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Prevalence of Ixodid Ticks on Cattle in and Around Jabitehnan Woreda, North Western Ethiopia

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Abstract: The study was conducted to determine the prevalence of ixodid tick infestation on cattle around Jabi tehnan Woreda, North western Ethiopia from October 2009 to March 2010. A total of 1729 adult ticks, which belongs to 7 different species of four genera, were collected and identified using direct stereomicroscopy. Based on the result, *Amblyomma* constituted (51.24%), *Hyalomma* (31.35%) and *Rhipicephalus* (17.41%). The abundance of tick species were *Amblyomma varigatum* (50.95%), *Hyalomma marginatum rufipes* (23.54%), *Rhipicephalus evertsi evertsi* (10.93%), *Hyalomma trunctum* (7.8%), *Rhipicephalus decoloratus* (3.70%), *Rhipicephalus paeretexatus* (2.78%) and *Amblyomma lepidem* (0.29%). From seven different body regions the higher and lower infestation recorded were escutcheon (34.88%) and shoulder/back/side (4.34%) respectively. There was a significant difference ($p<0.05$) between breed, sex and age groups. Therefore, based on the result there should be awareness creation among animal breeders on tick control measures.

Key words: Cattle · Genera · Species

INTRODUCTION

Livestock production in many parts of the world is constrained by several factors. Among these constraints disease stands in the first line. Ectoparasites, particularly ticks have considerable impact on animals either by inflecting direct damage or by transmission of tick borne diseases. Tick and tick born disease affect 90% of the world's cattle population and are widely distributed throughout the world, particularly in tropical and sub-tropical countries. The economic losses caused by tick and TBDs in cattle alone are estimated at US $ 13.9-18.7 billion annually worldwide [1]. However in tropical and sub- tropical countries they cause a tremendous economic importance in livestock production. The problem is severing in developing countries where the resource for control and eradication is very limited [2].

In Ethiopia, studies so far conducted in the country indicated that the most important ticks belong to genera *Amblyomma, Hyalomma* and *Rhipicephalus.* These ticks are important transmitter of diseases. The most commonly known TBDs are anaplasmosis, babesiosis, theileriosis, ehrlishiosis and tick associated dermatophilosis. Extensive surveys have been also carried out on the distribution of tick species in livestock in different regions of the country [3-8]. Of all ticks recorded *A. varigatum* and *R. decolaratus* are considered to be the most widely distributed and economically important except, Yitbarek and Abebaw by whom *A. cohaerens* instead *of A. varigatum* in Jimma area.

This study was conducted to determine the abundance and prevalence of ixodid ticks of cattle in the study area.

MATERIALS AND METHODS

Study Area: The study was conducted at Jabi tehnan woreda, at purposively selected districts (Mebesh, Hodansh and Fenoteselam) from October 2009 to March 2010. Locations were selected based on their vicinity to fenoteselam to minimize cost expenditure. The woreda is located, around 392 km from Addis Ababa, in Amhara Regional state, North Western part of Ethiopia. The study area has a mean temperature of 23°C, altitude range of 1500-2300 m.a.s.l and average annual rain fall of 1250 mm. According to the CSA [9], out of a total 456, 851 livestock population in the woreda, there are 187, 501 cattle; 12, 717 equine; 40, 931 sheep; 14, 133 goats and 201, 569 poultry.

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Study Animals: The study was conducted on local (n=416) and local cross Holstein Frisian (n=84) with a total of 500 cattle populations. The animals were selected and sampled by simple random sampling technique. Based on the owner's information and De Lauta and Habel [10] the sampled animals classified into two age groups, young (<2 years) and adult (>2 years). Following the recommendations of Okello-Onen, Hassan and Essuman [11] nine predilection sites (ears, head, dewlap/neck/brisket, forelegs, belly, rear legs, escutcheon, tail and shoulder/back/side) of ticks were carefully examined by restraining the animals.

Study Design and Sample Collection: The study design was a cross sectional study which is to assess the prevalence of adult ticks of cattle in the study area. A total of 1729 adult ixodid ticks were collected manually and with the help of thumb forceps without causing damage to the mouth part and other body regions. All visible attached adult ticks of all species were collected from different body regions of each animal. The collected adult ticks from different body regions and cattle breeds were kept separately in to a universal sample bottle containing 70% alcohol (ethanol) for identification [11 & 12]. Then the ticks were taken to Bahir Dar Regional Veterinary Laboratory and identified using stereomicroscope following the standard identification procedure described by Walker *et al.* and Matthysse and Colbo [12, 13].

The main identification features were the color, size and shape of mouth parts, scutum, anal grooves, festoons, punctuations and legs. The sample size was determined by using the formula given by Thrusfield [14] with 50% expected prevalence, 5% desired absolute precision and 95% confidence interval. But, to increase the confidence level (precision) it was increased by 116 heads of cattle.

$$n = \frac{1.96^2[P_{exp}\ (1\text{-}P_{exp})]}{d^2} = 384 + 116 = 500$$

where,
n= required sample size
P_{exp}= expected prevalence
d= desired absolute precision

Data Entry and Analysis: Data were entered and analyzed using Microsoft excel and SPSS version 16 statistical package for social science. Descriptive statistics and chi-square test were used. Tests were considered significant at $p \leq 0.05$.

RESULTS AND DISCUSSION

Prevalence of Ticks: A total of 1729 adult tick specimens were collected from 500 (local=416, cross=84) cattle. Among these 4 genera and 7 species had been identified. *Amblyomma* (51.24 %) was the most common and widely distributed which was in line with the findings of Hagos W. and Berihun A. and Belew T. and Mekonnen A. [25, 26] in the study area and *Rhipicephalus* (*Boophilus*) (3.7%) was the least tick genus identified in both breeds. The three most abundant tick species were *A. varigatum* (50.95%), *H. rufipes* (23.54%) and *R. evertsi* (10.95%) whereas *A. lepidum* (0.29%) was the least abundant tick in the area (Table 1 & 2).

Amblyomma varigatum is the most abundant tick in the study area. It is also the most widely distributed cattle tick in Ethiopia as indicated by Pegram *et al.* and Seyoum and Abebaw and Solomon [4, 5, 7, 15]. In this study, *A. varigatum* accounts for a prevalence of 50.95% and this result agrees with the findings of Solomon and Lakachew [15, 16] with the prevalence of 50.71% and 44.2% respectively. This result disagreed with the works of Meaza *et al* [24] in Bahir Dar in which R. decoloratus is the most abundant tick species. A. varigatum is frequently encountered from 1700 – 2500m elevation [17].

Hyalomma rufipes was the second abundant tick species (23.54%) identified. It is more common in most arid parts of tropical Africa, receiving 250–650 mm annual rainfall, in which cattle are the primary domestic hosts [18]. This result strongly disagrees with Million [19] who recorded 2.55% at Chagni cattle and forage multiplication and distribution center.

Rhipicephalus evertsi was the third abundant tick species (10.93%) of this study. This finding was lower than the works conducted by Solomon *et al.* [8] at Ghibe Tolly in central Ethiopia and Abebaw [7] around Bahir Dar with prevalence of 21.19% and 19.73%, respectively. This tick was reported to be distributed in different parts of the country [3, 5, 20].

Hyalomma trunctum accounts about 7.81% in the present study which is lower than the findings of Abebaw [7] around Bahir Dar with a prevalence of 15.32% and higher than the results of Solomon *et al.* [8] at Ghibe Tolly (0.02%). Several researchers reported the distribution of this tick in drier areas throughout the country [18].

Rhipicephalus decoloratus is the fifth abundant tick species that accounts 3.7% which is lower than the results of Solomon *et al.* [8] around Gibe Tollay in central Ethiopia (34.6%). But, it agrees with the results of Lakachew [16] done in Dembia and Alefa Takusa Woredas of North Gondar (4.45%).

Table 1: Tick species prevalence, sex and predilection sites of ticks on cattle

Tick species	Tick no.	%	Sex		Predilection site
			M	F	
A.varigatum	881	50.95	705	176	Escutcheon, foreleg, rear leg, belly, shoulder, tail and dewlap
A. lepidum	5	0.29	5	-	Escutcheon and belly
H. rufipes	401	23.54	303	104	Escutcheon, foreleg, rear leg, belly, shoulder, tail and dewlap
H. turunctum	135	7.81	99	36	Escutcheon, foreleg, rear leg, belly, shoulder, tail and dewlap
R. evertsi	189	10.93	150	39	Escutcheon, rear leg, belly, tail and dewlap
R. paeretextatus	48	2.78	34	14	Escutcheon, foreleg, belly, tail
R. decolouratus	64	3.7	22	42	Escutcheon, foreleg, rear leg, belly, shoulder, tail and dewlap
Total	1729	100	1318	411	

Table 2: Prevalence of tick infestation in breed, sex and age

		Total examined animal	Total positive animal	Positive (%)
Breed	Local	416	331	79.6%
	Cross	84	53	63.1 %
Sex	Male	285	215	75.4%
	Female	215	169	78.6%
Age	<2 years	154	76	49.4%
	>2 years	346	308	89%

The number of ticks recorded per animal during the study period was low. This is because the study was conducted during dry period of the year, at which tick infestation is low. This suggestion agrees with the findings of Lakachew and Abebaw and Pegram, Perry and Shells [16, 21, 22].

The male to female ratio of ticks in this study showed an agreement with the previous studies of Solomon *et al.* [8]. Except, for *R. decoloratus* in which female ticks were higher than males.

Of the total tick species identified *R. paeretextatus* and *A. lepidum* were not found in cross breed cattle. Even though the abundance of *Amblyomma* in both breeds of cattle is higher than any other genera of ticks, *Hyalomma* and *Amblyomma* have nearly the same abundance in cross breed cattle.

There was a significant variation ($p<0.05$) on the infestation of ticks across breed, sex and age. This result confirms previous observations of Solomon *et al.* [8] that the zebu cattle carry significantly more ticks than European and their cross breed cattle and disagreed with the results of Pegram *et al.* [4]. This difference might probably be due to a difference in management and higher exposure of adult animals for tick infestation at field level than young animals which spend most of their time around homesteads (Table 2).

Predilection Sites: Most tick species that infest cattle prefer a favorable attachment sites for their survival. Of the total tick specimens collected (1729) the distribution of ticks was indicated as escutcheon (34.88%), tail (17.89%), belly (15.96%) and dewlap/neck/brisket (14.34 %), fore leg (6.59%), rear leg (6.02%) and Shoulder/back/side (4.34%). Ticks on the ear and head regions of animals were not encountered.

This study result agrees with previous works of Million [19] who found higher burden of ticks on escutcheon (39.13%) and the results of Solomon *et al.* [8] around Gibe Tollay in central Ethiopia. In this study, *Amblyomma* and *Hyalomma* predominantly were found on escutcheon, belly and dewlap. *Rhipicephalus* species was more commonly found under the tail. On the other hand *R. decoloratus* was found everywhere on the body. The attachment site for ticks was related to the possibility of penetration by their hypostome. On cattle, ticks with short hypostome (*Rhipicephalus* species) attach on the thin skin (ear, head, tail and margin of the anus) whereas long mouth ticks (*Amblyomma, Hyalomma*) can attach at thicker skin (brisket, belly, escutcheon and dewlap) [23] Table 1.

CONCLUSION

This study determined the prevalence of ixodid ticks on cattle in and around Jabi tehnan woreda. The most important tick species were *A.varigatum*, (the most abundant tick) followed by *H. rufipes*, *R. evertsi*, *H. trunctum*, *R.decoloratus, R. paeretexatus* and *A lepidum*. Among the nine predilection sites examined escutcheon was the most important tick attachment site. The presence

of these tick species might cause severe constraint on cattle. Therefore, there should be awareness creation among animal breeders on tick control measures.

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