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Research Article

Prevalence of Bovine Ticks in and Around Mendi Town, West Wollega, Oromia, Ethiopia

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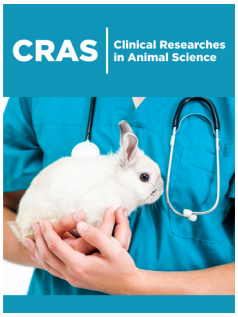

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Abstract

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 Menesibu district West Wallaga zone Oromia regional state. A total of 384 animals were sampled using random sampling technique. Of the total examined animals, 53.4% (n=205/384) tick infestation prevalence was recorded. There was no statistically significant difference in prevalence of tick infestation among male and female animals ($\chi 2$=0.38; p=0.540). There was statistically significance of prevalence of ticks according to age group ($\chi 2$=17.06; p=0.000). Animals with poor body condition score had significantly higher tick prevalence (80.7%) than medium (44.5%) and good body condition score (35.6%) animals ($\chi 2$=61.71; p=0.000). 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: Bovine; Menesibu; Prevalence; Tick

Introduction

Ethiopia has an extremely diverse topography, a wide range of climatic features and a multitude of agro-ecological zones that are suitable to host a very huge animal population [1]. The country has the largest livestock population in Africa with the estimated domestic animal more than 60.4 million cattle, 31.3 million sheep, 32.7 million goats, 1.41 million camels, 56 million poultry, 2 million horses, 0.46 million mules and 8.8 million donkeys [2]. The livestock subsector has an enormous contribution to Ethiopia's national economy and livelihoods of many Ethiopians. The subsector contributes about 16.5% and 35.6% of the overall agricultural GDP [3] and promising to rally round the economic development of the country [4].

Livestock production in many parts of the world is constrained by several factors [5]. Ectoparasite particularly ticks have considerable impact on the animals either directly or by transmission of tick-borne disease. Ticks and tick-borne disease affect 90% of the world cattle population and are widely distributed throughout the world, particularly in tropical and subtropical countries [6]. Ethiopia losses income generation due to tick infestation through degraded skin quality and reduce production capacity. As a result, economic impact of ticks and control of tick-borne diseases remain a challenge for the cattle industry of the world, and it is a priority for many countries in tropical and subtropical regions [7].

There are about seven genera of ticks of veterinary importance in Africa [8], out of which four genera (*Amblyomma*, *Haemaphysalis*, *Hyalomma*, and *Rhipicephalus*) are commonly found in Ethiopia [9-13]. In addition to this, in Ethiopia there are about 47 species of ticks infesting livestock and most of them have importance as vector and disease agent and also have damaging effect on skin and hide production [14].

Extensive surveys have been also carried out on the distribution of tick species on livestock in different regions of the country in which different tick species such as Rh. (*Boophilus*)

decoloratus, *Amblyomma varigatum*, *Amblyomma cohaerence*, *Amblyomma*, *gemma*, *R. evertsi eversti*, *Hyalomma marginatum rufipes*, *Hyalomma truncatumi*, *Amblyommaelide*, *Rhipicephalus pulchellus* are also frequently reported in many ticks survey carried out in the different part of the country [10-13].

In Ethiopia, tick occupy the first place amongst the external parasites by the economic loss it incurred when they infest livestock particularly cattle [15]. Moreover, Different tick species were reported by different authors based on the distribution and abundance of tick species in different parts of the country. They reduce cattle productivity, such as milk yield, quality of skin and increase susceptibility to other diseases.

This study aimed to assess the identification and species of ixodidea ticks in Ambo district, west shoa zone, central Ethiopia. The district is known for mixed agriculture where cattle production is the dominant agricultural component. So, the relevant data on the distribution of ticks is essential for the development of effective tick and tick-borne disease control strategies. Studying ticks on livestock under their natural conditions without any control measure is also useful for understanding the host parasite relationship and variation of tick population in different agro-ecological zone. Thus, the objective of this study was to generate information on prevalence, risk factors, types and distribution of cattle ticks in study area.

Materials and Methods

Study area

The study was conducted in and around Mendi town, which is found in western Wollega zone of Oromia regional state, Ethiopia. This area has a latitude and longitude of 9048'N and 35o6'E respectively and an elevation of 1583 meters above sea level. It is the administrative center of Manasibu Woreda. Manasibu is bordered on the south by Jarso, on the Southwest by Begi on the North by the Benishangul Gumuz Region and on the southwest by Nedjo. The town is approximately 596 km away from Addis Ababa to west direction [16]. The agricultural scenario is a mixed crop-livestock farming system, which is dominated by crop production system. The livestock populations of the area are estimated as 174253 cattle, 78652 sheep, 45009 goats, 12230 horses, 16135 donkeys, 267 mules, and 160030 poultry. The livestock production of the area is an extensive type where animals are kept on grazing pasture but there are also some intensive and semi-intensive animal production systems [16].

Study animals

The study animals were cattle of all age, sex and body condition scores found in the Ambo district. The cattle depend on grazing throughout the year for their feed sources with little supplementation of crop residues. The study cattle were categorized in to three groups based on their age as young (<3 years), adult (3 to 7 years) and old (> 7 years) [17] and body condition score were employing after categorizing the animals in to Good (G^+, G, G^-), Medium (M^+, M, M), Poor (P^+, P, P-) based on their body score [18].

Study design

A cross sectional study designed was conducted from November 2022 to June 2023 to estimate the prevalence of hard tick genera infestation and prevalence of tick species, determined risk factor for its occurrence in Menesibu district.

Sample size determination and sampling method

The desired sample size for the study was calculated by the formula given by [19].

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

Where:

n = sample size, p_{exp} =expected prevalence,

d = desired absolute precision and

Z (1.96^2) is a constant from normal distribution table.

Since there was no previous study conducted on tick in cattle in the area, sample size was determined by assuming 50% absolute precision and 95% confidence level. Based on the above formula the required size was calculated as 384. Simple random sampling technique was followed to select individual animals. During sampling, species, age, sex and body condition of the animals was recorded.

Laboratory Procedures

Tick genera and species identification

Ticks were identified to the genera and species level according to their morphological key structures such as shape of scutum, leg colour, scutum ornamentation, body grooves, punctuations, basis capitulum, coxaes and ventral plates. During tick identification in the laboratory the samples were put on petridish and adult ticks were identified to genus level and species level under a stereomicroscope using the standard identification keys of [20,21].

Data analysis

All the data recorded in this study was first entered into Microsoft excel. Before subjected to statistical analysis, the data were thoroughly screened for errors and all data properly coded. SPSS software version 20.0 was used to perform the statistical analysis. Descriptive statistical analysis such as table was used to summarize and present the collected data. Ticks' prevalence was calculated as percentage by dividing the number of animals positive to the total sampled animals. (Chi-square (χ^2)) test was employed to assess the existence of association between tick infested cattle's and different potential risk factors like different age groups, sexes, body condition considered in the study. For this analysis P-value <0.05 was considered significant whereas P value >0.05 considered non-significant.

Result

Prevalence of tick infestation

Out of the total 384 examined animals, 205 were positive for ticks with an overall prevalence of 53.4% each animal harboring at least a single tick (Table 1).

Table 1: Overall prevalence of ticks in study area.

Note: *Significant

Kebeles/ Peasant Association	N	Frequency	Percentage %	χ^2/P-value
Wama	119	53	44.5	6.65 (0.036)*
Kersa Walga	110	62	56.4	
Bijit	155	90	58	
Overall	**384**	**205**	**53.4**	

Prevalence of tick relates to different risk factors

Prevalence of tick infestation among male animals was 51.8% (71/137), while it was 54.3% (134/247) in females with no significant difference (χ^2 =0.38; p>0.05). There was significant difference in tick infestation rate among age group (χ^2= 17.06; p<0.05). Cattle with poor BCS showed significantly higher prevalence (χ2 =61.71; p<0.05) than cattle with good BCS (Table 2).

Table 2: Prevalence of ticks relates to different risk factors.

Note: * Significant

Risk factors	Categories	N	Frequency	Percentage %	χ^2/P-value
Sex	Male	137	71	51.8	0.38 (0.540)
	Female	247	134	54.3	
Age	Young	91	35	38.5	17.06 (.000)*
	Adult	236	130	55.1	
	Old	57	40	70.2	
Body condition	Good	101	36	35.6	61.71 (.000)*
	Medium	164	73	44.5	
	Poor	119	96	80.7	
Overall		**384**	**205**	**53.4**	

Association of different risk factors

The prevalence of ticks in old animals was 1.95 times higher than prevalence of ticks in young animals and 1.04 times higher than prevalence of tick in adult animals. The prevalence of ticks in poor body condition animals was 0.38 times higher than prevalence of ticks in medium body condition animals and 2.55 times higher than prevalence of tick in good body condition animals (Table 3).

Table 3: Study association of different risk factors.

Presence of Ticksa	B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
							Lower Bound	Upper Bound
Intercept	-.674	.371	3.299	1	.069			
[Sex=M]	.214	.245	.764	1	.382	1.239	.766	2.002
[Sex=F]	0[b]	.	.	0	.	.	.	.
[Age=O]	1.951	.411	22.559	1	.000	7.032	3.144	15.727
[Age=A]	1.038	.353	8.666	1	.003	2.823	1.415	5.634
[Age=Y]	0[b]	.	.	0	.	.	.	.
[BCS=G]	-2.545	0.355	51.499	1	.000	.078	.039	.157
[BCS=M]	-.380	.268	2.001	1	.157	.684	.404	1.158
[BCS=P]	0[b]	.	.	0	.	.	.	.

Discussion

In the present study, 57.6% overall prevalence of tick infestation was observed in the cattle found in the district. This high prevalence of tick infestation showed that ticks are 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 [22] in Asela. Several other reports revealed higher tick infestation prevalence of cattle in different geographic areas of the country such as [23] (74%) in Bahir Dar; and [24] (65.5%) in Wolaita Soddo, southern Ethiopia.

From the study animals in the study period, in poor body condition cattle higher number of tick infestation was observed

(86.6%), it was agreed with [23], they reported prevalence of 74% in Arbegona Woredas, southern Ethiopia. This was due to the fact that medium body condition animals have reduced resistance and are exposed to any kind of disease when grazing on the field, and poor body conditioned animals were kept at home due to their inability to walk long distant areas, so they become less infested than medium and good sized animals but the well fed animals were very resistant to any kind of diseases when they grazed in the field or are kept at home [25].

Conclusion

In the current study higher tick infestation was found in the area. It was also found that older animals were more infested than adult ones and 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, based on the above conclusion, the following recommendations are forwarded:

A. Further detailed study on the economic losses associated with tick infestation as well as designing efficient method of tick control would have great importance.

B. Awareness creation on impact of tick is the prerequisite to be given for cattle owners.

C. The government, privet sectors and veterinarians should work in co-operation in order to minimize ectoparasite and their impact on health and productivity of cattle.

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