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Tick Infestation in Cattle and its Implications for Control; a Case Study of Certain Abattoirs in Anambra State Southeast Nigeria

Ogbuefi, E. O. [1], **Joe-Ikechebelu, N. N.** [2,3,4], **Umeh, B. C.** [1], **Chidi-Okeke, C. A.** [5], **Emma- Ogbuefi, O. V.** [6,7,8], **Elosiuba N. V.** [1] **and Igwe, O. P.** [1]

[1]*Department of Parasitology and Entomology, Faculty of Biosciences, Nnamdi Azikiwe University Awka, Anambra State Nigeria*
[2]*Department of Community Medicine and Primary Health Care, College of Medicine, Chukwuemeka Odumegwu Ojukwu University, Amaku Awka Anambra State, Nigeria*
[3]*Social Dimensions of Health Program (INTD), Public Health and Social Policy Department, Faculty of Human and Social Development, University of Victoria, British Columbia, Canada*
[4]*Nigeria Coalition for EcoSocial Health Research, Chukwuemeka Odumegwu Ojukwu University Teaching Hospital, Amaku Awka Anambra State, Nigeria*
[5]*Department of Public Health, Nottingham Trent University, United Kingdom*
[6]*Department of Medical Services, Nnamdi Azikiwe University Awka, Anambra State, Nigeria*
[7]*Department of Family Medicine, Nnamdi Azikiwe University Teaching Hospital Nnewi, Anambra Stat,e Nigeria*
[8]*Faith Hospital and Maternity Awka, Awka South L.G.A., Anambra State, Nigeria*

ABSTRACT

Worsening environmental conditions and changing climatic happenings have been circuitously linked to increasing animal vectors distressing the worth and values of affected animals and equally negatively impacting the health of humans in Nigeria. In this research, an aggregate number of 150 cattle assembled from selected abattoirs located in Nkwor-Ogidi, Amansea and Awka all in Anambra State Southeast Nigeria were imperiled to ectoparasitic investigations from March, 2024 to June,, 2024. This study was designed to identify and subsequently determine the implication of tick infiltration in cattle at the designated abattoirs in Anambra State Southeast Nigeria predominantly in our present fluctuating climate. We examined 150 cattle for the presence of ticks using forceps and identified same with the aid of a hand lens and stereo microscope. The outcome of the survey displayed that out of the total of 394 ticks collected, 76% (114/150) of the examined cattle stood louse-ridden. Amblyomma with infestation rate of 49% (73/150) was the highest and Hyalomma with infestation rate of 18% (27/150) had the least percentage infestation alongside of other three (3) genera of ticks that were collected during the study though prevalence of tick species in the cattle showed no significant difference (p>0.05) in the survey. The outcome on the prevalence of ticks by attachment site, revealed that the number of ticks collected from udder/scrotum had the highest percentage prevalence of 25.5% (100/394) whereas those collected from the ear had 6.6% (28/394) which was the least infected body part with significant difference (p=0.013). Abundance of thick with respect toconcerning the sex and breeds demostrated no significant difference (p>0.05) which designates that tick infestation on cattle is independent on the breed and sex. Use The use of acaricides, proper hygienichygiene, good sanitation, and the practice of mixed forms of grazing are stalwartly endorsed.

Keywords: *Anambra State; Cattle; Climate Change; Infestation; Southeast; Nigeria; Ticks*

Introduction

All around the globe, amplifying climate and environmental fluctuations continue to errand increasing tick abundance, (1) infesting cattle, worsening emission of greenhouse gases (2), nonetheless, cattle remains a foremost font and source of animal protein, manure, pliable income, source of livelihood and farm energy. Ticks which are temporary, obligate and external vermin of backboned creatures which includes but not limited to reptiles, birds and mammals constantly requisite to nourish on lifeblood in order to remain alive and correspondingly breed. The scorching and humid ecological conditions positively favour their survival, whereas the truncated temperatures encumber and constrain their individual development and growth (3). Ticks largely fit into two foremost folks which include Ixodidae and Argasidae. Ixodidae is the greatest significant assemblage which is also being regarded as hard ticks because of the existence of a inflexible exoskeleton shield that concealments the all-inclusive adult's dorsal surface. The supplementary kinfolk is the Argasidae which lacks a shield unlike their other colleague and thus also regarded as soft ticks (4). Furthermore, one species is attached to a third family named the *Nuttalliellidae*; to (5) alongside superfluous genera of veterinary importance (4). The most imperative soft ticks fit into the category known as *Otobius Argas* and *Ornithodoros* (5).

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Corresponding Authors: **Ogbuefi E. O**
Email: **oe.ogbuefi@unizik.edu.ng**

These ticks belongs to one of the prime ectoparasites of public wellbeing and predisposes animals to veterinary glitches in the world. It is on records that they can influence the making of milk and production of meat, and adversely affect the vigor of animals through the consequence of their nibbles or circuitously by the contagious organisms they communicate (3). These diseases include but are not limited to rickettsiae, bacteria, protozoa and viruses (4). Ticks and their relativeanalogous pathogenetic agents they diffuse have co-existed in symmetry with desolate creatures that function by way of both reservoirs then hosts at the matching interval. Typically circumstances of variability solitary happen once these reservoirs emanate into touching base through domesticated animals whichever through the contacting uninfested creatures to pest-ridden districts, or by the association of unhealthy faunas to non-infested areas (6). Suitable preclusion, managing and control of tick invasion and parasitism is grounded on obtainable facts and well- versed knowledge of dynamics that upsets equally the endurance of organisms cutting-edge the atmosphere and communication to the host. Accidentally, parasitic completely elimination is problematic by means of one technique of action and managing particularly in the present varying climatic circumstances. Nevertheless, the unadorned effects of cattle and parasites by the use of acaricides and other rheostat methods can be minimized. It is auspicious to thwart the manifestation of furthermost bloodsucking illnesses of in cattle and to inhibit their blowout. This can be made imaginable by enchanting prompt counteractive and avoidance measures such as, unconventional prophylactic inoculations and austere asepsis procedures (7).

Material and Methods

Study Area

The survey was undertaken in tripatite dissimilar slaughter houses located in Awka, Amansea and Nkwor-Ogidi in Anambra State, Southeast part of Nigeria between the month of March and June, 2024. Awka being the center municipal of Anambra State, Nigeria (3) positioned in Awka South Local Government of the State which has lies between latitude 6 12'25''N and longitude 7 04' 04''E and sited in a steamy gorge with a populaces predictable to be 150,000 to 180,000. The settlement is cutting-edge the sultry tropical forest region of Nigeria also the means of livelihood of Awka general public includes but not limited to farming, skilled iron works, civil service and trading (8). On the other hand, Amansea is situated in Awka North L.G. A. of Anambra State which remains surrounded by the Awka center terrain in addition to being confined to the South by Awka city, to the northern part by Mamu tributary, Ebenebe settlement, to the west by Mgbakwu and to the East by Ezinato/Ubibia watercourse. The metropolis is in the interior of the rainforest expanse of Nigeria by means of an yearly precipitation of 100-150m. The region lies between latitude 6° 26' 32''N and longitude 7° 12' 64''E with a inhabitants predictable designate 90,000 to 120,000 (17). Moreover, Ogidi is similarly an Igbo settlement which is the center of operations of Idemili North L.G.A. of Anambra State, Nigeria which has a likely total populace of about 70,000 with the aforesaid adjoining Abatete town and others (9). The region is branded by two distinct periods, a rainy period from April to October and an arid period from November to March with an expanse topographical coordinates between 6° 9' 0"N and 6° 52' 0"E (10).

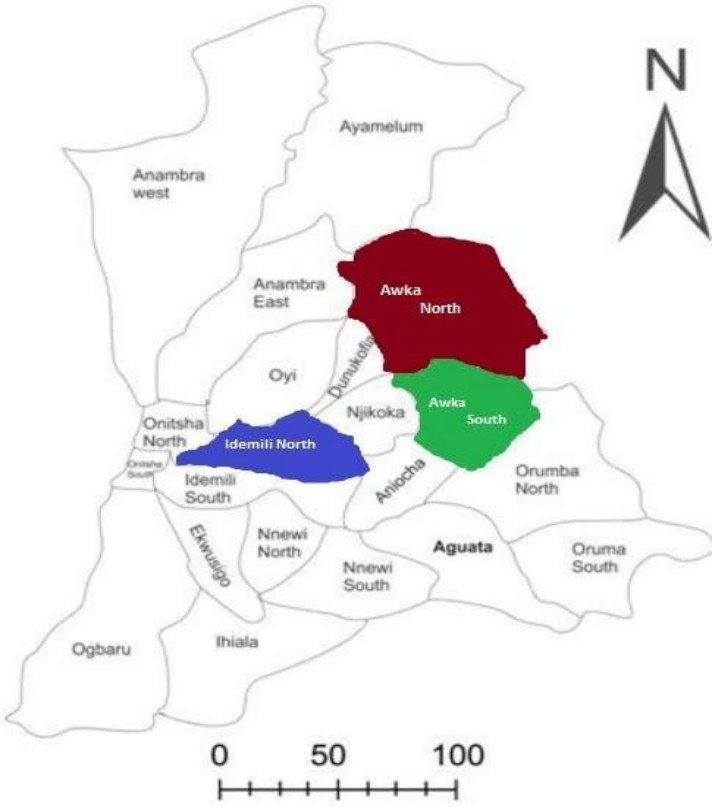


Figure 1: The atlas of Anambra State presenting the three LGAs of the nominated abattoir's study areas namely; Awka South, Awka North and Idemili North Local Government Area. Source (Wikipedia, 2024) accessed 5th March, 2025.

Determination of Model Magnitude

Cattle used cutting-edge the current survey remained nominated over and done with a simple haphazard selection method of the abortions in the State however the determination of study model magnitude was done using the calculations specified by (11) as calculated viz:. $n = \frac{Z_2 - PQ}{e^2}$

Anywhere Q= 1 − P,

Z = 1.96,

e = precision error (0.05), and

P = expected prevalence of about 50%.

Consequently, $n = 1.96^2 \times (0.5)\ (1 - 0.5) / (0.05^2) = 158$

Sample Collection and Study Design

Ticks for the current study were randomly composed in cooperation of previously slaughtered cattles and those that are alive awaiting slaughtering at the selected abattoirs between the month of March, 2024 and June, 2024. An aggregate number of one hundred and fifty (150) cattle stood scrutinized aimed at determining the manifestation of ticks whereas the models poised from every cattle stayed stowed inside a sampling carafe then labelled for analysis and other investigations. Records were auxiliary booked on the sex and strain of apiece cattle scrutinized where the complete physique superficial of the cows was scrutinized for the incidence of ticks. Afterward completely confining the cattles that were alive during examination, entirely noticeable mature tick types stood detached by fingers then by means of forceps stock-pilling the basis rudimentary capitulum, consequently as not to mislay the opening parts of the ticks as designated by the method described by (12). Ticks on or after every animal existed and positioned in discrete prelabeled collective carafes comprehending 70% ethanol and

conveyed on the way to theLaboratory of the Department of Parasitology and Entomology of Nnamdi Azikiwe University Awka, Anambra State aimed at detailed documentation and further analysis.

Identification of Ticks

After assemblage and prior examination, the conserved ticks remained desiccated on filter paper beforehand supplementary scrutiny under a indicator lens and stereophonic optical microscope. They be situated independently categorized hooked on their corresponding groups level via the regular documentation kits of anatomical physiognomies viz: the dimension of the aperture, the color of the physique, limb color, existence and absenteeism of the eye sight, and form of back side as designated by (13).

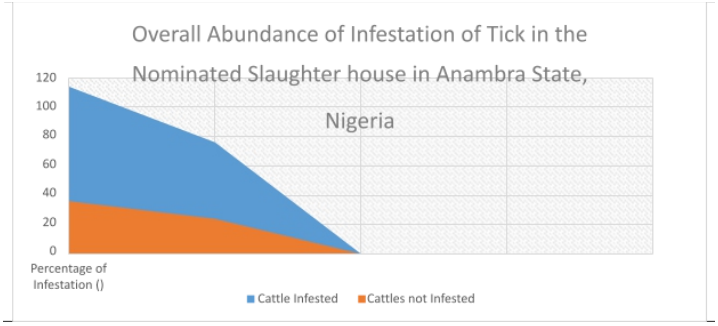
Analysis of Data

The data assembled from the survey were stowed in the Microsoft Excel Spreadsheet and scrutinized using Statistical Package of Social Science (SPSS). Chi-square data stayed rummage- sale towards assessment of the relationship amongst collected data and ~~to~~ correspondingly conclude on the level of significance of the study taking clue from the *P* value obtained.

Results

Figure 2: Overall Abundance of Tick Infestation in the Nominated Slaughter house in Anambra State, Nigeria

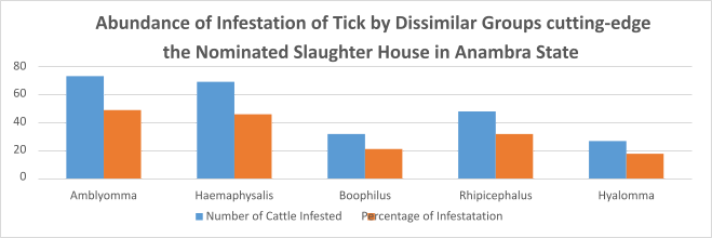
The survey outcome in Figure 2 displays that owing to the 150 cattle scrutinized intended for tick plague, 76% (114/150) were pest-ridden by means of dissimilar groups of tick however 24% (36/150) were not infested.



(p > 0.05), p= 0.199, X² (4) = 6

Figure 3: Abundance of Infestation of Tick by Dissimilar Groups cutting-edge the Nominated Slaughter house in Anambra State

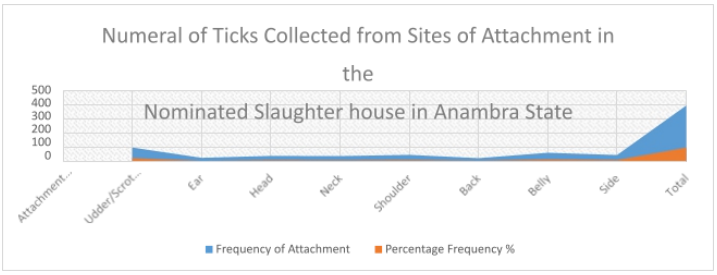
The survey outcome in Figure 3 spectacles that five (5) genera of tick remained detected from the study comprising and ranging from *Amblyomma* with 49% infestation to *Hyalomma* with18% infestation. The statistical analysis showed that there was no significant alteration in the abundance of plague by dissimilar tick genres.



(p > 0.05), p=0.220, X² (16) = 20

Figure 4: Numeral of Ticks Collected from Sites of Attachment in the Nominated Slaughter house in Anambra State

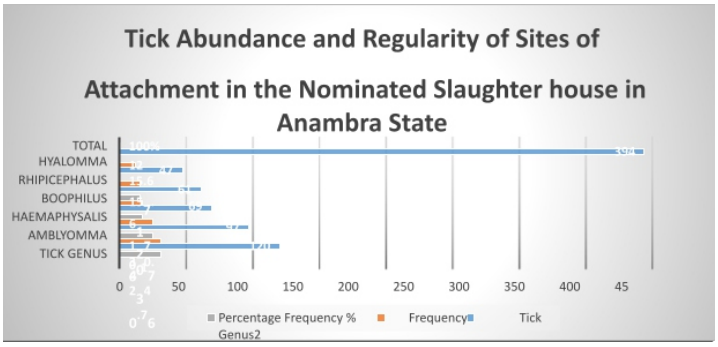
The survey outcome in figure 4 displays the figure of ticks recovered at the sites of predilection on the scrutinized cattle. The body location mostly involved by the plaque was found out that 25% of the tick were located at the udder/scrotum while the least abundance of tick 6.6% habours at the ear with is statistical significance (p = 0.00).



(p < 0.05), p=0.189, X² (4) = 20

Figure 5: Tick Abundance and Regularity of Sites of Attachment in the Nominated Slaughter house in Anambra State

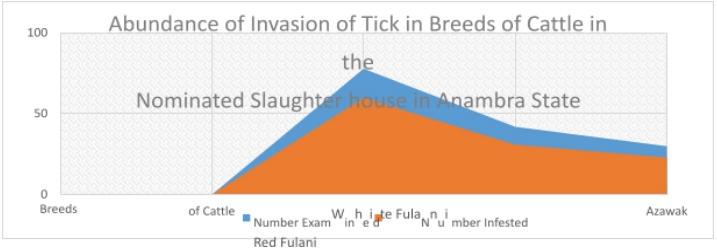
The survey outcome in figure 5 displas that *Amblyomma* devours other sites of attachment with a percentage prevalence of 30.6% whereas *Hyalomma* was the opposite 12% prevalence. The arithmetical scrutiny expresses that there is significance (p = 0.013) which means that infestation of ticks is strongly dependent on the site of attachment.



(p < 0.05), p=0.013, X²(4) = 3.706

Figure 6: Abundance of Invasion of Tick in Breeds of Cattle in Nominated Slaughter Sites in Anambra State

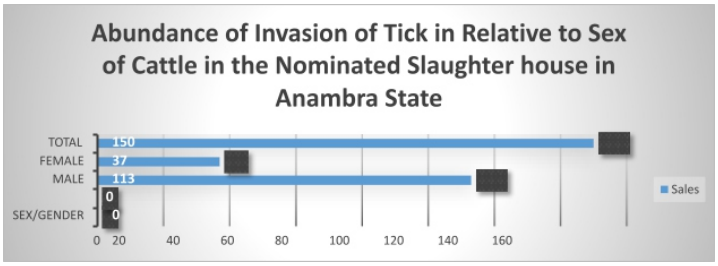
The survey outcome in figure 6 displays that the diverse varieties of cattle documented in the study were White Fulani which had the highest infestation abundance of 77% whereas the least Red Fulani had 73.8% although with no arithmetical implication (p = 0.199).



(p > 0.05), p=0.220, X² (16) = 20

Figure 7: Abundance of Invasion of Tick in Relative to Sex of Cattle in the Nominated Slaughter house in Anambra State

The survey outcome in figure 7 displays that male cattle had a greater tick frequency of 77.8% whereas the female counterpart had 70.2% although data analysis showed no arithmetical implication (p = 0.157).



X^2 (1) = 2, p= 0.157 (p > 0.05)

Discussion

From the study on tick infestation, an aggregate number of 150 cows stayed scrutinized and 76% were established designate infested with any or otherwise of tick categories. This result stays cutting-edge congruence with the studies of (13) and (14) who conveyed an over-all percentage infestation of 63.4% and 88.5% of tick in Maiduguri and Nsukka, Nigeria correspondingly nevertheless divergences through a transnational report of (9) that designated 59.6% infestation in an Ethiopia region named Harri. The reason for the contrast could be owing in the direction of the dissimilarity in region reportage of the study area and the agro ecology attainable therein. Additionally, it possibly will also stand owing toward disparities in availability and usage of chemicals use which is targeted against ticks (16). This is because biochemicals remains a foremost arsenal aimed at controlling and effective management of ticks in that region of the world. The survey auxiliary displayed that the furthermost predominant tick genera was *Ablyomma* with 49% abundance. This report is in disparity with the studies conducted by (17) and (18) who recorded that 32.5% of the ticks collected were categorized under *Hyalomma* as the most prevalent tick genera in different States of Anambra, Enugu and Plateau State of Nigeria. As observed from the survey, the genres by means of the lowest percentage of invasion was *Hyalomma* with 18% abundance rate, this could be as a result of difference in auspicious meteorological settings that facilitated to upsurge their frequency of continued existence even though there was no substantial alteration in the predominance of incursion by dissimilar genres of ticks. With respect to varieties of oxen, the infestation rate of ticks was to some extent greater cutting-edge the White Fulani breed with 77% than Red Fulani with 73.8%. This report contrasts by means of the study done by (14) where a greater predominance in Wadara with 66.7% in Maiduguri and 66.1% in Kuri, Nigeria. The survey outcome proposes that not an iota of this varieties remain absolutely resilient to tick plague by way of all the breeds remain louse-ridden in capricious echelons as was observed after these wide-ranging surveys, besides there was no substantial difference in the tick incursion to diverse strains of bullocks from our study. As observed from the survey, greater number of the ticks were recuperated from unalike and diverse body sites where the preference spot by means of the premier numeral of ticks plaque hooked to was the udder/scrotum with 25.5% prevalence, whereas the earlobe had 6.6% as the site with the least numeral of attachment. The observation supplementary ratifies that there is substantial variance in the tick incursion in respect to sites of attachment ($p < 0.05$). As was detected from the study that the attachment of ticks on steers was exceedingly hooked on the favorite locations on the bullocks as was also describedby means of study done by (19). We also detected that macho steers with 77.8% had to some extent lower incursion proportion than that of the female counterpart with 70.2% abundance which is in track by means of the results of the study conceded by (20) who similarly described that macho steers are supplementary verminous by way of ticks swarm than the female counterpart since greatest of the male bullocks moved from one place to another in search of food and are essentially used for farming activities. In the process of this movements, they get infested with ticks whereas the female counterpart are restricted for refinement drives besides are not as much of unprotected to tick incursion. However there remained no substantial variance amongst the dual sexual category ($p > 0.05$) which displays that there is no sexual characteristics predilection for tick incursion as observed from our current survey.

Conclusion and Recommendations

The current study shows an extraordinary burden of tick infestation which invariably indicates the high prevalence of parasitic diseases. Unvaryingly, weather warming up besides additional ecological vicissitudes have backed up to the extension of the variety of numerous tick species into greater spaces. The concentration of these vermin ~~to~~ in steers tips to the enfeeblement in worth of food source and over-all fiscal forfeiture. Utmost of these fleas can infect man over and done with the intake of non properly cooked meat, thus tagged zoonotic and consequently satisfactory eradication and elimination actions must stand executed. Evidence from our study therefore indorses that flea management plans like usege of appropriate chemicals ought to remain exaggerated through an improved regularity exclusively throughout rainy periods and appropriate grassland managing in foraging zones should stay fitting. Whereas finger pick of ticks on or after the physique of the cattle had better be ready recurrently, the cow herders have a duty to be educated on the significance of appropriate public health practices in the slauther houses. Bullocks possessors ought to consequently remain equipped with current information on the practice of chemotheraupic remedies. Moreover, veterinary provision conveyance scheme ought to remain adopted aimed at the identification and management of zoonotic and opportunistic ailments. In addition, all-encompassing investigation must stand accepted in the survey zone to generate ~~a~~ appropriate and adequate mechanism agendas.

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Author contributions: OEO, JNN and UBC wrote the first draft and edited the original manuscript, CCA and EOV developed the protocol, ENV and IOP oversaw study implementation and monitoring.

Conflict of Interest: The writers affirm that they do not have any clashes of interest.

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Data availability: All pertinent statistics are within the manuscript and its subsidiary statistics records. Nevertheless datasets rummage-sale or analyzed through the current survey are accessible from the the writers after judicious entreaty.

References

1. Bouchard, C., Dibernardo, A., Koffi J., Wood, H., Leighton, P. A., Lindsay, L. R. N. (2019). Increased Risk of Tick-Borne Diseases with Climate and Environmental Changes. *Communicable Diseases and Research*. 2019. 4; 45(4):83-89.

2. Ogliore, Talia (2020). Sicker Livestock May Increase Climate Woes. Vicious cycle; More Parasites means Emissions of Potent Greenhouse gas. Published: www.wustl.edu on 7th October, 2020.

3. Eskezia, B. and Desta, A. (2016). Review on the impact of ticks on livestock health and productivity. *Journal of Biology, Agriculture and Healthcare*. 2016; 6(22): 1-7.

4. Taylor, M., Coop, R., Wall, R. (2016). Veterinary Entomology. In: Taylor M, Coop R, Wall R, editors. *Veterinary Parasitology. 4th ed.* UK: Wiley- Blackwell; 2016. pp. 161-258

5. Ojeda, M., Rodríguez, R., Pérez, L., and Rosado, J. (2011). Epidemiology and control of *Rhipicephalus* (Boophilus) *microplus* in Mexico In: Quiroz H, Figueroa J, Ibarra F, López M, editors. *Epidemiology of parasitic diseases in domestic animals.* México: UNAM; 2011. pp. 477-504

6. Oscar, J., Betacur, H., Cristian, G., (2018). Economic and health impact of the ticks in production animals, tick and tick-borne disease pathogen. Columbia: *Intechopen.*

7. Wesolowski, R., Wozniak, A., and Mila-Kierzenkowska, C. (2014). The importance of tick-borne disease in public health. *Medical and Biological Sciences,* 28:51-55.

8. Wikipedia (2024). Wikipedia.org>wiki> *https://*www.researchgate.net Accessed on 20th November, 2024.

9. Wikipedia (2016). Wikipedia.org>wiki> https://www.researchgate.net Accessed on 4th November, 2021.

10. Thrusfield, M. (2007) "Sample size determination," *Veterinary Epidemiology, vol. 3*, pp. 185–189, 2007.

11. Abebe, F., Behablom, M., and Berhanu, M. (2011). Major trematode infections of cattle slaughtered at Jimma municipality abattoir and the occurrence of the intermediate hosts in selected water bodies of the zone. *Journal of Animal and Veterinary Advances.* 10: 1592- 1597.

12. Walker, A., Bouttour, A., Camicas, J., Estrada-Pena, A., Horak, A., and Latif, A. (2003) Ticks of Domestic Animals in Africa: *A Guide to Identification of Species, Bioscience Report,* Edinburg, TX, USA, 2003.

13. Eyo, J. E., Ekeh, F. N., Ivoke, N., Atama, C. I., Onah, I. E., Ezenwaji, N. E., and Ikele, C. B. (2014). Survey of tick infestation of cattle at four selected grazing sites in the tropics. *Global Veterinaria.* 12(4): 479-486.

14. Musa, H. I., Jajere. S. M., Adamu, N. B., Lawal J. R., Adamu, S. G., and Lawal, E. K. (2014). Prevalence of tick infestation in different breeds of cattle in Maiduguri, Northern eastern Nigeria. *Bangladesh Journal of Veterinary Medicine,* 12(2): 161-166.

15. Meseret, M., Tilaye, D., and Akinaw, W. (2017). 'Study on prevalence of major ixodid ticks of cattle in selected sites of Harari region, eastern Ethiopia,' *Ecology and Evolutionary Biology,* vol. 2, no. 6, pp. 96-100.

16. Nath, S., Manda, l. S., Pal, S., Jadhao, S., Ottalwar, and Sanyal, P. K, (2018). 'Impact and management of acaricide resistance: pertaining to sustainable control of ticks,' *Internatinal Journal of Livestock Research,* vol. 8, no. 10, pp. 46-60.

17. Rwang, P. G., Ahmed, H. O., Ombugadu, A., Hamid, H. Y., and Nkup, C. D. (2019). Ticks infestation and diversity on indigenous cattle reared in Qua'an Pan L.G.A of Plateau State, Nigeria. *International Archives of Food and Agricultural Sciences.* 1(1): 17-21.

18. Ikpeze, O. O., Eneanya, C. I., Chinweoke, O. J., Aribodor, D. N., and Anyasodor, A. E. (2011). Species diversity, distribution and predilection sites of ticks (Acarina: Ixodidae) on trade cattle at Enugu and Anambra States, South-eastern Nigeria. *The Zoologist.* 9: 1-8.

19. Ikpeze, O. O., Eneanya, C. I., and Onyido, A. E. (2015). Burden, seasonality, sex ratio and preferred sites of ticks of public health importance on cattle found at Amansea, Anambra state, Nigeria. *International Journal of Research,* 3(12): 61-71

20. Opara, M. N., Ezeh, N. O. (2011). Ixodid ticks of cattle in Borno and Yola states of Northereastern Nigeria: breed and coat preference. *Animal Research InternationaL,* 8(1): 1359-1365.