shekaro, A. & Apanaskevich, D.A. (2019). Ticks (*Acari: Ixodidae*) infesting dogs in Nigeria: epidemiological and public health implications. *Experimental & Applied Acarology,* 78(2), 231–246.

Konto, M., Biu, A.A., Ahmed, M.I. & Charles, S. (2014). Prevalence and seasonal abundance of ticks on dogs and the role of *Rhipicephalus sanguineus* in transmitting *Babesia* species in Maiduguri, North-Eastern Nigeria. *Veterinary World, 7*(3), 119–124.

Körner, S., Makert, G.R., Ulbert, S., Pfeffer, M. & Mertens-Scholz, K. (2021). The Prevalence of *Coxiella burnetii* in hard ticks in Europe and their role in Q-fever transmission revisited-a systematic review. *Frontiers in Veterinary Science*, 8, 655715.

Modu, K.A., Babagana, M., Kyari, F., Modibbo, L.M., Garba, A. & Usman, S.B. (2021).Assessment of tick infestation rate among local and exotic dog breeds in Kano municipal, Kano State, Nigeria. *International Journal of Veterinary Science and Animal Husbandry, 6*(2), 35–38.

Nuttall, P.A. (2021). Climate change impacts on ticks and tick-borne pathogens infections. Biologia, 2021, 1–10.

Odeniran, P.O., Adetayo, O.A., Makinde, O.E. & Adetayo, C.O. (2021). Prevalence and risk factors of tick infestation in dogs in Ibadan, Nigeria. *African Journal of Biomedical Research, 24*(1), 135–140.

Ogden, N.H., Beard, C.B., Ginsberg, H.S. & Tsao, I. J. (2021). Possible effects of climate change on ixodid ticks and the pathogens they transmit: Predictions and observations. *Journal of Medical Entomology, 58*(4), 1536–1545.

Ola-Fadunsin, S.D., Ganiyu, I.A., Ambali, H M., Gimba, F.I., Abdullah, D.A. & Younis, K.H. (2025). Biodiversity, prevalence, and risk factors associated with tick infestation of indigenous Nigerian breed of hunting dogs in Kwara State, Nigeria. *Veterinary Parasitology, Regional Studies and Reports*, 60, 101256.

O'Neill, D.G., Komutrattananon, R., Church, D.B., Hartley, A.N. & Brodbelt, D.C. (2024).The epidemiology of tick infestation in dog breeds in the UK. *Journal of Small Animal Practice*, 65(4), 1–13.

Opara, M., Adewumi, N., Mohammed, B.R., Obeta, S.S., Simon, M.K., Jegede, O.C. & Agbede, R.I. S. (2017).Investigations on the haemoprotozoan parasites of Nigerian local breed of dogs in Gwagwalada Federal Capital Territory (FCT), Nigeria. *Research Journal of Parasitology*, 10, 1-7.

Saleh, M.N., Sundstrom, K.D. & Duncan, K.T. (2019). Show us your ticks: a survey of ticks infesting dogs and cats across the USA. *Parasites Vectors*, 12, 595.

Soulsby, E.J.L. (1982). Helminthes, Arthropods and Protozoa of Domesticated Animals, 7th (Ed.), Bailliere Tindall, London, Pp. 765-777.

Walker, A., Bouattour, A., Camicas, J.L., Estrada-Peña, A., Horak, I.G. & Latif, A.A. (2014). *Ticks of domestic animals in Africa: A guide to identification of species.* Edinburgh, UK: Bioscience Reports.

Wama, B.E. Jonathan J., Garba L.C., Njilmah J.A. & Aguzie, I.O. (2021). Survey of tick infestations on pet dogs in Jalingo Local Government Area, Tarabastate. *Nigerian Journal of Parasitology*, 42(2), 1-7.