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 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 infected 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 ambyloma 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 thick 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 ≤8 years) [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%.

\[
\frac{Z^2 \cdot P_{exp} \cdot (1 - P_{exp})}{d^2}
\]

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

Prevalence, \( Z = 1.96 \)

\[
\frac{1.96^2 \cdot 0.5 \cdot 0.5}{(0.05)^2}
\]

\( n = 384 \). 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 prefixed 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 laborator; 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 (x²) 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: \textit{Amblyomma} 160 (40%), \textit{Boophilus} 72 (18%), \textit{Rhipicephalus} 48 (12%) and \textit{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 \textit{A. cohaerens} (40%), \textit{B. decoloratus} (18%) \textit{A. gemma} (R. evertsievertsi (12%) and \textit{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).

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%. \textit{Amblyomma variegatum} (40%) was found to be the most abundant in the study area, and followed by...
B. decolaratus (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 Hussen (2009) who report 54.3% of prevalence in Western Shewa. 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 *Rhipicephalus evertsi evertsi* was the third abundant in the study area. This finding is inconsistence 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 *Rhipicephalus evertsi evertsi* due to less comfortable for tick reproduction. With this respect, Tsesma and Gashaw (2010) was report as a second most abundant with prevalence 15% 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. decolaratus (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 showed 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 inconsistence 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. decolaratus* (18%), *R. evertsi evertsi* (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.

References

1. Moyo SB, Swanepoel F (2010) Multi functionality of livestock in developing communities. and the role of livestock in developing communities. The Technical Centre for Agricultural and Cooperation and University of the Free State 345-356. Link: https://bit.ly/3rHg23N

2. ILCA (International livestock center for Africa) (1998) Animal reproduction for African countries, report of a joint semin by international foundation for science and Swedish international program on animal production ILCA, Addis Ababa, Ethiopia.

3. Ayele S, Assegid W, Belachew H, Jabbar M, Ahmed M, et al. (2003) Livestock marketing in Ethiopia: A review of structure, performance and development initiatives. Socio-economic and Policy Research Working Paper 52. International Livestock Research Institute, Addis Ababa, Ethiopia. Link: https://bit.ly/3DXyD6G

4. Solomon G, Night M, Kaasa B (2001) Seasonal varetion of tick on calves at Sebeta in Weastern Shewa Zone. Ethio Vet Jour 7: 17-30. Link: https://bit.ly/3r3nRsRg

5. Olwoch JM, Revers B, Van Jaarsveld AS (2009) Hostparasite distribution patterns under simulated climate. International Journal of Climatology 29: 993-1000. Link: https://bit.ly/3cDo4V8

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6. Walker AR, Bovattour JL, Camicas IG, Horak A, Latif A, et al. (2003) Ticks of domestic animals in Africa: A guide to identification of species. Bio Science Report. Link: https://bit.ly/3DMFY3

7. Feseha GAB (1983) Notes on tick species and tickborne diseases of domestic animals in Ethiopia, AAU, FVM.

8. Bekele J, Tarikua M, Abebe R (2011) External parasite infestation in small ruminants in Wolmera district, Oromia region, Central Ethiopia. J Anim Vet Adv 10: 518-523. Link: https://bit.ly/3nJOKtL

9. Kassa B (2005) Standard Veterinary Laboratory Diagnostic Manual. Veterinary Diagnostic Laboratory, College of Veterinary Medicine at the University of Illinois, Urbana IL, 1: 23-30.

10. Abebaw G (2004) Seasonal dynamics and host preference of Boophilus decoloratus on naturally infested cattle in Jimma zone, South Western Ethiopia. Ethiopian Veterinary Journal 18: 19-28. Link: https://bit.ly/3oXgSsV

11. Gebre S, Nigist M, Kassa B (2001) Seasonal variation of ticks on calves at Sebeta in western Shewa Zone. Ethiopian Veterinary Journal 7: 17-30. Link: https://bit.ly/3xeByQE

12. Kewal J, Aberra T (2017) Prevalence and infestation load of ixodid ticks of cattle in Dassenech District, Southern Ethiopia. Ethiop Vet J 21: 121-130. Link: https://bit.ly/3cGUYUY

13. Tadesse B, Woldehana T (2019) Prevalence and associated risk factors of tick infestation on cattle in selected kebeles of Damot Woyde Woreda, Wolaita zone, Southern Ethiopia. Int J Adv Res Biol Sci 6: 114-121. Link: https://bit.ly/3l1btji

14. Meion N (1989) Body condition scoring of cattle in Ethiopia. Ministry of Agriculture and Rural Development, Ethiopia 129-146.

15. Kabir MH, Mondal H, Elyias Mannan MA, Hashem MA, debnath NC, et al. (2011) An epidemiological survey on investigation of tick infestation in cattle at chittagong district, Bangladesh. African Journal of Microbiology Research 4: 346-352. Link: https://bit.ly/3ot2Jk7

16. Tewodros A (2007) Prevalence of lung worm in small ruminants in Mecho. Vet Techn (Unpublished) 12-55.

17. Thrusfield M (2018) Veterinary Epidemiology. 4th ed. John Wiley and sons Ltd, The Atrium, South Gate, Chicester, West Sussex, UK 219-435.

18. Ekanem MS, Mbagwu HO, Opara KN, Agbata QC (2010) Ticks infestation of Domestic stick dogs (Canis Familiaris lupu) in Uyo Akwa Ibom scale. Nigeria. World Journal of Applied Science and Technology 2: 91-196. Link: https://bit.ly/3oST1Km

19. Arong GA, Shitta BK, James-Rugiu NN, Effanga EO (2011) Seasonal variation in the abundance and striation of ixodid ticks on mongrel, Alstatian and mixed breeds of dogs (canis familiaris) in Jos, in plateau state, North central, Nigeria. Nigerian Journal of Parasitology 5: 65-87.

20. Kaiser MN (1987) Ethiopia, Report on tick taxonomy and biology, Consultant report. Food and Agricultural Organization of the united Nations 92.

21. Tessaema T, Gashaw A (2010) Prevalence of ticks on local and crossbred cattle in and around Asella town, southeast Ethiopia. Ethiop Vet J 14: 79-89. Link: https://bit.ly/3cVkJpH

22. Belew T, Mekonnen A (2011) Distribution of ixodid ticks on cattle in and around Holeta town, Ethiopia. Global Veterinaria 7: S27-S31. Link: https://bit.ly/2Zd6T9M

23. Chumburo M, Bayou K (2021) Prevalence and Identification of Ixodid Ticks on Cattle in and Around Hawassa town, Southern Ethiopia. Int J Adv Res Biol Sci 8: 119-125. Link: https://bit.ly/3G5k9B3

24. Ammanuel W, Abdu M (2014) Prevalence of ixodid ticks of Ixodid Ticks on Bovine in Soddo Zuria Districts, Wolaita Zone, Ethiopia. Acta Parasitologica Globalis 5: 188-197. Link: https://bit.ly/30OJtbQ