Comparative Studies on the Prevalence of Ixodid Ticks on Some Selected Sedentary Farms and Trade Cattle in Adamawa State, Nigeria

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Abstract- This study compares the Prevalence of Ixodid Ticks on Some Selected Sedentary Farms and Trade Cattle in Adamawa State. The purposive data sampling technique was used to select 240 cattle from four locations (2-sedentary and 2 trade cattle), from Mayo Belwa, Fufore and Yola South Local Government Areas for four months periods (September-December, 2014). Ticks were collected from half of the body of each sampled cattle using hand-picking and preserved in a sampling bottle with 10% formaldehyde. Ages of the cattle were determined using dentition method. Breed, sex, age of cattle and collection date were recorded on each sampling bottle. The samples were then transported to National Veterinary Research Institute Laboratory for identification. Ticks collected were identified using Soulsby identification key to genera and species level. The data collected were analyzed using chi-square and t-test at 0.05 confidence level. The results showed 79.0% and 94.0% prevalence for sedentary and trade cattle respectively which showed significant differences ($p<0.05$) while other variables (i.e breeds, sex and ages of cattle) showed no significant differences. The *Rhipicephalus appendiculatus* is most prevalent which also infest all breeds except white fulani, while *Amblyomma variegatum* and *Hyalomma truncatus* were found prevalently infesting Bunaji. Both sedentary and trade cattle suffered tick infestation and therefore needed to be controlled.

Index Terms- Ticks, Ixodid,Sedementary, Bunaji

I. INTRODUCTION

Ticks are ranked as the most economically important ectoparasites of livestock in the tropics, including sub-saharan Africa [1]. Their veterinary importance is related to their blood-feeding, from which both their direct and indirect pathogenicity originates [2]. In livestock farming enterprise, parasitic diseases constitute major obstacles in maintaining good health and high productive performance of the herd, thus resulting in economic loss to the farming business [3]. The economic importance of ticks had long been recognized due to their ability to transmit diseases to animals [4]. In Nigeria, 90% of the cattle population are kept under the traditional pastoral husbandry of Fulani herders; mostly concentrated in the central to northern part of the country [5], [6]. Under the Fulanis' management, cattle are extensively grazed in pastures and forest, and exposed to infestation by the three ticks genera present in Nigeria (*Amblyomma*, *Hyalomma* and *Rhipicephalus spp*., sub-genus *Boophilus spp*. included) [7]. Apart from the direct effect of tick infestation on animal production and productivity, ticks are inevitably efficient vectors of many pathogens, like protozoa, viruses, bacteria, and rickettsiae to man and domestic animals. In cattle, tick infestation alone can cause anaemia, stress, reduction in weight gain and milk yields, depreciation of hide value, hypersensitivity and toxicosis, leading also to secondary infections [2]. In addition, some tick species can act as vectors of pathogens causing a number of tick-borne diseases (TBDs), a serious impairment to cattle health and productivity in sub-saharan Africa. Human as well are not completely safe from several possible diseases resulted through direct tick bites or food poising through tick excrement, the like of spotted fever, relapsing fever, Lyme disease, tularemia among others makes human-animal relationship become unsaved whenever there is tick infestation [8].

Considering the relationship that exist between tick abundance and tick borne infection. This study was aimed to compare the prevalence of ticks' infestation in Sedentary and Trade cattle in Adamawa State.

II. MATERIALS AND METHOD

2.1 Study Area

Yola South Local Government Area the capital city of Adamawa State is located within latitude 9^0 13' 48" N of the equator and longitude 12^0 27' 36" E of the Greenwich meridian. It has a total land mass of 1,139.1km^2 and share boundaries with Yola North in the North and Fufore in the South and East. The L.G.A. has a population figure of 257,706, [15]. Yola South is considered to be one of the most important commercial and agricultural centers in Adamawa State of Nigeria.

Fufore L.G.A. is one of the twenty one local governments in Adamawa State. It is 26km away from Yola, the state capital. It lies between latitude 9^0 13' N and longitude 12^0 39' E of Green which meridian. It is bounded on the east by the republic of Cameroon and in the west by Yola, Girei and Maiha Local Government Areas. The local government has a total land mass of 4464km^2 and population size of 207287 [9].The Sebore farm is an agricultural farm of private liability located km 12 Mayo-Belwa-Ngurore Road. The farm plays a very vital role in the transfer of knowledge to peasant farmers and other community dwellers who wish to produce fish on small scale, cattle, fruits

and other improved agro related products. The farm has been currently linked with partnership with many governments mostly from North-eastern Nigeria and non-governmental agencies in partnership towards food insecurity and acquisition programme towards self-employment in agriculture for unemployed youths and women farmers, school leavers, and graduates in agriculture or related disciplines [10]. The Borno state government signed Memorandum of Understanding with the Sabore Farm to allow the Borno underwent intensive training in agriculture to boost food production of the state and to improve condition of living of people and to be self-employed.

2.2 Study Design

Three Local Government Areas (LGAs), namely Yola, Fufore, and Mayo-Belwa were used for the study. Among these LGAs Mayo-Belwa and Fufore were identified as places where sedentary cattle are found (i.e in Sebore farm and Benue Valley Farm respectively). Whereas Yola and Fufore local government were structured into circles. They serve as a route through which these trade cattle enters from neighboring countries. One entry point was at Gurin, Fufore LGA while the second one is at Yola cattle market. Oral interviews and questionnaires were used to obtain pre-study data before the commencement of the study in order to acquaint the farmers with the study and also to identify where to take samples.

2.3 Sample Collection

Cattle were randomly sampled from each of the herds for the survey of ticks' infestation. Collection of sample was done in four months (September – December). Ten cattle out of every 100 cattle were sampled for tick collection. The ages of the cattle were determined using dentition method as described by [11]. Breeds of cattle on each herd was recorded. Estimation of total tick infestation per animal was done by collecting ticks manually from half of the body of the cattle and multiplying by two as expressed by [12]. Ticks were placed on a pre-labeled sampling bottle and fill with 10% formaldehyde. The sites of collection as well as collection date were also labeled on the sample bottles. Field information like name of farmer, Animal identification number, month of observation and age were collected. While the identification of ticks for genera and species was done in National Veterinary Research Institute Laboratory, Yola. Adopted the identification keys described by [13] and [14].

2.5Data Analysis

The data collected from each studied animal were recorded and were analyzed using, simple percentage, Chi-square test and T-test. at p-value $\leq$ 0.05 (95% C.I was considered significant) ran on SPSS version 20.

III. RESULTS

The prevalence patterns among sedentary and trade cattle indicated 79% and 94.2% prevalence respectively (Table 1). The results revealed that *Rhipicephalus appendiculatus* was most prevalent species infesting both sedentary and trade cattle by 89.5% and 55.8% respectively, while *Rhipicephalus (Boophilus) decoloratus* was least prevalent among tick species infesting sedentary and trade cattle by 1.1% and 0.0% respectively. The results indicated that there was significant differences in the prevalence of ticksamongsedentary and trade cattle .

***Table* 1: Prevalence of Tick Infestations amongst Sedentary and Trade cattle based on Location**

Type	No. examined	No. Infested (%)	No. infested (%) by sampled tick			
			Amblyomma variagatum	*Rhipicephalus (Boophilus) decoloratus*	*Hyalomma truncatus*	*Rhipicephalus appendiculatus*
Sed	120	95(79.0%)	4(4.2%)	1(1.1%)	22(23.2%)	85(89.5%)
TrC	120	113(94.2%)	54(47.8%)	0(0.0%)	39(34.5%)	63(55.8%)

t-calc (2.96), t-critical (1.968), degree of freedom (238), P-value (0.012).
Sed: Sedentary Cattle, TrC: Trade Cattle. No.: Number.

Prevalence of tick infestation amongst sex revealed males of trade cattle were (93.0%) infested than sedentary male cattle (80.6%). Also, female cattle in the sedentary were less infested (83.1%) than female in the trade cattle 95.2% and in either case, the difference was insignificant (P > 0.05). *Rhipicephalus appendiculatus* species had higher infestation rates of (76.0%) than the *Boophilus decoloratus* (4.0%) and it was statically significant p<0.05 as shown in Table 2.

***Table* 2 Prevalence of Tick Infestation among the Sedentary and Trade Cattle based o Sex**

Type	Sex (N)	No. (%) Infested	No. (%) infested with				
			Amblyomma variagatum	*Rhipicephalus (Boophilus) decoloratus*	Hyalomma truncates	*Rhipicephalus appendiculatus*	Total
Sed	Male (31)	25(80.6%)	2(8.0%)	1(4.0%)	3(12.0%)	19(76.0%)	25
TrC	Male (57)	53(93.0%)	25(47.2%)	0(0.0%)	19(35.8%)	28(52.8%)	72
Sed	Female (89)	74(83.1%)	2(2.7%)	0(0.0%)	19(25.7%)	66(89.2%)	87
TrC	Female (63)	60(95.2%)	29(48.3%)	0(0.0%)	20(33.3%)	35(58.3%)	84

Chi-square (x^2) values (0.60) and (1.658) for male and female cattle, table value (3.841), df (1), P-values >0.05. Sed: Sedentary Cattle, TrC: Trade Cattle. No.: Number.

The result in Table 3 showed that age group (>2½)of trade cattle were more infested (98.7%) than sedentary cattle of the same age group (91.0%). In overall, the adults (>2½)were more infested than the calf (<1½). *Rhipicephalus appendiculatus* was most prevalent ticks' species infesting cattle in the ages less than 1½ year by 35% and 12.5% in both locations. For the age group 1½ to 2½ for trade cattle *Amblyomma variegatumrevealed* most prevalent (56.8%) and *Rhipicephalus appendiculatus*(42.1%) for sedentary cattle. Furthermore, *Rhipicephalus appendiculatus* was reveled most prevalent ticks species for the cattle in the age >2½ years in both locations. The results revealed chi-square values which are all less than table values 3.841 at degree of freedom of 1, thus, implied that the prevalence of tick infestation among age group of cattle in both locations were not significant.

***Table* 3: Prevalence of Tick Infestation and their species among the Sedentary and Trade Cattle based on Age**

Type	Age (Year)	No. of Cattle examined	No. (%) Infested	No. (%) infested with				
				Amblyomma variagatum	*Rhipicephalus (Boophilus) decoloratus*	*Hyalomma truncatus*	*Rhipicephalus appendiculatus*	*Total*
Sed	<1½	20	7(35.0%)	–	–	–	7(35.0%)	7
TrC	<1½	8	3(37.5%)	1(12.5%)	–	1(12.5%)	1(12.5%)	3
Sed	1½ – 2½	38	31(81.6%)	6(15.8%)	–	9(23.7%)	16(42.1%)	31
TrC	1½ – 2½	37	36(97.3%)	21(56.8%)	–	12(32.4%)	16(43.2%)	49
Sed	>2½	78	71(91.0%)	3(3.8%)	1(1.3%)	20(25.6%)	62(79.5%)	86
TrC	>2½	75	74(98.7%)	32(42.7%)	–	26(34.7%)	46(61.3%)	104

<1½ years:-x^2 value (0.016), 1½ - 2½ years: - x^2 value (0.010), >2½ years: x^2 *value* (0.420), table value (3.841), df(1), P-value >0.05. Sed: Sedentary Cattle, TrC: Trade Cattle. No.: Number.

The results in Table 4 implied that there is no significant difference between the prevalence of ticks infestation among sedentary and trade cattle with respect to breeds. More so, *Amblyomma variegatum* revealed most prevalent species for trade cattle in the Wadara (75%) and Bunaji (51%) breeds, while *Boophilus decoloratus* indicated least prevalent (3.3%) in sedentary. *Rhipicephalus appendiculatus* indicated high prevalence across the rest of the cattle breeds irrespective of location.

***Table* 4 Prevalence of tick Infestation and their Species among Sedentary and Trade Cattle based on Breeds**

				No. (%) infected with			
Breed	Type	No. examine	No. (%) infected	*Amblyomma variagatum*	*Boophilus decoloratus*	*Hyalomma truncatus*	*Rhipicephalus appendiculatus*
Adamawa gudali	Sed	NA	NA	NA	NA	NA	NA
	TrC	32	23(71.9%)	8(25.0%)	0(0.0%)	4(12.5%)	14(43.8%)
Brahman	Sed	42	34(81.0%)	0(0.0%)	0(0.0%)	0(0.0%)	34(81.0%)
	TrC	5	3(60.0%)	1(20.0%)	0(0.0%)	0(0.0%)	2(40.0%)
Wadara	Sed	28	25(89.3%)	2(7.1%)	0(0.0%)	14(50.0%)	20(71.4%)
	TrC	4	4(100.0%)	3(75.0%)	0(0.0%)	1(25.0%)	1(25.0%)
Rahaji	Sed	30	23(76.7%)	2(6.7%)	1(3.3%)	7(23.3%)	19(63.3%)
	TrC	5	4(80.0%)	2(40.0%)	0(0.0%)	0(0.0%)	3(60.0%)
Simmental	Sed	18	12(66.7%)	0(0.0%)	0(0.0%)	1(5.6%)	11(61.1%)
	TrC	NA	NA	NA	NA	NA	NA
Sokoto gudali	Sed	2	1(50.0%)	0(0.0%)	0(0.0%)	0(0.0%)	1(50.0%)
	TrC	14	4(28.6%)	2(14.3%)	0(0.0%)	0(0.0%)	2(14.3%)
Bunaji	Sed	NA	NA	NA	NA	NA	NA
	TM	60	53(88.3%)	31(51.7%)	0(0.0%)	25(41.7%)	18(30.0%)

x^2 values: 3.180, 0.513, 0.027 and 0.374, for brahman, Wadara,Rahaji and Sokoto gudali
Table value (3.841), df (1), P-value >0.05. Sed: Sedentary Cattle, TrC: Trade Cattle. No.: Number.

IV. Discussions

In this study, the prevalence of tick infestations was lower in sedentary (79.0%) than in trade cattle (94.2%), and there is significant difference, P < 0.05 These results agreed with [15]; [16]; [17] who reported that animal movement from one zone to another is widely considered as means of introduction of ticks into new ecosystems. [16] reported that in Nigeria, about 80% of livestock are owned by the traditional sector, mostly nomads and that the overwhelming cattle routes in the northern part of Nigeria alongside various inter-border route allow ticks that are expected to have changed their distribution to emerged in new zones. Thus, the trade cattle which mostly involved usual movement for many factors such as grazing, seeking for good markets and better settlement become highly susceptible to tick infestation than those confined in particular location and vegetation.

The findings of the study, also revealed that the prevalence of tick infestation in relation to sex showed no statistically significant differences in the two locations p < 0.05. This is in contrast with the findings of [21] and [23] who reported higher infestation of tick in males and females respectively. This difference might be attributed to ecological zones where the studies were carried out as it can affects tick distribution.

The susceptibility of cattle to tick infestation with respect to age is found significant by this study. The results in respect to ages of cattle indicates close tick infestation patterns. This result agreed with the findings of [18]; [19]; [20] who reported higher tick infestation in adult than in younger cows. [21]also reported that age of cattle was observed to have significant effect on tick-borne infection. This is in contrast with the findings of [22] who reported that age of animal has no significant effect on their prevalence to tick species and [22]who found that younger cattle were more susceptible to tick infestation than older cattle. On the other hand, this study revealed no significant difference when comparing between the two locations with respect to age (p< 0.05). This might be as a result of exposing the cattle regardless of age to the same treatment. For example, both adult and calf were moved for grazing.The findings of this study also reveals that the relationship between ticks infestation among breed of sedentary and trade cattle had no significant different. Of all the breeds irrespective of location, the tick infestations remain high, though, the results revealed that some breeds are more

susceptible to some species of tick than others. For instance Bunaji indicates high susceptibility to the Amblyomma variegatum than other breeds. This could be attributed to the fact that Bunaji (white fulani) were higher in number in the study sites during the study period.

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