



PREVALENCE OF TICK INFESTATION AMONG SOKOTO GUDALI AND RED BORORO BREEDS OF CATTLE IN WURNO, SOKOTO STATE, NIGERIA

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ABSTRACT

*Ticks transmit different tick-borne diseases (TBD) to cattle causing production losses. Sokoto Gudali and Red Bororo breeds of cattle found in Achida, Wurno LG Sokoto State were sampled for Tick infestation between October, 2019 and February, 2020. Body surface of 464 cattle were visually examined and tick found were manually detached and preserved in 70% ethyl alcohol and taken to Parasitology laboratory Usmanu Danfodiyo University Sokoto for identification to species level using morphological features. A total of 296 Ticks infested 269 cattle (Mean Infestation Rate = 51.70) in general, cows were more infested (IR% = 52.65) than Bulls (IR% 51.0). Among the two breeds, Red Bororo has higher Mean Infestation Rate (%) (IR = 69.47) than Sokoto Gudali with IR (%) 24.80. Generally, in all the breeds of cattle, young cattle (< 1 Year) have the highest IR (%) with 53.35, followed by old cattle (> 3 Years) with IR (%) 52.35, and Adult (1-3 Years) have the least infestation Rate (IR%) = 35.70. Species of Ticks identified were *Hyalomma Truncatum* (46.3%), *Boophilus decloratus* (19.9 %), *Hyalomma dromedarii* ((9.8%), *Hyalomma refipes* (1.4%) *Hyalomma impressum* (1.0%), *Boophilus geigy* (3.7%), *Boophilus annulatus* (5.4%), *Amblyomma variegatum* (5.7%), *Rhipicephalus senguineus* (3.4%), and *Rhipicephalus evertsi*(3.4%). This research suggests that, these breeds of cattle are at risk of Tick-Borne Disease outbreak. Effective Tick control strategies should be adopted by cattle owners, herdsman, and veterinary personnel to prevent wide-spread.*

Keywords: *Prevalence, Tick infestation, Sokoto Gudali, Red Bororo, Tick-borne Diseases*

Background of the Study

Ticks are very important group of arthropod vectors of zoonotic disease (George, 1987; Iwuala and Okpala, 1978) including emerging Human Babesiosis (Ikpeze et al., 2007). Effect of tick bites and dermatophilosis infertility and other disease condition of cattle have been reported from Nigeria (Ikpeze, 2004 and Dalis et al., 2007). Tick transmits different tick-borne disease (TBD) in cattle and human while their bites predispose the cattle to dermatophilosis which result in down-grade of hides and other production loses (Ikpeze, 2004 and Dalis et al., 2007).

Cattle are major sources of animal protein in Nigeria but since the development stages of ticks often quest on pasture to infect their vertebrate hosts (Ikpeze, 2012), grazing cattle are usually predisposed to heavy tick infestation in Nigeria. Tick infestation on cattle therefore poses serious threat to cattle rearing and research in Nigeria. Herdsmen move their herds from Northern to Southern parts of Nigeria in search of greener pasture for their herds, and such movements naturally introduce ticks to new environment which are also suitable for the development, survival and maintenance of the ticks (Ikpeze et al., 2010; Ikpeze et al., 2011; Ikpeze et al., 2016).

Tick infestation and tick-borne diseases (TBDs) are the major problems in livestock production in Sub-Saharan Africa (Mattioli et al., 2000; Jongejan and Uilenberg, 2004). Tick-borne diseases, namely, East Coast Fever, anaplasmosis, babesiosis and cowdriosis have been reported to affect the optimal livestock productivity in East African region (McCosker et al., 1993). Apart from acting as vectors for TBDs, ticks have been recognized as important ectoparasites of livestock by sucking blood, causing local necrosis which results in low quality hides (Jongejan and Uilenberg, 2004), secondary bacterial infections (Ambrose et al., 1999), lowering productivity in terms of weight gain (Pegram and Oosterwijk, 1990) and milk yield (Sajid et al., 2007), increasing susceptibility to the other diseases (De Castro, 1997), dermatosis, toxicosis and paralysis (Solomon and Kaaya, 1998). Based on the number of hosts required to complete their development during their life cycle, ticks can be classified as one-host, two-host and three-host ticks (Walker et al., 2003). Due to medical and veterinary importance of ticks, their control and the transmission of tick-borne diseases remain a challenge for the cattle industry in tropical and subtropical areas of the world (Lodos et al., 2000).

Ticks are found in many parts of Nigeria, causing many different Zoonotic diseases in livestock including Human Babesiosis (George, 1987; Iwuale and Opkala, 1987; Dalis et al., 2007; Ahmad et al., 2007)

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The aim of the study is to determine the prevalence of Tick infestation among Sokoto Gudali and Red Bororo Breeds of Cattles in, Wurno LG., Sokoto State and the objectives of the study are as follows:

1. To determine the occurrence and abundance of Tick infestation in Sokoto Gudali and Red Bororo breeds of cattle in the study area
2. To compare the occurrence of Tick infestation between Sokoto Gudali and Red Bororo breeds of cattle with respect to gender/sex (Bull or Cow) and Age (<1, 1-2 or >3 years animal) in the study area.
3. To determine Tick species with the highest occurrence in the study area.

The study provide information on the distribution and occurrence of Tick infesting sokoto Gudali and Red Bororo Breeds of cattle reared in the study area whose prevalence pose great health threat to the farm animals and even human, thus causing aneamia, zoonosis, bebesiosis, irritation and so on (Singh et al., 2016; Dalis et al., 2007).

METHODOLOGY

Study area

The study was conducted from September 2019 to Dec 2019 in Achida, Wurno Local Government, Sokoto State, Nigeria. Achida is located at an elevation of 327 meters above sea level.

Its coordinates are 13°31'0" N and 5°24'0" E in DMS (Degrees Minutes Seconds) or 13.5167 and 5.4 (in decimal degrees). Its UTM position is GQ59 and its Joint Operation Graphics reference is ND31-12. Current local time is 17:01; the sun rises at 08:44 and sets at 20:50 local time (Africa/Lagos UTC/GMT+1). The standard time zone for Achida is UTC/GMT+1.

Study design and sample size determination

A cross-sectional study was carried out in the study area. The required sample size for the study was determined according to formula given by Okwuonu et al. (2017) at 50% expected prevalence, 5% desired precision and 95% confidence interval. The computed sample size was 256. These

animals were sampled using systematic random sampling techniques by taking into account the variation of age, sex and breeds of the animals. Age of the animals were determined as young (<1 year), adult (1-3 years) and old (> 3 years) (Nicholson and Butterworth, 1996).

Method of data collection and laboratory examination

The whole body part of each study animal was examined for the presences of ticks. From positive animals, ticks were collected into universal bottles by considering the age sex and breed of the animals. The collected ticks were preserved in 70% ethyl alcohol and transported to Parasitology Laboratory, Biological Science Department, Faculty of Science, Usmanu Danfodiyo University Sokoto, Nigeria. Identification and classification into species level was made using morphological features according to Walker et al. (2003) guidelines using gross and stereomicroscopic examination.

Data analysis

The mean value for the prevalence and mean infestation rate (IR %) of tick from the study was computed using summary statistics of the statistical package; InVivoStat version 4.1 in all the analysis, confidence level was held at 95% and $p < 0.05$ was set as level of significance.

number infested

$$IR = \frac{\text{Number infested}}{\text{Number examined}}$$

(Okwuonu et al., 2017)

Results

The 296 Ixodid ticks detached from cattle in the study area were distributed among the 10 species identified namely, *Hyalomma truncatum* 137 (46.3%), *H. dromedarii* 29 (9.8%), *H. rufipes* 4 (1.4%), *H. impressum* 3 (1.0%), *Boophilus decoloratus* 59 (19.9%), *B. annulatus* 16 (5.4%), *B. geigy* 11 (3.7%), *Rhipicephalus evertsi* 10 (3.4%), *Rh. Sanguineus* 10 (3.4%) and *Amblyomma variegatum* 17 (5.7%). From Table 7, it could be noticed that the genera *Hyalomma* and *Boophilus* were more dominant than *Rhipicephalus*, and *Amblyomma*.

Mean infestation rates (IR) regarding 269 tick-infested cattle (138 bulls and 158 cows) among the 464 sampled (223 bulls and 241 cows) were presented in Table 1. From the result presented, it is evident that Cows are more infested with tick than Bulls (Table 2).

Table 1: Occurrence of Tick infestation between Sokoto Gudali and Red Bororo Breeds

BREED	Examined (No.)	Infested (No.)	Infestation Rate (%)
Sokoto Gudali	118	32	27.1
Red Bororo	346	264	76.3
Total/Mean	464	269	51.70

Table 2: Distribution of Tick infestation by gender (Bull and Cow)

BREED	Examined		Infested		Infestation Rate (%)	
	Bull	Cow	Bull	Cow	Bull	Cow
Sokoto Gudali	53	65	16	16	30.2	24.6
Red Bororo	170	176	122	142	71.8	80.7
Total/Mean	223	241	138	158	51.0	52.65

Table 3: Distribution of Tick infestation by age (<1, 1-3 &>3 years)

Breed	Examined			Infested			IR (%)	
	<1	1-3	>3	<1	1-3	>3	<1	1-3
Sokoto Gudali	53	34	31	20	7	5	37.7	20.6
Red Bororo	100	61	185	69	31	164	69.0	50.8
Total/Mean	153	95	216	89	38	169	53.35	35.70

Table 4: Infestation Rate (%) of Sokoto Gudali and Red Bororo Breeds of cattle

Age	Sokoto Gudali			Red Bororo		
	Examined	Infested	IR (%)	Examined	Infested	IR (%)
Young (<1 year)	53	20	37.7	100	69	69.0
Adult (1-3 years)	34	07	20.6	61	31	50.8
Old (>3 years)	31	05	16.1	185	164	88.6
Total/Mean	118	32	24.80	346	264	69.47

Table 5: Tick species Abundance infesting Sokoto Gudali and Red Bororo Breeds of cattle

Species Identified (%)	Species Abundance (No)	Infestation Rate
H. truncatum	137	46.3
B. decoloratus	59	19.9
H. dromedarii	29	9.8
H. refipes	4.0	1.4
H. impressum	3.0	1.0
B. geigy	11	3.7
B. annulatus	16	5.4
A. variegatum	17	5.7
Rh. sanguineus	103	4.0
Rh. evertsi	10	3.4
Total/Mean	296	10.0±13.89

Table 6: distribution of species of tick infesting Sokoto Gudali breed of cattle according to gender and age in Achida, Wurno LG, Sokoto State

Breed	H. truncatum	B. decoloratus	H. dromedarii	H. refipes	H. impressum	B. geigy	B. annulatus	A. variegatum	Rh. sanguineus	Rh. Evertsi
F/SG/<1year	14	1	-	-	-	-	-	-	-	-
F/SG/1-3years	-	1	-	-	-	-	-	-	-	-
F/SG/>3years	-	-	-	-	-	-	-	-	-	-
M/SG/<1year	2	1	2	-	-	-	-	-	-	-
M/SG/1-3years	4	2	-	-	-	-	-	-	-	-
M/SG/>3year	3	-	-	-	2	-	-	-	-	-
Total	23	5	2	-	2	-	-	-	-	-

F- Female

SG- Sokoto Gudali

M- Male

Table 7: distribution of species of tick infesting Red Bororo breed of cattle according to gender and age in Achida, Wurno LG, Sokoto State

Breed	H. truncatum	B. decoloratus	H. dromedarii	H. refipes	H. impressum	B. geigy	B. annulatus	A. variegatum	Rh. sanguineus	Rh. evertsi
F/RB/<1year	5	3	-	1	1	-	-	-	-	-
F/ RB /1-3years	1	1	-	-	-	1	1	-	-	-
F/ RB />3years	-	58	25	27	-	7	11	-	-	-
M/ RB /<1year	31	11	-	3	-	4	4	4	-	2
M/ RB /1-3years	6	3	-	-	-	-	-	-	10	8
M/ RB />3year	13	11	-	-	-	-	-	12	-	-
Total	114	54	27	4	1	11	16	17	10	10

F- Female

M- Male

RB- Red Bororo

DISCUSSIONS AND CONCLUSION

DISCUSSIONS

Mean IR (51.70) observed in this study is lower than the mean IR 57.34% observed in the previous study conducted in sokoto metropolis on Sokoto Gudali, Red Bororo, White Fulani and Friesian-X (Okwuonu et al., 2017). It is equally lower than 64.2% recorded for Zebu cattle reared in Minna metropolis, Niger State by (Ejima et al., 2014) but considered relatively higher than 46.21% observed in goats at Sokoto (Ahmed et al., 2003). Perhaps the practice of intensive system of goat husbandry may allow for more frequent de-ticking in goats than in cattle under nomadic grazing. Decrease in the IR compare to the previous study in sokoto metropolis by Okwuonu et al. (2017) may be attributed to the fact that cattle usually peak in pasture between February and July, and that may be responsible for the high infestation earlier recorded. A study on abundance of ticks elsewhere in Nigeria (Ikpeze et al., 2016) also reported that infestation rate and tick burdens decreased during the dry season, and gradually increased during the rainy season.

Prevalence of ticks on cows was higher in bulls (see Table 2). This result goes contrary to research conducted by George et al. (2008) and Okwuonu et al. (2017) who reported that male cattle are more infested with ticks than the female ones even when both are moved together from place to place. Although the prevalence of infestation was higher on Red Bororo than Sokoto Gudali, there was no significant difference ($p>0.05$) in mean IR.

Species of ticks observed were the same noticed on cattle brought from Northern Nigeria for sale in Enugu and Anambra States' Cattle Markets (Ikpeze et al., 2011). *Hyalomma truncatum*, a desert tick, was the most abundant species in this study with 137 (46.3% IR). Sokoto State seemingly provides an ideal environment for *Hyalomma truncatum*, which prefers lowlands and sub humid areas that receives less than 500mm of rainfall annually (Okwuonu et al., 2017). Dipeolu (1975) had recorded few numbers of *Hyalomma truncatum* on cattle, sheep and goat in Western Nigeria where the annual rainfall is above 800mm. *Hyalomma dromedarii* of camel, which infested 57.6% of camel in Kano (Lawal et al., 2007) was in the study area with 29 (9.8% IR). This tick transmits pathogens that cause diseases of economic importance to livestock industries (Olabode et

al., 2010). *Boophilus decoloratus* 59(19.9% IR), also one of the dominant species encountered in Sokoto, is a one-host tick and spends its entirely life cycle on the same individual host (Ikpeze, 2012). It has long been incriminated as a vector of *Babesia bigemina*, *Anaplasma marginale* and *Anaplasma central* which are endemic in Nigeria (Leeflang and Ilemobade, 1977). *Amblyomma variegatum* 17 (5.7%) is of veterinary importance too, as it transmits the mildly pathogenic *Theileria mutans* (Saidu et al., 1984) which is prevalent in Nigeria. Bites of *A. variegatum* do not only cause dermatitis but they mechanically transmit *Dermatophilus congolensis* responsible for *Dermatophilus* infection – a condition in cattle which have been known to damage hides and skin (Ikpeze, 2004; Mohammed, 1974). The mean IR of *H. rufipes* 4 (1.4% IR) in this study is lower than previously observed by Okwuonu et al. (2017) with 9.2%, *H. impressum* 3 (1.0% IR), is also lower than observed in previous study with 8.4% IR, *B. annulatus* 16 (5.4% IR) is lower than previously observed 6.9% IR, *B. geigy* 11 (3.7% IR) is equally lower than previously observed 7.5% IR, *Rhipicephalus evertsi* 10 (3.4% IR) and *Rh. Sanguineus* 10 (3.4% IR) are both lower than previous studies reported with 5.5% IR and 4.5% IR respectively.

In this study, it is evident that young (<1 year) Red Bororo breed of cattle had higher mean IR than young (<1 year) Sokoto gudali breed with 37.7% and 69% IR respectively.

Adult (1-3 years) Red Bororo breed of cattle had higher mean IR than adult (1-3 years) Sokoto gudali breed with 50.8% and 20.6% IR respectively.

Old (>3 years) Red Bororo breed of cattle had higher mean IR than adult (1-3 years) Sokoto gudali breed with 88.6% and 16.1% IR respectively.

CONCLUSION

Four genera of ticks namely, *Hyalomma*, *Boophilus*, *Amblyomma* and *Rhipicephalus* species, which have been proven to be efficient transmitters of different tick-borne diseases (TBDs) of man and animals, were identified from local crosses of Zebu cattle kept under pastoral system in Achida Wurno LG, Sokoto, Sokoto State, Nigeria. TBDs in humans are difficult to treat because they are often misdiagnosed as malaria or other febrile human illnesses. There is need for effective tick-control strategies to be adopted by stake holders like cattle owners, herdsman and veterinary personnel in order to avert nationwide outbreak of TBDs in human and animal populations in view of the present migrating activities of nomadic herdsman in the country which may introduce potentially infected ticks to new environments.

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