

Short communication

Prevalence and infestation load of ixodid ticks of cattle in Dassenech District, Southern Ethiopia

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Abstract

Ticks are harmful blood sucking external parasites of livestock that are distributed in all agro-ecological zones in Ethiopia. A cross sectional study was conducted to identify major tick genera, prevalence and assess tick infestation load on cattle in Dassenech district, southern Ethiopia from October 2014 to June 2015. A total of 384 animals were sampled using random sampling technique. Ticks were collected from different sites including the ear, neck dewlap, abdomen, anus, hip udder, scrotum and base of tail. Of the total examined animals, 72.1% (n=277/384) tick infestation prevalence was recorded. *Rhipicephalus/Boophilus* was the most abundant tick genera (84.64%) among the three identified tick genera in the district followed by *Amblyomma*. There was no statistically significant difference in prevalence of tick infestation among male and female animals ($\chi^2=1.61$; $p=0.205$) as well as age group ($\chi^2=1.30$; $p=0.254$). Animals with poor body condition score had significantly higher tick prevalence (89.47%) than medium (77.48%) and good body condition score (48.74%) animals ($\chi^2=51.6$; $p=0.001$). This finding indicated that there is high prevalence of tick infestation in the area which alarms for further detailed investigation and designing efficient method of tick control in the study area.

Keywords: *Amblyomma*; *Rhipicephalus/Boophilus*; Tick infestation; Tick burden

Introduction

Ethiopia possess huge number of livestock populations with an estimated 57.83 million cattle, 29.33 millions of sheep, 29.11 millions of goats, 1.16 million of camels, 9.86 millions of equines and 56.87 millions of chickens which represent an immense economic potential (CSA, 2015). However, the production and contribution from this massive livestock resource to the country's national income is unduly small due to several factors such as parasites (Hagos *et al.*, 2013). Ticks are very significant and harmful blood sucking external parasites of livestock in the world (Rajput *et al.*, 2006). They are common and widely distributed in all agro-ecological zones in Ethiopia (Bersissa Kumsa and Sileshi Mekonnen 2011; Bersissa Kumsa *et al.*, 2012). Ticks are one of the major hindrances to the productivity of cattle in the country. They reduce milk yield, skin and hide quality, cause a wide range of health problems including udder damage and predispose to mastitis, suppress immunity and increase susceptibility to other diseases. They are reported as one of the major causes of high economic loss with downgrading and rejection of skin and hide that seriously affect the tanning industry of the country as a whole (Tefera Sertse and Abebe Wosene, 2004; Mersha Chanie *et al.*, 2010). Ticks are important vectors for diseases like babesiosis, anaplasmosis, theileriosis, and cowdriosis (heart water) which are major constraints to the improvement of cattle in the developing world particularly the sub-saharan Africa (Tomassone *et al.*, 2012).

Among several tick species widely distributed in Ethiopia, the major tick genera reported are *Amblyomma*, *Rhipicephalus*(*Boophilus*), *Hyaloma* and *Hemaphysalis* (Sileshi Mekonnen *et al.*, 2001) comprising several different tick species (Sileshi Mekonnen *et al.*, 1992; de Castro, 1994). Over 60 tick species are known to exist from these common genera in the country. *Amblyomma* tick is one of the most abundant tick genera and has been reported in many parts of the country, such as Asella (Behailu Assefa, 2004), Hawassa (Mehari Birhane, 2004), Mizan Teferi (Seid Belay, 2004) and Jimma (Yitbarek Getachew, 2004). *Rhipicephalus* is also predominant genera and has been reported in different parts of the country (Pawlos Wasihun and Derese Doda, 2013; Tsegaye Ayalew *et al.*, 2014). The most economically important and widely distributed tick species are *Amblyomma variegatum* and *Rhipicephalus (Boophilus) decloratus* (Pegram *et al.*, 2004). Very limited information on ixodid ticks infesting cattle exists in the study area. Therefore, this current study was carried out with aim to identify tick genera and observe cattle infestation load by the ticks and its prevalence in Dassenech district, southern Ethiopia.

Materials and Methods

Description of the study area

The study was conducted from October 2014 to June 2015 on ixodid ticks of cattle in Dassenech district, southern Ethiopia. Dassenech district is found in southern Ethiopia near the Kenyan border. The district is located 642 km far from the Hawassa and 956 km from Addis Ababa. The district have a total land area of 2,226 square km and bordered by Hammer in the North, Nyangatom district in the west, Borana in East and Kenya in the South. It is located at latitude and longitude of 4°.45'-4°.99' N and 35°.81'-36°.41' E respectively and it has an altitude of about 400 m above sea level (Figure 1). The average annual temperature ranges between 18 to 35 °C and the mean annual rainfall ranges from 350 – 500mm. In the district, rain is erratic and usually bimodal occurring from September to November and from March to May. According to district agricultural office annual report, the area has a total livestock population of 640,500 cattle, 224,537 sheep, 282,427 goats, 22,400 donkeys, 350 camel and 23,412 puoltry. In the district pastoralism is predominantly practiced followed by irrigation agriculture. Cattle are central to their lives and the basis of livelihood that provides meat, milk and income for clothing and other house matters in the area.

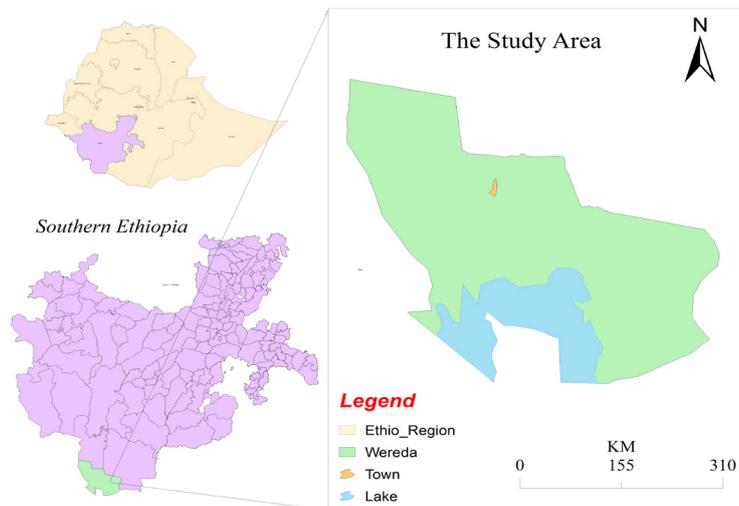


Figure 1. Illustrative representation of Dassenech district, south Omo, Ethiopia.

Study animals

The study was conducted on 384 local breeds of cattle that were kept under traditional management system. The animals depend on free range grazing for their feed sources with very little supplementation of crop residues. The study populations constituted all age and sex managed under extensive production system with indigenous breed dominancy.

Study design and sample size determination

A cross-sectional study was used to investigate the occurrence of adult ixodid ticks infestation on cattle. Animals were sampled by using simple random sampling technique at grazing land, watering point and veterinary clinic found in the district. The age, sex and body condition scores (BCS) of each animal was recorded. The age of the animals were categorized into young (<2 years) and adult (≥ 2 years) as described by Ammanuel Wolde and Abdu Mohamed (2014) and was determined based on owners evidence and dentition estimation. BCS were determined according to Nicholson and Butterworth (1986) for cattle as poor, medium or good body condition. Sample size was calculated using the formula given by (Thrusfield, 2005) for simple random sampling with 50% expected prevalence, 95% confidence interval and 5% desired absolute precision. Accordingly, considering the expected prevalence of 50% and 5% absolute precision with 95% confidence interval, a total of 384 cattle were included in the study.

Tick collection and identification

Visible adult ticks were collected after casting the animals by using thumb forceps and manually without causing damage to the ticks. Ticks were collected from half body region of the animals on different predilection sites including the ear, neck dewlap, abdomen, anus, hip udder, scrotum and base of tail following the procedure suggested by Walker *et al.* (2007). The collected ticks were put in to separate universal sampling bottles containing 70% ethanol, which are labelled according to the site of collection. All ticks collected from different animal body were transported to veterinary clinic of the district and were separately examined under hand lens and microscope using the standard identification keys (Walker *et al.*, 2007).

Statistical analysis

Data was analyzed with descriptive statistics such as percentages and averages. Categorical data were analysed by using Pearson's Chi-square. P-value less than 0.05 were considered significant.

Results

Prevalence of tick infestation

Out of the total 384 examined animals, 277 were positive for ticks with an overall prevalence of 72.13% each animal harbouring at least a single tick (Table 1). Prevalence of tick infestation among male animals was 75.6% (118/156), while it was 69.74% (159/228) in females with no significant difference ($\chi^2=1.61$; $p>0.05$). Similarly, there was no significant difference in tick infestation rate among age group ($\chi^2= 1.3$; $p>0.05$). Cattle with poor BCS showed significantly higher prevalence ($\chi^2=51.6$; $p<0.05$) than cattle with good BCS (Table 1).

Table 1. Prevalence of tick infestations in cattle in relation to risk factors (sex, age and BCS) in Dassenech district.

| Variables | Category | No. of animals examined | No. of animal positive | Prevalence (%) | 95% CI | χ^2 | p-value |
|-----------|----------|-------------------------|------------------------|----------------|------------|----------|---------|
| Sex | Female | 228 | 159 | 69.74 | -- | 1.61 | 0.205 |
| | Male | 156 | 118 | 75.64 | | | |
| Age | Young | 83 | 64 | 77.11 | -- | 1.30 | 0.254 |
| | Adult | 301 | 213 | 70.76 | | | |
| BCS | Poor | 114 | 102 | 89.47 | 0.00-0.008 | 51.6 | 0.001 |
| | Medium | 151 | 117 | 77.48 | | | |
| | Good | 119 | 58 | 48.74 | | | |
| Total | | 384 | 277 | 72.13% | | | |

From the total 277 infested cattle, 1777 ixodid ticks were collected from their different body regions. Three tick genera were identified with a tick burden prevalence of *Rhipicephalus/Boophilus* (84.64%), *Amblyomma* (9.17%), and *Hyalomma* (6.19%) in decreasing order of tick abundance (Table 2).

Table 2. Distribution of Ixodid tick genera count in cattle in the district

| Name of tick genera | No. of tick count | Proportion (%) |
|--------------------------------|-------------------|----------------|
| <i>Rhipicephalus/Boophilus</i> | 1504 | 84.64 |
| <i>Amblyomma</i> | 163 | 9.17 |
| <i>Hyalomma</i> | 110 | 6.19 |
| Total | 1777 | 100 |

Discussion

In the present study, 72.13% overall prevalence of tick infestation was observed in the cattle found in the district. This high prevalence of tick infestation showed that tick is widely distributed and most significant external parasites of cattle in the district. High tick infestation in the area could be attributed to the environmental factors such as humidity that are conducive for the survival and growth of developmental stages and reproduction of ticks. The current finding is in agreement with study by Tamru Tessema (2008) in Asela. Several other reports revealed higher tick infestation prevalence of cattle in different geographic areas of the country such as Meaza Gedilu *et al.* (2014) (74%) in Bahir Dar; Pawlos Wasihun and Derese Doda (2013) (61.98%) and Ammanuel Wolde and Abdu Mohamed (2014) (65.5%) in Wolaita Soddo, southern Ethiopia.

In the current study, the identified genera of ticks in cattle include: *Rhipicephalus/Boophilus*, *Amblyomma* and *Hyalomma*. Similar genera of ticks were identified in different location of the country by different authors (Yacob Hailu *et al.*, 2008; Bersissa Kumsa *et al.*, 2012). Different studies showed that the distribution and abundance of tick genera infesting cattle in Ethiopia vary greatly from one area to another area. *Rhipicephalus/Boophilus* registered higher proportion of tick infestation (84.64%) with significantly different from the later two tick genera in the study. This present finding agrees with other results reported from different regions of the country. Sileshi Mekonnen *et al.* (2007) described that *Boophilus/Rhipicephalus* is the commonest and most wide spread tick in Ethiopia who collected the parasite in most administrative regions of the country. Our result is also in consistent with Tamru Tessema (2008) who reported the highest prevalence of *Boophilus/Rhipicephalus* (80%) in Asela area. This tick is also reported in many other parts of Ethiopia indicating that the tick is highly prevalent (Morel, 1980; Bekele Tafesse, 2002). Sileshi Mekonnen *et al.* (2001) also reported *Boophilus/Rhipicephalus* as the most

common and abundant tick species in Sebeta in western Showa. According to Belew Tiki and Mekonnen Addis (2011), *Boophilus/Rhipicephalus* is widely distributed throughout the country and its distribution is connected with middle height dry Savannas and steppes, in association with zebra and ruminants. Our study is also in line with Ammanuel Wolde and Abdu Mohamed (2014) who reported that *Boophilus/Rhipicephalus* was the first and most common tick collected from bovine in Sodo Zuria district, southern Ethiopia.

Contrary to our finding, Tsegaye Ayalew *et al* (2014) reported that *Amblyomma* was highly encountered tick in central Oromia. This tick is the most economically important tick genera in Ethiopia (de Castro, 1994) because it is an efficient vector of bovine anaplasmosis, red water and transmits spirochaetosis of cattle. It is also a possible vector of *Babesia*, *Rickettsia* and *Theileria*. This tick is the most abundant in many parts of east Africa (Okello-Onen *et al.*, 1999).

Amblyomma was the second widely spread genera with 9.17% prevalence in the district. Previous reports also showed that this tick is also one of the widely distributed cattle tick in Ethiopia (de Castro, 1994; Sileshi Mekonnen *et al.*, 2007). Some species of these tick genera such as *A. varigatum* was reported to be frequently encountered in different parts of the country (Mesele Abera, 1989; Tamiru Tessema and Abebaw Gashaw, 2010; Belew Tiki and Mekonnen Addis, 2011; Mehari Birhane (2004) in Awassa reported *Amblyomma* to be the first most abundant tick species in their study areas. The difference in this result could be due to the geographical location where *Amblyomma* was found in highest number in the highland and high rainfall areas. It is a tick genera with great economic importance because it is efficient vector of heart water, Nairobi sheep disease and Q-fever (Okello-Onen *et al.*, 1999). *Amblyomma* infestation often leads to ulcer formation because the tick has long mouth parts which can inflict a deep painful bite (Wall and Shearer, 1997).

The least tick genera encountered in the present study was *Haylomma* and it accounts only for 6.19% of the total ticks collected. This tick species causes abscesses and sloughing of the host skin and it may also be associated with foot-rot of sheep. It is found in sub-Saharan Africa and rift valley and as far as South Africa. This tick is also commonly found throughout the dry regions of Ethiopia (Okello-Onen *et al.*, 1999) and highly abundant in low lands parts of the country as reported by Mesele Abera (1989).

Conclusion

In the current study *Rhipicephalus/Boophilus* was found to be the most abundant tick genera in the area. It was also found that animals with poor body condition were more infested by ticks than those in good body condition implying possible association of tick infestation with economic loss. Therefore, further detailed study on the economic losses associated with tick infestation as well as designing efficient method of tick control would have great importance.

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