Survey of cattle tick infestation on farm herds in Ogun state, Nigeria

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Cattle in the tropics are exposed to varying levels of challenges from endo and ectoparasites as well as environmental stressors. Ticks have been recognized as the most notorious threat to cattle because of their hide damaging and disease vector. As a result of these, continuous study of tick distribution on cattle is necessary. Two hundred and five cattle of determined breed, sex and age, were randomly sampled from eight different locations across four local Government areas of Ogun state in 2015. Harvested ticks were identified to species level. Variation in tick distribution across age, sex and locations were subjected to statistical analysis. Among the 205 cattle sampled, 125 (61%) had ticks while 80 (39%) had no ticks, 84 (67%) female have ticks, 27 (33%) do not have, 41 (44%) males have ticks and 53 (56%) do not have. The mean age of the cattle sampled was 3.0 ± 0.1 years, with a mean Packed Cell Volume (PCV) of $30.8 \pm 0.4\%$. *Amblyomma variegatum* was the most prevalent tick (76%), followed by *Rhipicephalus (Boophilus) decoloratus* (20%), *Rhipicephalus (Boophilus) microplus* (2%) while *Rhipicephalus (Boophilus) annulatus* and *Hyalomma arginatum* were 1% respectively. Age and sex of cattle were discovered to be statistically significant in this study. Considering the economic importance of ticks in regards to morbidity and mortality; appropriate tick control strategy and technique need to be applied and constant tick surveillance should be encouraged in the study area

Keywords: cattle, ticks, Ogun state, infestation

Introduction

Nigeria is one of the leading countries in cattle production in sub-Saharan Africa, the country had over 14.73 million cattle consisting of 1.47 million milking cows and 13.26 million beef cattle (Tibi and Aphunu 2010). These were predominantly zebu, but included are muturu, keteku, N'dama and Kuri. Less than 1% of this population is managed intensively, while about 99% are managed traditionally. Under the traditional system, there is the use of indigenous methods in all aspect of cattle production including health management (Mafimisebi *et al.*, 2012). This tilt towards traditional management continues to have grave implications for commercialization of the production of cattle and cattle products and their prices in

Nigeria (Abubakar and Garba, 2004). Cattle singly contribute about 12.7% of the agricultural Gross Domestic Product (GDP) in Nigeria (Central Bank of Nigeria, 1999). Cattle number increases steadily with declining rainfall, such that the southern part of the country has low cattle density compared to the North. Cattle play a significant role in the socio-economic life of the people. They produce meat and milk; provide draught power for cultivation of the agricultural lands of many peasants. Skins and hides are also important components of the livestock sector in generating foreign export earnings (Mohammed and Yunana (2014). Cattle production in Nigeria is however faced with a lot of challenges due to these ectoparasites which have various effects ranging from damage to hide and

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skin to the attendant health problems.

Ectoparasites are organisms that live on the animals upon which they depend for food, shelter and other basic needs to survive (Rechav and Nutall, 2000). It has been observed that ectoparasites do not only have direct effects on their host, they may also transmit pathogens, thereby acting as vectors of diseases (Parola *et al.*, 2001). Ectoparasites generally affect the health of animals and the quality of hides and skin. The leather industries have suffered great losses over the years because of tick infestation on animal skin. Certain factors have been observed to affect the distribution of ectoparasites on their hosts. Among these factors are season and mode of livestock rearing. The behavior of animals such as rolling on grasses contributes a great deal in the number of ectoparasites harboured by their hosts (James-Rugue and Iwuala 1998).

Ticks suck blood of their hosts resulting into severe anemia, loss of production, weakness and immunosuppression (Gwakisa *et al.*, 2001) as well as damages hides and skin leading to significant financial losses to livestock farmers (Biswas, 2003).

Ticks rank second to mosquitoes as vectors of transmissible diseases in man and animals (Opara and Ezech, 2011). Bowman *et al.* (2004) estimated more than 80% of world cattle population is infested by ticks, which are known to transmit viral, bacterial and protozoan pathogens causing Tick Borne Diseases (TBD) such as hemorrhagic fever, cowdriosis, ehrlichiosis, anaplasmosis, theileriosis and babesiosis (Rajput *et al.*, 2006). The causes of tick introduction and spread include the uncontrolled movements of domestic or wild animals, small but sustained climate trends, and changes in the use of land resources that allow for the increased

abundance of tick hosts. After ticks are introduced to a region, they may persist only if the climate is compatible with the requirements of the ticks and if sufficient hosts are available (Madder *et al.*, 2012). However, argasid ticks also play a significant role as vectors of diseases, especially in poultry (Jongejan, and Uilengberg, 2004). Due to heavy infestation of ticks, cattle takes more feed in order to cater for the presence of parasites that causes malnutrition, then it affects the growth of young ones, while adults may remain internally weak, stunted, thin and production of milk in dairy cows became greatly reduced (Ghulam *et al.*, 2008). Vector and vector borne diseases are major constraints to the development of viable livestock industries wherever they occur; tick and tick borne diseases are widely distributed throughout the world particularly in tropical and sub-tropical countries, which cause a tremendous economic importance in livestock production (Kettle, 1995). In most parts of Africa, ticks and tick borne diseases, together with tsetse and trypanosomes are economically important diseases (Solomon *et al.*, 2001). Thus this study was carried out to determine the prevalence of tick species in cattle herds and the attendant problems associated with their presence.

Materials and methods

Study location

The study was carried out in 4 local government areas in Ogun state, Nigeria. Samples were collected from eight different locations where cattle owners agreed to the usage of their animals.

Sampling technique

A simple random sampling technique was adopted in all the locations studied. Cattle were sampled based on the numbers allowed by the cattle owners or handlers and

the numbers available in the herd.

Sample collection and analysis

a. Tick collection

Apparently healthy cattle of both sexes and different breeds were sampled with the permission of the owners. Care was taken to minimize discomfort to the animals during sample collection. Sampled cattle were properly restrained with the help of the herdsman using anti kick and with horn restrain thereby making it easier to access the entire body parts of the cattle.

Ticks were picked with gloved hand, gently and carefully twisted at 180° to avoid mutilation. Samples were labeled categorically, noting the breed, age, sex of cattle, date of collection, site of collection on the cattle and location of the farm.

Harvested ticks were transported to the Parasitology laboratory of the Department of Veterinary Microbiology and Parasitology, College of Veterinary Medicine of the Federal University of Agriculture, Abeokuta in cold ice pack where further analyses were done.

b. Tick identification

In the laboratory, ticks were washed, counted, sorted for identification and were then kept in 70% ethanol. Sorted ticks were identified to species level noting the different sexes according to Walker *et al.* (2014) using a Stereomicroscope.

Results

Two hundred and five (205) cattle were sampled from eight different cattle herds covering Abeokuta North, Abeokuta South, Odeda and Ipokia Local Government Areas of Ogun state. One cattle herd was sampled in three of the local government areas while five were sampled in Odeda local government area. Among the 205 cattle sampled, 111 (54%) were females and 94 (46%) were males, these consists of 109 (53%) White Fulani, 24 (12%) Sokoto Gudali, 63 (31%) Muturu, 5 (2%) Red Bororo and 4 cross breed (2%) (Table 1). The mean age of cattle sampled was 3.0±0.1 years. 125 (61%) of the 205 cattle sampled had ticks while 80 (39%) had no ticks. Out of the 111 female cattle that were sampled 84 (76%) had ticks, 27 (24%) did not have ticks while 41 (44%) of the male cattle had ticks and 53 (56%) had no tick on their bodies (Table 1). Also, 2 (1%) of the Crossbreed had ticks and 2 (1%) had none, 18 (22%) of the Muturu breeds had ticks and 45 (36%) did not, only 1 (1%) of the Red Bororo had ticks while 4 (2%) do not, of the Sokoto Gudali sampled, 17 (8.29%) have ticks 7(14%) do not have, 57 (65%) of the white Fulani sampled have ticks and 52 (45%) do not have. (Table 2)

Table 1: Prevalence of Ticks Based On Sex of Cattle Sampled

SEX	Not infested	%	Tick infested	%	Total	%
Female	27	34	84	67	111	54
Male	53	66	41	33	94	46
Total	80	39	125	61	205	100

Table 2: Prevalence of Ticks among the Breeds of Cattle Sampled

Breed	Present	%	Absent	%	Total	%
Cross Breed	2	3	2	2	4	2
Muturu	18	22	45	36	63	31
Red Bororo	1	1	4	3	5	2
Sokoto Gudali	7	9	17	14	24	12
White Fulani	52	65	57	45	109	53
Total	80	39	125	61	205	100

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Four hundred and thirty (430) ticks were harvested from the 205 cattle and these were identified to species level, of these: *Amblyomma variegatum* was the most prevalent having 331 (76%) ticks, followed

by *Rhipicephalus (Boophilus) decoloratus* with 86 (20%) ticks, *Rhipicephalus (Boophilus) microplus* had 7 (2%), *Rhipicephalus (Boophilus) annulatus* 3 (1%) and *Hyalomma marginatum* 3 (1%) (Table 3).

Table 3: Distribution of different species of Tick Harvested

SPECIES	NUMBER	%
<i>Amblyomma.variegatum</i>	331	76
<i>Rhipicephalus decoloratus</i>	86	20
<i>Rhipicephalus microplus</i>	7	2
<i>Rhipicephalus annulatus</i>	3	1
<i>Hyalomma marginatum</i>	3	1
Total	430	100

Out of the 430 ticks harvested, 270 (63%) were male and 160 (37%) were female. These ticks were obtained from various body sites as follows: 15 on the dewlaps, 29 on the forelimbs, 9 on the ventral parts, 26 on the mammary glands, 13 from vulva,

15 on scrotum, 21 from hind limbs and 4 from tail region. The highest number of ticks was obtained from the mammary gland area followed by the fore limb with the least from the ventral region of cattle (Table 4).

TABLE 4: Distribution of Ticks Based on Body Site of Cattle

SITES	NUMBER
DEWLAP	15
FORELIMB	29
VENTRAL REGION	9
MAMMARY GLAND REGION	15
VULVA	26
HINDLIMB	13
TAIL REGION	21
SCROTUM	4

The distribution according to locations based on the local governments sampled is as follows: Abeokuta North local Government 29 (6.7%) ticks, Abeokuta

South Local Government 61 (14.2%) ticks, Ipokia Local Government 129 (30.0%) ticks and Odeda Local Government 211 (49.1%) ticks (Table 5)

TABLE V: Distribution of Ticks Using Farm Locations per Local Government Areas

LOCATIONS	NUMBER	%
CPV	62	14.4
ODEDA	64	15
BISHOP'S COURT	61	14.1
IPOKIA	129	30
CBG	2	0.5
DUFARMS	19	4
DADA	64	15
OKE ATA	29	7
TOTAL	430	100

Using chi-square it was discovered that the breed of cattle had no significant difference on tick infestation ($p=0.8$) but there was a statistical significance with age among infested and non-infested cattle ($p=0.02$) and sex ($p=0.001$) with tick infestation.

Discussion

Ticks have been identified as the main ectoparasites of cattle in the sub-humid zone of Nigeria. Occurrence of tick infestation in more than 60% of the cattle sampled across the four local government areas confirmed the earlier reports of the existence and problem of tick infestation in sub-humid zone of Nigeria (Bayer and Maina, 1984).

The prevalence of tick infestations among cattle examined in the study area revealed that 60% of the total animals were infested with ticks and thus a high prevalence in the study areas. This observation was similar to Shekaro *et al.* (2012) who reported that 63.4% of the total observed animals were found to be tick infested. Also in other parts of the world, Islam *et al.* (2009) and Rony *et al.* (2010) in Bangladesh reported tick infestation up to 65.5% and 64.07% respectively. This implies a high tick infestation rate among cattle studied and this could be due to little or no tick control practices in some of the herd sampled as well as development of some level of resistance by these ticks to the acaricides been used on them.

The demonstration of ticks on more than half of the studied population portend danger to both animals and humans in the study areas, their impact on economic loss directly and indirectly to the livestock industry and the possibility of disease transmission. Bekele (1996) had earlier reported that ticks and tick-borne diseases affect animals and human health worldwide and that they are the cause of

significant economic losses in livestock.

Tick species found infesting cattle in this present study in order of prevalence include *Amblyomma variegatum*, *Rhipicephalus decoloratus*, *Rhipicephalus microplus* and *Hyalomma marginatum* with *Amblyomma variegatum* having the highest prevalence. This observation agreed with Stachurski and Lancelot (2006) that 90% of the ticks sampled were *Amblyomma variegatum*. They further reported that *Amblyomma variegatum* and *Rhipicephalus spp* were the predominant ticks in western Nigeria. Also Bayer and Maina (1984) had earlier observed that the most common ticks in Northern Nigeria were *Amblyomma variegatum* and *Rhipicephalus decoloratus*. Presence of *Amblyomma variegatum* portends danger because it causes the greatest damage to hides and skins due to its long mouth part and thus renders hides and skin valueless on world market if the infestation is high (Solomon *et al.*, 2001). Also ulcer caused by *Amblyomma variegatum* becomes favorable site for secondary bacterial infection like *Dermatophilus congolensis* (Solomon 2005) which implied that the cattle sampled are potential victims of dermatophilosis if they are not already infected with its attendant problem.

Male to female ratio of identified tick species in the study indicated that, males are found to be dominant except for *Rhipicephalus decoloratus*. This agreed with Tamiru and Abebaw (2010) who recorded more males than females with the exception of *Rhipicephalus decoloratus*. This high incidence of male ticks could be that fully engorged female tick drop off to the ground to lay eggs while male tend to remain permanently attached to the host up to several months later to continue feeding and mating with other females before death.

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The predilection sites on which ticks are found in this study agreed with those reported by Wolde and Muhammed (2014) in Iowa, United States that hard tick infestation on groin and mammary glands areas are most prevalent in cattle and lowest prevalence in face and neck regions.

The prevalence of tick infestation was significant ($p=0.02$) among the ages of cattle sampled, this could be as a result of high rate of tick infestation in cattle within the ages of 2 to 4 years and lesser in younger ones below 2 years and older ones above 5 years. In contrast to this present study, Rony *et al.* (2010) reported that prevalence of tick infestation was significantly higher in older animals aged > 8 years and the lowest was seen in young aged 2 years. The variance in these reports could be as a result of higher number of middle age cattle sampled in this study.

The result of this study also showed that there was no significant ($p=0.5$) difference between the mean PCV of cattle infested with ticks and those that were not, this could be due to the number of cattle sampled and period of the year, being rainy season when the sampling was done in which all animals have green pasture to graze and also the management/environmental factors that vary in different locations of the study.

The differences in prevalence of tick infestation were found to be statistically significant ($p = 0.02$) between sexes of animals studied with female animals having more ticks than the male, but insignificant between breeds of the cattle sampled ($p=0.08$). This could be due to the uneven number of cattle breeds and sexes sampled and their dominance in each of the farm visited. Thus it can be said that there was no sex or breed disposition to tick invasion in cattle.

In conclusion this study showed that the most abundant species of ticks in the study

area include *Amblyomma variegatum* and *Rhipicephalus decoloratus*. Considering the economic importance of ticks in regards to morbidity and mortality; appropriate tick control strategy and technique needs to be applied, constant tick surveillance should be encouraged and awareness to sensitize animal owners on the danger of tick infestation in their flock.

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