

## Identification and Prevalence of Hard Tick in and Around Sude Woreda, Arsi Zone, Ethiopia

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### Abstract

A cross sectional study was conducted from November 2015 to April 2016 around Sude woreda, Arsi zone with the objectives to estimate the prevalence of hard tick infestation, identification of tick species and their preferred site on cattle's body. A total of 384 cattle were randomly selected and examined for the presence of tick. Out of the total examined 289(75.3%) were infested by one or more tick species. and significantly ( $P<0.05$ ) higher prevalence of tick infestation was observed on poor body condition (100%), medium (94.7%) and good (36.2%) respectively. The prevalence of tick infestation was also statistically significant ( $P<0.05$ ) with in breeds and higher prevalence were in cross breed (90.2%) than local breeds (73.5%). In the current study area four genera (*Amblyomma*, *Rhipicephalus*, *Boophilus* and *Hyalomma*) and six species were identified. The prevalence of each tick species was *Amblyomma variegatum* (38.75%) *Rhipicephalus evertsi evertsi* (28.61%), *Boophilus decoloratus*(17.72%), *Amblyommalepidium*(5.93%), *Hyalomma marginatum rufipes* (5.44%) and *Rhipicephalus pulchilus* (3.54%). Among the tick species *A.variegatum*(38.75%) and *R.pulchilus*(3.54) were the most abundant and least prevalent tick species respectively. Furthermore, the tick species were seen by their site of preference *Rh. evertsievertsi*(63.69%) prefers under tail and *A.variegatum*(39.78%) prefers under/scrotum and (37.23%) prefer brisket. The higher prevalence in the current study was due to agro climatic condition (rain fall, humidity, and temperature), host density and poor management system. Therefore it is recommended that it's better to develop the best control strategies of tick and tick borne diseases in the study area.

**Keywords:** Cattle; Predilection site; Prevalence; Sude woreda; Tick species

### INTRODUCTION

Ethiopia is believed to have the largest livestock population in Africa. This livestock sector has been contributing considerable portion to the economy of the country, and still promising to rally round the economic development of the country [1]. In Ethiopia, livestock production remains crucial and represents a major asset among resource-poor small holder farmers by providing milk, meat, skin, manure and traction force [2]. The contribution of livestock to the national economy particularly with regard to foreign currency earnings is through exploration of live animal, meat and skin and hides [3]. Ticks belong to the invertebrate animals called phylum Arthropoda. Arthropods include crustaceans, insects, spiders, scorpions and mites. Ticks only feed as parasites (feed only on the blood of their hosts) [4]. During feeding, the ticks crawl onto their host and attach to the skin with their mouthparts. When ticks have fully engorged the host's blood, they detach from the host's skin and drop to the ground. Ticks find their hosts in several ways. Some ticks live on open environments and crawl onto vegetation to wait for their hosts to pass by. This type of ambush and behavior of waiting on vegetation is called "questing". Some adult ticks are however, active hunters and run across the ground after hosts [5].

Ticks are very important and most common ectoparasites of mammals. Tick and tick born disease are widely distributed throughout the world particularly in tropical and sub-tropical countries, which cause tremendous economic importance in livestock production [6]. Of the major parasitic diseases, ticks and TBDs rank third after trypanosomiasis and endoparasitisms in causing economic losses of the country [7]. Therefore, relevant data on the distribution of ticks is essential for the development of effective tick and TBDs control strategies. Studying ticks on cattle 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 zones [8].

Ticks, besides being important vectors for diseases like theileriosis, anaplasmosis, babesiosis and rickettsiosis (heart water) in domestic animals; they also cause nonspecific symptoms like anemia dermatosis, toxicosis and paralysis Solomon [9]. Ectoparasite infestation cause serious economic loss to small holder farmer and the tanning industry through mortality of animal, decrease production, down grading and rejection of hide and skin.

Different tick species are widely distributed in Ethiopia and a number of researchers reported the distribution and abundance of tick species in different parts of the country. In Ethiopia, there are 47 species of ticks found on livestock and most of them have importance as vector and disease causing agents and also have damaging effect on skin and hide production [10].

Due to economic and veterinary importance of tick, their control and transmission of tick born disease remain challenge for the cattle industry in both tropical subtropical area the world and it had been priority of many countries [11]. In Ethiopia, tick are the most important of all. Livestock particularly, cattle are enormous

[12] [13]. In spite of the aforementioned prevailing situation and the presence of a number of problems due to ticks in Ethiopia, there is paucity of well documented information on the ectoparasits. Numerous studies have been conducted on the ticks and tick borne diseases of cattle in various parts of Ethiopia and several species of ticks belonging to genus *Amblyomma*, *Boophilus*, *Rhipicephalus*, *Hyalomma* and *Haemaphysalis* have been reported [14]. However, in the study area, to the best of the current knowledge, no research has been conducted that indicates the identification and prevalence of ticks among cattle. These concerns initiated this study to fulfill the following objectives:

- To identify the major tick species in the study area
- To identify the preferred site of tick species on cattle's body.
- Identifying the major risk factors in the study area.

## MATERIALS AND METHODS

### Study Area Description

The study was conducted from November 2015 to April 2016 in Sudewereda, Oromia regional state which is located about 216 km distance to the south east of Addis Ababa and 93km from Asella, the capital city of Arsi zone. The sudewerda is bordered on the North Juju on the South Robe and Amigna, on the East Colle and on the West Dikiswerda. From this wereda six peasant association were selected namely Gersacisa, Kula, Dereba, Wafiqa, summar and Hlila. The area comprises the majority of mid land area with an altitude 1500-2500 and high land area 2500-2750 meter above sea level (m.a.s.l.) within 8° and 8°30' latitude and 39.30° & 40.15° East longitude while the climatic condition of the area is "Weynadega". Sudewereda and the surrounding farming community, has a total area of 1124Km<sup>2</sup>. The area receives an annual range of rain fall from 800-1100 millimeter. The annual temperature range is 15-25 degree Celsius. It has a daily maximum temperature that can reach up to 28 degree Celsius and minimum temperature of 14 degree Celsius. The district has 204,826 Cattle, 84,365 Sheep, 21,469 Goat, 11,351 Horse, 5,671 Mule, 14,544 Donkey and 126,309 poultry [15].

### Study Population

The study population was cattle on different age and sex category that are found in and around SudeWoreda of selected kebele.

### Study Design

Cross-sectional type of study was conducted with an assumption that it was help to understand the current status of tick in relation to its identification and prevalence within the study area [16].

### Parasitological Technique

Ticks were collected from body of animals using forceps and manual by hand at main body sites from October 2015 to March 2016. Adult ticks was collected from each of main body sites preserved with pre-filled 70% ethanol in universal bottles separately. Date of collections, place of collections, body sites of collection (under tail, neck, brisket, scrotum, udder, ear & leg) and breed of host was recorded. Identification and recording takes place within 10 days of collection. The collected ectoparasites was identified from genus up to species level at the parasitolog laboratoy in Asella regional veterinary laboratory under stereomicroscope by putting the tick on petridish and using rotating wire loop and also using reference manual; the mouth part, ornamentation, coxa, spur, the presence of festoon, punctuation distribution, leg coloration, posterior median strip arrangement, genital aperture and base of capituli used for identification of tick genera and species as per the procedure recommended by [17].



Figure 1: Adult tick on belly region



Figure 2: Adult tick on udder & brisket region

## Data Analysis

The samples were collected based upon the appropriate sample collection methodology accordingly with the time frame work. All the data was entered through Microsoft Excel and was analyzed by using statistical package for social science (SPSS) version 22 for the sake of clarity. And descriptive statistics were used to determine the identification and prevalence of tick in cattle and p-value <0.05 was used to point out the possible association of risk factors with the prevalence of Tick.

## RESULT

### The Prevalence of tick infestation

In the present study a total of 384 cattle were examined for tick infestation. Out of the total, 289 were positive for one or more genera or species of tick and the overall prevalence was 75.3%. The overall prevalence of tick infestation among body condition significantly higher with (p= 0.000) and the difference in the overall prevalence of tick infestation between breed statistically significant (p=0.019) (Table 1).

**Table 1:** The overall prevalence of tick infestation in different risk factors

Variables	No. examined	No. positive	Prevalence (%)	X <sup>2</sup>	P- value	
Sex	Male	195	147	75.4	0.03	0.954
	Female	189	142	75.1		
Age	<1year	98	71	72.4	0.79	0.749
	1-3year	124	94	75.8		
	>3year	162	124	76.5		
Breed	Local	343	252	73.5	5.535	0.019
	Cross	41	37	90.2		
BCS	Good	138	50	36.2	177.14	0.00
	Medium	133	126	94.7		
	Poor	113	113	100		
Kebelle	G /cisa	74	60	81.1	5.321	0.378
	Kula	33	26	78.8		
	Dereba	45	36	80		
	Wafiqa	82	55	67.1		
	Summar	80	61	76.2		
	Halila	70	51	72.9		
<b>Total</b>	<b>384</b>	<b>289</b>	<b>75.3</b>			

### Tick genera in the study area

A total of 1213 tick were collected from the tick positive cattle and four genera were identified such as *Ambylomma*, *Rhipicephalus*, *Boophilus* and *Hyalomma*. There was higher prevalence of *Amblyomma* (44.6%) and lower prevalence of *Hyalomma* (5.4%) (Table 2).

**Table 2:** Prevalence of tick genera in the study area

Genus	Total tick count	Prevalence (%)
<i>Ambylomma</i>	542	44.68
<i>Rhipicephalus</i>	390	32.15
<i>Boophilus</i>	215	17.72
<i>Hyalomma</i>	66	5.44
<b>Total</b>	<b>1213</b>	<b>100</b>

### Tick species

Out of the four genera reported six species of ticks were identified; the higher prevalence was seen on *A.varigatum* (38.7%) and the lower percentage was in *Rh.pulchus*(3.54%) (Table 3).

**Table 3:** Prevalence and sex ratio of tick species

Tick species	Total count	Male	Female	M:F ratio	Prevalence (%)
<i>Ambylomma varigatum</i>	470	325	145	2.24:1	38.75
<i>Rhipicephalus eversi eversi</i>	347	219	128	1.71:1	28.61
<i>Boophilus decoloratus</i>	215	141	74	1.9:1	17.72
<i>Hyalomma marigatum rufipus</i>	66	37	29	1.28:1	5.44
<i>Ambylomma lepidium</i>	72	43	29	1.48:1	5.94
<i>Rhipicephalus pulchus</i>	43	26	17	1.53:1	3.54
<b>Total</b>	<b>1213</b>	<b>791</b>	<b>422</b>	<b>1.87:1</b>	<b>100</b>

### Distribution of tick species among predilection site

Each tick species tended to prefer a site of attachment on the animal's body. The most favorable predilection site for *A.lepidium* (43.05%) and *Rh.pulchrls* (44.1%) was in the Brisket, *Rh.eversieversi* (63.6%) prefers under tail and *B.decoloratus* (67.9%) prefers Neck/dewlap (Table 4).

**Table 4** Tick species distribution on different body region

Attachment site	Tick species					
	<i>A.varigatum</i>	<i>A.lepidim</i>	<i>Rh.eversi</i>	<i>Rh.pulchrls</i>	<i>Hy.mar.rufius</i>	<i>B.decoloratus</i>
Under tail	-	-	221(63.6)	6(13.95)	31(46.97)	7(3.25)
Ano-genital	-	-	115(33.1)	13(30.23)	23(34.85)	-
Udder/scrotum	187(39.78)	27(37.5)	-	5(11.63)	7(10.61)	-
Brisket	175(37.23)	31(43.05)	-	19(44.18)	5(7.56)	-
Groin/belly	108(22.98)	14(19.44)	11(3.17)	-	-	5(2.32)
Neck/dewlap	-	-	-	-	-	147(67.91)
Leg	-	-	-	-	-	37(17.67)
Ear	-	-	-	-	-	19(8.84)
<b>Total</b>	<b>470</b>	<b>72</b>	<b>347</b>	<b>43</b>	<b>66</b>	<b>215</b>

### DISCUSSION

The present study reveals that, the overall prevalence of tick infestation in Sude wereda was 75.3%. The current result was in agreement with [18] reported that 74% at Bahirdar. Lower prevalence was reported by [19] 27.3% at Bench Maji zone and 25.6% at Holeta, central Ethiopia [20]. However, higher prevalence was reported by [21] 89.4% in western Amhara. This variation could be due to the difference in the agro climatic condition of the study areas. Tick activity influenced by rainfall, temperature, altitude and atmospheric relative humidity [22] and management system include the use of acaricide and other preventive measures.

Tick infestation was significantly higher ( $P=0.019$ ) in cross breed cattle (90.2%) as compared with local breed cattle (73.5%). Similar study was done by [23] reported 33.5% and 43.7% in local and cross breed respectively. The reason might be due to higher prevalence of tick infestation in cross breed animals may be attributed to lack of supplementary feed, extensive management system, long distance grazing and environmental factor which local breed highly resistance than cross breed cattle. Therefore the chance of occurrence in cross breed cattle is greater than local breeds [24].

Significantly different ( $P<0.05$ ) association was reported in different body condition of animals. Higher prevalence was seen on poor body condition (94.7%) as compare to good body condition (0%). This result in line with other researcher preformed in different parts of Ethiopia [25] and [18]. This can be due to the fact that poor body conditioned animals had reduced resistance to tick infestation and lack of enough body potential to build resistance and they exposed to any kinds of disease when grazing on the field and medium body conditioned animals were free ranging and relatively resistance to disease so, they become less infested than poor body conditioned cattle and well feed animals were very resistance to any kinds of disease when grazing on the field [22]. In this study, the most abundant tick species in Sude woreda were *A. varigatum* (38.7%). This is in line with 38.87% [23] 32.2% by [24] at in Haramaya district and Fiche Selale ,respectively.this may be due to agroecology of the area,cattle management different and endemicity of disease [25] [22].

*Rhipicephaluseversieversi* was found to be the second most abundant (28.61%) tick species in this study. The result of the current research was also in line with [26] 29.29% in and around Holeta, [27] 26.75% in Nekemet, [28] 22% in Asella and [29] 21.5% in Bako. The native distribution of *Rh. Eversieversi* in Ethiopia seem to be connected with middle height dry savanna and steppes in association with zebra and ruminant and it's widely distributed throughout Ethiopia [25]. This tick species shows no apparent preference for particular altitude, rain fall zones or season [22].

*Boophilusdecoloratus* was the third abundant tick species (17.72%). This result was in line with researchers conducted in many parts of Ethiopia such as [30] 18% around Asella, and in Rift valley region of Ethiopia, [31]. This result disagree with the finding at Mekele ranch [32] 5.7% and [33] 48.7% in eastern Harerge. This variation due to the geographical location and altitude factor which govern the distribution of tick species in the area [25]. *B.decoloratus* often collected in Ethiopia and does not seem abundant anywhere. This tick species is abundant in wetter highlands and sub- highlands receiving more than 800mm rainfall annually [22].

*Ambylommalepidium* was confirmed to be the fourth abundant tick species in the study area, represent 5.9%.This result agreement with that of 4.27% reported by [34] in and around Mekele, Northern Ethiopia, 6.88% by [24] at Fiche selale Northern Shewa and disagree the result of [14] reported prevalence 0.02% in Borena,Ethiopia.

*Hyalommamarigatumrufipus* was the fifth abundant tick species in this study which scored 5.44% of the total tick collection from selected animals. This result was higher than reports of different authors of different

agro ecological zone of Ethiopia. For instance [29] in [30] in Asella and [35] in Somali had reported a prevalence of 1.2%, 2.5% and 2.8% respectively. This prevalence could be justified by the fact given by [36] who stated that *Hy.marigatumrufipus* was widely distributed in the most arid part of tropical Africa, receiving 250 to 650mm annual rain fall and rare in the western height land area. In Ethiopia, altitude is often between 1000-2000m making the presence of this parasite to be very rare. The current result increment due to the study site was found on the average elevation of 1500-2750m and this tick species was moderately distributed in the study area.

*Rhipicephalus pulchellus* was the least abundant tick species in the study area constituting 3.54% of the total tick collection from animal. According to [37] who confirmed that the abundant of this tick species in Southern range land of Ethiopia.

The male to female sex ratio in *A. varigatum*, *A. lepidium*, *Rh.evertsieversi*, *Rh. pulchus*, *Hy. Mar.rufipus* and *B.decoloratus* shows that male is greater than female. This is due to fully engorged female tick drop off to the ground to lay eggs while male tend to remain permanently attached to the host up to several months later to continue feeding and mating with other emales on the host before dropping off and hence males normally remains on the host longer than female [31]. From the total of 384 examined cattle, 71(72.4 %), 94(75.8%) and 124(76.5 %) rate of infestation were detected with age of <1year, 1-3year, and >3year respectively. Thus, the rate of tick infestation did not significantly affected by age of animal ( $p < 0.05$ ) However, the higher prevalence scored age >3year. This may due to different cattle management system, immunogenesity of cattle, and breed of cattle [38].

Regarding to predilection site for attachment, different tick species shows different site preference. Accordingly, the infestation rate of ticks in the neck and dewlap *B.decoloratus* was 67.9%, under tail *Rh.eversi evrsi* (63.89%), udde%r/scrotum *A.varigatum* (39.78%), brisket *A. lepidum* (44.4%) and anogenital *Hy. Marigatum rufipus* (34.85%) and this result in line with [20] who reported that *B.decoloratus* (77.41%) on dewlap and neck, *Rh.eversi evrsi* (63.6%), on under tail and *A.varigatum* (29.29%) on scrotum /udder. This may associated with factors such as host density, interaction between tick species, time and season and inaccessibility for grooming determine the attachment site of ticks [31].

## CONCLUSION AND RECOMMENDATIONS

This study showed high prevalence (75.3%) of tick species in sudewereda. The most important and abundant tick species investigated in this research were *Amblyomma variegatum*, *Rhipicephalus evertsi evertsi*, *Boophilus decoloratu* *Amblyomalepidium Hyalommmarginatumrufipes* and *Rhipicephalus pulchus*. Furthermore, predilection sites are identified that helps in designing control methods. In the study area Heavy infestations by different tick species might be suppress the health of cattle and also damage teats, hide & skin and reduce productivity of animals and there are direct effects associated with tick infestation that leads to anemia. These all are the impacts of tick infestation so, to minimize tick impact appropriate and timely strategic control measures are crucial. Therefore, based on the above conclusions; the following recommendations were forwarded:

- ✚ Research should be conducted on tick species and their epidemiology for the continuous understanding of improved control strategies
- ✚ Awareness should be given to animal breeder on problem of tick and TBD and different control method.
- ✚ Effective acaricid usage should follow to control tick species.

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