

Full Length Research Paper

Prevalence and identification of major ixodid ticks of cattle in Guder town, West Shewa, Ethiopia

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A cross-sectional study was conducted from April 2018 to June 2018 to determine the prevalence of tick and the associated risk factors and identify major tick genera infesting cattle in Guder town of the West Shewa Zone of Oromia Regional State, Ethiopia. Total 164 cattle under extensive management system purposely from Guder town were selected by systematic random sampling technique and then examined for tick infestation. Adult ticks were collected from different body parts of cattle and identified to genera level in the laboratory. Out of the total of 164 examined cattle, 164 (100%) were found to be infested by one or two genera of ticks. *Amblyomma* and *Rhipicephalus* (*Boophilus*) were the two genera obtained and identified from the study area with a prevalence rate of 89.2 and 66.5%, respectively. Since the entire selected cattle were positive, the prevalence of cattle ticks infestation was not feasible to study the tick infestation with indicated risk factors. The current study concluded a high prevalence of tick infestation in cattle found in the area. Therefore, effective tick control programs should be formulated and implemented in the area.

Key words: *Amblyomma*, cattle, Guder, ixodidae, prevalence, *Rhipicephalus* (*Boophilus*), tick.

INTRODUCTION

Ethiopia has Africa's largest livestock record with an estimated total cattle population of 57.83 million of animals (CSA, 2015). Currently, about 80% of the livelihoods of the rural human population of the country have been based on this livestock (Yacob et al, 2008). The current utilization of hides and skins estimated to be 48% for cattle is accounts for 12–16% of the total value of exports in the country (Asfaw, 1997). However, due to several factors, the contribution that may result from this huge livestock resource to the national income of the country is disproportionately small (Yacob et al., 2008;

Abera et al., 2010).

Tick is a very significant and harmful blood-sucking parasite of mammals, birds, and reptiles throughout the world (Rajput et al., 2006; Sumbria et al., 2016). According to Walker et al. (2003), ticks in Africa with veterinary importance comprise more than fourteen genera. Among these, the most important tick genera in Ethiopia are *Amblyomma*, *Hyalomma*, and *Rhipicephalus* (*Boophilus*) (Regassa, 2000). The environmental condition and vegetation of the country are highly conducive for ticks and tick-borne disease control and

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prevention (Pegram et al., 1981). Ticks are a worldly problem and considered a major obstacle in the health of livestock and products that cause considerable economic losses (Yacob et al., 2008; Abera et al., 2010). As the life cycle of the ticks depends on the animal's host, they cause the retardation of animal growth which results in loss of meat, and milk production, generally affecting the market and decreasing the annual income (Sumria and Singla, 2017). Reduction or loss of productivity which influences the performance and qualities of the animal yield in the area has been caused by tick infestation.

This problem can lead to the reduction of the sector's contribution towards the country's development. Through rejection and downgrading of hides and skins in Ethiopia, a conservative estimate of USD 45,269.35 (1 million ETB) loss was annually made (Pegram et al., 1981; Rahbori et al., 2009).

Although a considerable amount of research has been conducted regarding ixodid ticks infestation in a different part of Ethiopia, it is still relevant to generate periodic and recent information about the prevalence of different and distribution of ticks with the associated factors along with the different parts of the country. However, there was no known research conducted in the past and no published information regarding tick infestation on cattle's population in Guder town.

Tick-borne diseases are the most important diseases of cattle (Salih et al., 2015). However, the animals could have got relief from the disease status when the associated risk factors are identified and appropriate measures or control have been taken. Stakeholders like local communities, veterinarians, governmental and non-governmental organizations, veterinary teaching and research institutes, meat and skin processing organization, animal health institutes, and individuals who are interested to invest in dairy and beef farms have a contribution on the control of tick-borne diseases.

The study aimed to determine the prevalence of hard ticks on cattle in Guder town, assess the significant risk factors contributing to tick infestation among cattle in the area, and identify the primary tick genera affecting cattle.

MATERIALS AND METHODS

Study area

The study was carried out at Guder town of the West Shewa Zone of Oromia Regional State. Gudar is the capital city of Toke Kutaye district and is found 12km from Ambo and 124km from Addis Ababa to the west. The geographical coordinates are located between 10045'N - 10090'N and 37050'E to 40050'E (WOAD, 2013). It has three agro-climatic zones which are named as: highland (temperate/*Dega*) 27, midland (sub-tropical /*WoinaDega*) 55 and lowlands (desert/*Berha*) 18%. The town has a bimodal rainy season per year: the summer, autumn, and spring. Even though mixed agricultural practices (crop production and livestock rearing) are the major means, the livestock sub-sector plays an important role in

the livelihood of the rural people in terms of providing alternative income sources, as a strategy in building resilience to shocks, stress, and also in contributing to their food security of the study area (TKADB, 2015).

Study population

The study animals were cattle of all ages, sex, breed, and body condition scores found in kebele's of Guder town, Toke Kutaye district. The age of the cattle was grouped into three: young (1 to 2 years), adult (3 to 7 years), and old (>8 years) (Abera et al., 2010). During this study, cattle having a prominent dorsal spine (pointed when touched), extremely lean, and individual visible transverse processes were categorized as poor while a medium body condition was for a cattle expressed as having usually visible ribs with little fat cover and slightly visible dorsal spines. But when the animal was observed for fat coverage and was easily seen in critical areas and the transverse processes were not seen or absent in the animal is considered as good body condition score (Nicholson and Butterworth, 1986).

Study design

Through cross-sectional, the study was performed from April 2018 to June 2018, to know the prevalence of ticks with associated risk factors and identification of major tick genera in the study area.

Sample size determination and sampling technique

The formula is given in Thrusfield (2005) was used to determine the sample size. Accordingly, with the expected prevalence of 50% with a 95% confidence interval and 5% desired absolute precision. Hence the sample size was estimated as:

$$n = \frac{1.96^2 P_{exp} (1-P_{exp})}{d^2}$$

Where: n = required sample size p = expected prevalence; d = desired level precision; d = 5%.

The study animals were selected by using a simple random sampling method from 01 and 02 kebeles purposely those were on fields for grazing/ managed extensively. To avoid repeated taking of samples from the same animals the owner name of that animal was recorded.

Tick collection, transportation, and identification

After the selected animals were restrained properly, the entire body surface was inspected thoroughly for the presence of any tick and collected by using forceps from dewlap region, ear, preneal area of the animal body based on their predilection sites. The ticks were removed wisely and gently in a horizontal pull to the direction of animals' body surface. After the collection the ticks were kept in universal bottles containing 70% ethyl alcohol for preservation, and coded with the animal identification, age, sex, and date of collection. The specimens were transported to Ambo University, College of Agriculture and Veterinary Science parasitological laboratory for identification. Ticks were identified to genus level by

using a stereomicroscope, according to their standard identification keys given by Walker et al. (2003).

Data analysis

The data obtained from this study were entered and managed in a Microsoft excel sheet. Data analysis were employed by using SPSS 20.0 version software program. The overall prevalence of tick was determined by dividing the number of positive animals by the total sample size and multiplying by 100. Chi-Square test (χ^2) with computed $P < 0.05$ was used to estimate the statistically significant association of tick infestation with sex, breeds, age and body condition score.

RESULTS

Overall prevalence of ticks in Guder Town

A total of 68 male and 96 female cattle were examined and all of them (100%) male and (100%) female found to be positive with ticks of different genera. This study was carried out in three age groups young (1-2 years), adult (3-7 years) and old (>8 years). A total of 76 young, 71 adults and 17 old age cattle were examined and all of the age groups were found to be positive with different genera of ticks. A total of 11 crosses and 153 local breeds of cattle were examined and all of them from both breeds were found to be positive with different genera of ticks. A total of 33, 92 and 69 cattle with body conditions of good, medium and poor respectively were examined and all of them were found to be infested by different ticks' genera (Table 1).

Common tick genera of cattle in the Guder town

In the study areas, from the collected ticks, *Amblyomma* and *Rhipicephalus (Boophilus)* species were identified. In this study, *Amblyomma* ticks were found to be the most prevalent (89.2%) tick, followed by *Rhipicephalus (Boophilus)* (66.5%) genera in Guder town (Figure 1).

DISCUSSION

In our study, a very high overall prevalence (100%) of two tick genera was registered. The present finding was greater than the reports of Nateneal et al. (2015), Getachew et al. (2014), Meaza et al. (2014) Wolde and Mohamed (2014) and Nigatu and Teshome (2012), with the prevalence of 82, 81.25, 74, 65.5 and 89.4 percent, respectively. This finding is also greater than the reports of Kassa and Yalew (2012) who reported 33.21% prevalence of ticks of different genera in Haramaya district and Tesfahey and Simeon (2013) prevalence of 16.0% ticks in Benchi Maji Zone of the Southern Nations

and nationalities of Ethiopia. The percentage variation in the present study could be due to the distribution of ticks influenced by rainfall, altitude and atmospheric relative humidity. The higher percentage in the present study may be also due to a difference in the season of study, as the present study was conducted in the season in which the tick population rose.

Prevalence of tick infestation in the study areas was the same with the prevalence of (100%) in sex, age, body condition and breed as the entire selected cattle were found positive to tick parasite. This disagrees with the indicated risk factors finding which reports the role of the prevalence of ticks' infestation (Abdeta et al., 2016; Tadesse and Sultan, 2014 and Tamiru and Abebaw, 2010). The difference may be due to study season because the present study was conducted in the season in which ticks infestation is higher. Because, a tick infestation is high during the rainy season (Radiostat et al., 2000) due to the influence of various macroclimatic factors (Singh et al., 2000). So, the chance of getting negative animals is less. The difference may be also due to the management system. Because the cattle selected in the present study were managed extensively. So, in an extensive management system, the chance of getting ticks is higher than in intensively managed cattle (Radiostat et al., 2000).

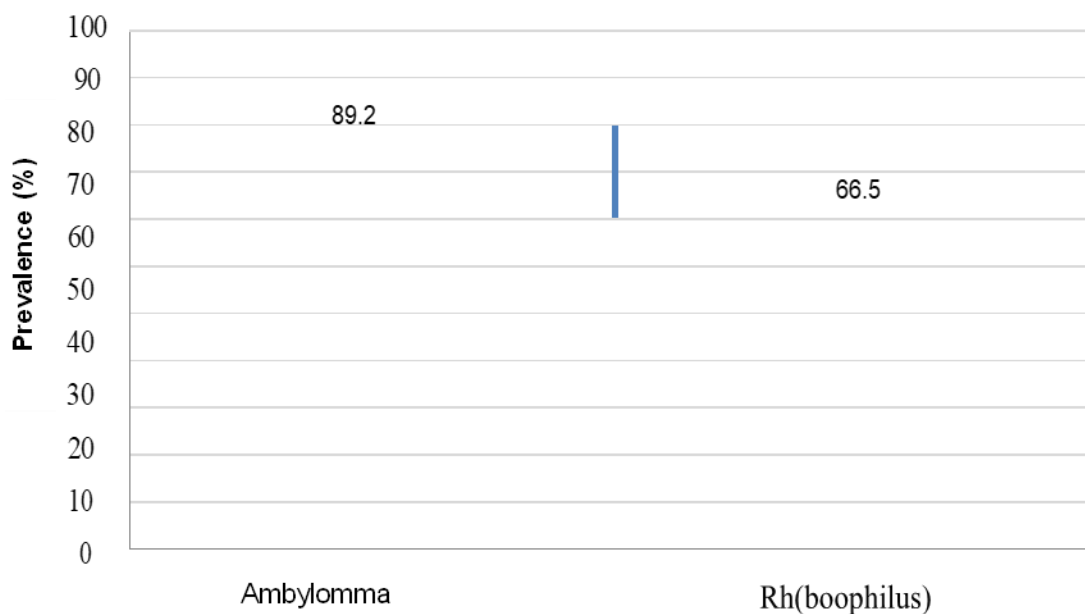
Rhipicephalus (Boophilus) and *Amblyomma* were the two important genera of ticks that were identified during the study period. In this study, *Amblyomma* were found to be the more prevalent (89.2%) tick genus in Guder town. The present finding on the prevalence of *Amblyomma* tick (89.2%) was greater than the report of Abdeta et al. (2016) which reports a low prevalence of *Amblyomma* ticks (25.3%). The prevalence of genus *Rhipicephalus (Boophilus)* (66.5%) tick was greater in this study area which agrees with studies of Tamiru and Abebaw (2010) with a prevalence of 60.1%. The prevalence of genus *Rhipicephalus (Boophilus)* (66.5%) tick was greater in this study disagree with the studies of Kassa and Yalew (2012), Bossena and Abdu (2012) and Sileshe et al. (2007) who reported 47.2%, 45% and 40% prevalence of *Rhipicephalus (Boophilus)* ticks respectively.

CONCLUSIONS AND RECOMMENDATIONS

The study demonstrated a high prevalence (100%) of tick infestation in cattle found in the area which indicates that ticks are the main ectoparasite of cattle in Guder town. Since all the selected cattle were found positive during the study, it is not possible to conclude that sex, breed, management system, body condition and age of cattle as principal determinants for the distribution and abundance of tick in the study area. The most important genera identified during this study period were *Amblyomma* and *Rhipicephalus (Boophilus)* ticks. Among the genera of

Table 1. Prevalence of ticks based on sex, age, body condition and breed

Variable	No. of examined	No. of infected	Prevalence (%)
Sex			
Male	68	68	100
Female	96	96	100
Age			
Young	76	76	100
Adult	71	71	100
Old	17	17	100
Breed			
Cross	11	11	100
Local	153	153	100
Body condition			
Good	33	33	100
Medium	62	62	100
Poor	69	69	100

**Figure 1.** Distribution of hard tick genera of cattle in the Guder town.

tick identified, *Amblyomma* was a relatively more abundant tick genus followed by *Rhipicephalus(Boophilus)* ticks. Therefore, based on the above conclusion the following recommendations were forwarded:

1. Effective tick control programs should be formulated and implemented in the area.
2. Awareness for the animal owner should be created on

management, the effect of ticks, the season in which ticks infestation increase and control methods.

3. Further studies such as the prevalence of ticks to the species level and seasonal dynamics should be conducted in the study areas.
4. Further detailed study on economic losses associated with a tick infestation in the areas should be conducted.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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