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# Identification and Prevalence Study of Cattle Ticks (*Acari; Ixodidae*) in Ejere District, West Shewa Zone, Ethiopia

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**Abstract**

A cross sectional study was conducted from November 2014 to March 2015 in Ejere district with the objectives of determining the prevalence, identifying Ixodidae cattle ticks, their predilection sites and burden in relation to breed, sex, and age group of animals. A total of 392 cattle were examined and of which 164 (41.8%) found infested with one or more tick species. Among the total 4s68 ticks collected, four genera (Amblyomma, Boophilus, Hyalomma and Rhipicephalus*)* and four species (*A.variegatum*, *B. decoloratus*, *Hy.m rufipes* and *Rh.evertsi evertsi)* were identified with relative prevalence of 36.5% ; 27.86%;18.34%; 17.3% respectively. Ambylomma genus shows higher preference to axilla, scrotum, udder, and belly/groin. *B. decoloratus* were found prominently on the dewlap/neck. *Rh. evertsi evertsi* and *Hy.m.rufipes* showed high preference to the under base of tail and ano-vulval regions of the body. The male to female sex ratio of the collected ticks revealed that higher proportion of male than their counter parts except for *Boophiilus decoloratus*. There is statistically significant difference between semi-intensive and extensive management systems (P = 0.000) indicating that cattle under extensive management system were 9.33 times higher (OR =9.33) to be infested by ticks compared to cattle under semi-intensive management system. Using univariate logistic regression age was found to have statistically significant effect for tick infestation (p= 0.002). The overall tick infestation in different age group of cattle was 17.1%, 45.4% and 44.4% for < 1year, 1-3 years and 3-6 years of age respectively. The present study contributes its part in bringing information on the distribution and tick species composition in the study area. This may help in the development of best control strategies of tick- and tick-borne diseases in the study area in particular and country wise in general. Accordingly, it is recommended that further studies on the distribution of tick species and their epidemiology are necessary for the continuous understanding of improved control strategies.

## INTRODUCTION

Ethiopia has huge and diverse livestock population that plays an important role in the economy and livelihood of farmers and pastoralists. Ethiopia has the largest livestock in venture in Africa including more than 53.99 million (Cattle), 25.5 million (Sheep), 24.06 million (Goat), 0.92 million (Camel), 9.01 million (Equine) and 50.38 million (Chickens) with livestock ownership currently contributing the livelihoods of an estimate 80% rural population [1]. Livestock are a ''living bank'' or ''living account'' for rural and urban poor farmer, or livestock owner. They serve as financial reserve for period of economic distress such as crop failure as well as primary cash income. Among livestock, cattle are primary resource for people and government of Ethiopia. Despite the large population, productivity in Ethiopia is low and below the average for most countries in Eastern and sub-Saharan African due to poor nutrition, reproductive insufficiency, management constraints and prevailing animal diseases [2].

Poor health and productivity of animal due to disease has considerably become the major stumbling block to the potential of livestock industry [3]. Now a day parasitism represents a major obstacle to development and utilization of animal resource. In Ethiopia ectoparasites in ruminant causes serious economic losses to small holder farmers, the tanning industry and country as a whole through mortality of animals, decreased production, downgrading and rejection of skin and hide [4]. From the ectoparasites, ticks are ranked as the most economically important of livestock in tropics including sub-Saharan Africa [5]. Ticks are small, wingless ectoparasitic arachnid arthropods that are cosmopolitan and prevalent in warmer climates [6].

Tick cause substantial losses in cattle production, in terms of diseases, reduced productivity and fertility and often death, and are economically the most important ectoparasites of cattle [7]. Ticks suck blood; damage hides and skins introduce toxins and predispose cattle to myiasis and dermatophilosis [8,9].

Furthermore, they reduce body weight gain and milk yield, in addition to creating sites for secondary invasion by pathogenic organisms [9,10]. More significantly, ticks transmit diseases from infected cattle to healthy ones. Ticks transmit a greater variety of pathogenic micro-organisms than any other arthropod vector group, and are among the most important vectors of diseases affecting animals [5].

Because of the direct and indirect effects on their hosts, they are considered to be a significant threat to successful livestock production and seriously interfere with the economy of a country. Approximately 80% of the world's cattle populations are at risk from ticks and tick- borne diseases. Annual worldwide losses due to tick infestation and diseases transmitted by ticks have been estimated to be 18 billion US$ [11]. Furthermore, the costs associated with maintaining chemical control of ticks in tropical and subtropical regions of the world have been estimated at US $25.00 per head of cattle per year [12].

In Ethiopia there are about 47 species of ticks found on livestock and most of them have importance as vector and disease-causing agent and also have damaging effect on skin and hide production [13]. Tick infestation in cattle lead to loss of weight, thereby causing retarded growth [5]. Apart from direct effects of tick infestation on animal production and productivity, ticks are inevitably efficient vector of many pathogens like protozoa, viruses, bacteria and rickettsia to man and domestic animals [14].

According to Walker et al. [15], ticks which are considered to be most important to health of domestic animal in Africa comprise about seven genera. Among these genera the main tick genera found in Ethiopia includes Ambylomma, sub genus Rhipicephalus (Boophilus), Haemaphysalis, Hyalomma and Rhipicephalus. The genus Ambylomma and Rhipicephalus are predominating in many parts of country. Hyalomma and genus Boophilus also have significant role [16].

Due to economic and veterinary importance of ticks, their control and transmission of tick-borne diseases remain challenge for the cattle industry of the world and it is a priority for many countries in tropical and subtropical regions [17]. Investigation toward the magnitude of infestation level and the type of species identification will assist to diagnose different tick-borne diseases and their respective control program [18]. Underlying the fact mentioned above, the objectives of the study were; hence, this study was conducted with the objective to identify major cattle Ixodidae tick species and determine the prevalence and associated risk factors.

## MATERIALS AND METHODS

### Study area

The study was conducted in central highland of Ethiopia, West Shewa zone, Ejere district of Oromia regional state, which is located at a distance of 40km from Addis Ababa. Ejere is located at an elevation ranging from 2060-3185 meter above sea level and $38^0$15'E-$38^0$30'E latitude and $9^0$00'-$9^0$15'E longitudes. The area receives annual rain fall which ranges from 900-1200mm and mean annual temperature ranges from 22-28°C. The climatic condition of the area is divided into highland (45%) and 55% is mid land [19]. The district has about 56918 hectares of land and 99062 population sizes. The district also consists of 95786 heads of cattle, 37423 sheep, and 11600 goats, 20409 equidae (horse, donkey and mules) and 54760 Poultry. Mixed farming system is commonly practiced in the area [19]. The mid land parts of the woreda is mainly covered by short vegetation while highland part was found plain and cold.

### Study Design and Study Population

A cross sectional study was conducted from November 2014 to March 2015 on cattle found in selected rural area of Ejere district. Those cattle which come to veterinary clinic in close locality of the selected area were included to identify major Ixodidae tick species, their predilection sites, prevalence and burden in different age groups, breeds and sex of animals. The study population includes both indigenous and cross breed (342 local breed and 50 cross breed) of different age, sex groups and kept under different management systems. The age of animals were grouped as calf (less than one year), young (between 1 and 3 years) and adults (≥ 3 years) according to the classification method used by [20].

### Sampling and Sample Size Determination

The study animals were selected by simple random sampling technique, from animals which are found in Kimoye, Basso, Iluaga, Dhamottu, Cirri and from those cattle which visit veterinary clinic in the study area. For those animals which came to veterinary clinic, the name of the clients and their respective animals that were sampled was recorded to avoid a risk of repeated sampling. The sample size was decided based on the formula described by Thrusfield [21], with 95% confidence interval at 5% desired absolute precision and assuming the expected prevalence of 50%.

$$N = \frac{1.96^2 (P_{exp}) (1 - P_{exp})}{D^2}$$

Where

N =sample size required

$P_{exp}$=expected prevalence (50%)

D =desired level of precision (5%)

Based on the above formula, the sample size calculated was 384 cattle.

### Tick Collection and Preservation

Adult ticks were collected by careful and gentle removals by rotating the ticks not to damage their mouth parts. All body parts of animal were examined for the presence of ticks mainly from ano-vulval, back/flank, dewlap and head, belly/groin, under

tail, ear, udder and scrotum. During collection of tick, data with animal identification, tick attachment site, breed, sex, age of animal, number of ticks count and their sex was recorded. Ticks were collected using plastic containers containing 70% ethanol [15]. Each container was properly closed and transported to Holeta Agricultural Research center, Animal Health laboratory.

### Tick Identification and Material used

To identify tick, petridish, forceps and stereo microscope were used. The ticks in containers were transferred to petridish and examined under stereo microscope for morphological identification of the ticks to their genus and species level, their sex according to standard identification keys given by Walker *et al.* [15].

### Data Analysis and Management

The data recorded was entered into Microsoft excel database system and statistical analysis was done using STATA12 statistical software. Prevalence was determined by the formula described by Thrusfield [21], as the rate of number of infested animals and total number of animals in the population at risk. Logistic regression model was used to determine the effect of different risk factors (explanatory variables like- age, sex, management system and breed of animals) for tick infestation. In all analysis, 95% confidence intervals and P<0.05 were set to indicate statistical significance.

## RESULT

Out of the total sample of 392 cattle, 164 were found to be infested by one or more tick species with the total prevalence of 41.8% and (CI=0.3690-0.4689). A total of 468 Ixodid ticks were collected among which four genera and four species were identified. Amblyomma was the most abundant (36.5%) genus and Rhipicephalus was confirmed to be the least prevalent (17.3%) tick genus in the study area (Table 1).

*Rhipicephalus evesti eversti* was found distributed in both agro-ecology of the study area while *Amblyomma variegatum* found in all study sites and its heavy infestation was recorded in mid altitude area. (Table2).

The overall prevalence of tick infestation in male and female animals was 43.2% and 40.6%, respectively. The difference in the prevalence of tick infestation in male and female animals was not statistically significant (p = 0.59) and in both sexes of cattle's, *A. variegatum and B. decoloratus* were the dominant tick species. On the other hand, the overall prevalence of tick infestation in calf, young and adult age groups was 17.1%, 45.4% and 44.4% respectively. The present study revealed that, there is statistically significant difference (p = 0.002) in the prevalence of the various species of ticks between adult and calf (Table 2). But there is no statistically significant difference (p=0.872) in the prevalence of tick infestation between the two-age group, means between young and adult (Table 2).

Cattle managed under extensive production System were found 9.33(OR=9.33) times at risk to be infested with ticks than that of cattle under semi-intensive type of production system. Similarly, the level of tick infestation between the two management systems is statistically highly significant (p=0.000) and based on the breed of animals, there is no statistically significant difference of tick infestation (P=0.740) Table 2. (Table 3).

Based on the origin of cattle, there is no statistically significant difference of tick abundance in Kimoye, Baso and Ciri with the P-value of 0.587, 0.416 and 0.416 respectively. The reason behind this is that these three kebeles founds in the same agro ecological zone (midland). Cattle in Ilu-aga are about 1.30 (OR=1.30) times at risk for tick infestation than cattle in other origin. On the other hand, the prevalence of tick infestation in Damotu and Ilu-aga is less when compared with the three previous origins (Table 4).

The results of this study indicated that, the most favorable predilection sites for Amblyomma species and *H.m.rufipes* were the ventral body parts (Udder/scrotum, brisket, belly and entire body under line) and hoof. *B. decolaratus* was found distributed over the entire body of animal except under base of tail and ano-vulva. But it was collected mostly from dewlap, head back and ear. Adult *R. evertsi- evertsi* and *H.m.rufipes* had a strong predilection for smooth skin under the tail as well as peri- anal and vulva areas (Table 4). In this study, large number of *Amblyomma variegatum* was collected from brisket region, *Boophilus decoloratus* from body under line, *Hyalomma marginatum rufipes* from base of tail and *Rhipicephalus eversti eversti* from base of tail and ano vulva respectively (Table 4).

Table 1: The prevalence of tick genera and species in the study area

| Genus | Species of ticks | Sex of ticks | | Sex ratio | Prevalence |
|---|---|---|---|---|---|
| | | M | F | | |
| Amblyomma | *A. variegatum* | 123 | 46 | 2.67:1 | 169(36.5%) |
| Bophilus | *B.decoloratus* | 0 | 126 | 0:126 | 126(27.86%) |
| Hyalomma | *Hy. M. rufipes* | 83 | 12 | 6.9:1 | 95(18.34%) |
| Rhipicephalus | *Rh. evesti eversti* | 58 | 20 | 2.9:1 | 78(17.3%) |

**Table 2:** Association and univariate analysis of different risk factor with tick infestation in cattle in Ejere district of Oromia regional state, Ethiopia

| Variables | No. Examined | No. positive | Prevalence | Odds Ratio | P-value | 95% CI |
|---|---|---|---|---|---|---|
| **Sex** | | | | | | |
| Male | 185 | 80 | 43.2% | 1.11 | 0.59 | 0.74-1.66 |
| female | 207 | 84 | 40.6% | 0.89* | 0.59 | 0.59-1.39 |
| **Age** | | | | | | |
| Calf | 41 | 7 | 17.1% | 0.257 | 0.002 | 0.10-0.603 |
| Young | 108 | 49 | 45.4% | 1.04 | 0.872 | 0.66-1.64 |
| Adult | 243 | 108 | 44.4% | 3.88* | 0.002 | 1.65-9.10 |
| **Breed** | | | | | | |
| Local | 342 | 142 | 41.5% | 0.903 | 0.740 | 0.496-1.6 |
| cross | 50 | 22 | 44.4% | 1.104* | 0.740 | 0.60-2.01 |
| **M.system** | | | | | | |
| Extensive | 252 | 146 | 57.9% | 9.33* | 0.000 | 5.36-16.25 |
| S.intensive | 140 | 18 | 12.9% | 0.107 | 0.000 | 0.006-0.2 |

Where, * indicates references, **No. examined** indicates number of cattle examined, and **No. +ve** indicates number of cattle found positive.

**Table 3**: Level of tick infestation in relation to animal origin in the study area

| Origin | No. examined | No. Positive | Prevalence | Odd Ratio | P-value | 95% CI |
|---|---|---|---|---|---|---|
| **Damotu** | 100 | 36 | 36% | 0.55 | 0.054 | 0.29-101 |
| **Ilu-aga** | 90 | 28 | 31.1% | 0.44 | 0.012 | 0.12-0.83 |
| **Ciri** | 75 | 33 | 44.0% | 0.76 | 0.416 | 0.4-1.46 |
| **Baso** | 73 | 37 | 50.7% | 1.30* | 0.416 | 0.68-2.49 |
| **Kimoye** | 54 | 30 | 55.6% | 1.22 | 0.587 | 0.6-2.46 |

Where **No.examined** indicates number of cattle examined, **No.positive** represents number of cattle found positive and **CI** represents confidence interval.

**Table 4:** Site preference and distribution of tick species on different body region of cattle

| A.site | *A.varigatum* | *B.decoloratus* | *H.m.rufipes* | *Rh.eversti* |
|---|---|---|---|---|
| Ear | - | 20(5.10%) | - | 7(1.79%) |
| Udder | 21(5.36%) | 8(2.04%) | 13(3.32%) | - |
| Scrotum | 31(7.91 %) | 3(0.77%) | 6(1.53 %) | - |
| Body under line and groin | 28(7.14%) | 25(12.37%) | 24(6.12%) | - |
| Dewlap and head | 17(4.34%) | 30(7.65%) | 3(0.77%) | 1(0.26%) |
| Back and neck | 12(3.06%) | 28(7.15%) | 3(0.77%) | - |
| Ano-vulva | - | - | 11(2.81%) | 30(7.65%) |
| Brisket | 33(8.42%) | 7(1.79%) | 6(1.53%) | |
| Base of tail | 7(1.79%) | - | 25(6.38%) | 38(9.69 %) |
| Hooves & tail | 20(5.12%) | 5(1.28%) | 4(1.02%) | 2(0.51%) |
| **Total** | **169(36.5%)** | **126(27.86%)** | **95(18.34)** | **78(17.3%)** |

Where **A.sites** represents .tick attachment site

## DISCUSSION

The distribution and abundance of the most common tick species infesting cattle in Ethiopia vary greatly from one area to another. From the total of 392 cattle examined for presence of tick species, 164 cattle were found infested with one or more species of ticks with an overall prevalence of 41.8%. The present finding agrees with the findings of [22], and [23], who reported 40.2% in and around Mekele and 47.0% in and around Bishoftu respectively. However, the present finding disagrees with findings of Wasihun and Doda [24], who found an overall prevalence of 61% in SNNPR. Furthermore, there is a great variation between the present finding and that of Nigatu and Teshome [25], who reported an overall prevalence of 89.4% in Amhara regional state. This difference may be due to the current status of tick control strategy, seasonal variability and agro-ecological difference between the study areas. This means, animal health protection is under improvement from time to time since large number of veterinarians and animal health technician graduate from higher institution each year. On the other hand, large number of ticks became active and can be collected during warm rainy season than hot dry season.

From the total of 463 ticks collected four genera and four species were identified. Detailed investigation was carried out to identify and determine the type of tick species and predilection site of ticks infesting cattle in Ejere district. Although, there are different species of ticks in Ethiopia, only four species of tick, *Amblyomma variegatum (*36.5%), *Boophilus decoloratus* (27.86%), *Hyalomma marginatum rufipes* (18.34%) and *Rhipicephalus evertsi evertsi* (17.3) were identified in the study site (Table1). In this study *A. variegatum* were found to be most abundant tick species in Ejere district (36.5%) and similar results have been reported by Tesemma and Abebaw , in Asella, Tiki and Addis [4] in Holeta, (Mekonnen *et al*,) [26], in central Ethiopia. Furthermore, (Mekonnen *et al*.,) [26], has reported heavy infestations of *A.variegatum* in shewa province and indicated that the most economically important tick species infesting cattle in Ethiopia are *A.variegatum* and *B.decoloratus*.

Apart from disease transmission; adult tick attaches in clusters and can cause considerable tissue damage leading to secondary bacterial infection. Infestation with *A.variegatum* also has direct causal relationship with severe clinical dermatophilosis caused by *Dermatophilus Congolensis* [26].

The present finding revealed that B. *decoloratus* was the second most abundant tick species in the study area (27.86%). In previous findings in Assosa, higher abundance of *B.decoloratus* was reported with the prevalence of 45% [27]. Which make an agreement with the current finding. Similar results were also reported in Haramaya [28], and in SNNPR [24], with the results of 31.54% and in 30% respectively. Morel [29], stated that *B. decoloratus* often collected in Ethiopia and is not highly abundant anywhere. *B. decoloratus* can transmit *Babesia big-emina* to cattle and severe tick infestations can lead to tick worry, anorexia and anaemia. Larger numbers are generally present from spring to autumn than during the cooler months. Prevention of tick damage by both *A. variegatum* and *B. decoloratus* can be achieved if strategic tick control is implemented just before and during the warmer and moister months of the year.

*H.marginatum rufipes* was the third abundant tick species in the present finding and represents only 18.34% of the total count. (Gurmessa *et al*.,) [29]. in and around Sebeta, Hussen [27], in Bako, Tesema [32], in Asella, Belew Tiki and Addis [4], in and around Holeta also reported a lower prevalence of 2.9%, 1.2%,

2.5% and 1.86% respectively. However, the current finding, 18.34% opposes with the previous reports. This might be due to global and local adverse climatic change from time to time and prolonged dry season or absence of rain throughout the year and management system. *Hy.m.rufipes* is widely distributed in most of African countries and has been recorded from every climatic region from desert to rain forest. The infestation of birds by the immature stages of this tick contributes to its extensive distribution [15]. The main hosts of adult *Hy.m.rufipes* are cattle and prefer open country habitats [33]. Therefore, it is more likely to attach to cattle which permanently graze on pastures. Since most of the cattle found in the present study area are kept under extensive management system and found permanently grazing on the field, increment of *Hy.m.rufipes* can be expected. The most severe risk posed by the presence *of Hyalomma spp*. is the transmission of the zoonotic *Crimean-Congo haemorrhagic fever* (CCHF) virus for which they are considered to be the primary vectors [34]. To be specific, epidemiological studies showed that *H. m. rufipes* may harbour different genotypes of CCHF virus naturally, and in certain regions this tick subspecies is thought to play a leading role in the maintenance of CCHF endemicity [35].

*Rh.E. eversti* (17.3%) was the least abundant tick species in the study area relative to other tick species. This dis-agrees with finding of Tessema *et al*. [32], in Assela whom reported as a second abundant tick species. Morel [36], affirmed that the native distribution of *R.E. evertsi* in Ethiopia seems to be connected with middle height dry savannas and steppes in association with Zebra and ruminant and it is widely distributed throughout Ethiopia. This tick species shows no apparent preference for particular altitude, rainfall zones or seasons [37]. *R.E. evertsi a*ppears to occupy a wide range of climatic and ecological conditions [29], and in the present study it is collected from all sites of the study area. Even if the number of *Rh.E.eversti* collected during the study period is less than the other species of ticks identified, it's overall prevalence is not too much less than that of *Hyalomma.m.rufipes.*

Ticks are known to be distributed in different parts of the host body. In the present study ticks were collected from different part of animal body and burden of tick infestation differs from site to site (Table 4). The predilection site mentioned in the result of the current study was similar with those reported by other authors [38]. *Ambylomma species* found on scrotum, udder, belly/groin, dewlap and ano-vulval areas, whereas *Boophilus decoloratus* were found distributed over the entire body of the animals. *Rhipicephalus evertsi evertsi* showed high preference to the ano-genital region of the body. This is similar with report of Belew Tiki and Addis [4], and Bedasso *et al.* [39]. Morever, Siyoum [40], and Behailu [41], were also reported similar findings in their study conducted in North Wollo zone and Asella respectively. Factors such as host density, interaction between tick species, time and season [42], and inaccessibility for grooming [43], determine the attachment site of ticks. Information on predilection sites of ticks is helpful in spraying individual animals since it gives a clue as to which part of the body requires more attention [37].

The sex ratio of all tick species identified during the current study was skewed towards male except for *Boophilus decoloratus* (Table 1). This condition is due to the small size of males of *Boophilus decoloratus* that makes difficult to see it and get missed during collection. High number of male ticks of other species may be due to the fact that substantial proportion of females may be engorged in few days and fall on the ground in short period of time as compared to males. Therefore, the present finding was in agreement with the findings of [3,16,32,44] that suggested engorged females may be removed by self-grooming of the host, because of the large size.

There is no statistically significant difference (P = 0.59) between the two sexes which implies sex has no impact on the tick infestation rate (Table 2). This result makes agreement with many other studies conducted in Ethiopia such as study in Somali region [45], in Haramaya [28,39], and in Mekele [22]. Both male and female animals are equally susceptible and ticks did not prefer sexes since their target is feeding of blood for their survival. The level of tick infestation was relatively similar (OR=0.9, CI=0.496-1.6) in two breeds of cattle. The overall tick prevalence was 41.5 %( n=142) in local breeds and 44% (n=22) in cross breed of cattle (Table 2). The relative higher prevalence of tick infestation in local breed of cattle (OR=0.9) compared to the cross breed may be due to the management practice. Since almost nearly all local breed cattle's in the study area were under extensive management system. Additionally cross breed cattle gets attention and treatment more frequently than local one. This result is in agreement with findings of [22,46], in and around Mekele and Mulualem [47], in and around Debre zeit. But the present finding disagrees with that of [32], in and around Asella town and Esihak [48], in Adami Tulu.

Concerning the origion of cattle, there was no statistically significant difference in the level of tick infestation (P = 0.587; 0.416 and 1.30) among the animals originated from Kimmoyye, Cirri and Basso respectively. Animal in these sites is infested relatively equal which agrees with study conducted in Haramaya [28]. This is due to the fact that the agro ecology of the above listed three areas is the same and cattle are kept under the same management system (Table 3). But contrarily there is statistically significant difference between highland area (Ilu-aagaa and Damotu) and midland (ciri, Kimoye and Baso).

Based on the age group of animals, there is statistically significant difference (P = 0.02) of tick infestation level between calf (<1year) compared with adult age group (3-6 years) and calves are affected -3.12 times lower (OR=-3.12) compared to adult age group. But young and adult animals are more susceptible than calves due to the fact that the calves are not often driven with adult age groups into grazing and watering points. This practice naturally reduces the chance of exposure of calves to ticks. This result agrees with that of Yismashewa [49], in Decha woreda, southern Ethiopia; Esihak [48], in Adami Tulu. Similarly, Seyoum [40], also found that the number of ticks attached to animals increases with their age. Since host seeking activity involves awaiting hosts in an environment, there is greater chance of attaching on larger animals than calves because

of body surface area. Calves are less attractive to ticks than cows because they are protected by some form of innate and age-related resistance [38].

Differences in the relative abundance of the tick species might be attributed to the ecological variations between areas. The most important ecological factors influencing the occurrence of ticks in a biotope include temperature and relative humidity [36]. Even if the same factor affects the survival of all tick species to varying degrees, each species has its particular threshold temperature and moisture below those diapauses occurs in all instars. Obviously, field development periods will vary according to the temperature [36,50]. The result of the present study revealed that, the prevalence is getting decreased as compared to the previous study with the prevalence of 61% in SNNPR [24], and prevalence of 89.4% in Amhara regional state [25]. This is probably due to an increase in the level of awareness of the farmers on how to reduce the tick infestation of their cattle, improvement in the management of their animals and increase of veterinarians' number per district and regular treatment with acaricides.

Generally, heavy infestations by different tick species suppress the immunity, damage teats and reduce productivity of animals. So, to minimize tick impact in the livestock production sector, appropriate and timely strategic control measures are crucial.

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