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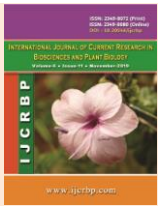

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Tick infestation and haematocrit alteration of cattle in Boklé-Garoua (Northern Cameroon)

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ABSTRACT

Ticks and Tick-Borne Diseases (TBDs) represent a scourge to livestock health and production in Cameroon. Information on their ecology and impact on cattle in the North region of Cameroon which is an important livestock zone of Cameroon is scanty, reason why a cross sectional study in the rainy season was conducted from May to September 2015 in the locality of Boklé-Garoua in the North region of Cameroon with the aim of identifying the different species of ticks and relate tick load with haematocrit. Ticks were collected once a week from six adult cattle and identified using standard keys. In total, 404 ticks were collected and classified under *Amblyomma variegatum*, *Hyalomma truncatum*, *Rhipicephalus sanguineus* and *Rhipicephalus* (*Boophilus*) *decoloratus*. *Hyalomma truncatum* (50%) was the most frequent species, while*Rhipicephalus sanguineus*(1%)was the least. There was a negative and statistically non-significant(r=-0.170, p>0.05)correlation in mean tick load and haematocrit of cattle.The results of this study indicate the occurrence of four species of ticks and their negative but non-significant effect on haematocrit of cattle from the north region of Cameroon. Studies on the diseases transmitted by these vectors are underway and will indicate the impact and need for their control in Cameroon.

Introduction

Ticks are blood-sucking ectoparasites and represent one of the major constraints to livestock production in Cameroon. The North region of Cameroon is an important livestock zone of the country (MINEPIA, 2003). To augment animal production (meat, milk etc)in order to meetwith its national and international demands, it is imperative to fight against ticks and the diseases they transmit. The economic losses inflicted by TBDs is estimated at 30-40 $USA per year (Lew-

Tabor and Rodriguez Valle, 2016). Current reports indicate the occurrence of *Rhipicephalus* (*Boophilus*) *microplus*in Cameroon and reveal the neighbouring Nigeria as its possible source (Mebanga Sassaet al., 2014; Silatsa et al., 2019). This species is economically important worldwide partly because of its ablility to rapidly develope resistance to major chemical classes of acaricides (de La Fuente et al., 2007). It is common in west Africa (Yao-Acapovi et al., 2018; Diaha-Kouame et al., 2019), but few studies have reported its occurrence in central Africa (Mebanga Sassa et al., 2014; Silatsa et al., 2019). Although few reports already exist on the occurrence of ticks in North Cameroon (Mamoudou et al., 2015; Abah et al., 2017), there is need to update on its occurrence and impact on livestock. The presence of ticks and their co-existence with trypanosomes and TBDs in cattle in North and Adamawa regionsled to the alteration of their haematocrit (Mamoudou et al.,2015; Abdoulmoumini et al., 2017). To control ticks in rangelands, there is need to know their species composition, dynamics and impact, reason for which a study was conducted in the locality of Boklé in Garoua in the North region of Cameroon to identify the different species of ticks on cattle as well as correlating tick burden and haematocrit.

Materials and methods

Study area

The survey was carried out at the Garoua National Veterinary Laboratory (LANAVET) animal farm, located in Bocklé village, found in Garoua III District of Benoue Division in the North Region of Cameroon. It is bordered to the north by river Benoue, to the south by the Sanguéré-Goumbai village, to the east by the Sanguéré Ngaoundéré village and to the west by the Djalingo village (Fig.1). LANAVET is 14 Km from the town of Garoua on the Ngaoundéré-Garoua highway. The animals are kept in a semi-intensive husbandry system. The animals from thisresearch lab were chosen because they are kept solely for experimental purposes. The survey was conducted in the rainy (period with high tick numbers) season from May to September 2015.

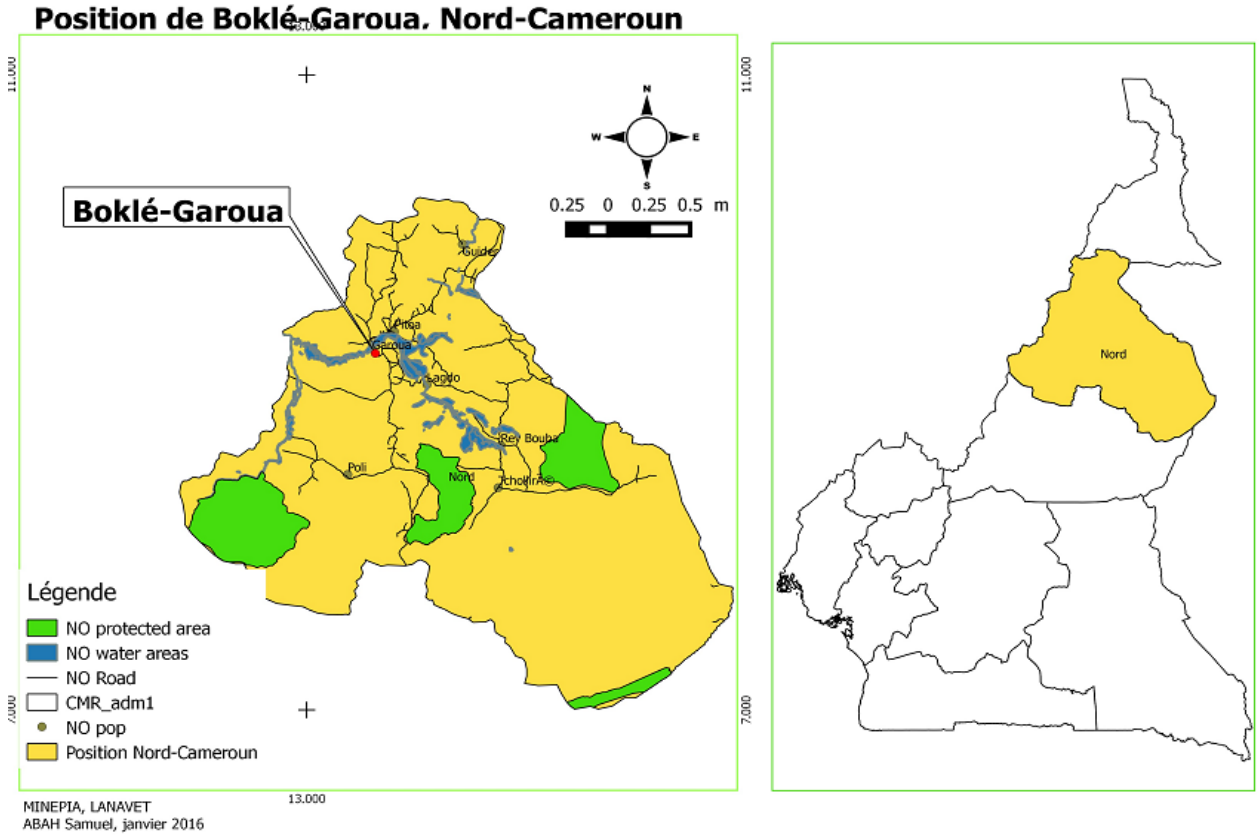

Fig.1: Location of the study area (red star).

Tick collection and identification

Six cattle were used for this study.Tick collection was carried out using blunt steel forceps andthorough examination of the entire body surface of the restrained animal was carried out. Ticks were preserved in tubes containing 70% ethanol. In the parasitology laboratory of the LANAVET, all collected ticks were counted and identified upto species level using a dissecting microscope and following published keys (Walker et al., 2003; Bouattour, 2002).

Blood collection and haematocrit determination

Blood was collected from cattle via the jugular vein during the tick collection days. Blood in the capillary tubes were sealed with 'cristoseal' (Hawksley) and centrifuged immediately in a microhaematocrit centrifuge for 5minutes at 9000revolutions per minute. After centrifugation, the haematocrit was determined using a haematocrit reader.

Statistical analysis

The SPSS (version 17.0) software was used for analysis. The mean number of the tick species with respect to month was compared using one way ANOVA and post hoc turkey test was used to compare the difference between the means. The mean tick number was correlated with mean haematocrit using the Pearson's correlation test. All statistical tests were kept at $p<0.05$ significance level.

Results

In total, 404 ticks were collected from May to September 2015, identifiedand classified under four species notably *A. variegatum*, *H. truncatum*, *R. sanguineus* and *R.*(*B.*) *decoloratus* (Fig. 2 & Table 1). *H. truncatum*(5%) was the most frequent species and *R. sanguineus*(1%)was least represented (Table 1). It was noticed that more males were collected than females, but this was different for *R. (B.) decoloratus* where more females were encountered as compared to their male counterparts (Table 1).

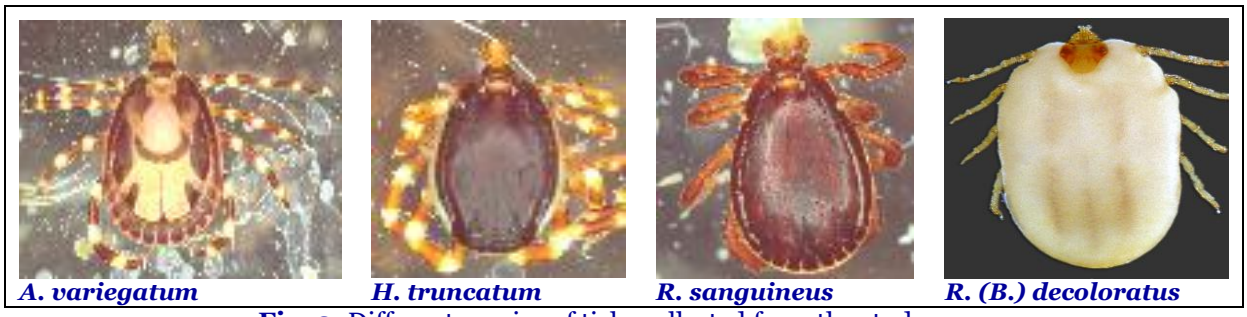

Fig. 2: Different species of ticks collected from the study area.

Table 1. Tick species collected with respect to sex.

Tick species	Male	Female	Total	Frequency (%)
A. variegatum	142	32	174	43
H. truncatum	155	49	204	50
R. sanguineus	1	1	2	1
R. (*B.*) *decoloratus*	1	23	24	6
Total	**299**	**105**	**404**	**100**

Based on the mean number of ticks collected with respect to survey month, the highest was observed in June and lowest in May. All species were present during prospection months except *Rhipicephalus sanguineus* that was only present in May (Table 2). The mean number of *A. variegatum*, *H. truncatum* and *R.* (*B.*) *decoloratus* did not differ across seasons and species. But, *R. sanguineus* showed a statistically significant difference with mean number in May as compared to the other collection months (Table 2). There was a negative and non significant correlation between mean haematocrit and mean tick number (Fig.3).

Table 2. Mean number of ticks collected with respect to prospection month.

Month	Mean tick species ± standard deviation			
	A. variegatum	***H. truncatum***	***R. sanguineus***	***R. (B.) decoloratus***
May	1.17 ± 1.52[a]	0.92 ± 1.3[a]	0.17 ± 0.39[a]	0.67 ± 0.89[a]
June	1.77 ± 1.98[a]	1.31 ± 3.30[a]	0.00 ± 0.00[b]	0.04 ± 0.20[a]
July	1.17 ± 2.36[a]	0.58 ± 1.36[a]	0.00 ± 0.00[b]	0.11 ± 0.40[a]
August	0.42 ± 0.94[a]	1.17 ± 2.18 [a]	0.00 ± 0.00[b]	0.04 ± 0.20[a]
September	0.02 ± 0.14[a]	1.10 ± 2.34[a]	0.00 ± 0.00[b]	0.17 ± 0.56[a]

Similar supersript letters across columns and rows indicate a non-statistically significant difference (p>0.05), while different superscript letters across columns and rows indicate a statistically significant difference (p<0.05).

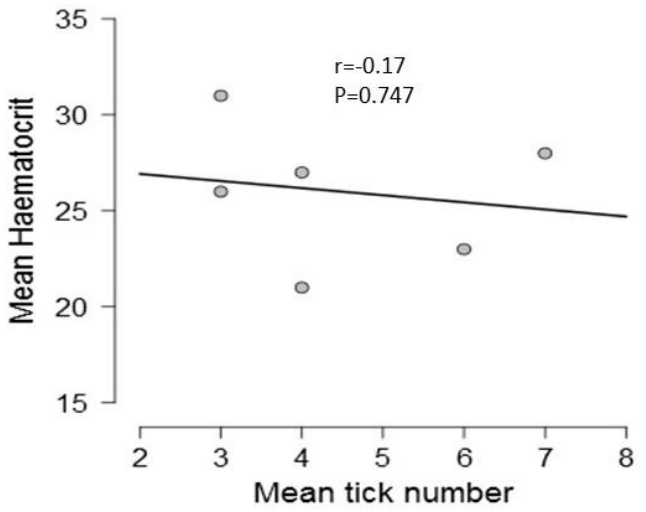

Fig. 3: Correlation between mean haematocrit and mean tick number.

Discussion

The present prospection led to the identification of four species of ticks with *H. truncatum* being the most prevalent of the species encountered. Similar work conducted in Cameroon (Awa et al., 2015; Mamoudou et al., 2015) indicate a low representation of *H. truncatum* and lack of *Boophilus decoloratus*. The number of species encountered in this study are more than those reported by Abah et al. (2017) in the same study area. This could be related to the difference in the study duration in the different studies; as the present study was carried out in five different months while that of Abah et al. (2017) was conducted in one month, indicating a greater chance of encountering higher species in the former than in the latter. The high prevalence of *H. truncatum* in the present collection was contrary to the reports from the same and neighbouring regions of Cameroon (Mebanga Sassa et al., 2014; Mamoudou et al., 2016). The high number of this species could be related to the prevailing favourable conditions for this species during the collection months. However, Dobler-Chitimia et al. (2019) reported that the genus *Hyalomma* is wide spread in Africa. The high prevalence range of ticks on animals during survey was not astonishing because the study was carried out in the rainy season and this season has been reported to favour tick development and survival in several regions of Africa (Mebanga Sassa et al., 2014). High encounter rate was obtained for male ticks than their female counterparts. The gender difference obtained in the present study is contrary to that obtained in studies from Cameroon and elsewhere (Mamoudou et al., 2016; Behroz Davari et al., 2017; Diaha-Kouame et al., 2019). The high population of males was from *H. truncatum* and *A. variegatum* whose population constituted 93% of the ticks collected, indicating that more males for the two species emerged and survived than their female counterparts. The low number of ticks caught during rainy season which happens to be the season that favours tick development could be explained by the fact that the collection was carried out from experimental cattle kept in a semi-intensive management system. According to Mebanga Sassa et al. (2014) and Abah et al. (2017), ticks are highly encountered on cattle in extensive husbandry system than on those in the semi-intensive system. The discrepancy in tick collection with respect to husbandry system can be related to the fact that cattle in the extensive system graze freely and are highly exposed to ticks on pasture surface that they share with infested cattle while those in the semi-intensive system are confined, do not graze freely, and less in-contact with infested animals. There was a negative and non-significant correlation between mean haematocrit and mean tick load. This finding is similar to that obtained by Mamoudou et al. (2015); Abdoulmoumini et al. (2017) who propounded that ticks and co-infection

with TBDs and trypanosomes negatively affected the packed red blood cell volume of cattle. Because the decrease in haematocrit is caused by several factors, tick presence alone without considering the impact of other pathogens and environmental factors will not be sufficient to account for this phenomenon. Despite the high usage of acaricides by herders in the North region of Cameroon, ticks still remain a major problem to them since their occurrence causes production losses and high cost for their control.

Conclusion

This propspection led to the identification of four species of ticks notably*A. variegatum*, *H. truncatum*, *R. sanguineus* and *R.*(*B.*) *decoloratus*. *H. truncatum*was most frequent and important tick species during the study period. There was a negative and non-significant difference between tick number and haematocrit.

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Conflict of interest statement

Authors declare that they have no conflict of interest.

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