ASSESSMENT OF TICK'S INFESTATION ON SMALL RUMINANTS PRODUCTION IN PAIKORO LOCAL GOVERNMENT AREA OF NIGER STATE, NIGERIA.

*Idris, I. A[1] & D.O.Balogu[2]
[1]Department of Animal Production,
Ibrahim BadamasiBabangida University, Lapai, Nigeria.
[2]Department of Food Science Technology,
Ibrahim BadamasiBabangida University, Lapai, Nigeria,
*Corresponding author Email:idib2288@gmail.com +2348032562607

ABSTRACT
The study was conducted from 15th April to 31st July 2019 in Paikoro Local Government Area of Niger State, Nigeria; with the aim of determining the types, prevalence and intensity of ticks infestation in small ruminants production and identifying the major risk factors. Clinical examination and laboratory analysis were made on 160 sheep and 160 goats. The collected raw data were analyzed using software package SAS (Version 2010). Out of 320 sampled animals 67.2% (215/320×100) were found to be infested with one or more of tick species. The prevalence ticks observed were *Rhipicephalusevertsievertsi* 70(21.9%), *Amblyommavariegatum* 59(18.4%), *Boophilusdecoloratus* 40(12.5%), while *Hyalommaanatolicumexcavatum* 36(11.3%) and *Rhipicephaluspulchellus* 26(8.1%) were the minor species of ticks observed on goats and none on sheep were recorded in the study area. The infestation rate of tick in species, age and body condition scored (BCS) were significantly varied (P<0.05), however in sex (P> 0.05). In conclusion, the high prevalence in tick infestation becomes a threat to small ruminants production in the study area, therefore, further studies is recommended on the epidemiology of tick infestation, tick borne diseases as well as tick related risk factors on small ruminants production; as these may provide a benchmark to design appropriate prophylactic and control measures of tick infestation in the study area.
Key words: Small Ruminant, Infestation, Tick, Prevalence, Paikoro.

INTRODUCTION
Sheep and goats farming is one of the most important features of agriculture, which has contributed significantly towards the growth and development of the national economy of Nigeria. They play significant roles in the livelihood of rural households, where they are largely the property of women and their children (5). They provide a vast range of products and services, such as meat, milk, hairs and skin, horns, bones, manure, security gifts, religious ceremonies as well as production of drugs (11, 2).

Ticks infestation on sheep and goats reduce their ability to provide the above mentioned products and services. It could lead to noticeable economic losses to farmers due to loss of efficiency, death, and skin diseases. They are described to cause a wide range of diseases such as painful sore, mechanical tissue damage, bowel, loss of weight, loss of blood, and in strict conditions death of infested animals often followed by socioeconomic implications (7, 9). Apart from the direct effect of tick infestation on small ruminants' production and efficiency, ticks can harbor multiple pathogenic agents; patient can be infected with multiple pathogens at the same time, there by making diagnosing and treatment to be difficult (14). Despite these serious strikes no animal, the significance and incidence of tick infestation on small ruminants has not been assessed in Paikoro Local Government Area of Niger State, Nigeria. Therefore, the aim of this study was to determine the types, prevalence and intensity of ticks' infestation on small ruminants' production in Paikiro Local Government Area of Niger State, Nigeria, with a view to suggesting control measures for increasing efficiency of livestock and other meat producing animals.

MATERIALS AND METHODS
Study Location
Paikoro Local Government Area is one of the Local Government areas in Niger State, Nigeria. It has its administration headquarter situated in Paiko town about 25km south of the state capital Minna. It is located in the eastern region of the state, it lies within longitude 9°26'N and 6°38'E and latitude 9.433°N and 6.633°E. It has an area of 2,066km^2 (798 sq. mi) and a population of 158,086 which comprises of 79,399 males and 78,779 females at the 2006 census (6). Annual rainfall is between 1,100mm to 1,300mm with a mean temperature of 37°C during the dry season.

For the collection of data, a random sampling technique (12) was applied to gather the data on tick prevalence from eight wards out of eleven wards in 160 sheep and 160 goats in Paikoro Local Government Area of Niger State, Nigeria from 15th April to 31st July 2019. All the information required such as species, sex, age and body condition score were recorded on the predesigned proforma.

Prior to collection of ticks, animals were restrained properly and their whole body was thoroughly examined for the present of tick following which they were manually collected using hand with gloves. The collected ticks were preserved in 70% ethanol in labeled plastic vial and were taken to animal biology Laboratory, Federal University of Technology (FUT), Minna, for ticks' identification with the aid of stereomicroscopy using identification key described by (15).

All data were analyzed using Statistical Package for Social Science (SPSS) Software (Version 20).

RESULTS

During the present survey, all the eight wards were visited and a total of 320 small ruminants v*iz.* 160 sheep and 160 goats were randomly inspected for tick collection. Out of 320 animals 215/320×100 (67.2%) were found to be infested with one or more of tick species. From the sampled animals 134/160×100 (83.8%) and 81/160×100 (50.6%) sheep and goats respectively were found positive for tick infestation. The differences in tick infestation in species (χ^2= 7.89, df= 1, P< 0.05), in age (χ^2= 3.83, df= 1, P< 0.05),and in body conditioned scored (BCS) (χ^2= 12.82, df= 1, P< 0.05)were statistically significant. However, the difference in sex (χ^2= 2.35, df= 1, P> 0.05), was not significant (Table 1).

Overall, a total of 933 *ixodidae* ticks were collected from 160 sheep and 160 goats. In general, four *Ixodidae* tick genera (Table 2) and five species (Table 3) were identified from the study area. From the identified tick species male ticks outnumber female ticks (Table 4).

Table 1: Prevalence of Ticks' Infestation Based on Rick Factors.

Variable	Category	No. of animals examined	No. of animals infested (%)	Significance
Species	Sheep	160	134(83.8)	χ^2= 7.89
	Goats	160	81(50.6)	P= 0.005
Sex	Female	160	122(76.3)	χ^2= 2.35
	Male	160	93(58.1)	P= 0.126
Age	Young	160	89(55.6)	χ^2= 3.83
	Adult	160	126(78.8)	P= 0.050
Bcs	Poor	149	134(89.9)	χ^2= 12.82
	Good	171	81(47.4)	P= 0.000

Table 2: Prevalence of Tick Burden at Genera Level in the Study Area.

Tick species	Sheep (Prevalence in %)	Goats (Prevalence in %)
Amblyomma	216 (37.44)	236 (66.29)
Rhipicephalus	319 (55.29)	60 (16.85)
Boophilus	42 (7.28)	28 (7.87)

Tick species	Sheep (Prevalence in %)	Goats (Prevalence in %)
Hyalomma	0 (0.00)	32 (8.99)
Total	**577 (100)**	**356 (100)**

Table 3: Tick Species-Level Prevalence on Small Ruminants in the Study Area.

Tick species	Sheep (n=160) Prevalence (%)	Goat (n=160) Prevalence (%)	General score of all ruminants Prevalence (%)
R. evertsievertsi	63 (39.4)	7 (4.4)	70/320 × 100 (21.9)
A. variegatum	49 (30.6)	10 (6.3)	59/320 × 100(18.4)
B. decoloratus	32 (20.0)	8 (5.0)	40/320 × 100 (12.5)
H. anatolicumexcavatum	0 (0.00)	36 (22.5)	36/320 × 100(11.3)
R. pulchellus	0 (0.00)	26 (16.3)	26/320 × 100 (8.1)

Table 4: Total Adult Tick Species and Sex Ratio in Small Ruminants.

Tick species	Female tick Count	Male tick Count	Female: Male Ratio
Amblyommavariegatum	200	252	0.8: 1
Rhipicephaluspulchellus	0	24	0: 1
Rhipicephalusevertsievertsi	200	155	1.3: 1
Boophilusdecoloratus	24	46	0.5: 1
Hyalommaanatolicumexcavatum	32	0	1: 0

DISCUSSION

The study revealed the overall prevalence of tick infestation 67.2%. The result recorded in this study is higher than 16.7% prevalence of ecto-parasites in sheep and goats reported inNorth Eastern, Nigeria by(1), but this result is slightly lower than 68.1%in South Eastern Nigeria reported by (8). The higher proportion of ticks' infestation in sheep (83.8%) as compared to goats (50.6%) could be due to the marshy habitat and soft skin of sheep as compared to drier habitat and hardy skin of goats. This result is in consistence with the previous work of (10) who reported higher prevalence in sheep (47.0%), in goats (19.0%). The difference in the prevalence might be due to the geographical difference, season of the study period, management conditions as well as ticks control strategies in the study area.

The difference in the prevalence rate was found to be statistically significant between the two species of the small ruminants' production. This result was in agreement to the study undertaken by another author on ecto-parasites in Gombe State, South Eastern Nigeria (1). However, this report is parallel to the findings of (4) who reported that male animals are more susceptible to ticks.

The proportion of tick infestation was higher in adult animals as compared to young animals. However, there was no statistical significant association (P> 0.05) and the greater prevalence rate could be due to the long distance movement of the adult animals in search of food and water in comparison to the young animals; this maximized the chance of exposure to ticks. This finding is in line with the report ofecto-parasites by(17) who statedsimilar observation for a higher proportion of adult animals being studied.

The higher prevalence of tick infestation found in this report was not statistically significant between bodies conditioned scored. This observation could be attributed to the fact that good body conditioned scored animals were well fed and this make them to developed resistance to different types of diseases to which they were exposed whilst grazing in the field or were maintained in their sheds in comparison to poor body conditioned scored

animals who lack body potentials to build resistance as a result of poor nutrition especially during the dry season, thus make them to be more susceptible to ticks. This report of higher prevalence in poor body conditioned scored animals is in accord with that of (13).

The higher prevalence of single infestations to double infestations recorded in this report agreed with that of (3) who reported a single infestation, three double infestations and one triple infestation. The effects of tick infestations are more noticeable when infestation is heavy and combined. Thus, more single infestation recorded in this report means that the effect of tick infestations was not so noticeable on the animals.

In all cases, except *Rhipicephalusevertsievertsi*and *Hyalommaanatolicumexcavatum*, males ticks out number females ticks, this is due to the fact that the females engorged on much blood, its expanded greatly then detached and convert the blood to eggs drop off the body of the host to the ground to lay eggs, and finally dies after this single laying, while the males ticks takes repeated small meal of blood and attempt to mate repeatedly whilst on the same host (16).

CONCLUSION AND RECOMMENDATION

The present study revealed a high prevalence of tick infestation on small ruminants in the study area and difference determinants such as species, sex, age and body conditioned scored are the risk factors for ticks' distribution. Therefore, based on this finding further studies is recommended on the epidemiology of tick infestation, tick borne diseases as well as tick related risk factors on small ruminants production; as these may provide a benchmark to design appropriate prophylactic and control measures of tick infestation in the study area.

ACKNOWLEDGEMENT

The authors are thankful to the farmer communities of the study area and field staff of veterinary section of Paikoro Local Government Area of Niger State, Nigeria for their support during tick collection.

REFERENCES

Adang, K. L.,Ayub, J.&Yoriyo,K.P. (2015). Ectoparasites in Sheep (Ovisaries L.) and Goats (Capra hirus L.) in Gombe, Gombe State, Nigeria. Pakistan Journal of Biological Sciences, 18:224-231.

Anyanwu, W. (1998). Agriculcultural Science for West African Colleges, Ibadan University Press, Nigeria, page: 224.

Brito, D.R., Santos,A.C. &Guerra,R.M. (2005). Ectoparasites in goat and sheep folks from Alto Mearim and GrajauMicroregion, State of Maranhoa. RevistaBrasileiraParasitogiaVeterinaia, 14: 59-63, (In Portuguese).

Hussen, Y. (2009). Preliminary survey of cattle tick species and burden in and around Bako Town. DVM Thesis, School of Veterinary Medicine Jimma University, Jimma, Ethiopia.

Lebbie, SHB. (2004). Goats under household condition. Small Ruminant Research, 51: 131-136.

National Bureau of Statistic (2010). Annual Abstract of Statistic, Federal Republic of Nigeria, p. 37.

Nyangiwe, N. &Horak, I. G. (2007). "Goats as alternative hosts of cattle ticks," Onderstepoort*Journal of Veterinary Research*, vol. 74, no. 1, pp. 1–7, 2007. View at Google Scholar • View at Scopus.

Obi, Z.C.L., Anyaegbunam&Orji,M.K.N. (2014). Ectoparasitosis, a challenge in sheep and goat production in Uli, Anambra State, Nigeria. *Int. J. Fauna Biol. Stud.*, 1:27-29.

Ofukwu, R.A., Ogbaje,C.I. &Akwuobu, C.A. (2008). Preliminary study of the epidemiology of ectoparasite infestation of goats and sheep in Makurdi, North Central Nigeria. Sokoto Journal of Veterinary Sciences, Vol.7 (2) 22-26.

Ohaeri, C.C. &Ugwu,A.U. (2013). Survey of ectoparasites of farm animals *J. Agric. Vet. Sci*., 5:163-172.

Sertse, T. &Wossene,A. (2007). Effect of ectoparasites on quality of pickled skins and their impact on the tanning industries in Amhara regional state, Ethiopia. Small Rumin. Res., 69: 55-61.

Thrusfield, M. (2007). Veterinary Epidemiology. USA: Blackwell Science Limited; 180-185.

Tsegaw, D., Abraham,F. &Surafel,K. (2015). Survey of tick Infestation in Domestic Ruminants of Haramaya District, Eastern Hararghe, Ethiopia. *J. Bacteriolparasitol* 6: 246.

Unsworth, N. B.,Stenos, L. &Graves,S.R. (2007). "Flinders Island spotted fever rickettsioses caused by 'marmionii' strain of Rickettsia honei, Eastern Australia". Emerging Infectious Diseases. 13 (4): 566–73. doi:10.3201/eid1304.050087. PMC 2725950 Freely accessible. PMID 17553271.

Walker, A.,Bovattour, J.,Camicas, I.,Horak&Latif, A. (2003). Ticks of domestic animals in Africa: A guide to identification of species. Bio Science. Report. Pp. 1-122. Wallingford, UK. Pp. 440-485.

Walker, MD. (2017). Ticks on dog and cats. The Veterinary Nurse, 8(9), 486-492.

Yishak, I.,Tsegalem, A. &Wakayo,B.U. (2015). Epidemiological study on ectoparasite infestation of small ruminants in SodoZuria District, Southern Ethiopia. *J. Vet. Med. Anim. Health*, 7: 140-144.