

IXODID TICKS OF CATTLE IN BORNO AND YOBE STATES OF NORTHEASTERN NIGERIA: BREED AND COAT COLOUR PREFERENCE

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ABSTRACT

*The prevalence of Ixodid ticks of cattle in Borno and Yobe states, Northeastern Nigeria was studied from March to October, 2010. Out of 3,150 cattle examined in these areas, 1,095 (34.8%) of them were infested with ticks. Of these, 57.1% of the infestation was among cattle in Borno State, while 42.9% was observed in Yobe State. Out of the total number of cattle examined, 2,175 (69.0) were males and 33.8% of them were infested with ticks. The number of females examined was 975 (31.0), out of which 36.9% had ticks. There was no significant difference ($p > 0.05$) in the infestation of ticks between the male and female cattle. The ticks observed on the cattle in both states were *Amblyomma variegatum* (43.8%), followed by *Hyalomma sp* (24.7%), *Boophilus sp* (21.9%) and *Dermacentor sp* (9.6%). Overall, tick infestation occurred most among the White Fulani breed with a prevalence of 240 (21.9%), followed by N' dama and Red Bororo in which the prevalence of ticks was 180 (16.4%) for each of the breeds. The least (6.8%) infestation of ticks was among the Keteku breed. The preferred sites of attachment for ticks among cattle examined in Borno state were inner thigh, dew lap, abdomen, legs, udder, dorsum, ear and hump, in this order. Cattle examined in Yobe state were infested on their dorsum, inner thigh, legs, abdomen, udder and then on the dew lap, ear and hump. The ticks observed infesting cattle in these states are of veterinary importance, because they are vectors of economically important blood protozoan parasites. Adequate control measures should therefore be adopted to protect these animals.*

Keywords: Ixodid, Ticks, Cattle, Breed, Coat colour preference, Northeastern Nigeria

INTRODUCTION

Ticks are arthropods of the class arachnida. They are obligate and temporary parasites of vertebrates, from whose bodies they feed on blood and tissue fluids. They rank second to insects as vectors of transmissible diseases in man and animals. Some of these diseases transmitted to man are: Lyme disease, Q fever (rare but more commonly transmitted by infected excreta), Colorado tick fever, Rocky mountain spotted fever, tularemia, Tick-borne meningoencephalitis, Babesiosis, Tick paralysis

including Cowdriosis and Anaplasmosis in cattle (Rabo and Beald, 1980). These diseases are considered as the most important constraints to the health and improved productivity of cattle in sub-Saharan Africa (Ajayi *et al.*, 1983; FAO, 1984; Young *et al.*, 1988; Bell-Sakyi *et al.*, 2004).

Some ticks such as *Rhipicephalus sp.* are anthropophilic in nature. They can be found both outdoor and indoor where they may come in contact with man (Okoli *et al.*, 2006).

Adult ticks are often found on tall grasses where they attach to passing host such as the cattle during grazing (Soulsby, 1990). Physical contact is not the only method of transmission of ticks; they can jump or fly (Soulsby, 1990). Some species, like *Amblyomma* stalk their host from ground level, emerging from cracks or crevices located in the woods or even inside a home or paddock. The larvae or "seed ticks" of some tick species are equally known to climb blades of grasses and shrubs to favourable position for attaching themselves to passing hosts during grazing (Soulsby, 1990).

The pathogenic effects of tick infestation are associated with the feeding pattern of the parasite which is ideal for both penetrating the skin and transmitting micro-organisms (Seddon, 1988). The salivary glands are thought to produce a hyaluronidase-like substance which assists in penetration. It is a cement-like material which assists locking and acts as an anti-coagulant. The dorsal groove in the hypostome provides a channel for the saliva to flow into the host and subsequently, blood and lymph from the host into the tick. As the female ticks engorge and swell, they tend to bulge out from the site of attachment and the hind legs stiffen, the tick becoming tilted at right angle to the body (Sutherst, 1998). During engorgement, the body weight of the tick increases by about 200 times. Tick infestation is important for three reasons; they suck blood and in occasional heavy infestation can cause anaemia, the lesions caused by the toothed mouthparts during feeding may become infected and predispose to blowfly strike and also at slaughter the value of the hide or fleece may be reduced.

Over 6 million cattle slaughtered in Nigeria come from the Borno and Yobe States' axis, with Potiskum in Yobe State known to have one of the largest cattle markets in West Africa (FDLPCS, 1996). Report on ticks of veterinary importance among cattle in Borno and Yobe states of Northern Nigeria is scanty. Therefore, this study was carried out to investigate and document the prevalent ixodid ticks of veterinary importance in these states.

MATERIALS AND METHODS

Study Areas: The study was carried out between March and October, 2010 in Borno and Yobe States of Northeastern Nigeria. Borno state occupies the greater part of the Chad basin and is located on latitude 10°N and 14°N and longitude 11° 30'E and 14 ° 45' E and occupies a land area of 61,435sq Km. The state is bordered by the Republics of Niger to the north, Chad to the Northeast, Cameroon to the East and Yobe State to the west. The climate is hot and dry for a greater part of the year, with the rainy season stretching from June to September in the northern part of the State and May to October in the southern part. It has a relative humidity of 49% and annual evaporation of 203 mm. The vegetation is of two types; the Sahel in the north with severe desert encroachment and the Sudan savannah in the south which consists of scrubby vegetation, interspersed with tall tree woodland.

Yobe State is equally located in the northeastern geopolitical zone of Nigeria. It lies on an area of 54,428sq Km and has borders with Niger republic to the north. The temperature range is 39°C – 42°C, with an annual rainfall of 500 mm – 1000 mm. The rainy season lasts from June to September in the northern part of the state and May to October in the south. The vegetation comprises of Sahel in the north and Sudan savannah in the south.

Study Population: Tick samples were randomly collected from cattle in the livestock markets following standard procedures, as described by Soulsby (1990). A total of 3,150 cattle were examined for ticks on their faces, ears, neck, hump, dorsum, tail, under the tail, peri-anal region, inner thigh, scrotum for the males, legs, abdomen, vulva and udder in the females, sternal region and dewlap. The number of ticks per region was recorded. Notes were also taken on the breeds and colour of the animals examined.

Analysis: The ticks collected were preserved in 70% alcohol, taken to the laboratory and processed into slides for examination under stereomicroscope using standard taxonomic

tools (Soulsby, 1990; Ballweber, 2001; Wall and Shearer, 2001). They were taxonomically identified (Medler, 1980) and confirmed as either *Amblyomma variegatum*, *Hyalomma* sp., *Boophilus microplus* or *Dermacentor variabilis* by an Entomologist in the Department of Animal Science and Technology, Federal University of Technology, Owerri, Imo State, Nigeria, where voucher specimens (TickCattle 01 – 04) were deposited. Data obtained were analysed by simple averages and percentages according to location, sex, breed, coat colour of cattle, tick species and preferred sites of attachment.

RESULTS

The overall prevalence of ticks indicated that out of 3,150 cattle examined in both States, 1,095 (34.8%) were infested. Furthermore, the prevalence of ticks among cattle examined from Borno State (57.1%) was higher than those examined from Yobe State (42.9%) (Table 1).

Table 1: Overall prevalence of tick infestation among cattle in Borno and Yobe States

<i>Location</i>	<i>Number of Animals examined</i>	<i>Number of Animals infested</i>	<i>% Animals infested</i>
Borno	1800	600	54.8
Yobe	1350	495	45.2
Total	3150	1095	34.8

The prevalence of ticks according to the sex of the animals examined in the two states indicated that out of 2,175 males examined, 735(33.8%) were infested, while out of 975 females examined 360(36.9%) were infested. In Borno State, 55.9% and 54.2% of the males and females respectively were infested, whereas in Yobe, tick infestation was 44.9% and 45.8% respectively for male and female cattle examined (Table 2).

The prevalence of ticks according to the breeds of cattle examined in Borno and Yobe States indicated that out of 1095 cattle infested, the prevalence was highest in the *White Fulani* breed (240, 21.9%), followed by *N'dama* (180, 16.4%), *Red Bororo* (180, 16.4%), Kuri (165, 15.1%), *Wadara* (150, 13.7%), *Sokoto Gudali*

(105, 9.6%) and *Keteku* (75, 6.8%). *Keteku* breed was not found among the cattle examined in Borno State. In both States, the males were more infested with ticks than the females (Table 3).

Tick species encountered were *Amblyomma variegatum* 480(43.8%), *Boophilus microplus* 240(21.9%), *Dermacentor variabilis* 105(9.6%) and *Hyalomma* sp. 270(24.7%). In Borno State, all the tick species were observed in both sexes of animals examined, except *Dermacentor variabilis* which was not observed among the females. In Yobe State, all the tick species collected were observed on both male and female cattle examined (Table 4).

Observation made among cattle from Borno indicated that ticks preferred to attach on the inner side of the thigh (20.0%), followed by the dew lap (15.0%), abdomen, leg and udder (12.5%). The least preferred site of attachment was the hump (7.5%). No ticks were picked from the ear of the females examined. On the males, ticks were mostly encountered at the inner thigh, followed by the dew lap and leg while most of the ticks collected from the females were from the udder, followed by the abdomen, dew lap and inner thigh (Table 5).

Among cattle examined from Yobe State, ticks were encountered mostly on the dorsum (18.2%), followed by the inner thigh and leg (15.2%) and udder (12.1%). On the dew lap, ear and hump, the preference for tick attachment on each of these areas was 9.1 respectively. Among the males, 60(18.2%) were infested with ticks on their dorsum, inner thigh and leg, followed by 45(13.6%) on their dew lap and ear. The hump was the least preferred site of attachment among the male cattle. On the females, tick infestation was on udder 60(36.4%), followed by the abdomen and dorsum 30(18.2%) respectively. The least preferred sites of attachment were the hump, inner thigh and leg (Table 6).

Furthermore, among the males, ticks attached mostly on the white coloured cattle (33%), followed by brown coloured cattle (31%) and black coloured cattle (22%). Ticks infested 14% of mixed coloured male cattle examined.

Table 2: Prevalence of tick infestation according to sex of cattle in Borno and Yobe States

Location	No. (%) of male examined	No. (%) of male infested	No. (%) of female examined	No. (%) of female infested
Borno	1200 (55.2)	405 (55.9)	600 (61.5)	195 (54.2)
Yobe	975 (44.8)	330 (44.9)	375 (38.5)	165 (45.8)
Total	2175 (69.0)	735 (33.8)	975 (31.0)	360 (36.9)

Table 3: Prevalence of tick infestation according to breeds of cattle examined in Borno and Yobe States

Cattle breed	Borno		Yobe		Total (%) infested
	No. (%) males infested	No. (%) females infested	No. (%) males infested	No. (%) females infested	
<i>N'dama</i>	90 (22.2)	30 (15.4)	45 (13.6)	15 (9.1)	180 (16.4)
<i>White Fulani</i>	75 (18.5)	60 (30.8)	60 (18.20)	45 (27.3)	240 (21.9)
<i>Red Bororo</i>	75 (18.5)	15 (7.7)	60 (18.20)	30 (18.2)	180 (16.4)
<i>Sokoto Gudali</i>	45 (11.1)	30 (15.4)	15 (4.5)	15 (9.1)	105 (9.6)
<i>Kuri</i>	45 (11.1)	30 (15.4)	75 (22.7)	15 (9.1)	165 (15.1)
<i>Wadara</i>	75 (18.5)	30 (15.4)	15 (4.5)	30 (18.2)	150 (13.7)
<i>Keteku</i>	-	-	60 (18.2)	15 (9.1)	75 (6.8)
Total	405 (67.5)	195 (32.5)	330 (66.7)	165 (33.3)	1095

Table 4: Occurrence of tick species among cattle in Borno and Yobe States

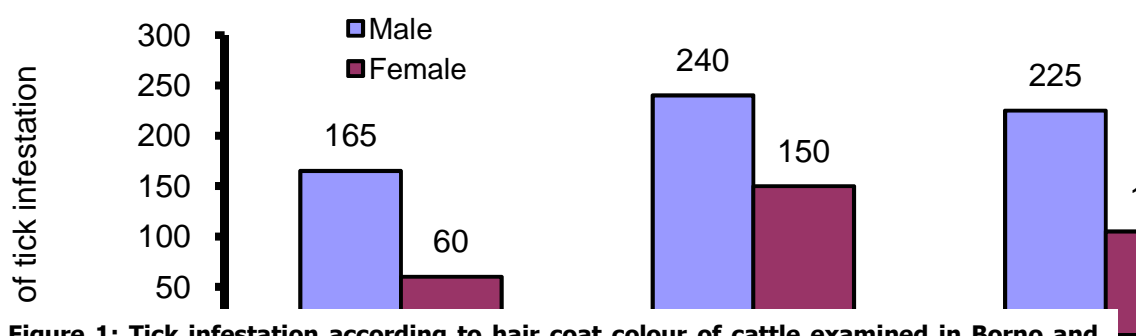
Tick	Borno			Yobe			Total (%) infested
	No. (%) Animal infested	No. (%) males infested	No. (%) females infested	No. (%) Animal infested	No. (%) males infested	No. (%) females infested	
<i>Amblyomma variegatum</i>	300 (50.0)	195 (48.1)	105 (53.8)	180 (36.4)	135 (40.9)	45 (27.3)	480 (43.8)
<i>Boophilus microplus</i>	135 (22.5)	90 (22.2)	45 (23.1)	105 (21.2)	75 (22.7)	30 (18.2)	240 (21.9)
<i>Dermacentor variabilis</i>	45 (7.5)	45 (11.1)	-	60 (12.1)	30 (9.1)	30 (18.2)	105 (9.6)
<i>Hyalomma sp</i>	120 (20.0)	75 (18.5)	45 (23.1)	150 (30.3)	90 (27.3)	60 (36.4)	270 (24.7)
Total	600	405 (67.5)	195 (32.5)	495 (66.7)	330 (33.3)	165	1095

Table 5: Preferred sites of attachment of ticks among cattle examined in Borno state

Site of Attachment	Number (%) of ticks on males	Number (%) of ticks on females	Total (%) infested
	Abdomen	45 (11.1)	
Dew lap	60 (14.8)	30 (15.4)	90 (15.0)
Dorsum	45 (11.1)	15 (7.7)	60 (10.0)
Ear	60 (14.8)	-	60 (10.0)
Hump	45 (11.1)	-	45 (7.5)
Inner thigh	90 (22.1)	30 (15.4)	120 (20.0)
Leg	60 (14.8)	15 (7.7)	75 (12.5)
Udder	-	75 (38.5)	75 (12.5)
Total	405 (67.5)	195 (32.5)	600

Table 6: Preferred sites of attachment of ticks among cattle examined in Yobe state

Site of Attachment	Number (%) of ticks on males	Number (%) of ticks on females	Total (%) infested
Abdomen	30 (9.1)	30 (18.2)	60 (12.1)
Dew lap	45 (13.6)	-	45 (9.1)
Dorsum	60 (18.2)	30 (18.2)	90 (18.2)
Ear	45 (13.6)	-	45 (9.1)
Hump	30 (9.1)	15 (9.1)	45 (9.1)
Inner thigh	60 (18.2)	15 (9.1)	75 (15.2)
Leg	60 (18.2)	15 (9.1)	75 (15.2)
Udder	-	60 (36.4)	60 (12.1)
Total	330 (66.7)	165 (33.3)	495

**Figure 1: Tick infestation according to hair coat colour of cattle examined in Borno and Yobe States**

Similarly among the females, ticks infested 41% of the white coloured cattle, followed by brown coloured cattle (29%), black coloured cattle (17%) and mixed coloured cattle (13%) (Figures 1).

DISCUSSION

The result of this study confirmed a high prevalence of tick infestation among cattle from the Sahel region of Nigeria (Borno and Yobe States). However, cattle in Borno State were slightly more infested than those from Yobe State. This could be attributed to the slight difference in their vegetations, since Borno State has more savannah areas than Yobe State. Overall, ticks seemed to infest more of the male than female cattle. This result agreed with Hitchcock (1993) who reported that male cattle are more infested with ticks than the females because most of the males in the tropics are always moved from place to place in search of food and in this process get infested with ticks, while the females are confined mainly for breeding purposes. Larvae or "seed tick" of ticks are known to climb blades of grasses and

shrubs to reach favourable position for attaching themselves to passing hosts during grazing, which are mostly the male cattle (Soulsby, 1990).

This study showed that *Amblyomma*, *Boophilus*, *Dermacentor* and *Hyalomma* were prevalent in the study areas, with *Amblyomma* being the most prevalent. Soulsby (1990) reported that the cuticle of hard ticks was the key to their survival in areas of high temperature. The predominance of these hard ticks in Borno and Yobe States could have been favoured by the high temperature in this region which makes it unfavourable for the survival of soft ticks. Therefore, it does appear that temperature affected the distribution of the different species of ticks observed. This finding was in agreement with Price (1997), who reported that changes in climatic condition of an area affected the distribution of ticks.

The distribution of ticks among these breeds of cattle such as *N'dama*, *White Fulani*, *Red Bororo*, *Sokoto Gudali*, *Kuri*, *Wadara* and *Keteku* suggested that the hard ticks though, not host specific need a host for their survival. However, tick infestation was more common on

the White Fulani than other breeds. It seems that the white colour of this breed played a vital role in attracting more ticks to it as confirmed by our result. According to Kelvin (1988), white objects reflect light, making the body of the object to be cooler than black or other coloured objects which seem to absorb light, thus conserving heat.

The lower prevalence of ticks, especially on the mixed coloured and to some extent, other coloured cattle, suggests that colour could serve as an important control strategy against tick infestations.

The result of this study also confirmed that there are some parts of the body of an animal where ticks prefer to attach and feed. Our findings revealed that ticks infesting cattle in Borno State prefer to attach on the inner thigh, dew lap, abdomen, legs, udder, dorsum, ear and hump, in this order, while those collected from Yobe State attached on the dorsum, inner thigh, legs, abdomen, udder and then on the dew lap, ear and hump of the host cattle. This was in agreement with Wood (1990) who listed the preferred predilection sites for ticks as the face, ear, around the genital region, leg, thigh, dewlap, hump and udder. Ticks were mostly found at the inner thighs of the males and udder of the females. These areas are the parts of the body where there are little or no hairs, but well vascularised and easy for the ticks to take their meal (Opara *et al.*, 2005).

Conclusion: *Amblyomma*, *Boophilus*, *Dermacentor* and *Hyalomma* have been identified as the prevalent ticks of veterinary importance in Borno and Yobe states. The ticks preferred parts of the body with sparse hairs and well vascularised for attachment. Mixed coloured cattle had lower tick infestation than the single coloured ones. The need for proper current data on the epidemiology of diseases transmitted by these ticks cannot be overemphasized. Thus, it is important for the relevant authorities in these states to design effective control measures against these ticks, with full knowledge of their biology. Regular treatments using appropriate acaricides will help to control the continuous challenge of tick vector and the diseases they transmit.

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