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Survey on bovine ticks species in and around Alge town

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Abstract

A cross- sectional study was conducted from November, 2016 to April, 2017 in and around Alge town with the objective to identfy the main tick species infesting cattle and their distribution in and around Alge town to asses associated risk factor with tick infestation and to identfy predilection sites of important tick species infesting cattle. The cattle selected from study site by random sampling technique. a total of 384 cattle's were used representative animals on which study was done to know which species of ticks are prevalent and cause economic losses in the area. An investigation procedure requires both field works and laboratory investigation of collected sample. Ticks were collected from different body regions of cattle and transferred into universal sampling bottle containing 70% ethanol. In this study, a total of 4579 adult ticks were collected from 384 cattle comprising three genera and five species. Analysis of collected data was done by chi square (x^2), ANOVA and independent samples test were used to test the association between tick infestation with different factors. The genera of ticks encountered were *Amblyomma,Boophilus,* and *Rhipicephalus* with relative infestation rate of 76.70%, 19.98% and 3.32%, respectively. Among the five species indentified three species (*A.coharens,A.variegatum* and *A.gemma)* from the genus *Amblyomma,* one species (*B.decoloratus)* from the last species (*R.evertsi evertsi)* from the genus *Rhipicephalus.*

Keywords: Bovin, Alage, Tick,

1. Introduction

Ethiopia, located in the horn of Africa between latitude 30^0 North to 15^0 North of the equator and the longitude from 33^0East to 48^0 East is agrarian county with an estimated a total area of 1,101,000 km^2. The proportion of a total population in agriculture sector is 82.4% (CSA, 2008). The agricultural sector is characterized to a large extent by mixed farming system in which livestock play a vital role in the farming system of the country (CSA, 2002). According to CSA (2003) estimate, the livestock population is about 30 million heads of cattle, 24 million sheep, 18 million goats, 7.2 million equines, 1.25 million pigs, and 55.6 million poultry. The Ethiopia livestock contributes only 15% of the GDP. Total herd meat off-take is estimated at around 7% annually which is perhaps one third lower than the average for tropical Africa. Cattle are a prime resource for the people and government of Ethiopia (CSA, 2002). However, the occurrence of disease and parasite are the major contributing factors that have impeded the full exploitation of cattle (Melese, 1989).

Vector and vector born disease (VBD) are the major constraints to the development of viable livestock industries wherever they occur (Mekuria, 1987). Tick and tick born disease (TBD) are widely distributed throughout the word particularly in tropical and subtropical countries, which cause a tremendous loss in livestock production (Kettle, 1995). In most parts Africa, including Ethiopia tick and TBD, together with tsetse and *tryanosomosis* are economically very important disease (Solomon *et al*., 2001). The

economic losses caused by tick and TBDs in cattle alone are estimated at US$ 13.9_18.7 billion annually worldwide (De castro, 1997). The problem is severing in developing countries where the resource for control and eradication is very limited (FAO, 1984). Among developing countries in Ethiopia, ticks occupy the first place amongst the external parasite, and the economic loss incurred when they infest livestock, particularly cattle is enormous (Feseha, 1983).

According to warker *et al* (2003) ticks are considered to be the most important to the health of domestic Ethiopia are *Amblyomma, Boophilus, Haemaphysalis, Hyalomma* and *Rhipicephalus*. The most important and wide spread tick species are *Amblyomma variegatum* (vector of *Cowdria ruminantum* and *Theileria mutan*) and *Boophilus decoloratus* (Vector of *Anaplasma marginale* and *Babesia bigemina*) (Abebaw, 2004). These ticks are important tranismetter of disease and can damage hides and skins, and interfere with meat and milk production.

Extensive surveys have also carried out on the distribution of tick species on livestock in different regions of the country in which different tick species such as *Boophilus decoloratus,Amblyomma variegatum, R.evertsi evertsi, Hyalomma marginatum rufipes, Hyalomma truncatumi, Amblyomma cohaerens, Amblyomma gemma, Amblyomma elide, Rhipicephaalus pulchellus* are also frequently reported in many tick survey carried out in the country (Morel, 1980; Jewaro,1986; Abebaw, 1996; Solomon *et al*., 1998; Seyoum, 2001; Solomon *et al*., 2007).

Ilubabor zone, including Alge town located in south western part of Ethiopia. In the area, there are about 3,009,509 heard of cattle which are always under the risk of tick infestation and tick born disease challenge despite extensive data available on the tick distribution and abundance, no survey was conducted on identification of tick species in and around Alge

Hence, the objectives of this study were:-

- To identfy the main tick species infesting cattle and their distribution in and around Alge town
- To asses associated risk factor with tick infestation
- To identfy predilection sites of important tick species infesting cattle

2. Literature Review

Ticks are blood sucking ectoparasite of both warm blooded and cold blooded animals. The belong to the phylum arthropoda, the class arachnida and order acari (Hendrix, 1998; Walker *et al*., 2003; Latif and Walker, 2004). Since, they belong to the acarines; any infestation of domestic animals by ticks is referred to as acariasis (Hendrix,1998).

Ticks have two well defined families, the *Ixodidae* or hard ticks and *Argasibae* or soft ticks. Though, sharing sharing certain basic properties, they differ in many structural, behavioral, physiological, feeding and reproductive patterns (Urquhart et al.,1989). From veterinary piont of view the hard ticks are by far the most important. These are over sity different tick species which are found in East Africa, but many off these are appearing to be little or no veterinary important (Walker, 1970).

Ticks occur in temperate as well as in tropical and sub-tropical regions of the world, but ticks and TBDs cause a major constriant to livestock production in tropical and subtropical areas (Bram, 1975). Hard ticks are vectors diseases which are most important for animals production in the tropics (Seifert, 1996).

2.1. Life Cycle of Ticks

All ticks are parasitic during some part of their life cycle. All of them pass from the egg through the larval and nymphal stages before becoming adults and utilize one or more host animals during the developmental cycle. However, the life cycle of *Argasidae* and *Ixodidea* ticks differ principally in that the *Argasidae*, except Otobius, feed repeatedly as nymph adults lay their egg in batches at interval of weeks or month. *Ixodidaae* adult females, on other hand, take a single enormous meal after which they drop off the host and ovipost in natural shelter (Urquhart *et al*., 1989). Ovipositions occur after period of digestion and oogenesis. The emptied female then dies after a single oviposition, the newly hatched larvae or seed ticks climb the grass or shrup and wait there till suitable host passes to which they attach themselves with their claws (Soulsby, 1982)

After having engorged the larvae molts and become nymph. The nymph engorges and molts and become Imago. After hardening of integument and often after ccopulation the female engorged, drop off and seek a shelter spot to lay the eggs, which the male tick remain much longer than the female on the host (Urqurhart *et al*.,1989).

The whole process of subsequent development of adult stage is greatly infuelenced by prevailing temperature and humidity causing marked prolongation of different stage especially hatching off eggs and pre-oviposition peroid of engorged female. Accorging to the number of hosts they require during their life cycle, ticks can be classifiede into three groups (One, two and three hosst ticks) (Chandler and Reaad, 1961)

One host tick:- The larvae which emerge from the eggs within 3-4 weeks, attach themselves to the host animal where they complete their entire development on the single host, the develop from larvae to nymph and imagoes. Then copulate after maturation period and following engorgement female drops off and deposit eggs on the ground. The entire development cycle takes mostly 19-21 days are with a minimum of 15 days and a maximum 40 days. But depend on the enviromental condition (availability and level of humidity and temperature) (Morel,1980; Seifert, 1996). All three instars engorge on the same aanimals (Soulsby, 1982; Muller and Durden, 2002). All the species of *Boophilus* are common examples of one host tick (Walker *et al*., 2003).

Two host tick:- The eggs hatch to give larvae, which can attaches to a host animal and feed on blood, then develops into nyphm stage. After maximum of 14 days, it drops off on to the ground where it reaches the imago stage in 20-30 days time. The adult looks for another host and feeds for 6-11 days, then females' drops to the ground and deposite eggs, which will develop into larvae (Morel, 1980). Some examplesof two host ticks are; *Rhipicephalus evertsi evertsi, Hyalomma deteritum* and *Hyalomma marginaturrm rufipes* (Walker *et al*.,2003).

Three host ticks:-The three host looks for a new host during each stage of development in order to feed; the larvae merges from the eggs deposited on the ground, looks for host, feed on it for 3-4 days, drops off and molts after 3-4 weeks on the ground to nymph. The nymph climp to a second host in order to feed on it for 3-7 days, leave it and molt into imago on the ground after 2-8 weeks. The adult attach to thrid animals and feed, and then females drop off and lay eggs to continue the new cycle which takes about 1-3 weeks generally (Forse, 1999; Latif and Walker, 2004). These ticks require three hosts for development, irrespective of the host species. All species of *Amblyomma, Dermacentor, Ixodes* and most species of *Hyalomma* (except, few species) are three host ticks (Okello *et al*.,1999). The entire development of one cycle may last up to one year since the different length of time spent in each stage on the ground (Latif and Walker, 2004)

2.2. Factors Influencing the Distribution of Ticks Species

Ticks occur in the tempereture as well as in the tropical regions of the world. There are about 825 described species of tick in the world parasitizing domestic and wild animals as well as human (Walker *et al*., 2003). The most important situation to be considered in the epidemiology of ticks categorized into free living developmental phase, host finding phase and parasitic phase. When ticks occur freely in the environmental external factors like tempereture and humidity are the major determents of their development and growwth (FAO, 1984).

2.2.1. Host Relationship

The survival of a population of ticks depends on the prensene of maintenance hosts suitable for perpetuation. Whenever ticks couldn't get host they will die of starvation. They are limited than those on which adult may attemt to feed but not necessarily survive (FAO, 1984; Walker,2003) they feed their host in several way. Some ticks live in open environments and crows on to vegetation to wait for host pass by. This is a type ambush and the behavior of waiting on vegetation is knowwn as questing. The ticks genera like *Rhipicephelus, Haemaphysalis* and Ixodes, the larvae, nymph and adults quest on vegetation. Adult ticks of the genera *Amblyomma* and *Hyalomma* are active hunters, they run across the ground to seek hosts. The genera behavior of seeking hosts inan open environment described as exophilic (Walker *et al*., 2003). It is observed that when cattle are less resistant due to nutrition, stress and lactation the tick survivability rather increases (FAO,1984;Brown, 1985)

2.2.2. Natural of Hosts or Host Specificity

The degree of host specificity in *Ixodid* ticks varies from to genera to genera or within certain group of various genera (Seyoum, 2001). Earlier ticks have characteristic of hosts to which they are adapted. Hosts are usually in a group of similar species for instance, all the species are adapted to feed on cattle, but some may survive by feeding on sheep or artelope (Warker *et al*., 2003).

As sited by Tatchell (1986) and Seyoum (2001), define different categories of ticks host specificity. The majority of ticks at least 700 of 850 Ixodid species are characterized species more or less strict host specificity. Some have adapted either to wide range of host (For example; *Ixodid ricinus*) while other have become host specific become host specific like *Boophilus* species (Tatchell,1986).

2.2.3. Location on the Host (Attachment Site)

The tick's location on the host is linked to the possibility of penetration by the hypostome. Species with a short hypostome (*Rhipicephalus,n Dermacenter, Haemaphysalis)* usually attached to the head with in ear, nape of the neck, margin of the anus and under the tail of cattle. Long hypostome species attach to the lower part of the body where the skin is thicker, such as the dewlap, axilla, groin udder, testes, perineum, and small ticks (all instars of *Boophilus*, larvae and nymphs of *Ambylomma*) have no marked preference, and can be found all over the body (Morel, 1989). Site specificity is one of the populations limiting system that operate through the restriction of tick species to certain parts of the host body. The host or aspects of the environment and tick behavior enforce it (Tatchell, 1992). They also seek out places on the hosts where they are protected and favorable conditions for their development and prefer to bite into thin parts of skin (Okello, *et al*., 1999).

2.2.4. Cattle Resistance to Ticks

Host resistance means the ability of cattle to acquire the physiological or immunological means to control the number of ticks completing engorgement on their body. All breeds of cattle have this ability but *Bos indicus* breeds are very much more successful than *Bos taurus* breeds. *Bos indicus* and *Bos taurus* crosses are intermediate and the degree of resistance is roughly proportional to the amount of *B.indicus* blood level in the cross. In studies conducted in Ethiopia Jersey-cross cattle particularly Jersey cross with Horro, showed very good resistance levels (Mekonnen, 1995).

Different defense mechanisms, including tick avoidance, grooming, skin characteristics and more specific immunological responses, are involve in reducing the number of ticks parasitizing cattle (De castro,1991; Mijaw and De castro, 2000).

2.2.5. Ecological Factors

The previous studies in South Western Ethiopia by (Morel, 1980; Pegram *et al*., 1981; De castro, 1994) classify the area where ticks are commonly distributed into different altitude, rainfall, rain, type and climate climax and vegetation cover which affect the distribution of tick species in the area. Humid rather than wet conditions are essentials for the development and survival of eggs and pupae, and unfed hatched ticks (Morel, 1989). Depending on the climate characteristics of season and region, ticks may be active during the morning and evening of the day (Morel, 1989).

High summer temperature influences the behavior of ticks in all habitat types and results in shorter longevity in certain habitats. As behavioral response to rising temperature during November to April, ticks migrate down the vegetation to the soil (Abebaw, 2004). The parameter (temperature and humidity) are the result of the simultaneous action of several factor, such as latitude, altitude, and their effects (sunlight, rainfall, and wind patterns) (Morel, 1989). In tropical Africa principal activity of adults during the rainy season, peaks at the beginning and in the middle due to rainy nature of South Western (Morel, 1989; De castro,1994).

Rainfall and relative humidity were the main climatic factors that influence tick distribution and activity. A peak of activities for most species was detected at the beginning of the heavy rain (June to July). Due to extreme difference in rainfall and relative humidity during the year tick numbers during the dry season are low with a marked increase coinciding with the start of the rains. Relative high tick burn was observed the rainy season (Abebaw, 2004).

2.3. Economic Importance of ticks

Ticks pose considerable threat to human and animals all over the world (Brossard, 1998). Ticks and TBDs

are widely distributed throughout the world. Economically developed nations spends huge sum of money to control tick and TBDs (Tamiru, 2008). In developing nation particularly in tropical and subtropical countries, with little resources for control and prevention, losses from tick and TBDs are considerable high (ILRI, 1999). FAO (1984) estimated that 80% of the world cattle population is infested with ticks.

According to Morel (1980), the effect of ticks broadly classified as direct and indirect pathogenic effect. All the direct pathogenic effect of ticks occurs at the time of feeding (Latif and Walker, 2004). During feeding, ticks cause disease to their hosts by taking blood, injuring the skin causing irritation, pain, udder damage and injection of toxins (FAO, 1984 and Morel, 1989).

Being ticks are voracious blood feeders heavy infestations can result in anemia (Jongejan and Uilenberg, 1994). In natural infestation that involves thousands of ticks per animal, the anemia can be severing (Kaufmann, 1989). The local injury developed at site of attachment may predispose to secondary bacterial infestation and to screw worm myiasis (Jubb *et al*., 1993). With their power full moth parts ticks damage the skin of animals and leads to reduction in the leather quality and consequently to considerable economic losses (Brossard, 1998).

Deep and painful bite wound is more severe in long mouth ticks like *Abmlyomma* and *Hyalomma.* Deep bite often leads to abscess formation due to infection by pyogenic bacteria and damage to the udder (Jubb *et al*., 1993). The irritation and painful phenomenon that followed tick bite result in worry or annoyance. Hence, the hosts expend much of its time and its effect to avoid this effect rather than grassing (Kaufmann, 1989).

Ticks have also direct cause of illness, toxicosis and paralysis (Brossard, 1998). Some species of ticks are known to introduce toxin through their salivary secretions into host blood stream while feeding. These toxins act like neurotoxins producing ascending paralysis or responsible for tick borne toxicosis. Ticks like *Ixodes* species, *Dermqcentor* species, *Rhipicephalus* species (*R.evertsi evertsi, R.simus*) and *Ambylomma cajanse* reported to be responsible to tick paralysis, while *Hyalomma truncatum* and *R.appebdiculatus* able to cause tick toxicosis, sweating sickness that is seen in Southern and Eastern Africa (Morel,1989).

The direct pathogenic effect of tick manifested principally through their ability to transmit wide spectrum of pathogenic microorganism (FAO, 1984). When microorganisms infest ticks, the ticks are able to transmit the microbe to livestock (Latif and Walker, 2004). In Africa, the major tick borne cattle disease are *East Cost Fever, Babesiosis, Cowdrosis, Tropical theileriosis, Anaplasmosis* and *Dermatophilosis* (Jongenjan and Uilenberg, 1994). Except the former, the later diseases are known to present in Ethiopia (Morel, 1989).

The effect of ticks may vary from a situation where it is impossible to raise livestock (either at all or not economical) to where a great expense incurred in the control of tick and TBDs. In tropics and temperate areas, where they pose a problem, ticks and TBDs is responsible for hundreds of millions of dollars loss per year is (Soulsby, 1982).

The direct loss due to tick and TBDS tend to be less in areas where indigenous animals are kept under natural condition whereas the loss is significant when exotic animals susceptible to tick and TBDs are introduced to tick infested areas (FAO,1984).

2.4. Tick Control Methods

The aim of tick control is not to control all ticks simultaneously but a definite species are controlled because of its particular role. The strategy, therefore, is based on the biological characteristics of the target species (Jongejan and Uilenberg, 1994; Abebaw, 2004). Acaricide application is the main control methon in Ethiopia. Apart from the use of chemical compounds for tick control, certain cultural practices such as hand picking of ticks, burning with hot iron and plat preparation are widely used by cattle owners in the rural areas. Moreover, there is no perfect single control method (EVA, 1998).

Tick biology data are fundamental in chemical control and biological control methods. The two control method differ only in the use of acarisides using procedures direct affecting the microhabitat and the host availability such as using hyper parasites and predators and immunological control from a part of an integrated biological control program. The importance of these methods varies, some are effective in their own, some are effective in own, but it is important to combine them. The use of accaricide is inconvincible without data in the natural environment of ticks and their host (Abebaw, 2004)

2.4.1.Chemical Control

Acaricides are needed to control tick infestation, but needs to concerns about residues in food and environment. The selection of the method depends on the host species, target parasite, size of the animal population and type of animals (Abebaw, 2004).

Two methods of control by chemicals are possible first by application of chemicals to the surface body of animals and secondly by systemic attach of the tick by way of its blood meals (Urqquhart *et al*., 1989). Application of acaricides to the surface of livestock through deep and sprays has been the main method for the control of tick infestation and prevention of disease transmission in Africa (Brossard, 1998)

Acaricides used to control ticks on livestock or in the livestock or in the environment are killed, but should not harm livestock or applicators, the tissue of treated animals should not contain chemical residues, and the environment should not be adversely affected (Soulsby,1982).

Major chemicals that have been used for this purpose are arsenicals, chlorinated hydrocarbons, organophosphorus compounds carbamates, amidines and synthetic pyrethroids. The use of arsenic trioxide in the past was chlorinated hydrocarbons and is also being phased-out mainly due to the emergence of resistant tick populations. Organophosphates, amidines and synthetic pyrethriods are currently the most widely used chemicals for the control of ticks although evidence of some tick species resistant to organophosphates is also coming to light (EVA, 1998).

2.4.2. Ecological Control

Many of the methods are not feasible since fencing which will exclude wild life has not been constructed in many areas. Pastures are kept free of mammalian host, until the free living larvae stage has died. To a large extend the method will not work in Africa because most of tick species may have other food sources and also the unfed adults may survive for two years or more on pasture (Soulsby,1982)

Rough pasture and tree cover increases the survival of tick population. There is a general practice with pastoral people in East Africa to burn grass land once a year both to improve the pasture and to control tick population. This is not a particular effective method of tick control since many stages missed with burning, because they rest in the soil surface so that ticks will soon recognized on burnt areas after a time (Branangan, 1970).

Pasture management may be developed to have detrimental effect on tick population. A direct effect would be plant pasture with species which inhibit the ascent of tick up the vegetation (Urquhart *et al*., 1989). It was pointed out by Sutherst (1983) that the improvement to the nutrients value of pasture will allow cattle to develop a better resistance to tick infestation. Little positive improvement has occurred in many areas of Africa.

2.4.3. Biological Control

Biological Control of tick is defined as active attach against ticks using biological means the use of hyper parasites like chalcid flies and humterellus are probably important in nature, but they are difficult to manipulate or reproduce them for practical use, predators, are more effective, especially ants and birds (*Buphagus* species or Ox pickers, crotophages species, various magpies village foul). Depending on concentration, these predators consume a large number of ticks (Soulsby, 1982).

Control of ticks by sterilization of male could be applied under certain conditions with reasonable hope of success (Soulsby, 1982). Probably the most exiting areas of biological control of ticks are the use of tick resistance cattle to control tick population. Such resistance is important in principle and has to be proved to be effective. At present, this method is widely used to reduce to acaricide application or to replace them when they are found ineffective in resistant tick population (Mijaw and Des Castro, 2000).

2.5. Status of Tick Distribution in Ethiopia

Different type of tick species widely distributed in Ethiopia and a number of individuals reported the distribution and abundance of tick species in different part of the county. However, the overall study done in the Ethiopia by Mokennen (1995) showed *Amblyomma* (40%), *Boophilus* (21%), *Haemaphysalis* (0.5%), *Hyalomma* (1.5%) and *Rhipicephalus* (37%); but over 60 species are known to exist in the country.
The distribution of *A.variegatum* is similar to that of *B.decloratus* (Pegram *et al*., 1981), and together these two species constitute more than 40% of the total

collections. More than 80% of ticks were collected from cattle and *B.deecloratus* (28%) was the most abundant tick found with heavy infestations. This species were observed mostly on cross bred cattle. *B.annulatus* is restricted to Gambela, South West Ethiopia. *A.cohaerens* predominates in western Ethiopia (De castro, 1994) and *R.pulchellus* was mostly found in South Ethiopia along the lift valley. *R.evetsi evertsi* appeared to occupy a wide range of climate and ecological zones. *Ambylomma gemma* and *R.pulchellus* are confined to semi-aired (Pegram *et al*., 1981) and low land tick densities are usually greater than those in the high lands. *Amblyomma*, *Boophilus* and *Rhipicephalus* ticks are mainly found on livestock. The remaining species occur in limited numbers and have little practical significance to livestock production. Tick population levels in the local cattle are generally low for most of the year, but numbers increases during the rainy season (Pegram *et al*.,1981). However, *Amblyomma* and *Rhipicephalus* are predominant genera in many part of the country; *Boophilus* and *Hyaalomma* also have significant figures. The population changes of ticks are influenced by climatic changes, which affect the rate of tick population on the ground, host resistance and natural enemies (Solomon and kayaa, 1996).

3. Materials and Methods

3.1. Study Area

The study was conducted in and around Alge town which is located 654 km South West of Addis Ababa and $8^0$16" to 9^0 60" North latitude and 40^0 55" to $40^0$40" East longitude. It lies in altitudinal range of 885-3300 m.a.s.l. The average annual rainfall 1500mm. The weather condition is hot and humid with temperature fluctuation between 8^0c 34^0c (MoA, 2006).

3.2. Study Population

According to the Alge town finance and Office of Agriculture, the total animal population of the Ilubabor zone 4,762,478 in 2016, out of the total population the registered cattle population is 2, 006,467; on which the study was conducted. Majority of these cattle were kept under extensive management system which are highly prone to tick infestation.

3.3. Study Design

Across sectional study was conducted to identify important tick species infesting cattle and their predilection site on the body of animals. In addition, the study also designed to know the effect of age, sex and body condition on the prevalence and rate of ticks.

3.4. Sampling Method and Sample size Determination

The cross sectional study was conducted to assess tick species present in and around Alge town during study time. The cattle selected from study site by random sampling technique. The sample size was determined by using the formula given Trusfield (2005) with expected prevalence 50%, level of significance 95%, and absolute precision 5%. According to, a total of 384 cattle's were used representative animals on which study was done to know which species of ticks are prevalent and cause economic losses in the area.

3.5. Investigation Procedure

An investigation procedure requires both field works and laboratory investigation of collected sample. Ticks were collected from different body regions of cattle and transferred into universal sampling bottle containing 70% ethanol (Okello *et al*., 1999; Walker *et al*., 2003). Ticks were collected from different body regions of the animals such as head, dewlap, brisket, belly, back, udder or scrotum, ano-genital, legs, tail, perineum, ear, and hump were thoroughly assessed (Kaiser *et al*., 1987). Ticks were removed from the host skin whilst retaining their good condition for identification using steel forceps after application of a drop of 70% ethanol to the site where the mouth of ticks attached. The collection ticks from each body regions were kept separately for identification in separate sample bottles containing 70% ethanol until identification was done according to Hoogstraal (1956), Walker (1961) and Mattysse and Colbo (1987). Finally, ticks were identified counted recorded by species and sex within 5 days of collection using stereomicroscope (Hendrix, 1998).

3.6. Data Analysis

After entry of the collected data into the Microsoft excel sheet it was summarized by descriptive statistic like mean and percentage and then displayed by graph and tables. Analysis of collected data was done by chi square (x^2), ANOVA and independent samples test

were used to test the association between tick infestation with different factors (age, sex and body condition score). For this analysis, SPSS version 17.0 soft ware (SPSS INC, 2007 LEAD Technologies) was used.

4. Results

In this study, a total of 4579 adult ticks were collected from 384 cattle comprising three genera (Fig.1) and five species (Table.1). The genera of ticks encountered were *Amblyomma,Boophilus,* and *Rhipicephalus* with relative infestation rate of 76.70%, 19.98% and 3.32%, respectively.

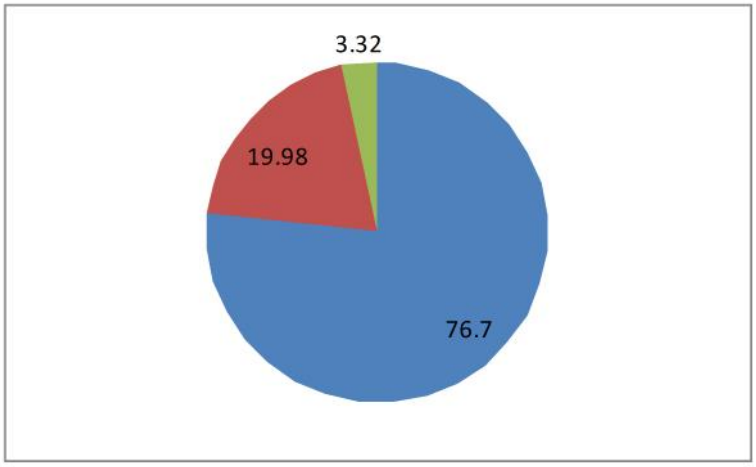

Figure 1: Relative infestation rate of tick genera on cattle

Among the five species indentified three species (*A.coharens,A.variegatum* and *A.gemma)* from the genus *Amblyomma,* one species (*B.decoloratus)* from the last species (*R.evertsi evertsi)* from the genus *Rhipicephalus*

Amblyomma coharens was the most abundant (40.69%) ticks species found in and around Alge town. Although generally observed in low numbers as compared to previous finding the examined animals carried more ticks of this species. The male to female sex ratio was 1.95. *A.variegatum* was the second most abundant (33.59%) tick species found next to *A.coharens.* Its male to female ratio was 1.73. *B.decoloratus* was the third abundant species next to *A.variegatum*. It was encountered in Alge town with percentage prevalence of 19.98%. The male to female ratio of this species was 0.01; which was different from other tick species found in having more female than male. *R.evertsi evertsi* and *A.gemmaq* while the fourth and fifth most abundant ticks with a relatively low number of percentage prevalence (3.32% and 2.42%) respectively (Table 1).

Table 1: Species, sex and proportion of tick collected

Tick	Sex of Ticks		Male to female	Total	
	Male	Female	ratio	Number	percent
A.coharens	1231	632	1.95	1863	40.69
A.variegatum	975	563	1.73	1538	33.59
B.decoloratus	7	908	0.01	915	19.98
R.evertsi evertsi	100	52	1.92	152	3.32
A.gemma	82	29	2.83	111	2.42
Total	2395	2184	1.1	4579	

About 88.8% of the examined animals were infested by ticks. Statistically significance (p=0.003, x^2=11.32) variation in the tick infestation was observed between cattle of good and poor body condition. The prevalence was higher in poor body condition than in the good body condition. The highest infestation rate of ticks also seen on poor body condition animals that good body condition (Table.2)

Table 2: Prevalence of Bovine tick species on the basis body condition

Body condition	No examined animals	No of infested animals	Infestation rate (%)
Poor	146	135	92.50
Medium	128	118	92.18
Good	110	86	78.18

The infestation level on age was statistically significant (p=0.005, the mean tick is 10.48/head in animals of ≤ 3 yrs and 13.11/ head in animals of > 3yrs), as the age of animals increase tick burden also increase. Similarly the female animals also carried more ticks than males (Table2)

Table 3: Tick burden with in age, sex and body condition of the animals

	Age		Sex		Body condition		
	<3yr	>3yr	Male	Female	Poor	Medium	Good
No of animals examined	173	211	190	194	146	128	110
Tick burden	1813	2752	1949	2630	1930	1588	1061
Mean tick burden/ head	10.48	13.11	10.26	13.56	13.22	12.41	9.65

Each species of tick tend to prefer a site of attachment on the animal body (Table 3). Hence, udder/scrotum (32.8%), perineum (22.17%), brisket (14.06%), ano-vulva (11.49%), neck (8.32%) and dewlap (7.68%) were the preferred sites of attachment for *Amblyomma cohaerens* in decrease order. Udder/scrotum (31.53%), perineum (24.12%), brisket (15.86%), ano-vulva (8%), uddertail (6.31%) were the preferred predilection site for *A.variegatum.* it was also collected from the animal's body where the *Amblyomma cohaerens* was collected but in less count.

Boophilus decoloratus usually infests the udder/scrotum/ (18.14%), perineum (18.8%), neck (17.92%), brisket (13.2%), ano-vulva (14.97%), dewlap (12.35%), but this species was restricted mainly to ano-vulva (37.5%) and udder tail (44.08%) with low burden on udder/scrotum, perineum and ear. *Amblyomma gemma* was the last species found in the study area. Only 2.42% the total tick species collected and identified. It was collected from under/scrotum (21%), ano-vulva (17.12%), neck (15.32%), under tail (11.71%), and tail (11.71%), and perineum (10.81%) (Table4). The highest tick burden during the study period was observed during the first months of study (November and December) then after on words their numbers per months decreased.

Table 4: Distribution of different tick species in different body part of the animals

Site of	***A.cohaerens***		***A.variegatum***		***B.decoloratus***		***R.evertsi evertsi***		***A.gemma***		**Total**	
Attachment	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Udder/scrotum	611	32.80	485	31.53	166	18.14	15	9.87	21	18.92	1298	28.35
Perineum	413	22.17	371	24.12	172	18.80	8	5.26	12	10.81	976	21.31
Brisket	262	14.06	244	15.86	121	13.22	0	0	11	9.91	638	13.93
Neck	155	8.32	85	5.53	163	17.92	0	0	17	15.32	421	9.19
Ano-vulva	212	11.49	123	8.00	135	14.97	57	37.50	19	17.12	550	12.01
Dewlap	143	7.68	111	7.22	113	12.35	0	0	8	7.21	375	8.19
Under tail	27	1.45	97	6.31	17	1.86	67	44.08	13	11.71	221	4.83
Abdomen	9	0.48	11	0.72	4	0.44	0	0	7	6.31	31	0.68
Back	2	0.11	0	0	2	0.22	0	0	0	0	4	0.09
Thigh	0	0	0	0	7	0.77	0	0	0	0	7	0.15
Hump	7	0.38	4	0.26	3	0.33	0	0	3	2.70	17	0.37
Head	3	0.16	0	0	4	0.44	0	0	0	0	7	0.15
Mandible	0	0	0	0	5	0.55	0	0	0	0	5	0.11
Ear	17	0.91	7	0.46	0	0	5	3.29	0	0	29	0.63
Eyelid	2	0.11	0	0	0	0	0	0	0	0	2	0.04
Foot	0	0	3	0.19	3	0.33	0	0	0	0	6	0.31
Total (%)	1863		1583		915		152		111		4579	

5. Discussion

Although there are different species of ticks only five species of ticks (*Amblyomma cohaerens, Amblyomma variegatum, Ablyomma gemma, Boophilus decoloratus, Rhipicephalus evertst evertsi*) were identified in Alge district. In this study, *Amblyomma cohaerens* was the most abundant ticks species in the area. This may be due to geographic location and humid climatic condition of South Western part of Ethiopia and also due to its being relatively active throughout the year. This result also agreed with previous studies conducted by Abebaw (1994), Yitbark (2004), De castro (1994) and Pegram *et al*., (1981).

Amblyomma variegatum was the second most abundant tick species. Its distributions is similar to that of *Boophilus decoloratus* (Pgram *et al*., 1981) and more wide spread throughout the Western zone but less abundant than *Amblyomma cohaerens* (De Casto,1994). It was also the most widely distributed cattle tick in Ethiopia, as reported by the survey in North Omo (Tesfanesh, 1993) and Bahir Dar (Mesele, 1989) with prevalence of 59% and 75.91, respectively. *A.variegatum* has a great economic importance, because it is an efficient vector of *Cowdria ruminantum.* This parasite also causes the greatest damage to hide and skin because of its long mouth parts which render the commodity value less on the word market if the ticks are large in number (Solomon *et al.,* 2001). Furthermore, ulcers caused by this tick species become favorable sites for secondary bacterial infection like *Dermatophilus congolensis* (Kaufmann, 1989).

Boophilua decoloratus is the third abundant tick species in this study, has also been reported as prevalent in many other parts of the country such as rift valley (Pegram *et al*., 1981); Solomon and Kaaya, 1996) and in Dire Dawa (Manueri and Tilahun, 1991). The result of this study disagrees with finding of Alekaw (1998) at Metekel Ranch, Ethiopia showing prevalence of 5.7%. This may be due to the different in geographical location and altitude factor. This tick species is abundant in wetter highland and sub-highlands receiving more than 800mm rainfall annually (Pegram *et al*., 19881). The regional distribution of *Boophilus decoloratus* is similar to *Ambylomma variegatum* (Feseha, 1983). *Boophilus decoloratus* can also transmit *Babesia bigemina* and *Anaplasma marginale* to cattle. This peak population occurs in May, June and July, September and October is moderate in South Western parts of Ethiopia (Abebaw, 2004).

Rhicicephalus evertsi evertsi was the fourth abundant tick species. This tick species was also reported in Bahir Dar (Mesele, 1989; Behailu, 2004), Jimma (Abebaw, 1996) and Asela (Tamiru, 2008). Morel (1980) mentioned that the native distribution of *Rhicicephalus evertsi evertsi* in Ethiopia seems to be connected with middle highland, dry savannas and steppes in association both zebra and ruminant. This tick species shows no apparent preferences for particular altitude, rainfall zones and seasons (Pegram *et al.,* 1981), so appears to occupy a wide range of climatic and ecological condition. This species prefer the attachment site mostly under tail and ano-vulva. Its short mouth and behavior makes to feed on soft area which make it specific to these sites. *Rhicicephalus evertsi evertsi* is the possible vector of *Babesia, Rckettsia coronary* and *Theleria.*

Ambylomma gemma was the fifth species encountered during the study period. This may be due to environmental condition is not favorable to their survival, humid and highland nature of the area. It is confined to semi arid lands of Harar province (Pegram *et al.,* 1981). It is the least species encountered during the period which supports the pervious finding (Yitbarek, 2004; De Castro, 1994).

In this study, the most infested region of the animals where udder/scrotum (28.35%), perineum (21.31%), brisket (13.93%), ano-ulva (12.01%), neck (9.19%). The predilection sites mentioned in the results corroborated with those reposted by other author (Solomon *et al*., 2001) and Melese (1989). A variety of factors such as density (Kettle *et al*., 1995), time and season (Evans, 1952), in accessibility for grooming chandler and Read, (1961) have also been reported to determine the attachment sites of ticks. Information on predilection sites of the ticks is help full in spraying individual animals since it gives clue as to which part of the body requires more attention (Zeleke, 1980).

The male to female sex ratio of *Boophilus decoloratus, A.variegatum,A.cohaerens, Rhipicephalus evertsi evertsi* and *A.gemma* were similar to previous reports (Solomon *et al*.,2001; Solomon *et al*., 2007 and Melese, 1989). In all cases, except *B. decoloratus* males outnumbered females. This is due to fully engorged female ticks drop off to the ground to lay egg while the male tends to remain on the host before dropping and hence males normally remains on the

host longer than females (Solomon *et al*., 2001) thus it results in variation in male to female sex ratio during sampling. The females of *B. decoloratus* out numbered males in this study are probable due to small size of male which could not seen during collection.

The study also showed that the infestation level of ticks were higher in poor body condition than good body condition animals ($p<0.05$). This may be due to the high infestation of tick result in weight loss due to consumption of high amount of blood and fluid by those ticks. This present study also agrees with previous reports at Mizan Teferi (Seid, 2004). The effects of sex and age on the burden of tick were statistically significance ($p<0.05$) that will agreed with (Hussen 2009) and Seyuom (2001). This may be due to lactation and calving stress among other possible predisposing factor such as adult animals serve as draft animals.

Although, this study was conducted for short period (November to March) it is possible to indicate the trend of seasonality of tick population by comparing the number of tick collected every month. There was tendency of tick population to show seasonal variation that is decreasing from slightly wetter month to the drier month. Similarly, it has been reported by Feseha (1983). Solomon *et al*., (2001) and Alekaw (1998) that infestation by ticks during the dry season months reaches very low level and during rainy season the activity of the adult tick become high.

Ilubabor zone because of climatic condition that favors their development ticks gives a continuous and substantial challenge to cattle especially between May and October and become difficult to control. In general, to make cattle less attractive or to develop breeds that are able to defend ticks importance the best solution would be the combination of pasture management, animal and acaricide use strategy (Abebaw, 1996).

6. Conclusion and Recommendations

The study was conducted to determine the prevalence and identify the tick species of veterinary value. The most important and abundant species were *A.cohaerens, A.variegatum, B.decoloratus,* followed by *R.evertsi evertsi* and lastly *A.gemma*. The overall tick distributions were observed mainly on, different body parts such as udder/ scrotum, perineum, brisket, and ano-vulva, dewlap and other. The long mouthed species especially *Amblyomma* species dominates in the study area that can cause skin and hide damage and also causes reduction of milk and meat production. The district veterinarian and tha government should give attention for control options besides applications of acaricide. Tick should be managed at an economical acceptance level by a combination of different techniques and this requires familiarity with the tick species and an understanding of their epidemiology. Since, there is no single method that adequately control the complete problem of tick and tick borne diseases, combination of available techniques to produce an integrated system of tick management is necessary. This encompasses the selection of resistant cattle, acaricide treatment, appropriate livestock management and incorporation of traditional practices or remedies to be of value.

In hand spraying of acarricides, of priority shall be given to udder to be followed by the uro-genital sites, brisket and dewlap, respectively.

In general, the distribution limit of ticks are not fixed but are determined by complex interaction of factors such as climate, host density, host susceptibility and grazing habits. So, further investigations on seasonal dynamics of tick population, study on tick infesting in order domestic animals in different regions; and a drug trial on efficacy or development of resistance to acaricides which will enable to recommend regional and national tick control programs is essential for the continuous understanding of improved control strategies application there by bringing the tick number on livestock to numbers that are more manageable.

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