



Study on Assessment of Tick Infestation on Cattle in Selected Sites of Fedis District, Eastern Ethiopia

Dr. Megersa Mahammed Musa

Agricultural resource and rural development sector of Fedis district, Eastern Hararghae zone, Ethiopia

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ABSTRACT

Background: Tick infestation is the major problems for animal health that causes loss of animal production and economy at individual and country level.

Objectives: To determine the prevalence and risk factors associated with tick infestation, and to identify genera of ixodid tick in cattle in the study area.

Methods: A cross-sectional study was conducted on 384 cattle using simple Randal sampling techniques to address the objective of the study.

Results: Out of 384 cattle tested, 290(75.50%) were found to be positive for tick infestation. The prevalence of tick infestation among sex, age, and body condition was statistically significant ($\chi^2=35.56, p=0.0000, \chi^2=46.72, p=0.0000, \text{and } \chi^2=20.96, p=0.0000$), respectively. A total of 1920 adult ticks were collected and 2 genera were identified from the study areas. The prevalence of each genera was *Amblyomma*(63.90%) and *Rhipicephalus*(36.10%).

Conclusion: The present study shows high prevalence of tick infestation which still causing health problem of cattle in the study area. There fore, the out comes of this study will be useful in the planning of integrated control strategies in tick infestation and as base line data for future studies in the area.

Keywords: Cattle, Prevalance, Random sampling, Risk factors, Tick

1. INTRODUCTION

Livestock products and by-products in the form of meat, milk, honey, egg, cheese, and butter supply the needed animal protein that contribute to the improvement of the nutritional status of the people(CSA,2016). Livestock also play an important role in providing export commodities such as live animals, hides and skins to earn foreign exchanges to the country(Tamiru,2017). However, the livestock contribution for the economic aspect of the country is still lowest amount and diseases can be considered as major constrain(Negash,2016).

About 80% of the world cattle population is at risk of tick and tick borne diseases, causing a global annual loss of \$u22-30 billion(Nyangiwe et al.,2018). Ticks are one of the most important ectoparasites of cattle which cause serious economic loss through mortality of animals, decreased production, down grading and rejection Of skin and hide(kemal et al.,2016). Ticks are the most important external parasites of cattle which are known to transmit more pathogens than any other groups of arthropods world wide(walker et al., 2003; Nyangiwe et al., 2018).According to (Bariso and warku, 2018 ; Tamiru, 2017) tick borne haemoparasitic diseases of ruminant such as anaplasmosis, babesiosis, and theileriosis present in Ethiopia and remain most important in tropical countries .

The main tick genera found in domestic animals of Ethiopia are *Amblyomma*, *Hyalomma*, *Rhipicephalus*, *Boophilus*, and *Haemaphysalis*(Negash, 2016). Ticks are widely distributed throughout the world particularly in tropical and sub-tropical countries(Nasero and Robs,2020). According to (Negash, 2016; Kemal andAbera, 2017) ticks are distributed in all agro-ecological zones in Ethiopia. Environmental and climatic factors such as temperature, rain fall, relative humidity, vegetation and host availability influence tick distribution(Estrada-pena, 2015).

In Ethiopia, a number of authors reported burden, abundance and distribution of tick genera and species in different parts of the country. However, there was no any research conducted and published information in the past regarding the prevalence and distribution of tick in cattle in this areas. Hence, it is crucial to obtain accurate and precise information to estimate the prevalence and distribution of tick as base line data for future studies in the area. Therefore, the objective of this study was

1. to determine the prevalence and associated risk factors with tick infestation,
2. to identify the common tick genera on cattle in the study area.]

2. MATERIAL AND METHODS

2.1. Study Sites

The study was conducted from October 2020 to June 2021 in Fedis district, eastern Hararghae zone. The district has latitude 8° 22' and 9° 14' north and longitude between 42° 02' and 42° 19' East, in middle and lowland areas. The altitude range is from 1200 to 2100 m.a.s.l meters, with prevalence of lowlands. The area receives average annual rain fall of 650-900 mm and the minimum and maximum temperature of the area is 20-25°C and 30-35°C, respectively (CSA, 2013).

2.2. Study animals

Study animals were local breed cattle that originated from different location.

2.3. Study design

A cross-sectional study was conducted to address the objectives of the study in the area. Four peasant association of the district namely: Boko, Malka, Anani, and Bobbasa were selected for sampling sites based on accessibility and willingness of the owners.

During the study time, the study animals were categorised into three as young, adult and old age. The age of studied animals were estimated based on dentition pattern. whereas body condition score were grouped into poor, medium and good body condition animals (Nicholson and Butterworth, 1986).

2.4. Sample size determination

In this study area, there was no previous study conducted on ticks in cattle. Therefore, it is possible to assume 50% prevalence of tick infestation in the area to determine sample size. By using 50% prevalence with 5% desired level of precision and 95% of confidence interval, the desired sample size for the study was calculated by the formula given by (Thrustfield, 2005).

$$N = \frac{(1.96)^2 p_{exp}(1-p_{exp})}{(d)^2}$$

Where. N= required sample size

P= expected prevalence

D= desired absolute precision which is 5% .

Accordingly, the sample size (n) was determined as n= 384. Therefore, sample size of 384 cattle was examined in the study.

2.5. Sampling methods

Simple Randal sampling methods was subjected on the study population and the animals within the selected sites were selected and examined randomly.

2.6. Study methodology

All the selected cattle were casted to the ground and one half of the body was searched fully for the presence of adult ticks. All adult ticks were collected and preserved in universal bottles containing 70% ethyl alcohol and labeled with the animal identification such as date of collection, species of host, sex, age, origin, and body condition of the animals. Finally, tick specimens were transported to laboratory and were counted and identified to genus level based on standard identification keys given by Latif and Walker (2004) and Walker et al. (2003).

2.7. Data analysis

The collected data was entered on Microsoft excel spread sheet 2007 and was analyzed by using statistical package for social science version 20. Descriptive statistics was used to determine the prevalence of tick infestation and chi-square (X²) test was used to assess statistical significant association between tick infestation and host risk factors. P<0.05 was considered statistically significant where as p>0.05 was considered statistically in-significant.

3. RESULTS

3.1. Overall prevalence of tick infestation

Out of the 384 examined animals, 290 animals were positive for ticks yielding an overall prevalence of 75.50% (Table 1). The prevalence of tick infestation within different peasant association were: Boko(68.50%), Malka (70.80%), Anani(80.60%), and Bobbasa(82%)(Table 1). The variation in prevalence of tick infestation between peasant association might be due to difference in sample size collected and geographical location.

3.2. Risk factors associated with tick infestation.

The statistical analysis was done for the prevalence of tick infestation with risk factors such as sex, age, and body condition score of animals as follows: **Sex:** sex-wise prevalence was 86.80 and 60.40% in female and male, respectively; there was statistically significant ($p < 0.05$) association between tick infestation and sex of animals (Table 2).

Age: age-wise prevalence was higher in adult (90%) than young (70.50%) and old age groups (52.40%); there was statistically significant ($p < 0.05$) association between age and tick infestation (Table 2).

Body condition score: There was statistically significant ($p < 0.05$) association between body condition score and tick infestation; higher tick infestation was seen on poor body (87.50%) than medium body (75%), and good body condition animals (59.50%) (Table 2).

3.3. Identified tick genera

Of the total 1920 adult ticks collected, 2 genera were identified.

Genera: The tick genera identified in this study were *Amblyomma* (63.90%) and *Rhipicephalus* (36.10%). *Amblyomma* (63.90%) was the most abundant genus followed by genus *Rhipicephalus* (36.10%) in this study (Table 3).

Table 1 - Over all prevalence of tick infestation based on origin.

Origin	Tested	Positive	Prevalence
Boko	92	63	68.40%
Malka	94	66	70.20%
Anani	98	79	80.40%
Bobasa	100	82	82%
Total/overall	384	290	75.50%

Table 2. Prevalence of tick infestation based on risk factors.

Risk factors	Categories	Tested	Positive	Prevalence	P-value	Chisquare
Sex	Male	164	99	60.40%	0.0000	35.56
	Female	220	191	86.80%		
Age	Young	120	84	75.50%	0.0000	46.72
	Adult	180	162	90%		
	Old	84	44	52.40%		
Body condition score	Poor	120	105	87.50%	0.0000	20.97
	Medium	180	135	75%		
	Good	84	50	59.50%		
Total		384	290	75.50%		

Table 3 . Prevalence of tick genera in study area.

Genera	Positive	Count	Prevalence
<i>Amblyomma</i>	167	1227	63.90%
<i>Rhipicephalus</i>	123	693	36.10%
Total/overall	290	1920	100%

4. DISCUSSION

A total of 384 cattle were examined, of which, 290 cattle were infected by tick with over all prevalence of 75.50%. This finding is agreement with the finding of Kemal and abera (2017) in dassenech district, chumburo and Bayou (2021) In and Around Hawassa town, assefa et al. (2017) in horoguduru district who reported over all prevalence of 72.10, 77.1 and 78.23%, respectively. However, this prevalence was lower than the report of gudinaet al. (2016) in and around Gambella town, and dabaso et al. (2017) in Dillo district of Borana zone who reported an over all prevalence of 89.50 and 98.20%, respectively. this prevalence was higher than the report of Fessaha and mathewos (2020) in Hosana District, Hadiya Zone who reported an over all prevalence of 29.4%. This difference in prevalence of tick infestation could be due to difference in geographical location of the study area.

Statistically significant difference in prevalence was observed in animals with different sex, age and body condition groups. The high infestation was recorded in female compared to male with prevalence of 86.80 and 60.40%, respectively. This result is compatible with previous researchers who revealed heavy infestation of tick in female (Taffese and Amante, 2019). The high infestation of tick in female compared to male animals might be due to low immunity resulted from stress production. The age wise tick prevalence of the current result showed that there was high infestation of tick was recorded in adult (90%) than young (70.50%), and old (52.40%) age groups. This finding was compatible with the previous work of Tegegn and Amante (2020) who reported the higher prevalence in adult (35.8%) than old (27.3%), and young (16.50%) age groups. The higher infestation of tick in adult age groups as compared to young and old age group is probably associated with out door management of adult animals as compared to other age groups

which exposed them to infestation where as young and old animals were managed in-door in current study area. The prevalence of tick infestation was higher in poor body conditioned (87.50%) as compared to medium (75%) and good (59.50%) body conditioned animals. This finding was compatible with previous researchers such as Nasero and Roba (2020) in Ethiopia, Bayisa and Duguma (2022) in and Around Ambo District, West Shoa Zone, Gebre and Uro (2019) in selected kebeles of DamotWoyde woreda, Getiso and Geinoro (2019) in Sodozuria districts of Wolayita zone who revealed similar result. The higher infestation of tick in poor body conditioned animals could be due to reduced immunity and less resistance against infestation of tick as compared to other body conditioned animals.

From 1920 collected adult ticks, 2 genera were identified. The identified genera were *Amblyomma*, and *Rhipicephalus* with prevalence of 63.90, and 36.10% , respectively. This result is compatible with reports done by other authors in different area such as shamsu (2020) in kersa district, Eastern Hararghae zone, hordofa et al. (2021) in cattle in and around HonkolaWabe District, Fesseha et al. (2021) in Dasenech and Salamago District, Southern Ethiopia, Gebre and Uro (2019) in Damotwoyde, and Darza et al. (2021) in Soddozuria district. Contrary to our finding, Taffese and Amante (2019) in gutogida district, Namomsa and Morka (2019) in jardegajartedistrict , and Dabaso et al. (2017) in Dillo district of Borana zone reported that *Rhipicephalus* was the first abundant genera and followed by genus *Amblyomma* and *Hyalomma* .This variation in abundance of tick could be due to difference in geographical location and season. It has been explained that agroecological systems and season play great role in the variation in distribution and abundance of tick (Adugna and tamrat, 2022). In addition to this, Estrada-pena (2015) explained that the distribution and abundance of tick are influenced by temperature, rain fall, relative humidity and vegetation of an area .

5. CONCLUSION AND RECOMMENDATIONS

Tick infestation in cattle were found highly prevalent in Fedis district. The present study revealed that sex, age, and body condition of the animals significantly associated with the prevalence of tick infestation. Two genera of ticks namely *Amblyomma*, and *Rhipicephalus* were identified and recorded. The presence of high prevalence of tick infestation, still cause the problem and reduce productivity of cattle in the area. There fore, integrated and effective tick controlling programs should be formulated and implemented in the area.

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CONFLICTS OF INTEREST

The author has declared that there is no conflict of interest.

Ethics Approval

For this study, verbal agreement was obtained from Fedis district Agricultural Resource and rural development sector and owner of animals.

Author Contributions

The author contributed to the conception and design of research; collection, analysis and interpretation of data. Finally, drafting and revising current manuscript to be published.

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