

Research Article

A Study on prevalence, identification and status of Ixodid (Hard) Ticks Infestation in cattle in and around Honkola Wabe District

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Abstract

Ticks are one of the best known groups of ecto parasites, which affect the cattle production and productivity either by transmitting different tick borne disease or by affecting health of cattle and as well as the quality of hides. Cross-sectional study design was implemented with the objective to estimate the prevalence of tick infestation and to identify the type tick of cattle in and around Honkola-Wabe woreda of Arsi zone of Oromia regional state, from January 2021 to August 2021. 400 cattle (local and cross breed) were selected using simple random sampling from four randomly selected kebeles; and examined for tick infestation and adult tick were collected for tick identification. From these 292(73%) of the animals were infested with different tick species and 108 (27%) of them were free of tick infestation. The highest number of cattle was infested with *Amblyomma* 160 (40%) followed by *Boophilus* 71(18%), *Rhipicephalus* 48 (12%) and *Hyalomma* 12(3%). There were significant statistically difference between tick infestation prevalence among different factors like breed, age, and sex and body conditions scored. For example, the prevalence rate of tick infested cattle were higher in cross breeds (79.4%) than in local breeds (69.5 %) ($\chi^2=4.57$; $p=0.033$). The result of the current study fills the information gap on prevalence of tick infested cattle of different breeds found in Honkola Wabe area. Tick, therefore, can lead to highly damage the national economic. Thus, in order to provide effective control of tick infestation systematic intervention approach could be implemented that will reduced chance of tick infestation of cattle and thereby improve cattle production.

Introduction

Livestock productions contribute an essential role both for the national economics and the livelihood of rural communities in sub-Saharan African countries like Ethiopia [1]; since they are an important economic, social and cultural uses for rural households to improve income and wellbeing of the rural communities [2]. In addition to this, it is considered as the main source of food as well as insurance against future shocks and stresses. Even though this sub-sector contributes very important input to the national economy, its growth is affected by different constraints in the country. Especially, cattle productions are highly harmed influenced by widespread endemic disease comprising parasitic infestation (endoparasites and ectoparasites), backyard management

system, unimproved genetic potential, lack of veterinary services and adequate infrastructure [3].

Ticks are one of the best known groups of large, obligate, blood sucking ectoparasites of vertebrates, particularly mammals and birds, which are occur in tropical and sub-tropical regions [4,5]. As stated by [6], ticks are found to be one of the most important concerns to the health of cattle in Africa and it comprises about seven genera. From these tick genera, *Amblyomma*, *Boophilus*, *Haemaphysalis*, *Hyalomma* and *rhipicephalus* were found in Ethiopia, which have more than 60 species of tick's record that infest both domestic and wild domestic animals [7].

In Ethiopia, ticks can lead to huge loss to the national economic through both either direct effects by blood sucking



or indirectly as disease and toxin transmitting pathogens and toxins [8]; and also it has damaging effects on the quality hides and skin production [9] and thereby it affect the economy of Ethiopian farmers as well as international markets [6]. The most important and widely spread tick species are *amblyomma variegatum* and *boophilus decoloratus* [10].

Ticks transmit disease of some protozoan, rickettsial and viral diseases; and on the top this, it can predispose cattle to secondary bacterial infections, reduce meat and production of cattle [7]. Anaplasmosis, babesiosis, theileriosis and heart water are the most commonly known tick borne disease [11]; and in addition to this, ticks can cause non-specific symptoms like anemia, dermatitis, toxicosis and paralysis [4].

Different researcher investigated the prevalence of different tick species infestation in different areas of Ethiopia [4,7,12,13]. However, in Honkola Wabe woreda, there is not enough published information in relation to the prevalence of tick genera and species. Therefore, this study was implemented with the objective:-

- To identify the common tick genera and species in and around Honkola Wabe woreda
- To estimate the prevalence of cattle's tick infestation in the study area
- To the association between risk factor and prevalence of tick infestation.

Materials and methods

Study area and period

The study was carried out in Eastern Ethiopia, Arsi zone, in and around Honkola Wabe woreda of Arsi zone of Oromia regional state, from January 2021 to August 2021. Honkola Wabe woreda is located 400Km east of from Addis Ababa at a latitude of 8° 8' North and longitude of 36° 97' East. The climatic condition of the woreda is mainly 'dega'. A total rain fall ranges between 1800 to 2050mm annually and average temperature 11°C to 28°C. The humidity attains highest (98%) in summer and lowest (15-25%) in winter annually. The production system of the woreda is crop-livestock production system, from the total woreda population, 89% engage in agriculture and livestock production.

Study population

The study was conducted on 400 local and cross breeds of cattle found at four randomly selected kebeles. The study populations constituted cattle with different age groups, sex, breed, and body condition categories that managed under extensive and semi-extensive production system, in which cattle were kept under backyard management practices and free range grazing for their feed sources with very low supplementation crop residues. None of all animals included in this study had been received tick treatments for at least one month at the time of sample collection.

Study design

Cross-sectional study design was carried out from January 2021 to August 2021 to investigate the occurrence of the main tick species and to estimate its prevalence. Simple random sampling technique had been applied to selected study animals and the tick was collected by considering favorable predilection area. For each selected animal, age, breed, sex and body condition categories was identified. All animal were classified based age as young, medium and old age and body condition as poor, medium and good body condition score [14]. Animal categorized into young (<2 years), adult (cattle of >2, and ≤ 8years) [15] and old (>8 years) [16] and was determined based on owners evidence and dentition estimation

Sampling techniques and sample size

A simple random sampling technique was used to select study animal. A total number of animals required for the current study can be calculated based on the equation given by Thrust field [17]. Sample size was calculated by using 50% expected prevalence since there is no study was done in the study area. For this study, the desired sample size was computed by using 95% confidence interval at absolute precision of 5%.

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

Where: n = Sample size of the study population, d = desire absolute precision, P_{exp} = Expected

Prevalence, Z= 1.96

$$n = \frac{1.96^2 * 0.5 * 0.5}{(0.05)^2}$$

n = 384. Additional 16 cattle is added to the sample and make sample size was 400 cattle

Sample collection (tick), preservation and identification

After properly restrain all selected study animal, examination of animal for the presence of tick was done from head to tail including legs on the body of the cattle. Ticks were gently removed from the bodies of the animals by brushing their hair with fine comb as described by [18]. For tick collections, the half body of selected animal on alternative sides was made.

From different sites on the body of animal were collected includes dewlap, head, udder/scrotum, belly, anus/anal area, brisket, shoulder, sternum, thigh and teat [19]. During the tick collection the animals were handled properly, the ticks should be collected without damaging and injuring the animal body. To loosen the attachment of the ticks from the body surface the ethanol was used as described by [15].

After collection, the samples were coded, and then preserved in separated pre-filled universal bottle containing



70% ethanol by considering their site of collection. Finally, important information, regarding date of sample collections, area of collection, site of collection, species and breed of host cattle were registered and immediately transporting sample to Honkola Wabe veterinary laboratory. Identification of tick genus and species was performed using stereo microscope; and the half body tick count were double to get the whole body tick burden as state by [20]. The additional in the laboratory; Petridish, props, identification key and color print picture of different tick species were used.

Data analysis

Data collected during study period were stored and coded in Microsoft Excel 2007 spreadsheet and data was summarized using descriptive statistics such as percentages and averages. Prevalence was, define as a proportion of cattle infested by tick to the number of total sample size. Analysis was done by Stata/SE version 14.0 software using person's chi-square (χ^2) test to investigate the statistically association between hypothesized risk factors such as age. Breed, sex and body condition categories. P-value less than 0.05 were used as statistical significance.

Results

In this study, total 400 cattle comprising local and cross breed were observed to detected tick infestation. From these 292(73%) of the animals were infested with different tick species and 108 (27%) of them were free of tick infestation. From tick infested animals, the sample was collected from different body site and identification done at laboratory. Ticks belonging to four genera: *Amblyomma* 160 (40%), *Boophilus* 71(18%), *Rhipicephalus* 48 (12%) and *Hyalomma* 12(3%) were identified (Table 1).

The four tick species were identified and categorized under four genera. The highest number of animals were infested with *A.cohaerens* (40%), *B.decoloratus* (18%) *A.gemma* (*R.evertsievertsi* (12%) and *H.truncatum* (2%) respectively as shown in (Table 2).

Risk factors

The relationship between tick infestation prevalence and different risk factors were displayed by Table 3. All risk factors were found to be statistically associated significant with tick infestation prevalence. Tick infestation prevalence was higher in cross cattle breed (79.4%) than that of local breed of (69.5%). Similarly, tick infestation prevalence was found to be higher in cattle with poor (98.8%) and medium body scored (46.2%) than good body conditioned (31.3%) (Table 3).

Predilection site

In this study the preferred attachment sites of ticks was investigated. The results showed that various tick species have relatively different predilection sites. The most preferred attachment sites for most tick species was included dewlap, belly, anus, brisket, thigh, sternum, groin, teat, head and scrotum as shown below (Table 4).

Table 1: The percentage of cattle's tick genera in the study area.

Genus	Total number of cattle infested	Prevalence
<i>Amblyomma</i>	160	40
<i>Boophilus</i>	72	18
<i>Rhipicephalus</i>	48	12
<i>Hyalomma</i>	12	3

Table 2: Relative number of various tick species from cattle at study site.

Tick species	Number observed	Proportion (%)from total sample size
<i>B.decoloratus</i>	72	18
<i>R.evertsi evertsi</i>	48	12
<i>H.truncatum</i>	12	3
<i>A.variegatum</i>	160	40

Table 3: Tick infestation prevalence in relation to risk factors (sex, age, body condition score & breed).

Parameter	No of cattle observed	No of cattle infested	Proportion (%)	p-value
Sex				
Male	199	199	100%	0.001
Female	201	93	46.3%	
breed				
Local	259	180	69.5%	
Cross	141	112	79.4%	0.033
Body condition				
Poor	229	225	98.3%	0.001
Medium	91	42	46.2%	
Good	80	25	31.3%	
Age				
Young	109	102	93.4%	
Adult	201	142	70.1%	0.009
Old	90	48	53.3%	

Table 4: Majorly Preferred attachment sites of ticks observed during the study period.

Attachment site	Number of infected animals	Percent
Dewlap	68	17
Scrotum	50	12.5
Groin	45	11.3
Sternum	49	12.5
Brisket	30	7.5
Belly	25	6.3
Teat	15	3.8
Head	10	2.5

Discussion

In the present study, 73% of the study animals were infested with one or more tick genera. This is consistent with a previous report of [5] in Dassenech district with overall prevalence of 72.13%. *Amblyomma variegatum* (40%) was found to be the most abundant in the study area, and followed by



B. decoloratus (18%), *R.evertsi evertsi* (12%) and *H.truncatum* (3%), respectively. However, their distribution and abundance can be vary from place to place due to different factors such as annual rainfall, relative humidity, atmospheric temperature, vegetation cover, altitude and host availability [12].

The present study has shown that *Amblyomma* (40%) was one of the most dominantly widely distributed tick genera in the study. This finding is similar with [13] whose report prevalence of 39.7% in five selected kebeles of Damot Woyde of Wolaita sodo. These might be due to mean monthly humidity and temperature records of the study area were conducive for *Amblyomma* reproduction and survival. However, this finding is less than that of report of Hussien (2009) who report 54.3% of prevalence in Western Showa. But, the current finding is higher than the previous report of [21,22], their prevalence was 18.13% and 15.4% in and around Holeta and Asella, respectively. This finding variation may be the result of climatic difference between the study areas.

The prevalence of tick infestation with *Rhipicepalus evertsi evertsi* was the third abundant in the study area. This finding is inconsistency with that of [23] who reported 33.9% of prevalence in their study area and it was the second most abundant tick species. This finding variation may be the result of climatic difference between the study areas. The present study area is colder than that area; this may lead low prevalence of *Rhipicepalus evertsi evertsi* due to less comfortable for tick reproduction. With this respect, Tessema and Gashaw (2010) was report as a second most abundant with prevalence 22% in and around Asella town. This result finding variation could be a result of the variation between the study area, like altitude, latitude and their effects (Sunlight, rainfall and wind patterns) which affect the distribution of tick and their activity as stated by [24].

In the current finding, *B. decoloratus* (18%) was the second widely distributed species of tick. This current finding is disagreement with that of [22] that show the third abundant tick with the prevalence of 15.4% in and around Asella town.

In the present finding, the prevalence of tick infestation cross breed cattle (79.4%) was higher than local breeds (69.5%). This variation could be a result of less genetic resistance for any disease condition in cross breed cattle than local breed. This means local breed are less susceptible to tick borne disease and may be this differences due to noted difference between strains or families. This agrees with finding of [13].

The present study shown that the cattle with poor body condition score (98.3%) was higher infested by tick than medium (46.2%) and good body condition (31.3%). This is due to poor body scored cattle have low body resistance and thereby higher predisposed to tick problem. This finding is disagreement with finding of Chumburo and Bayou (2021).

The present result shows that the prevalence of tick infestation was higher in male cattle (100%) than females (46.3%). This current finding is inconsistency with [23] who reported 42.2% and 37.6% of prevalence in female and male cattle, respectively.

Conclusion

In this study, different tick genera that affecting cattle, their site of attachment, in relation to breed, sex, and age of cattle was identified in and around Honkola Wabe woreda. The result showed that significant proportions of cattle were infested by ticks. This can show immense economic losses can be occurred due to by transmitting different tick borne disease, by affecting health of cattle; and by affecting the quality of hides. Most abundant tick species in the woreda is *Amblyomma variegatum* (40%) followed by *B.decoloratus* (18%), *R.evertsievertsi* (12%) and *Hyalomma truncatum* (2%). The level of infestation was higher in male cattle compared to female, cross breed than local and young animals were more infested than aged animals. The preferred attachment sites were dewlap, scrotum, groin, sternum, brisket, bell, teat and head. Based on the current findings in study area in order to provide effective control of tick infestation systematic intervention approach could be implemented that will reduced chance of tick infestation of cattle and thereby improve cattle production. Therefore, the following recommendations are forwarded:-

- Strategic control of ticks using acaricides based on seasonal dynamics of ticks is required
- Strengthening veterinary service delivery in the study area
- Use less susceptible cattle breed to tick infestation in the study site that is very important to reduce the problems.
- Tick population dynamics and epidemiological picture of the tick infestation in the area should be studied in detail
- Enhancing the awareness of farmers through continuous education on the problem of tick and how to solve the problem.

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