

Cattle Tick Prevalence and Species Identification in Tarcha Zuriya District, Dawro Zone, Southwest Ethiopia

Ashenafi Akirso¹ Ataro Abera²

¹Dawro Zone Tarcha Zuriya Woreda, Agri/F/P/C/D/D, Tarcha Ethiopia, Email: akirsoashenafi@gmail.com, Phone: +251913802325

²Dawro Zone, Agri/F/P/C/D/D, Tarcha Ethiopia, Email: atishabe.dvm@gmail.com, Phone: +251910197960

Keywords:

Amitraz
Adult immersion test
Cattle, Diazinon
Prevalence, Resistance
Species
Tick.

ABSTRACT

Ticks are widely distributed in different agroecology of Ethiopia. They decrease the productivity of cattle and transmit different diseases from sick to healthy animal. A cross sectional study was conducted from December 2023 to June 2024 to estimate prevalence, identifying tick species and evaluate tick resistance to acaricides in Tarcha Zuriya district, Dawro Zone, Southwest Ethiopia. The study was carried out on randomly selected 384 cattle, comprising 324 local and 60 cross breeds (Local X Friesian). Ticks were identified at species level using stereomicroscope (10X magnification). Prevalence was 79.95% (n=307/384). Of the total 1538 ticks collected, 60.8% was *Amblyomma*, 33.1% *Rh. (Boophilus)*, and 6.1% *Rhipicephalus*. Under these genera, 47.53% *A. variegatum*, 33.1% *Rh. (Boophilus) decoloratus*, 9.62% *A. cohaerens*, 5.33% *Rh. evertsi evertsi*, 3.64% *A. gemma* and 0.78% *Rh. pulchellus*. High number of this study animals were infested by *A. variegatum* (31.25%) followed by *B. decoloratus* (21.35%), *A. cohaerens* (5.99%), *Rh. evertsi evertsi* (3.65%), *A. gemma* (2.87%) and *Rh. pulchellus* (0.52%). In the male to female ratio, more number of males were recorded in all species of ticks. In this study udder, scrotum and belly were found to be more favorable site of attachment whereas, head and ear were least favorable sites. Body condition of cattles was significantly ($p < 0.05$) associated with the prevalence of tick. Poor conditioned animal (40.1%, n=154/384), than medium (39.1%, 150/384) and good (0.8%, 3/384). However, association of age and sex was not significant ($p = 0.537$, $p = 0.702$, respectively). There was high prevalence of ticks in the study area.

INTRODUCTION

Background

Ethiopia has the largest livestock population making it first in Africa and tenth in the world. It is home of 70 million cattle, 52.5 million goat, 42.9 million sheep, 10.80 million donkey, 8.1 million horses, 2.15 camel, 0.38 million mules and 57 million poultry (CSA, 2021). It has different topography, climatic features and agro-ecology that are suitable to host a very large animal population (Mekasha et al., 2014). Thus, Livestock sector is an important integral component of the agricultural production system and plays a vital role in Ethiopian economy by contributing about 16.5% of national gross domestic products (GDP) and 35.6% of the agricultural GDP. Among the livestock primarily cattle characterizes the stake of the Ethiopian economy and serves as source of livelihood to farmers and stakeholders, confirms food security, and plays significant role in environmental, social and cultural issues (Bureau and Swinnen, 2018). In addition, cattle provide essential nutrients like meat and milk, also skin, manure and traction force for poor farming community. However, the production of those cattle is below its expected potential due to various constraints such as, inadequate nutrition, health problems, and poor management. Of the health problems of cattle, parasitic diseases are widely distributed and have adverse impact on the economy of the Country. Out of ten major diseases of livestock, four are of parasitic origin (Pérez de León et al., 2012).

Parasitic diseases are caused either by internal or external parasites. Ticks, lice, mange mites and keds belong to external parasites. Among the external parasites, tick and tick borne diseases rank fourth among the major infections of livestock and latter is regarded as the most important arthropod borne diseases of livestock, humans

and companion animals (Ghosh et al., 2007). Eighty percent of the world cattle population is infested by ticks (Minjauw and McLeod, 2003). Because of the environmental conditions joined by traditional system of keeping livestock, and animal husbandry, ticks are widely distributed and are major external parasites of cattle in Ethiopia (Chanie et al., 2010).

Ixodide ticks are obligate ectoparasites of cattle which feed on blood and tissue fluid. According to Kumsa et al. (2016) *Boophilus*, sub genus *Rhipicephalus* (*Boophilus*), *Haemaphysalis*, *Amblyomma* and *Hyalomma* belong to the economically most significant ticks of cattle in Oromia, Ethiopia. They cause mechanical damage (skin and udder), irritation, allergic reaction, and blood loss. A single female engorged tick imposes a daily loss of 0.5 to 2 ml of blood, 8.9 ml of milk and 1 g of body weight (Minjauw and McLeod, 2003) as well as tick bite marks cause 20-30% depreciation in market value of hides and leather (Biswas, 2003).

They also transmit tick borne diseases like babesiosis, theileriosis, anaplasmosis, and heart water from sick to healthy animals and predispose for secondary disease condition such as screw-worm myiasis, dermatophytosis, and dermatophlosis (Mtshali et al., 2004; Kaufman et al., 2006; Marufu, 2008). In addition, ticks cause economic loss by reduction of milk, meat, and skin production of cattle. They also lead to reduced fertility and difficulty in introducing improved cattle breeds into tick infested areas FAO (2004).

Statement of the Problem

Ticks are widely distributed in different agro-ecological areas of the Country. As the result, they have remained to be threat to human, domestic and wildlife health, and livestock industry economy by transmitting wide range of pathogens among others. Because of

their importance in both animal and human health, animal welfare, and economics of the Country, assessment of ticks prevalence and identification of their species is of considerably crucial. Ticks regional importance depends to a great extent on the tick species present (Jongejan and Uilenberg, 2004).

This enables policy makers to formulate appropriate strategies for effective control and prevention of parasitism by ticks and thereby minimizes risk of tick born-infection in cattle and humans. Those studies of tick prevalence on cattle in Ethiopia have usually been focused on localized geographical regions rather than countrywide (Tadesse and Sultan, 2014; Jelalu Kemal, 2016; Hordofa et al., 2021) at Fitcha, Arbegona, Wabe, respectively. As result despite a favorable context for ticks and tick-borne diseases, prevalence of cattle ticks and identification of their species has not systematically been investigated in the study area. Therefore, the objectives of this study was to estimate the prevalence and identify tick species infesting cattle in the study area and to determine associated risk factors with tick infestation in Tarcha Zuriya District, Dawro Zone, Southwest Ethiopia.

MATERIALS AND METHODS

Description of the Study Area

The study was conducted in Tarcha Zuriya District, Dawro Zone, Southwest Ethiopia. It is located at about 497 km of Southwest of Addis Ababa. Geographically, it lies between 6°59' - 7°35' North Latitude and 36°6' - 37°53' East Longitude. The district is divided in to eighteen rural kebele administrations. Its elevation ranges from 1000 to 2300 meter above sea level. The rainfall distribution is bimodal with the long rainy season from June to September and short rainy season from March to May. The mean annual rainfall ranges from 650 to 1100 mm with considerable spatial and temporal variability in quantities and distribution. The annual mean temperature varies from 18 to 23 °C (TZWOA, 2020). The district is partitioned in to three agro- ecological zones; namely low land (Kola), mid land (Woina dega) and high land (Dega) with their total land holds of 61%, 28% and 11%, respectively. The livestock population of the district was estimated to be 145,191 Bovine, 4,396 Equine, 75,630 Ovine, 55,610 Caprine, and 131,751 poultry. Cattle are managed under extensive farming system. The type of vegetation coverage is wanza, tid, eucalyptus (bahirzaf) and coffee whereas natural forest, grassland and all green riverine tree species are naturally exists. The major crops growing in the area include maize, teff, enset, and sweet potato and to smaller extent other crops. The total area of the district is about 416,375 hectare and the human population is 89,432 from which 43,550 are males and 35,882 females (TZWLFO, 2023).

Study Animals

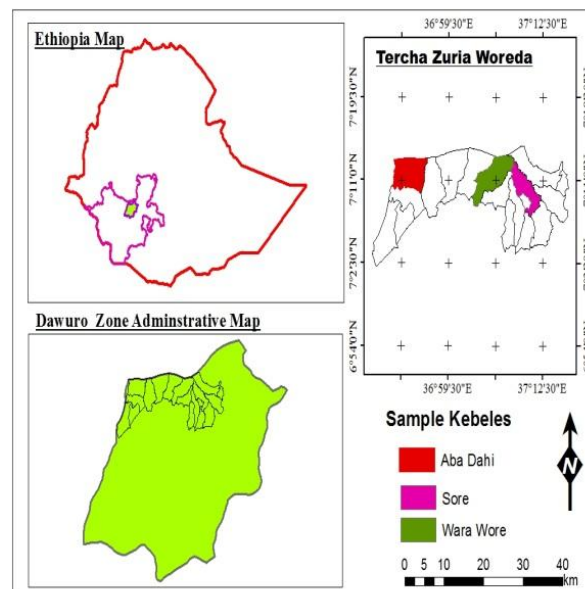
The study population consists of cross and local breed cattle under extensive management system. The cattle were kept under individual households depending on grazing for their feed source with little supplementation of crop residues. The study cattle local and cross breeds, no acaricide treatment with in month young (<3 years) and adult (>3 years). Cattle were categorized in to age groups based on either the information obtained from the owners or using the dentation: young (less than three years old) and adult (above three years old) (Arnold and Wilesmith, 2004), sex: male and female; breed: local and cross; body condition score as thin (poor), moderate (medium) and good based on the method by Nicholson and Butterworth (1986).

Study Design

A cross sectional study from December 2023 to June 2024 to estimate prevalence and identify tick species infesting cattle and to determine associated risk factors with tick infestation in Tarcha Zuriya District Dawro Zone, Southwestern Ethiopia.

Figure 6. Map of Tarcha Zuriya district, the study area.

Source: GIs (2023)



Sample Size Determination

The sample size was determined by supposing the expected prevalence of 50%. The sample size was determined by formula described by Thrusfield (2005). The parameters used were 95% CI and 5% desired level of precision, therefore by substituting these values in to the formula, the sample size was found to be 384.

$$n = 1.962 \times P \times p (1 - p \times p)$$

d2

Where: n= required sample size,

Pexp = expected prevalence,

d = desired absolute precision

$$= (1.96)^2 \times 0.5 (1 - 0.5) / 0.052 = 384$$

Sampling Technique

The study district and Kebeles were selected purposively based on accessibility, geographical location and cattle population proportion. Accordingly, from the eighteen Kebeles in the district, three Kebeles: Sore, Wara Worja, and Aba Dahi that relatively had cattle population were considered for the study. The total lists of household rearing cattle were obtained from Agriculture Office, development agent and Kebele administration head. From 511 household of three kebele 170 are sampled (33.27%) and cattle population in three kebele $21249 \times 0.3327 = 7069$ cattle for 170 households and the interval was 18th and sample was calculated as proportionally 2 or 3 cattle from each 170 households. Due to absence of ear tag, all the cattle color was registered and were marked with permanent different inks to identify the study cattle during sample collection. The cattle population in Sore $7160 \div 21249 \times 100 = (34\%)$, Wara Wore $8086 \div 21249 \times 100 = (38\%)$ and Aba Dahi $6003 \div 21249 \times 100 = (28\%)$. Therefore, the total sample of cattle allocated in this study was 384 and the number of cattle sampled were $34 \times 384 \div 100 = 130$ from Sore, $38 \times 384 \div 100 = 146$ from Wara wore and $28 \times 384 \div 100 = 108$ from Aba dahi.

Tick Sample Collection and Transportation

Tick sample collection and transportation for counting and species identification

Prior to tick collection, the objectives of the study were explained to the owners, and verbal consent was obtained to collect ticks from their cattle. All selected households agreed to the sampling. Ticks were collected from cattle after being restrained in crush and where crush was not available by physical restraining. First the whole half body of the study animal was thoroughly examined for tick infestation. Accordingly, if a tick is found on an animal or more, this

animal is called positive or if it is not found negative. Then ticks were collected from different half body part using flat headed forceps. The samples were collected early between 6:00am to 7:30 am in the morning because most engorged ticks drop off host in the morning (FAO, 2004). The ticks were collect from the head, ears, dewlaps, belly, udder, scrotum, legs and tail side of age, sex, breed and body condition score of each sampled cattle among others (Okello-Onen et al., 1999).

The collected ticks from each body region of individual cattle were kept in a separated universal bottle containing 10% formalin as a preservative. The universal bottle was labeled with cattle number or name, owners' name, date of collection and place of collection.

Laboratory Examination

Identification of tick

Tick identification was made based on morphological, structural and color differences of the ticks. The Genera level identification was based on, mouth parts, body size, coxae and color of the body. The

morphology and structure of Amblyomma, Rh (Boophilus) and Rhipicephalus ticks were have scutum as a hard plate on the dorsal surface, curved body and mouth part. Male ixodid tick has slender and long bodies, upper part are black mottling, adult are 1/16 inch in length and dorsal shield covered entire abdomen whereas, females are rounded body, upper part are black shield, adults are 1/8 inch in length and dorsal shield covered small portion of the body but, Both sex have four pairs of leg and large genital aperture (Walker et al., 2003). Accordingly, the genes Amblyomma large sized tick (6-7 mm). Long mouth part, which project to the anterior of the body also large eye and pale body color. The genes Rhipicephalus medium sized tick (3-5mm) but with short mouth part and eyes. Its coxae 1 have large and unequal paired spurs and brown body color and Rh (boophilus) is small sized tick (<3mm), short mouth part projected to the anterior and small eyes. Coxae 1 has small paired spurs and blue body colors. The species level identification was made based on, leg color, shape of scutum, body punctuation, festoon, eye and coxae (Walker et al., 2003).

Table 3. Identification criteria for different tick species

Characteristics	A.variegatum	A.cohaerens	A.gemma	Rh.(boophilus) decoloratus	Rh.evertsi evertsi	Rh.pulchellus
Leg color	pale	Pale yellow	Pale ring	Not pale but thick leg	Distinct pale orange	No leg color
Shape of scutum	Straight and broad	Triangular convex	Straight broad posterior angle	Completely body covering	Slightly sinuous scutum	Large robust scutum shape
Body punctuation	Small to medium spurs distribution	Small to medium localized distribution	Small to medium	No punctuation	Small to medium dense distribution	Minute to small dense punctuation
Festoon	Absent enameling	enameling	Partly enameling	Absent	present	Present
Eye	Distinctly convex	Slightly pale convex	Slightly convex	Small distinct eye	Very convex	Flat eye
Coxae	External medium internal short	Un equal pair	Externally medium internally short	Small paired spurs	Anteriorly spurs visible	Anteriorly spurs visible coxae

According to Walker et al. (2003).

Data Management and Statistical Analysis

The data collected during sampling and laboratory findings were entered and stored in to MS-excel spread sheet. Before subjected to statistical analysis, the data were thoroughly screened for errors and properly coded. Stata version 14.0 software package was used to perform the statistical analysis. Tick prevalence was calculated by dividing the number of positive sample by the whole sample size and expressed as percentage. Chi-square (X²) test used to asses if there was statistically significance in tick infestation between sex, breed, age and body condition score. A p-value less than 0.05 at 95% confidence interval was considered significant.

Ethical Consideration

The study will not harm cattle and proper cautions were followed during sample collection and restraining procedures are taking

place. And also results obtained from the study were confidentially kept and there will be no harm to their business rather will benefit them through forwarding the appropriate tick prevention and control strategies. Thus all the data collection activities were undertaken with the good will of the owners.

RESULTS

Prevalence, Counts and Risk factors

In this study three genera and six species of ticks were identified. The overall prevalence of ticks was found to be 79.95 % (n=307/384). Tick infestation prevalence with respect to Kebeles shown in the Table 4 below. No significant variation in the prevalence of ticks was noted between districts of the study animals' origins. The highest prevalence was recorded in Wara district at 32.03 % followed by Sore at 26.82 % and Aba at 21.1 %.

Origin	Number of (n) animal	Prevalence %	P-value	95% CI
Aba	108	81(75)		
Sore	130	103(79)	0.438	
Wara	146	123(84)	0.069	
Total	384	307(79.95)	0.131	75.6% - 83.8%

Table 4. Prevalence of cattle tick infestation in different Kebele of study area

Genus	Total count	Percent
Amblyomma	935	60.8
Boophilus	509	33.1
Rhipicephalus	94	6.1
Total	1538	100

Table 5. Infestation of tick genera of cattle in the study area

The commonly encountered tick genera during the study were *Amblyomma*; 60.8 %, followed by *Rh. (Boophilus)*; 33.1 % and *Rhipicephalus* 6.1 % (table 5).

The species of ticks identified in the study area are indicated in Table 6. Among the species of ticks identified, *Amblyomma*

variegatum was the leading cattle infesting tick at 47.53 % (n=731/1538) prevalence followed by *Boophilus decoloratus* at 33.1 % (n=509/1538), *Amblyomma cohaerens* at 9.62 % (n=148/1538), *Rhipicephalus evertsi*, *evertsi* at 5.33 % (n=82/1538), and *Amblyomma gemma* at 3.64 % (n=56/1538). The least prevalent was *Rhipicephalus pulchellus* at 0.78 % (n=12/1538).

Table 6. Tick species identified in the study area

Tick species	Total tick	Percent
<i>Amblyomma variegatum</i>	731/1538	47.53
<i>Amblyomma cohaerens</i>	148/1538	9.62
<i>Amblyomma gemma</i>	56/1538	3.64
<i>Boophilus decoloratus</i>	509/1538	33.1
<i>Rhipicephalus evertsi evertsi</i>	82/1538	5.33
<i>Rhipicephalus pulchellus</i>	12/1538	0.78

The burden of ticks in animals above three years old was high compared to animals less than three years of age (64.56 % vs 35.44 %). Similarly, local breeds were highly burdened with ticks compared with cross breeds (Local X Frisian) (84.27 % vs 15.72 %). In contrast; female animals had lower intensity of tick infestation than male animals (48.05 % vs 51.95 %). Regarding body condition,

animals with good body condition were infested with less number of ticks than medium body conditioned animals (0.39 % vs 50.46 %) whereas, there was no apparent difference in burden of ticks between medium and poor body conditioned cattle (50.46 % vs 49.15 %).

Table 7. Burden of ticks on study animals related to their intrinsic factors

Variables	Description	Examined cattle	Total tick counted	Mean tick burden
Age	<3 years	138	545	3.95
	>3 years	246	993	4.03
Sex	Male	197	799	4.05
	Female	187	739	3.95
Breed	Cross	60	242	4.03
	Local	324	1296	4
BCS	Poor	155	756	4.87
	Medium	203	776	3.82
	Good	26	6	0.23

Of the six species identified in the study area, *Amblyomma variegatum* was the major tick species infesting 31.25 % (n=120/384) of the examined cattle followed by *Rhipicephalus (Boophilus) decoloratus* 21.35 % (n=82/384),

Multispecies 14.32% (n=55/384), *Amblyomma cohaerens* 5.99 % (n=23/384), *Rhipicephalus evertsi*, *evertsi* 3.65 % (n=14/384), *Amblyomma gemma* 2.87 % (n=11/384), and *Rhipicephalus pulchellus* 0.52% (n=2/384)

Table 8. Prevalence of tick species on cattle

Tick species	Infested cattle/ Examined cattle	Prevalence (%)
<i>Amblyomma variegatum</i>	120	31.25
<i>Amblyomma cohaerens</i>	23	5.99
<i>Amblyomma gemma</i>	11	2.87
<i>Rh. (Boophilus) decoloratus</i>	82	21.35
<i>Rhipicephalus evertsi evertsi</i>	14	3.65
<i>Rhipicephalus pulchellus</i>	2	0.52
Multi species*	55	14.32

*=more than one species of tick presented.

The male to female ratio of the prevalent ticks was the highest in *Rhipicephalus (Boophilus) decoloratus* at 1.97:1 (n= 338 vs 171) followed by *Amblyomma variegatum* at 1.87:1. No variation was observed in male to female ratios of *Amblyomma variegatum* and

Amblyomma gemma, 1.8:1. The least male to female tick ratio was found in *Rhipicephalus pulchellus* at 1.4:1. In this study, male ticks dominated females in all cases.

Table 9. Male to female ratio of identified species of cattle tick in the study area

Tick species	Sex of male and female tick		Male to female ratio
	Male	female	
<i>Amblyomma variegatum</i>	477	254	1.87:1

Amblyomma cohaerens	94	54	1.74:1
Amblyomma gemma	36	20	1.8:1
Boophilus decoloratus	338	171	1.97:1
Rhipicephalus evertsi	51	31	1.64:1
Rhipicephalus pulchellus	7	5	1.4:1

The present study disclosed the preference attachment sites of ticks infesting cattle vary among different species of ticks. Amblyomma variegatum has got greater preference for udder, scrotum, tail, dewlap and leg, and belly in descending order of tick attachment. Likewise, Rhipicephalus (Boophilus) decoloratus highly preferred

to attach to udder, scrotum, and dewlap and whereas Amblyomma coherence had more preference for belly and dewlap. Rhipicephalus pulchellus and Amblyomma gemma had greater preference for ear in descending order. On the other hand, Rhipicephalus evertsi, evertsi more prefer to attach to belly.

Table 10. Tick species attachment preference on cattle body

				Body	Region				
Tick species	Head	Ear	Dewlaps	Belly	Udder	Scrotum	Leg	Tail	Total
Amblyomma variegatum	1	2	69	64	210	188	69	128	731
Amblyomma cohaerens	-	-	34	96	5	6	7	-	148
Amblyomma gemma	2	32	6	-	-	-	16	-	56
Rh.(Boophilus) decoloratus	5	18	39	20	240	157	14	16	509
Rh.evertsi evertsi	1	21	6	54	-	-	-	-	82
Rh.pulchellus	-	73	3	-	-	9	-	-	12
Total	9	73	157	234	455	360	106	144	1538

Logistic regression analysis to determine the association of predictor variables with tick infestation was performed. The current study revealed that body condition was significantly associated with the prevalence of ticks on cattle ($X^2 = 121.07$, $p = 0.000$). Although not significant, three years old and above animals had higher

prevalence of tick infestation than animals less than three years old. Similarly, male animals exhibited more tick occurrence compared to female animals. In terms of breed, local breed animals demonstrated increased tick prevalence than cross breeds (Table 11.).

DISCUSSION

In this study, a total of 1538 ticks were collected from 307 local and cross breed cattle. Thus, there was a 79.95% tick prevalence. This result agrees with the findings of 82% (Regassa, (2001) in Borana zone Southern Oromia and 81.25% (Alemu et al., (2014) in Dambia district, Northern Ethiopia. However, it is much different from the result of 25.64% (Belew and Mekonnen, (2011) in Holeta and Adaa berga dairy farm, 33.21% (Kassa and Yalew, (2012) in Haramaya and 6.1%, respectively. Six species of ticks belonging to the three genera were identified showing that A. variegatum 31.25%, A. cohaerens 5.99%, A. gemma 2.87%, Rh. (Boophilus) decoloratus 21.35%, Rh. evertsi evertsi 3.65%, Rh. pulchellus 0.52% and multi species 14.32%. Among the tick species, A. variegatum 31.25% was found to be abundant tick in the study area. This result is agrees with 29.4% (Nuna and Guder, (2018) in Bako district, West shoa Zone, Oromia regional state. But it is higher than 23.4% (Bossena and Abdu, (2012) in and around Assosa and, 18.1% (Tadesse et al., (2012) in Mizan Teferi. However, lower than 48.2% (Tamiru and Abebaw, (2010) in and around Assela, South East Ethiopia. This variation might be due to management difference.

Rh. (Boophilus) decoloratus, it is the second ranked tick species in this study (21.35%). This finding is agrees with 26.3% (Bedasso et al., (2014) in and around Haramaya town, 18.1% (Belew and Mekonnen, (2011) in and around Holeta, and 15.4% (Tamiru and Abebaw, (2010) in and around Assela. On the other hand, this finding is lower than 70.3% (Bossena and Abdu, (2012) in and around Assosa town, Western Ethiopia and 40.86% (Alemu et al., (2014) in and around Bahr dar. On the other hand, very low reported 1.6% (Regassa, (2001) in Borana ranch comparing to the result in this study. This may be due to management difference as the ranch have had its own tick control measure on relative bases that reduce tick burden on study cattle.

district, Eastern Ethiopia, and 16% (Tesfahewet and Simon, (2013) in Bench Maji Zone, Southern Ethiopia. Difference in geographical location, climatic condition, cattle management and accessibility to veterinary service and season of study in different areas might have contributed for such variations.

Amblyomma, Boophilus and Rhipicephalus were identified with a total prevalence of 60.8%, 33.1%

A. cohaerens was found to be the third populous 5.99% cattle tick identified in the study area. This result agrees with 5.21% (Alemu et al., (2014) in Dambia district, North Gondar zone. However very higher reported 50.5% (Seid, (2004) in Mizan Teferi and 83.1% (Yitbarek, (2004) in Jimma. This difference might be due to poor management practice in the area and community not award in the use of acaricide.

This study revealed much lower prevalence of Rh.evertsi evertsi and A.gemma (3.65%, 2.87%, respectively) in the study area comparing to the results registered by Tadesse et al. (2012) in and around Mizan Teferi, Southern Ethiopia (12.3%, 8.3%, respectively). This might be due to awareness of the farmers on using acaricides and managing their cattle at tick season.

Rh. pulchellus was the least prevalent tick with the prevalence of 0.52% in current study. This result disagrees 81.0% (Regassa, (2001) in Borana province. Borana province having low land altitude; it becomes most favorable for survival and proliferation of this tick species, which might be due to the nature of this tick species that can have an ability to confine to semi-arid and low land area Pegram et al. (1981).

The male to female ratio documented in the current study for A. variegatum, A. cohaerens, Rh. (Boophilus) decoloratus, Rh. evertsi evertsi and R. pulchellus were comparable to the previous report of (Solomon et al., (2007) in extra number of males. This is

may be due to that fully engorged female tick drop of the ground to lay eggs whereas males tend to persist on the host up to numerous months later to stay feeding and matting with other females. The data with regards to the predilection site on the host body revealed that udder 29.58% was the highest tick infested site, followed by Scrotum 23.40%, Belly 15.21%, Dewlaps 10.20%, Tail 9.37%, Leg 6.9%, Ear 4.7% and Head 0.59%. The high tick infestation on the udder and scrotum of cattle in this study could confirmed the explanation by (Muchenje *et al.*, (2008) that tick prefer warm, moist and hidden site with a good vascular supply.

The prevalence of ticks was higher in adult (>3 years of age) animals 51.8% as compared to young cattle (<3 years of age) (51.8% vs 28.1%). This was probably due to long distance travel of adult animals in search of feed and water, which increases their exposure to ticks comparing to most young animals that are usually kept around villages to protect them from predators. Tick infestation rate in female cattle was slightly lower (38.5%) compared with male cattle (41.4%). This variance could be associated with male cattle are exposed to tick because they spend most of their time outdoor during drawing plough in the field and travel long distance in search of food.

There was significant association of body condition of the study animals with tick infestation rate. The prevalence of tick in poor body conditioned animals was highly significant ($p=0.00$, 40.1%) compared to medium (39.1%) and good (0.8%). This was due to tick resistance differences between different body conditioned cattle. It is difficult to be sure whether the body condition was reduced by the high tick infestation rate or the reduced body condition due to various reasons exposed the animals to numerous ticks. In any case, animals carry higher number ticks because of their reduced resistance to ticks. Animal, environment, and tick factors can affect the level of host resistance to ticks or the expression of host resistance. Among which nutrition (body condition), sex, pregnancy, lactation, age, exposure to ticks, breed and tick density play key roles FAO (2004).

Cattle lose resistance with stress, and it seems that the more stressed the animal, the lower the resistance to tick infestation. Although subjected to scientific investigation, another important finding of this study was that from animals kept under the same management system; grazing on the same grazing lands, drinking at the same water point, and residing in the same stall a few of them were found to be free of ticks while the remaining herd mates harbored numerous ticks. This probably was due to within breed variation in resistance to ticks providing opportunities for within-breed further investigation for tick resistance.

CONCLUSIONS AND RECOMMENDATIONS

The study on the prevalence, species identification and resistance evaluation of regularly used acaricide in the area is considered for improving of tick control.

A. variegatum and *Rh* (*boophilus*) *decoloratus* are the common and dominant tick species of cattle and it's less susceptibility to 60% diazinon in the study district much attention to minimize the impacts on health and productivity of cattle to improving the living standards of community in the study area.

Based on the above conclusion the following recommendations are forwarded.

Combination use of Diazinon and Amitraz at recommended concentration are more effective and to minimize tick infestation.

Use proper acaricide, application and dilution has also its own contribution.

Professional attention should be given: on strength veterinary service delivery, active regulation of acaricide importation, promoting and intensive care in the area.

REFERENCES

- Abebeaw, G.K. 2004. Seasonal dynamics of ticks (*Amblyomma cohaerens* and *Boophilus decoloratus*) and development of a management plan for tick and tick borne diseases control on cattle in the Jimma zone, Southwestern Ethiopia. *Ethiopia Vet J* 18(1): 19-28.
- Abebe, R., Fentahun, T., Abera, M and Bekele. J. 2010. Survey of ticks (Acari: Ixodidae) infesting Cattle in two districts of Somali Regional State, Ethiopia. *Veterinary World* 3(12): 539-543.
- Alemu G, Chanie M, Mengesha D and Bogale B. 2014. Prevalence of Ixodid ticks on cattle in Northwest Ethiopia. *Acta Parasitol. Glob* 2:139-145.
- Arnold M and Wilesmith J. 2004. Estimation of age dependent risk of infection to BCS of dairy cattle in Great Britain. *Preventive veterinary medicine* 66:35-42.
- Bedasso M., Abebe B. and Degefu H. 2014. Species Composition, Prevalence and Seasonal Variations of Ixodidae Cattle Ticks in and around Haramaya Town, Ethiopia 6: 131-137.
- Belew T. and Mekonnen A. 2011. Distribution of Ixodidae ticks on cattle in and around Holleta Town, Ethiopia. *Veterinary Journal* 7(6): 527-531.
- Biswas, S. 2003. Role of veterinarians in the care & management during harvest of skin in livestock species. In *Proceeding National Seminar Leather Industry in Today's perspective*. 14th & 15th November, Kolkata, India. Pp. 62-64.
- Bossena F and Abdu M. 2012. Survey on the distribution of tick species in and around Assosa town, Ethiopia. *Res J. Vet. Sci* 5:32-41.
- Bureau, J.C. and Swinnen, J. 2018. EU policies and global food security. *Glob. Food Sec* 16: 106– 115.
- Chanie, M., Negash, T. and Sirak, A. 2010. Ectoparasites are the major causes of various types of skin lesions in small ruminants in Ethiopia. *Tropical Animal Health and Production* 42: 1103–1109.
- CSA. 2021. (Central Statistical Agency) Agricultural sample survey, Volume II, report on livestock and livestock characteristics: central statistical agency.
- Estrada-Pena, A., Mangold, A.J., Nava, S., Venzal, J.M., Labruna, M.B. and Guglielmone, A.A. 2010. A review of the systematics of the tick family Argasidae (Ixodida). *Acarologia* 50, 317–333.
- Estrada-Pena, A. 2015. Ticks as vectors: taxonomy, biology and ecology. *Rev. Sci. Tech. Off. Int. Epic* 34(1): 53-65.
- FAO. 2004. Acaricide Resistance: Diagnosis, Management and Prevention. Guidelines Resistance Management and Integrated Parasite Control in Ruminants, Animal Production and Health Division, Agriculture Department, Food and Agriculture Organization of the United Nations, Rome. pp. 25-77.
- Ghosh, S., Azhahianambi, P., and Yadav, M. P. 2007. Upcoming & future strategies of tick control: a review. *Journal of vector borne diseases*, 44(2):79.
- Hordofa D, Hedato A, Haji Y and Senbetu A. 2021. A study on prevalence, identification and status of ixodid (Hard) tick infestation in cattle in and around Honkola Wabe District. *Int Jvet Sci Res* 7(2): 151-155.
- Jelalu Kemal. 2016. Infestation and identification of ixodid tick in cattle. The case of Arbogona District, Southern Ethiopia. *Journal of veterinary medicine* (4): 1-8.
- Jongejan, F. and Uilenberg, G. 2004. The Global importance of ticks. *Parasitol* 29: 513-514.
- Kassa S.A. and Yalew A. 2012. Identification of Ixodide ticks of cattle in and around Haramaya district, Eastern Ethiopia. *Scientific Journal of Crop Science*.1 (1):32-38.
- Kaufman PE, Koehler PG and Butler JF. 2006. External Parasites on Beef Cattle. Entomology and Nematology Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. pp. 420-490.
- Kumsa, B., Signorini, M., Teshale, S., Tessarin, C., Duguma, R., Ayana, D., Martini, M. and Cassini, R. 2014. Molecular detection of piroplasms in ixodid ticks infesting cattle and sheep in western Oromia, Ethiopia. *Trop. Anim. Health Prod* 46: 27–31.
- Kumsa, B., Laroche, M., Almeras, L., Mediannikov, O., Raoult, D and Parola, P. 2016. Morphological, molecular and MALDI-TOF mass spectrometry identification of ixodid tick species collected in Oromia, Ethiopia. *Parasitol. Res* 115: 4199–4210.
- Labruna, M.B., Nava, S., Marcili, A., Barbieri, A.R.M., Nunes, P.H., Horta, M.C and Venzal, J.M. 2016. A new argasid tick species (Acari: Argasidae) associated with the rock cavy, *Kerodon rupestris* Wied-Neuwied (Rodentia: Caviidae), in a semiarid region of Brazil. *Parasit. Vectors* 9: 511.
- Latif, A.A. and Walker, A.R. 2004. An introduction to the biology and control of ticks in Africa. *ICTTD-2 Proj.* 1–29.
- Lora, R. B. 2001. Veterinary Parasitology. The Practical Veterinaria, Arthropods. Butterworth-Heinemann, A member of the Reed Elsevier group, Library of Congress Cataloging, United State of America, Pp. 16-21.
- Marufu, M. C. 2008. Prevalence of Ticks and Tick-borne Diseases in Cattle on Communal Rangelands in the Highland Areas of the Eastern Cape Province, South Africa. Master of Science in Agriculture (Animal Science) in the Department of Livestock and Pasture Science Faculty of Science and Agriculture. Pp. 1-134.
- Mekasha, A. Tesfaye, K., Duncana and A. J. 2014. Trends in daily observed temperature and precipitation extremes over three Ethiopian eco-environments. *Int. J. Climatol* 34: 1990–1999.
- Mekonnen, S. 2001. In vivo evaluation of amitraz against ticks under field conditions in Ethiopia: research communication. *Journal of the South African Veterinary Association* 72(1): 44-45.

- Minjauw, B. and McLeod, A. 2003. Tick borne diseases and poverty. The impact of ticks and tick borne diseases on livestock owners in India and Eastern health program center for tropical veterinary medicine. University of Edinburgh, UK. pp. 24-57.
- Mtshali MS, de Waal DT and Mbatia PA. 2004. A sero-epidemiological survey of blood parasites in cattle in the north-eastern Free State, South Africa. Onderstepoort J. Vet. Res 71:67-75.
- Muchenje V, Dzama K, Chimonyo M, Raats JG and Strydom PE. 2008. Tick susceptibility and its effects on growth performance and carcass characteristics of Nguni, Bonsmara and Angus steers raised on natural pasture. *Animal* 2:298-304.
- Nava, S., Mangold, A.J. and Guglielmone, A.A. 2009. Field and laboratory studies in a tropical population of the spinose ear tick, *Otobius megnini*. *Med. Vet. Entomol.* 23: 1–5.
- Nicholson, J and Butterworth, MH. 1986. Aguid to condition scoring of zebu cattle. International Livestock Center for Africa. Addis Ababa. pp. 1-50.
- Nuna, M.S. and Guder, D.G. 2018. Prevalence of Tick Infestation in Cattle in Bako District, West Shoa Zone, Ormia Regional State, Ethiopia. *Prevalence* 8: (21).
- Okello-Onen OJ, Tukahirwa EM, Paerry BO, Rowlands GJ, Nagda SM, Musis G, Bode E, Heinonen R, Mwayi W, and Opuda-Asodo, J. 1999. Population dynamics of ticks on indigenous cattle in pastoral dry to semi-arid range land zone of Uganda. *Exp. Appl. Acarol* 23:79-88.
- Pegram, R.G., H. Hoogstral and H.Y. Wassef. 1981. Ticks (acarida ixodidae) of Ethiopia. Distribution, ecology and host relationship of species infesting livestock. *Bulletin of Entomological Research* 71: 339-359.
- Pérez de León AA, Teel PD, Auclair AN, Messenger MT, Guerrero FD, Schuster G. and Miller, R.J. 2012. Integrated strategy for sustainable cattle fever tick eradication in USA is required to mitigate the impact of global change. *Frontier in Physiology* (3) 195.
- Regassa, A. 2001. Tick infestation of borana cattle in the Borana province of Ethiopia. *Journal Resistance Management and Integrated Parasite Control in Ruminants, Animal Production and Health Division, Agriculture Department, Food and Agriculture Organization of the United Nations, Rome.* pp. 25-77.
- Seid B. 2004. Survey of cattle tick species in and Around Mizan Teferi, Bench Maji Zones of
- SNNPS. DVM thesis, FVM, AAU, Debrezeit, Ethiopia.
- Sharma, A., Singla, L. Das, Tuli, A., Kaur, P., Batth, B.K., Javed, M. and Juyal, P.D. 2013. Molecular prevalence of *Babesia bigemina* and *Trypanosoma evansi* in dairy animals from Punjab, India, by duplex PCR: a step forward to the detection and management of concurrent infections. *Biomed Res. Int.* 2013;2013:893862. doi:10.1155/2013/893862. Epub 2013 Aug 29. PMID:24069605; PMCID: PMC3773408.
- Sileshi M, Pegram RG, Solomon G, Abebe M, Yilma J, and Sileshi Z. 2007. A synthesis of review of Ixodids (Acari: Ixodidae) and Argas (Acari: Argasidae) ticks in Ethiopia and their possible role in diseases transmission. *Ethiopia Vet. J.*, 2:1-22.
- Solomon G, Nigist M and Kassa B. 2001. Seasonal variation of tick on calves at Sebeta in Western Shoa Zone. *Ethiop. Vet. J.* 1:17-30.
- Solomon, J., M. Sileshi, M. Nigist, C. Thomas, T. Getachew, M. Abebe, B. Genet, S. Demeke and Z. Ejigu. 2007. Distribution and seasonal variation of ticks on cattle at Gibe Tollay in Central Ethiopia. *Ethiopian Veterinary Journal* 11: 121-141.
- STATA Corp. 2005. Stata statistical software. Release 9.0 Lake-way Drive, College Station, Texas.
- Tadesse, B. and Sultan, A. 2014. Prevalence and distribution of tick infestation on cattle at Fitcha Selale, North Shewa, Ethiopia. *Lives. Res. Rural Dev* 26(8).
- Tadesse, F., Abadfaji, G., Girma, S., kumsa, B. and Tariku Jibat, T. 2012. Identification of tick species and their preferred site on cattle's body in and around Mizan Teferi, Southwestern Ethiopia. *Journal of Veterinary Medicine and Animal Health* 4(1): 1- 5.
- Tamiru T and Gashaw A. 2010. Prevalence of ticks on local and cross breed cattle in and around Assela town, Southeast Ethiopia. *Ethio. Vet. J.*, 14:79-89.
- Tesfahewet ZS and Simeon HO. 2013. Prevalence of ectoparasite infestations of cattle in Bench Maji Zone, Southwest Ethiopia. *Vet. World* 6:291-294.
- Tuli, A., Singla, L. Das, Sharma, A., Bal, M.S., Filia, G. and Kaur, P. 2015. Molecular epidemiology, risk factors and hematochemical alterations induced by *Theileria annulata* in bovines of Punjab (India). *Acta Parasitol* 60: 378–390.
- TZWLF0. 2020. Official Document on Livestock resource of the Woreda.
- TZW0A. 2020. Official Document on Vegetation and land condition of the Woreda.
- Walker AR, Bouattour A, Estrada-pena A, Horak IG, Latif AA, Pergam RG and Preston PM. 2003. *Tick of domestic animal in Africa, Guide to Identification, Tick Species*. Bioscience Reports, 42 Comiston Drive, Edinburgh EH10 5QR, Scotland, and U.K. pp. 3-210.
- Walker, A. R., Bouattour, A., Camicas, J. L., Estrada-Pena, A., Horak, I. G., Latif, A. A., Pegram, R. G., and Preston, P. M. 2014. *Ticks of domestic animals in Africa: a guide to identification of species*, Edinburgh, UK. Bioscience report. pp. 1-221.
- Yitbarek G. 2004. Tick species infesting livestock in Jimma, Southern Western Ethiopia. DVM Thesis, Faculty of Veterinary Medicine, Addis Ababa University, Debre Zeite, Ethiopia. pp. 8-33.