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Review On Bovine Tick Infestation In Ethiopia Prospective

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ABSRACT: Ticks are arachnids in the sub class acari which are relatively large and long lived parasite. They are blood feeding external parasites. Ticks are classified in to two families, argarisidae or soft ticks and ixodidae or hard ticks which differ considerably by their structure. There are total of 28 species of ticks distributed in Ethiopia. The percentage of their prevalence was ranges from 16 to 86.1% in different parts of country. There are four major stages in the life cycle of ticks: egg, larva, nymph, and adult. The pathogenic effects are associated with the feeding mechanism of the parasite which is ideal for both penetrating the skin and transmitting micro-organisms. Ticks are causes great economic losses to livestock, and adversely affect livestock hosts in several ways. The effect of ticks on host species can be divided into cutaneous and systemic effects. Irritation, loss of appetite, depression, debilitation, weakness, ulceration, anemia, development of myiasis, annoyance, restlessness, loss of weight, and tick paralysis are clinical signs of tick infestation. Ticks acts as potential vector for haemo-protozoa and helminth parasites. Treatment of hosts with acaricides to kill attached larvae, nymphs, and adults of ixodid ticks and larvae of argasid ticks has been the most widely used control method.
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Key words: Bovine, Ethiopia, Ixodid, Ticks

1. INTRODUCTION

Ticks are arachnids in the sub class acari which are relatively large and long lived parasite. They are blood feeding external parasites. Ticks are classified into two families, argarisidae or soft ticks and ixodidae or hard ticks which differ considerably by their structure. More than 28species of ticks are distributed in Ethiopia. There are four major stages in the life cycle of ticks: egg, larva, nymph, and adult. They maintain their parasite existence by feeding on vertebrate host. Tick bites can be directly debilitating to domestic animals causing mechanical damage, irritations, inflammations and hypersensitivity. When ticks are present in large numbers, feeding may cause anemia and reduction of productivity (George *et al.,* 2004).

A complex of problems related to ticks and tick-borne diseases of cattle created a demand for methods to control ticks and reduce losses of cattle production and productivity. Control of tick infestations and the transmission of tick-borne diseases remain a challenge for the cattle industry in tropical and subtropical areas of the world. Tick control is a priority for many countries in tropical and subtropical regions. Tick and tick born disease causes considerable loss of live stock economy of Ethiopia, ranking third among major parasitic disease after trypanosomiasis and endoparasite (Lodos *et al.,* 2000). Therefore, the main objectives of this seminar paper are; to high light
bovine tick infestation, their distribution and species of ticks found in Ethiopia and to indicate economic importance of ticks and their control and prevention.

2. LITERATURE REVIEW

2.1. Taxonomy of Ticks

Tick are belongs to kingdom animalia phylum , arthropoda, class insect,subclass acari,order parasitiformes.suborder ixodidae , family ixodidae(hard tick) and argasidae (soft ticks) (Marquardt *et al., 2000).*

2.2. Morphology of Ticks

Ticks are classified into two families, argasidae or soft ticks and ixodidae or hard ticks which differ considerably by their structure (Hendrix, 1998). Structurally the argasidae are distinguished by having the body covered by a leathery cuticle marked

by granulation and sometimes small circular discs, but not plates or shields (Zajac and Conboy, 2006). Ixodidae are the most important ticks which are often called as hard ticks, because of the presence of a rigid chitinous scutum which covers the entire dorsal surface of the adult male; in the adult female and in the larva and nymph it extends for only a small area which permits the abdomen to swell after feeding (Wall *et al*., 2001).

The mouthparts carried on the capitulum are anterior and visible from the dorsal surfaces (Aymer et al., 2006). Other distinguishing features are a series of grooves on the scutum and body and in some genera a row of notches, called festoons, on the posterior border of the body. Chitinous plates are sometimes present on the ventral surfaces of males. The genital opening is in the ventral mid-lines and the anus is posterior. Sometimes ticks have colored enamel like areas on the body and these are called "ornates ticks". The adults have a pair of spiracles behind the 4th pair of legs (Bowman, 2003).

Hard ticks remain attached for several days during feeding. For ticks with long mouth parts, attachment by the chelicerae and hypostome is sufficient to anchor the ticks in place. However for ticks with short mouth parts, attachment is maintained during feeding by secretions from salivary glands which harden around the mouth parts and effectively cement the ticks in place. Female ticks can show substantial increases in size when they engorge during feeding (Cumming, 1997). Male ixodidae ticks are usually smaller than females. Males imbibe little blood when they feed and show little increase in size. Ixodidae ticks possess a sclerotized dorsal shield or plate on the idiosoma called scutum. In males the scutum covers the entire dorsal surfaces, where as in females the scutum is relatively small to facilitate the size increase which occurs during feeding. The scutum is difficult to see in fully engorged females. If the scutum has pattern of grey and white on a dark background, it is described as ornate, if not it is described as inornate (Marquardt *et al.,* 2000).

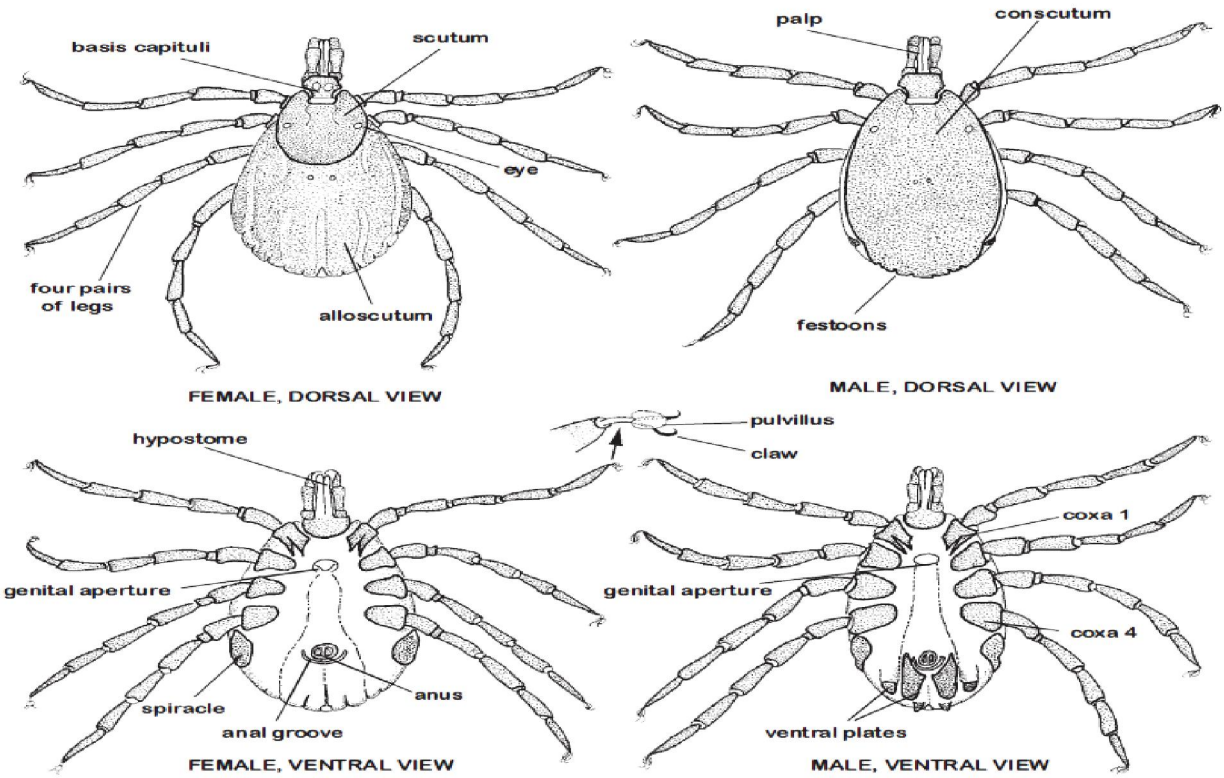

Figure 1: morphology soft ticks

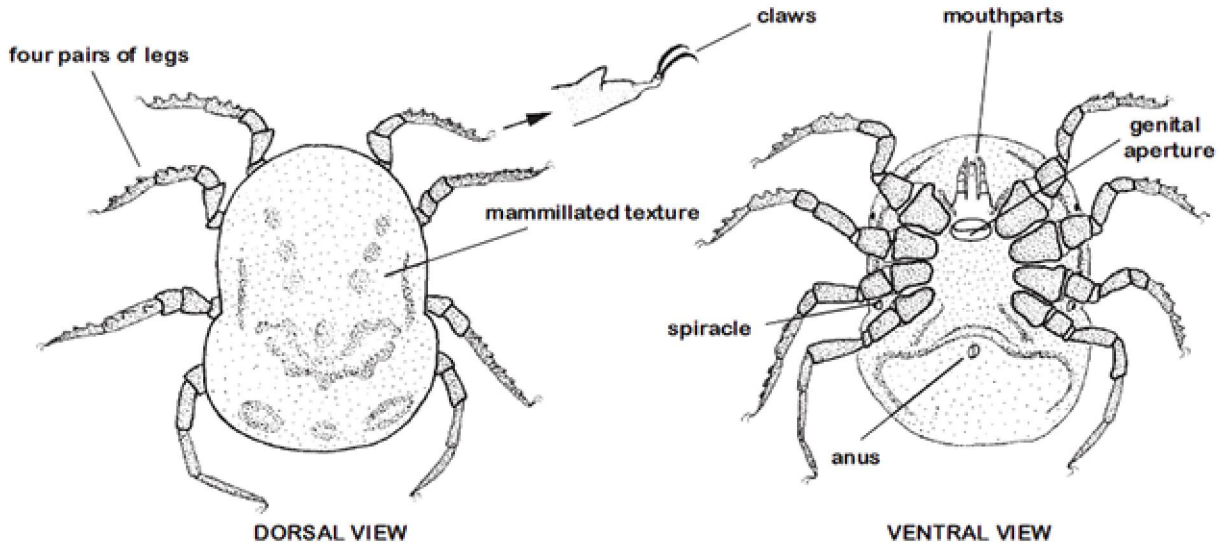

Figure 2: morphology of hard ticks
Source (Marquardt *et al.,* 2000*)*

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.3. Epidemiology of Ticks

Tick species are widely distributed around the world. Ticks are most active during the warm season provided there is sufficient rainfall, but in some genera the larval and nymph stages are also active in milder weather and this affects the duration and timing of control programmes, but they tend to flourish more in countries with warm, humid climates, because they require a certain amount of moisture in the air to undergo metamorphosis, and because low temperatures inhibit their development from egg to larva. Ticks of domestic animals are especially common and varied in tropical countries, where they cause considerable harm to livestock by transmission of many species of pathogens and also causing direct parasitic damage. (FAO, 2009).

Table 1: show species of ticks found in Ethiopia

SN	SN	SN	SN
1	*Rhipicephalus pulchellus*	*15*	*A.lepidum*
2	*R.evertsi evertsi*	*16*	*A.gemma*
3	*R.praetexatus*	*17*	*Hyalommma trancatum*
4	*R.muhsamae*	*18*	*H.marginatum rufipes*
5	*R.sanguineus*	*19*	*H.anatolicum*
6	*R.bergeoni*	*20*	*H.a.excavatum*
7	*R.lunulatus*	*21*	*H.imeltatum*
8	*R.parvus*	*22*	*H.dromedari*
9	*R.turanicus*	*.23*	*H.impresum*
10	*R.guilhoni*	*24*	*H.marginatum turacinum*
11	*R.camicasi*	*25*	*H.m.marginatum*
12	*Boophilus decorolatus*	*26*	*Haemaphysalis laechi*
13	*B.annulatus*	*27*	*Argas persicus*
14	*Amblyomm variegatum*	*28*	*Ornithodorus savignyi*

Source: (MoARD, 2005)

The distribution of the most common tick species infesting cattle is different from one area to another. In Ethiopia, several tick species belonging to genus *Ambylomma, Hyalomma, Boophilus* and *Rhiphicephalus* have been distributed most part of the country.

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Table 2: The percentage of prevalence of bovine tick infestation in part of the country.

Area	Percent of Prevalence	Reference
South west Ethiopia	16	Simeon Haile and Tesfayetwet Zerhun,2013
Woloiata zone	65.5	Ammanuel Woldeand Abdumohamed, 2014
North west of Ethiopia	81.25	Getacho Alemu *et al.*, 2014
Jimma	74	Abdu Mohamed, 2014
Mekelle	86.1	Hagos werede *et al*, 2013
Holeta	25.6	Belew Tiki and Mekonnen Addis, 2011
Hararge	84	Mohammed badeso *et a.l*, 2014
Eastern part of Ethiopia	85.3	Morka Aante and Eyob Hirpha, 2014
Beadle	82	Nateteal Tamerat *et al.,*2015
Central part of Ethiopia	47	B.Tadese and A.Sultan., 2014
Somalia region	55	Rahmeto Abera *et al.*, 2014
Borena	70	Meseret gebre selame *et al.*, 2014
Asosa	83	Bossena Fantahun and AbduMohamed,2012
Bahir dar	75	Meaza Gedilu *et al.*, 2014

2.4. Life Cycle

There are four major stages in the life cycle of ticks: egg, larva, nymph, and adult. Following their engorgement on the host, female ticks drop off the host and seek protected places, such as cracks and crevices or under leaves and branches, to lay their eggs (Gatenby, 2002).

During the passage through these stages ixodidae ticks takes a number of large blood meals, inter spersed by lengthy free living periods. They are relatively long lived and each female may produce several thousand eggs (Andrew *et al.,* 2004). According to the numbers of hosts, Ixodid ticks are classified as one-host ticks, two-host ticks, three-host ticks and Argasid classified as multi-host ticks (Chauhan, 2006). In one-host ticks, all the parasitic stages (larva, nymph and adult) are on the same hosts; in two- host ticks, larva attach to one host, feed and molt to nymphal stage and engorged, after which they detach and molt on the ground to adult; and in three-host ticks, the larva, nymph and adult attach to different hosts and all detach from the host after engorging, and moult on the ground (Richard, 1997). In multi-host ticks (Argasids), a large number of hosts are involved and it is common to have five molts, each completed after engorging and detaching from the hosts (Boden, 2005). The ticks detect the approach of the host using vibrations, moisture, heat and passing shadows may also be important cues in host recognition (Taylor *et al.,* 2007). Once contact made, as the host animal brushes past, the ticks transfer to the host and then move over the surfaces to find their preferred attachment sites. Preferred sites for attachment may be highly specific to the particular species of ticks (Urquhart *et al.,* 1996).

On completion of feeding the larvae drop to the ground where, 2 to 3 weeks later, they molt to become nymphs. After several months the nymph begin to quest for a second host. The second host need not necessarily be of the same species as the first. After feeding, the nymphs drop to the ground then molt and become adults. Finally after a further interval, adults begin to quest. The third host is usually a large mammal. On their final host female mate and then engorge. Following the final blood meal, adult females ‘are dropped to the ground to lay eggs (Morel, 1980). Figure three lifecycle of ticks (Morel, 1980).

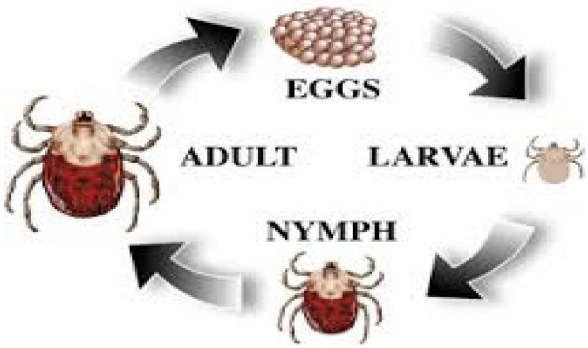

Figure 3: lifecycle of ticks

2.5. Pathogenesis of Tick

The pathogenic effects are associated with the feeding mechanism of the parasite which is ideal for both penetrating the skin and transmitting micro-organisms. The effect of ticks on host species can be divided into cutaneous and systemic effects (Radostits *et al.,* 2007).

In cutaneous infection at the sites of tick bite local dermal necrosis and hemorrhage occur; followed by on inflammatory response, dermal necrosis is sufficient to damage the hide. Tick bites wounds can become infected with *staphyloccocus* bacteria causing local cutaneous abscess. Heavy tick infestation can result in significant blood loss, reduced productivity, reduced weight gain, and can cause restlessness (NMA, 2008).

Table 3: Proportion and host body site distribution of tick species

Species of ticks	Predilection sites
Amblyomma variegatum	Scrotum, brisket, belly, dewlap, vulva, perineum
Amblyomma cohaerens	Udder, vulva, dewlap, perineum, belly, briske
Amblyomma lepidum	Udder, vulva, dewlap, perineum
Rhipicephalus decoloratus	Dewlap, ears, scrotum, brisket, udder, flank, legs
Hyalomma marginatum	Udder, tail, anus
Hyalomma truncatum	Udder, under tail, scrotum, anus
Rhipicephalus evertsi-evertsi	Udder, tail, vulva, anus
Rhipicephalus simus	Ear, tail tuft, udder, dewlap, brisket

Source :(Getacho Alemu *et al*, 201)

In the systemic effect blood feeding habit of ticks are important as vectors of animal disease transmitting a wide range of pathogenic viruses, rickettsia, bacteria and protozoa (Urquhart *et al.,* 1996). Ticks transmit many diseases, among them shown on the following

Table 4: some of the diseases that ticks transmit

Tick species	Vector role
Ambylomma gemma	Heart water disease
A.variegatum	Heart water disease
A.variegatum	Dermatophilosis
Boophilus. annulatus	Bovine babesiosis
B.annulatus	Bovine anaplasmosis
B.decoloratus	Bovine babesiosis
B.decoloratus	Bovine anaplasmosis
B.microplus	Bovine anaplasmosis
Rhipicephalus bursa and R.evertsi	Ansaplasmosis and babesiosis
Dermatocentor nitens	Equine piroplasmosis
Hyalomma.analoticum	Bovine theilerosis
H.anatolicum	Bovine theilerosis
H.truncatum	Sweating sickness
H.marginatum	Arbovirus

Source (Urquhart *et al.,* 1996).

2.6. Clinical Sign

When the animals are infested with by tick, it results local inflammation, edema, hemorrhage, irritation, loss of appetite, depression, debilitation, weakness, ulceration, anemia, development of myiasis, annoyance, restlessness, loss of weight, and tick paralysis (FAO, 1998). Tick paralysis is a flaccid ascending paralysis that occurs in a wide range of vertebrates after attachment of one or more ticks (Drummond, 2007)

2.7. Economic Importance

Ticks causes great economic losses to livestock and adversely affect livestock hosts in several ways (Rajput *et al.,* 2006). Loss of blood is a direct effect of ticks acting as potential vector for haemo-

protozoa and helminthes parasites. Blood sucking by large numbers of ticks causes reduction in live weight and anemia among domestic animals, while their bites also reduce the quality of hides (Lefevre *et al.,* 2010). Tick and tick born diseases causes considerable loss of live stock economy of Ethiopia, ranking third among major parasitic disease after trypanosomiasis and endo parasites

2.8. Control and treatments

Treatment of hosts with acaricides to kill attached larvae, nymphs, and adults of ixodid ticks and larvae of argasid ticks has been the most widely used control method (Seifert, 1996). There are 3 methods now available to control ticks; these are treating with acaricidal drugs like diazon, vaccinations (Decastro, 1997).

Individual animals can be effectively treated by the applications of any one of a number of acaricides applied either as a spray or by dipping. Both dipping and spraying are recommended for the control of ticks, complete wetting of the animals, which can only be effected by dipping, is essential if eradication is to be undertaken. The use of pour-on applications, which allow a longer period between treatments, and of Ivermectin, will necessitate to control and eradication techniques (Torell *et al., 2003).* Rotational grazing has been shown to be capable of greatly reducing the tick population on farms in some areas (Michael, 2011).

CONCLUSION AND RECOMMENDATIONS

Among ectoparasites, ticks cause the greatest economic loss in livestock population by affecting on the health of animals, on the quality of hide and skins, on the productivity of the animals, on the economy of farmers and the country at large. The distribution of ticks are not fixed but are determined by a complex interaction of factors such as climate, host density, host susceptibility, grazing habits, and pasture-herd management. Therefore, effective tick control program should be formulated and implemented based on the distribution pattern of ticks and factors responsible for their distribution. To control and prevent ticks infestation the following recommendations have been forwarded;

- Treatments of infested animals with acaricides
- Regular on routine application of acaricides ticks infested areas
- Regularly cleaning of the animal's house and spraying of acaricides
- Appropriate pasture management should be followed
- Provision of good veterinary services should be present into the area.
- Restrict animal's movement from place to place.

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