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Prevalence Of Ixodid Ticks Of Cattle In Gboko Area Of Benue State, Nigeria

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Abstract
The prevalence of Ixodid ticks of Cattle in a major livestock producing area of Benue State was undertaken for 6 months. Body ticks were collected physically from each animal examined. A total of 5,766 cattle were examined with 1,109 (19.23%) being infested. Prevalence of tick infestation in White Fulani (W.F.) and Sokoto Qudali (S.Q.) breeds of cattle were 12.01% and 21.48% respectively. The total number of ticks collected was 10,676 and comprised of four genera and five species. The species included Amblyomma variegatum (57.65%), Boophilus species (34.60%), Rhipicephalus sanguineous (4.75%), Hyalomma truncatum (2.23%) and H. rufipes (0.79%), in descending order of abundance. Boophilus and Amblyomma species occurred in wet and dry seasons while Rhipicephalus and Hyalomma were exclusively wet season ticks. Prevalence of tick infestation and rainfall was highly correlated ($r = 0.75$; $P \leq 0.05$). Optimum ambient temperatures and rainfall for high activity of ticks was between 25.0 - 29^oC and 147.1-368.5mm respectively. The proportion of adult animals infested with ticks was significantly higher than that of young ($P \leq 0.05$; $x^2 = 16.3$) and W.F. than S.Q. ($P \leq 0.5$; $x^2 = 60.11$). These results suggest that S.Q. and W.F. are important hosts of various tick Species in the area of study and it is necessary to include them in any parasite control program. The epidemiological and epizootiological implications of these findings are discoursed.

Keywords*: Ticks, Cattle, Nigeria.*

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I. Introduction

Within the past several years, cowdrosis has been diagnosed in ruminants at Akperan Orshi Polytechnic Yandev, Veterinary Clinic Gboko (unpublished data). The presence of these pathogens represents an increasing threat to animal populations (Daszak, *et al.*, 2000). In Nigeria, Adeoye (1985) listed ticks and tick-borne diseases (TBDs) among the most common conditions diagnosed in cattle. Their effects are diverse including reduced growth and milk production, anaemia, paralysis, and secondary infection by other parasites (Estrada-Pena, 2001; Munks *et al.*, 2005; Okoli *et al.*, 2006). However little is known about the ticks on livestock in Benue State, Middle Belt region of Nigeria. Limited surveys of species of ticks in different regions of Nigeria for over a long period of time have supported the presence of *Amblyomma, Haemaphysalis, Hyalomma, Boophilus* and *Rhipicephalus species* in the different ecological zones (Mohammed, 1974, Okello-Onen *et al*., 2006; Dipeolu, 1974, 1984, Carvalho *et al.*, 2008, James-Rugu and Jidayi, 2004 and Adeyefa and Dipeolu, 1986). James-Rugu and Jidayi (2004) reported prevalence of 43.0% of ticks on ruminants in Borno and Yobe States. Ticks and tick-borne diseases are reported to be responsible for up to 20.6% morbidity in sheep and 16.2% in goats in Nigeria (Adeoye, 1985). Because the organism that causes cowdrosis is transmitted by ticks, a need arose to survey the domestic livestock to determine the tick fauna on cattle. This study provides descriptive information on the prevalence of ticks on cattle in Gboko Local Government Area (L.G.A) of Benue State Nigeria. Results of this work hopefully will be useful baseline epidemiological data for those contemplating a tick control programme in future.

II. Materials And Methods

Study location

The survey was carried out in Gboko L.G.A. of Benue State of Nigeria (Lat. 07^02' N and Long. 09^010' E). The most common domestic animals in this area are chickens, sheep, goats, pigs and cattle. For most of the year, they are mostly raised free-range during which they easily peak up ticks. However during the cropping season, they are either tethered or confined in enclosures, both night and day, in order to protect the crops. The study was carried out in five collection centres namely, Gboko town/Yandev, Ipav, Mbayion, Mbatierev and Mbatiav. In each collection centre, fifty (50) herds were selected using simple random technique. Simple random sampling was also employed in selecting animals for examination as described by Putt *et al*. (1987).

Where the number of animals in a household was ten (10) or less, all of them were examined and where they were more than ten (10), ten (10) were examined. These animals were examined fortnightly for a period of months. The White Fulani and Sokoto Qudali breeds respectively were examined.

Collection of ectoparasites

A comprehensive examination of the complete outer surface (head, ears, neck, legs, thorax and abdomen, back, udder or scrotum and tail) of each animal was made and ticks found were collected according to the methods of James – Rugu and Jidaiyi (2004). Collected ticks were preserved in universal bottles containing equal proportions of 10% formaline and 5% glycerol. Ticks were transported to the Veterinary Parasitology laboratory, Akperan Orshi Polytechnic Yandev and identified to species level using the parameters stipulated by Hoogstraal (1958) and Walker *et al.* (2003). Data were entered into computer and analyzed using SPSS version 12 computer software programmes. Tests were carried out at 95% level of confidence ($P < 0.05$).

III. Results

A total of 5,766 cattle were examined and 1,109 (19.36%) were infested with ticks. Of 4,400 White Fulani and 1,266 Sokoto Qudali examined, 145 (21.48%) and 164 (12.01%) respectively were infested. The pattern of monthly fluctuation of prevalence was similar in both species although proportion of tick infestation was significantly ($\chi^2 = 60$; $P \leq 0.05$) higher in White Fulani than Sokoto Qudali between June and November (Fig.3). Of 10,676 ticks collected from all animals examined, *Amblyomma variegatum* represented 57.63%, *Boophilus species* (34.60%), *Rhipicephalus sanguineus* (4.75%) and *Hyalomma truncatum/H rufipes* (3.02%) (Table1). All developmental stages of *A. variegatum* and *Boophilus species* were encountered and collected while the immature stages (larvae and nymphs) of *Hyalomma* and *Rhipicephalus species* were not seen.

The lowest overall number of ticks collected per month occurred in late dry season (January to April) when prevalence of tick infestation ranged from 1.5% to 11.19% (Fig. 1) when the mean ambient temperature was 27.6ºC $\pm$ 0.45, mean relative humidity was 28.15% + 3.55 and there was no rainfall. The number of ticks collected per month was highest during the rainy season with two peaks in June and August. Relative humidity in June was high (74.32%) and mean ambient temperature was moderate (27.0ºC). Optimum temperatures and rainfall that corresponds to high prevalence of tick infestation appear to fall between temperature range of 25.0 - 29.^{0}C and rainfall between 147.1- 368.5mm. The correlation coefficient between rainfall and prevalence of tick infestation was high ($r = 0.75$; $P \leq 0.05$). The relationship between age and prevalence showed a significant association ($x^2 = 16.35$; $P \leq 0.05$) (Fig. 2).

IV. Discussion

The prevalence of tick infestation in Gboko L.G.A. was high (19.36%) though lower than the 43.0% reported by James-Rugu and Jidayi (2004) in cattlets from some parts of northern Nigeria. The difference could probably be as a result of the greater population of livestock in the north and thus more tick infestation. Tick infestation was significantly ($\chi^2 = 60$; $P \leq 0.05$) higher in White Fulani than Sokoto Qudali. Thick wool on S.Q. makes it difficult to see many ticks on their body particularly if the level of infestation is low. As such many infested S.Q. may have escaped being diagnosed positive.

The four genera of ticks reported in this study have been observed as important ticks of livestock in Nigeria (James-Rugu and Jidaye, 2004, Bayer and Maina, 1984, Mohammed, 1974). These ticks are widely distributed and are found in all the ecological zones in Nigeria. The predominance of *A. variegatum* over other ticks collected has been observed by some previous workers. In a similar work, Bayer and Maina (1984) reported *Boophilus decoloratus* as being only second to *A. variegatum* in order of frequency of occurrence in Nigeria. Nyangiwa and Horak (2007) reported heavy infestation with adults of *Boophilus, Amblyomma and Hyalomma species* on Cattle in South Africa. Dipeolu (1975) had also reported that the most abundant *Hyalomma* and *Rhipicephalus species* found on cattle in Nigeria are *H. rufipes*, *H. truncatum* and *R. sanguineous*. Multi-host parasitism by *Rhipicephalus species* has been reported by Dipeolu (1975) and Sadiq *et al*. (2001). The presence of *Rhipicephalus sanguineous* on cattle is of public health implications, especially in rural households in Africa (Ikambarage *et al*., 2004). This is because animal keepers in many rural communities maintain close association with their owners and in some communities, people share houses with small ruminants. Direct contact between hosts has been shown to ensure host-to-host tick transfer (Norman *et al*., 2004).

A good number of ticks in each of the four genera of ticks collected were partially to fully engorged. This was an indication that these tick species could complete their parasitic cycle on these animals. The recovery of *Boophilus, Amblyomma, Rhipicephalus and Hyalomma species* from sheep and goats at so many localities in the present study can be ascribed to the high prevalence of infestation on other domestic animals like goat, sheep, dogs and cats at the same locations. These animals have been reported to serve as reservoir of cattle ticks (Nyangiwe, 2006; Hook, 2007). The implication in that intensive rearing of ruminants will increase

the risk of spread of tick infestation. All developmental stages of *Amblyomma and Boophilus species* were found on cattle. Immature stages of *Rhipicephalus and Hyalomma* were not found on these animals. Typically, *Amblyomma* ticks have a 3-hosts life cycle, with each feeding stage of the tick (larva, nymph, and adult) having a single host (Sonenshine, 1991, 1993., Hilyard, 1996., Spickett, 1994).

The biology of ticks is greatly influenced by rainfall and temperature (Walker *et al*., 2003) which varied significantly in different months of the year in Gboko L.G.A (fig. 2). Since ticks spend most of their life off their hosts (Walker *et al.*, 2003) ambient temperature and humidity determine their survival. Ticks survive better in the wet season. Very high temperatures can reduce survival of ticks and mortality increases under drier conditions (Norval, 1977). The correlation coefficient between rainfall and prevalence of tick infestation was very high ($r = 0.75$; $P \leq 0.05$). The seasonality of ticks on cattle reported in the present study was similar to those of Talabi *et al.* (2007) in cattle. Ixodid ticks have been reported to have higher prevalence of infestation during the rainy season of October to March in goats of Botswana (Mushi *et al*., 1996). The non-parasitic stages (Embryonic and larval) of *Rhipicephalus* (*Boophilus) microplus* for example may last longer (89 days) in areas with 935mm of rainfall and temperature of 26^{o}C and 251 days at 4358mm annual rainfall and 22.5^{o}C mean temperatures (Tate, 1941).

Movement of Fulani pastoralists into Gboko L.G.A. in search of water and pasture is highest between February and May. This condition increases mingling of tick infested cattle with sheep, goats and wildlife population and hence infestation of ticks. Increased interaction between animals has been reported to be responsible for increased prevalence of tick infestation (Walker *et al*. 2003). This observation also agrees with those of Mohammed (1974) that tick population increases rapidly at the beginning of the rains.

As far as ascertained, very few data are available on the relationship of age with prevalence of tick infestation. Inoussa *et al*. (2007) studied the prevalence of tick infestation in camels and found that adults have higher prevalence than young. The reason behind this trend may be that they are strong and are used for work more than young age class. This behaviour exposes them to tick infestation as they make more body contacts with other infested animals. In a similar study, Meltzer (1996) suggested a simple physical explanation for the higher number of attached adult ticks (*Amblyomma hebraeum*) in large breeds like Brahman. These breeds have naturally larger surface areas of skin in the belly and groin regions than small breeds providing more space for the adult *Ambloymma hebraeum* to attach. In a similar study, Hereford breed was found to have the highest susceptibility to tick infestation as compared to Bonsmara and Nguni cows under similar environmental conditions (Scholtz *et al*., 1991). In a study of tick epidemiology in northern Nigeria James-Rugu and Jidaye (2004) found significantly higher values of prevalence of tick infestation among adult than young animals which was explained by differences in size between hosts. The contributing factor to the difference in prevalence of tick infestation between adult and young was attributed to the larger body surface of adults that facilitates increased contact with the environment and hence enhanced exposure to infested environment. Host age was therefore a significant factor in tick infestation.

V. Conclusion

The results of this study indicate that four genera and five species of ticks infested cattle in Gboko L.G.A. They included *A. variegatum, B. decoloratus, R. sanguineus, H. truncatum and H. rufipes*. Climate and movement of Fulani pastoralists with their animals to Gboko L.G.A. were thought to be partly responsible for these variations in prevalence of tick infestation. In the light of these findings it is imperative to include sheep and goats in any tick control programme applied to cattle. The results indicated that it would be feasible to use strategic chemical treatment during the early wet season to break the peak in tick load. The seasonal pattern of tick load found in this study suggests that exotic ruminants could be introduced into Benue State in the dry season, when they will be exposed to relatively low tick burdens. However, this would mean that the animals would be introduced during a period of nutritional stress, and the need of supplementary feeding would increase.

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Table 1: Relative abundance of species of ticks on cattle in Gboko L.G.A.

Species	Number (%) of Ticks	All animals (%)	W.F.	S.Q	Total
A. variegatum	2,452(77.3)	3,701(49.3)	6,153		57.63
B. species	459(14.5)	3,235(43.1)	3,694		34.60
Rh. sanguineus	164(5.2)	343(4.6)	507		4.75
H. rufipes	15(0.5)	69(0.9)	84		0.79
H. truncatum	82(2.5)	156(2.1)	238		2.23
Total	**3,172(100)**	**7,504(100)**	**10,676**		**100**