European Journal of Biological Sciences 12 (3): 100-107, 2020
ISSN 2079-2085

DOI: 10.5829/idosi.ejbs.2020.100.107

Review on Economical Impact of Ticks and its Control Strategies on Livestock Production

Netsanet Tadesse

Haramaya University, Poultry Farm, Haramaya, Ethiopia

Abstract: Ticks are obligate haematophagous ectoparasites of domestic and wild animals as well as humans, considered to be second world-wide vectors of human diseases. They are the most important ectoparasites of livestock in tropical and sub-tropical areas and are responsible for severe economic losses both through the direct effects of blood sucking and indirectly as vectors of pathogens. The present review is focused on impact of tick on livestock productivity and health. Loss of blood is a direct effect of ticks acting as potential vector for haemoprotozoa and helminth 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 and skin. The impact of ticks on livestock production and health includes tick borne disease morbidity and mortality, huge loss of milk and meat production, damage on the quality of skin and hide and cost for tick and tick borne disease control and prevention. The economic losses due to ticks can be expressed either in terms of body weight or milk production lost or treatment cost employed for its prevention and control. The implementation of rational and sustainable tick control programs in grazing animals is dependent upon the knowledge of the ecology and epidemiology of ticks. Major tick controlling techniques such as biological and chemical control methods, grazing management, genetic manipulation and vaccination could be employed. The prolonged and incorrect use of tick chemicals can lead to resistance in ticks, enabling the ticks to tolerate and survive chemical applications and making tick control in the future much more difficult. Therefore, appropriate method of control and prevention of ticks should be formulated based on the ecological and epidemiological study done ahead of time, appropriate tick drug handling and management should be practiced to prevent the drug resistance and deep investigation should be done on the preparation and application of vaccines which could be a successful prevention method in the future.

Key words: Control · Economical · Impact · Livestock · Tick

INTRODUCTION

Parasitic disease is a global problem and considered as a major obstacle in the health and product performance of animals. These may be due to endo-parasites that live inside the body or ecto-parasites such as ticks, mites, flies, fleas, midges, etc., which attack the body surface. Among ecto-parasites, ticks are very important and harmful blood sucking external parasites of mammals, birds and reptiles throughout the world [1]. The medical and economic importance of ticks had long been recognized due to their ability to transmit diseases to humans and animals.

Ticks are obligate, blood-feeding ectoparasites of vertebrates (mammals and birds) belonging to the class Arachnida, Order Acari [2]. They have four pairs of legs as nymphs and adults [3]. Ticks are related to animals such as spiders and insects all of which are animals without a spine (= invertebrates) belonging to a group called the phylum Arthropoda. All members of this group have an exoskeleton, a hard outer covering to which the muscles are attached internally. The exoskeleton also contains and protects organs such as the gut and reproductive apparatus. Ticks are very similar to mites but are larger and all of them only feed as parasites. There are two main groups of ticks called the families Argasidae or

Corresponding Author: Netsanet Tadesse, Haramaya University, Poultry Farm, Haramaya, Ethiopia.

argasids and the Ixodidae or ixodids. Argasid ticks are often called soft ticks because they do not have hard plates on their bodies. The ixodids with these plates are often called hard ticks. There are at least 866 described species of tick in the world [4, 5].

Ticks are usually larger than mites, ranging in length from 3-12 cm, or more in the case of engorged females. The ixodid (hard) ticks are of greatest importance in veterinary medicine. Various hard tick species are vectors of a number of viral, bacterial and protozoal animal and human pathogens. In addition, hard tick species cause tick paralysis and tick toxicosis [6]. Once they attach to a host for blood meal, ticks can result in diverse effects leading to significant losses due to tick worry, blood loss, damage to hides and skins and introduction of toxins [7]. Moreover, ticks are responsible for transmission of tick- borne pathogens of various types and secondary attacks from other parasites [8]. Ticks are responsible for severe losses caused either by the effect of blood loss, tick worry, damage to hides and skins and the injection of toxins or through mortality and morbidity caused by the disease transmitted [7].

Like other ticks the ixodids are temporary parasites and spend relatively short periods on the host. The number of hosts to which they attach during their parasitic life cycle varies from one to three and, based on this, they are classified as one host ticks where the entire parasitic development from larva to adult takes place on the one host, two host ticks where larvae and nymphs occur on one host and the adults on another and three host ticks where each stage of development takes place on different hosts [8]. Approximately 80% of the world's cattle population of 1, 281 million is at risk from ticks and tick-borne diseases (TBD). In Africa, with 186 million head of cattle, ticks and TBD are the most serious constraints to increased production. Weekly or twice-weekly application of chemical acaricides is still a common form of control but in recent years, immunization against TBD and the economics of control are receiving increasing attention [9].

Like other ticks the ixodids are temporary parasites and spend relatively short periods on the host. The number of hosts to which they attach during their parasitic life cycle varies from one to three and, based on this, they are classified as one host ticks where the entire parasitic development from larva to adult takes place on the one host, two host ticks where larvae and nymphs occur on one host and the adults on another and three host ticks where each stage of development takes place on different hosts [8]. The ixodid (hard) ticks are of greatest importance in veterinary medicine. Various hard tick species are vectors of a number of viral, bacterial and protozoal animal and human pathogens. In addition, hard tick species cause tick paralysis and tick toxicosis [6]. Tick activity is influenced by rain fall, altitude and atmospheric relative humidity [10]. Therefore, the objective of this paper is to review the impact of ticks on livestock production and its control strategies.

Tick Morphology: The Family of *Ixodidae* is varied in shape and species. Ticks belong to the super order of *Acarina,* which have certain characteristics that distinguish them from other arachnids such as spiders. It has a rounded body, without a clear boundary between the anterior and posterior parts. The body is divided in to a capitulum and the rest of the body. It has six pairs of appendages including the chelicerae, pedipalps and four pairs of locomotor appendages [11]. The ixodids have a chitinous covering or scutum which extends over the whole dorsal surface of the male, but covers only a small area behind the head in the larvae, nymph or female. The mouth parts carried on the capitulum are anterior and visible from the dorsal surface. Other distinguishing features are a series of grooves on the scutum and body and in some species, a row of notches, called festoons, on the posterior border of the ventral surface of the males. The genital opening is in the ventral mid-line and the anus is posterior. Some ticks have coloured enamel-like areas on the body and this are called 'ornate ticks'. The adults have a pair of spiracles behind the fourth pair of legs. Eye, when present, are situated on the outside margin of the scutum [8].

Larvae always have three pairs of legs and no genital aperture. Nymphs have four pairs of legs and no genital aperture. Females have four pairs of legs and a large genital aperture. Males have four pairs of legs and a genital aperture in the same position as the female. All ixodid ticks have a scutum as a hard plate on the dorsal surface but argasid ticks lack this scutum [4]. Adult ticks have distinctive genital and anal area on the ventral body surface. The foreleg tarsi of all ticks bear a unique sensory apparatus; Haller's organ for sensing carbon dioxide, chemical stimuli (odor), temperature, humidity, etc [12].

Life Cycle of Ticks: Although they share certain basic properties, argasids and ixodids differ in many structural, behavioral, physiologic, ecologic, feeding and reproductive patterns. Tropical and sub tropical species may undergo 1, 2, or rarely 3 complete life cycles annually. There are four developmental stages: egg, larvae, nymph and adult [12]. The life cycles of the ticks vary widely. Some species pass their entire life on the one host, others pass different stages of the cycle on successive hosts and others are parasitic only at certain stages. One-host ticks are more easily controlled than those which pass part of their life cycles away from the host [13]. There are three active stages in the life cycle of a hard tick: larvae, nymphs and adult ticks. Most ticks require three different hosts to complete one full cycle. As long periods often elapse between the different feeding periods, ticks are well adapted for long - term survival, maintaining their water balance by taking up moisture from the atmosphere [3]. *Ixodidae* produce enormous numbers of eggs. Under suitable climatic conditions mostly hot and humid, the eggs open after a while and six-legged larvae emerges. They wait on the tops of plants for a host animal to pass. They localize their target by means of their chemoreceptor (Haller organ) which is on the upper side of the tarsus and by waving its fore legs in the air; they manage to cling on to the host animal [1]. In the hard ticks mating takes place on the host, except with *Ixodes* where it may also occur when the ticks are still on the vegetation. Male ticks remain on the host and will attempt to mate with many females between repeated feedings. The females mate only once before they are ready to engorge fully with blood. When they finally engorge, they detach from the host and have enough sperm stored to fertilize all their eggs. Female hard ticks lay many eggs (2000 to 20, 000) in a single batch. Female argasid ticks lay repeated small batches of eggs. Eggs of all ticks are laid in the physical environment, never on the host [5].

One Host Ticks: This is a less common type of life cycle but it occurs in the entire *Boophilus* genus. Eggs are laid on soil. Larvae hatch after several weeks of development and crawl onto vegetation to quest for a host. When they have completed feeding they remain attached to the host and moulting occurs there. The nymphs then feed on the same host and also remain attached. After another moult the adults hatch and then feed on the same host. The adults will change position on the same host for mating. Thus all three feedings of any individual tick occur on the same individual host. The life cycle of one-host ticks is usually rapid, for *Boophilus* it takes three weeks for the feedings on one host and two months for egg laying and larval development [4]. In this life cycle, larvae hatch from eggs, climb and attach onto a host and engorge, moult on the host to nymphs, which attach and continue to feed and engorge, then moult on the host to males and females. The adults attach, partially engorge, mate and the females then fully engorge. After engorgement the females detach to the ground and lay a single large batch of eggs in a sheltered locality and then die. The next generation of larvae hatches from these eggs [14]. The larvae that emerge from the eggs three to four weeks after deposition attach themselves to a host animal where they complete their entire development. On the host they develop to nymph then to adult and then copulate. Afterwards, they drop off and deposit their eggs on the ground. The entire development cycle takes mostly 19-21 days as a rule, with minimum of 15 and maximum of 40 days, each stage taking one week [1].

Two Host Tick: Attach itself as a larva to a host, feeds on blood and develops into the nymph stage. After a maximum of 14 days, it drops off on to the ground where it reaches the imago stage in 20-30 days time. Male as well as female ticks then look for another host, feed on blood and copulate. After 6-11 additional days, the female drops to the ground and deposits its eggs. The entire cycle from the time the larva emerges until the engorged female deposits the eggs mainly depends on the time the adult spent on the ground to find a new host. According to the species the nymph may survive on the ground for several weeks [1]. In this life cycle, the larvae hatch from eggs, climb and attach onto a host. After engorgement, moulting to nymphs will take place on the same host. The nymphs then engorge and drop to the ground and moult to adult male and females in a sheltered locality. The adults then climb onto a second host and engorged females drop and lay eggs as in the case of the one- host ticks. Species that adopt this two-host cycle include *Rhipicephalus evertsi* and *Hyalomma rufipes* [14].

Three Host Ticks: Looks for a new host during each stage of development in order to feed. The larva emerges from the egg on the ground, looks for a host, feeds on it for three to seven days, drops off and molts after three to four weeks on the ground. The nymph attacks a second host for three to seven days, feed on it and drops and develops into an adult on the ground after two to eight weeks. After that, the adult tick looks for a third host to feed on and for copulation that takes one to three weeks. Finally it drops off and completes the cycle with oviposition on the soil. Because of the different time spent in each stage on the ground, the entire development cycle may last up to one year [1]. This is the commonest type of life cycle. Larvae develop in the eggs until ready to hatch, usually in several weeks. The female feeds once and lays one huge batch of eggs. The depleted female then dies. The male may take several small feeds, mate and then die. Ticks that have recently hatched from eggs or from molting have soft bodies and are inactive for one to two weeks until the external body wall hardens. The life cycle of three-host ticks is slow, from six months to several years [4, 5]. *Rhipicephalus appendiculatus* and most species of the genus *Amblyomma* belong to this pattern of life cycle [14].

Factors Influencing the Distribution of Tick Species: Although many ticks favor a particular host they are usually not completely host specific and many parasitize a wide variety of animals [13]. Primary factors in the extensive distribution and prevalence of many tick species and tick borne disease agents are movement of tick infested livestock over great distances and introduction of livestock to tick species and tick borne agents that they have not previously experienced and against which they have no immunity or innate resistance [12].

Host Specificity: Ticks do not feed equally on all vertebrate animals. Many tick species show some degree of host specificity, accepting only a limited variety of animals as a candidate blood source. Such ticks are host specific [15]. The survival of a population of ticks depends on the presence of hosts suitable for reproduction by the adults. These hosts are known as maintenance hosts [4, 5].

Nature of the Tick: Ticks have characteristic species of hosts to which they are adapted. For example all the *Boophilus* species are adapted to feed on cattle, but some may survive by feeding on sheep or antelope. Because *Boophilus* species are one-host ticks, all stages must be able to feed on the same species of hosts. *Rhipicephalus appendiculatus* is found most commonly on cattle. All stages feed well on cattle and similar hosts in the family Bovidae such as sheep and many wild species such as buffalo. In genera such as *Rhipicephalus*, *Haemaphysalis* and *Ixodes* the larvae, nymphs and adults will quest on vegetation. The ticks grab on to the hosts using their front legs and then crawl over the skin to find a suitable place to attach and feed. Adult ticks of the genera *Amblyomma* and *Hyalomma* are active hunters, they run across the ground after nearby hosts [4].

Habitats: A tick's habitat is composed of the variety of living and nonliving things in the space in which it lives that are good or bad for its survival. Ticks are adapted to two extremely contrasting components of their habitat: the physical environment and their host. When ticks are molting and then questing in the physical environment, they are in danger of drying out, starving and freezing. They are also exposed to predators such as ants and to pathogens such as fungi. These adverse factors limit the type of habitats that a species will be found in. The preferences of hosts for certain habitats will influence distribution of hosts and the ticks on them [4].

Attachment Sites on the Host: On initial infestation, ticks are picked up during the day when cattle are grazing and attached temporarily near the hooves. Subsequently, when cattle rested, especially at night, the ticks detached and then reattached more firmly at the usual predilection sites. The tick's location on the host is linked to the possibility of penetration by the hypostome. Species with a short hypostome usually attach to the head within the ear, nape of the neck, margin of the anus and under the tail. Long-hypostome species attach to the lower part of the body where the skin is thicker, such as the dewlap, groin, udder, testes, perineum and margin of the anus. Small ticks, all instars of *Boophilus*, larvae and nymphs of *Amblyomma* have no marked preference and can be found all over the body [11].

Climatic Factor: Ticks are found on all continents and are bound to certain climates as far as the requirements for temperature, humidity; sun-radiation and shade of each species are concerned. Furthermore, each species requires specific environmental conditions for its habitat. The respective species only have a chance for survival when these prerequisites are fulfilled [1]. Humid conditions are essential for the development and survival of eggs and the survival of unfed hatched larvae. Each species is adapted to a particular relative humidity range and it varies with the instars and its size. Larvae and nymphs have high humidity requirements, whereas the adults can protect themselves better against evaporation because of their larger size and thicker tegument. The requirement ranges from 100 % to very low relative humidity. Each species has its particular threshold temperature below which diapauses occur in all instars; egg and larvae development and egg production in engorged females are inhibited, while immature and unfed adults become quiescent [11].

Economic Importance of Ticks: The medical and economic importance of ticks has long been recognized due to their ability to transmit diseases to humans and animals. Ticks cause great economic losses to livestock and adversely affect livestock hosts in several ways [16]. Tick infestations are of great importance in the production of animal diseases. In addition to their role as vectors of infectious diseases, heavy infestations can cause direct losses. Many are active blood feeders and may cause death from anemia. Some species cause tick paralysis and it is possible that other ticks may elaborate toxins other than those causing paralysis. Heavy tick burdens cause sufficient irritation and stress such that affected animals become anorexic which may lead reduced productivity [13]. Tick bites can be directly debilitating to domestic animals causing mechanical damage, irritation, inflammation and hypersensitivity and when present in large numbers, feeding may cause anaemia and reduced productivity. The salivary secretions of some tick species may cause toxicosis and paralysis. Ticks may also transmit a range of pathogenic viral, rickettsial and bacterial diseases to livestock [2].

Direct Effects of Ticks: Ixodid ticks cause direct damages such as reduction of quality of hides, reduction in live weight gain, anaemia, toxaemia and paralysis. Because of the many lesions caused through feeding by the ticks, the quality of leather and even the quality of the carcass may be damaged; these lesions may become the location for skin infections (dermatophilosis). Enzymes which are secreted during feeding in order to inhibit the coagulation of the blood of the host may cause severe diseases because of an allergic reaction; tick toxicosis and sweating sickness [1]. Ixodid ticks ingest very large quantities of blood, amounting to several hundred times their unfed weight. Surprisingly, tick feeding is generally very wasteful, as large amounts of haemoglobin are passed into the faeces unchanged; the quantity of blood passed in the faeces during feeding can equal or even exceed the final engorgement weight of the tick [3].Estimates of the amount of blood removed vary according to the species under consideration. A single adult female will remove 0.5-2.0ml of blood and thus where an animal carries several thousand ticks a substantial blood loss may occur [17]. Heavy tick burdens cause sufficient irritation and stress such that affected animals become anorexic which may lead reduced productivity. Ticks cause damage to hides and loss of production, anemia and death when they are present in large numbers. They also cause greater morbidity and mortality during periods of drought, as well as delays in fattening resulting in animals held longer before they can be sold [13].

Tick-Bite Paralysis: This is a disease of man and animals characterized by an acute ascending flaccid motor paralysis. The condition may terminate fatally unless the ticks are removed before respiratory paralysis occurs. Adult ticks, chiefly females, but sometimes nymphs, are responsible and ticks of the genus Ixodes are particularly associated with the condition but other genera, especially *Dermacentor (D. andersoni*) are concerned. In general the degree of paralysis is proportional to the length of time the tick has been feeding and frequently also on the number of ticks attached. The nature of the toxin is unknown. It acts on motor and sensory nerves and on neuromuscular transmission. The liberation of acetylcholine is diminished and the receptor site is changed. It appears to be elaborated in the tick concomitantly with egg production and it has been suggested that the toxin accumulates in the ovaries and passes to the salivary glands in the late stages of engorgement [17]. Tick paralysis is most common in late winter and spring when the adult ticks are active, but it can occur at any time if the weather is warm and humid [16].

Physical Damage: Ticks are attached to the body for a blood meal and may cause irritation and serious physical damages to livestock. Included are "tick worry", irritation, unrest and weight loss due to massive infestation of ticks; the direct injury to hides due to tick bites, loss of blood due to the feeding of ticks [16]. Ticks cause damage to hides and loss of production, anemia and death when they are present in large numbers [13]. The harm done by their bites and blood-sucking has been reduced by control measures taken to control the diseases transmitted by ticks, but these two forms of harm are themselves important. Though very heavy infestations do occur in nature, it is more usual for animals to carry a few hundred ticks. These produce "tick worry "which is a combination of several entities including irritation from the tick bites, local skin infection, blood loss and 2° attack by flies. The 2° effects of tick attack are infection of the local area producing suppurative lesions (e.g: of the ears, legs, etc).Attacks by blow flies and screw-worm flies are much encountered by ticks. A further effect is the damage produced to hides [17].

Transmission of Diseases: Ixodid (hard) ticks are important in veterinary medicine primarily as vectors of a wide spectrum of pathogenic micro-organisms such as protozoa, rickettsia, spirochaetes and viruses [1]. In Africa, the major tick borne diseases of cattle are east-cost fever, babesiosis, cowdriosis, theileriosis, anaplasmosis and dermatophilosis [3]. Except for the former, the later diseases are known to exist in Ethiopia [7]. For example *Amblyomma variegatum* adults cause scarring on teats of cattle sufficient to reduce suckling efficiency. It is to reduce these diseases that much money and effort is spent on the control of ticks using a wide variety of treatments and management techniques [4]. In tropics and temperate areas ticks and tick borne diseases are responsible for hundreds of millions of dollars loss per year [17].

Tick Control Methods: The aim of a tick control campaign is not to control all ticks simultaneously, but a definite species because of its particular role. The strategy should therefore be based on the biological characteristics of the target species. Moreover, there is no perfect control method. The efficacy of these methods depends on rational and methodical use [3]. Tick control is a priority for many countries in tropical and subtropical regions. There are three major reasons for controlling ticks in domestic animals: disease transmission, tick paralysis or toxicosis and tick-caused physical damage. The main weapon for controlling ticks at present is the use of chemical acaricides. Ticks are responsible for severe economic losses both through direct effect of blood sucking and indirectly as vector of pathogens and toxins [16]. Four methods are now available to control ticks: Treating with acaricidal agents, Pasture spelling and use of resistant cattle [13]. Biological control agents are in principle highly desirable. There is no single, ideal solution to the control of ticks [18]. Control measures are as a rule, directed against the diseases of which the ticks are the vectors and therefore based on the epizootiology of these diseases as well as on the habitats of the ticks [17].

Chemical Control: The conventional method for tick control is the treatment of animals by dipping or spraying with acaricides [3]. Acaricide application is still the main tick control method in Ethiopia [19]. Acaricides are used in different ways to control parasites of domestic animals. The selection of the method depends on the host species, target parasite, size of the animal population and type of acaricides [11]. Chemical acaricides, if correctly applied, are efficient and cost effective; they are however, often incorrectly used, chemical resistance is a serious global problem and the presence of chemical residues in food is increasingly an issue for consumers [18]. There are several methods being applied for controlling ticks and tick-borne diseases. The main weapon for the control of ticks at present is the use of chemical acaricides. Acaricides used to control ticks on livestock or in the environment are applied in such a manner that the ticks are killed, but will not harm livestock or applicators, the tissues of treated animals will not contain chemical residues and the environment will not be adversely affected. The conventional control methods include the use of chemical acaricides with partially successful results but this treatment has certain implicit drawbacks, such as the presence of residues in the milk and meat and the development of chemical resistant tick strains [16]. Because ticks attach to various parts of the bodies of animals, treatment has to be applied to the whole body and may be carried out by dipping the animals in a suitable tank containing the dip in an aqueous solution, suspension or emulsion; however, spray races, showers, etc are replacing conventional dips since they are labour saving and economical. The various stages of ticks may *stay* on their hosts for only a few days during each year and are often on the hosts only at certain times of the year. Dipping for control of ticks is therefore planned with knowledge of the biology of each species of ticks, the duration of each of its stages and of its feeding times and the duration of the whole life history [17].

Ecological Control: Tick control in the habitat and vegetation requires modification of the plant cover by periodic removal of vegetation by burning that shelters ticks, but spontaneous or induced fires have little direct effect on ticks since they occur in the season when adults are not active. Replacement of natural vegetation, cropping and soil cultivation are integrated methods that enable pasture improvement and tick eradication. Wild ungulates and carnivores, as well as other possible hosts of the different instars should be eliminated. Since wild ungulates are alternative hosts and can maintain tick populations as effectively as cattle, their removal is the most effective measure. Periodic withdrawals of domestic hosts to cause the ticks to disappear through inanition since the only available hosts are cattle [11]. Cultivation of land undoubtedly tends to reduce tick life by controlling the movements of domestic and wild animals, as well as by creating conditions unsuitable for ticks, as for instance, exposure of eggs to sunlight, or burying them deeply by ploughing. Pasture spelling works on the principle of removing cattle from pastures infected with ticks for long enough to ensure that most, if not all, of the larval ticks on the pastures are killed off by starvation or climatic effects [17].

Biological Control: Biological control refers to situations where humans attempt to use naturally occurring species of living organisms as antagonists to reduce pest populations. Hence, augmenting populations of existing antagonists (predators, parasites, parasitoids and pathogens) or importing exotic antagonists are included in this definition. Practically, biological control is intended to reduce the density of a pest population to an equilibrium level low enough to avoid appreciable economic or clinical effects. A successful agent of biological control would be expected to be highly specific to the target organism, with no detrimental effects on antagonist or benign species. There are many natural predators of ticks, primarily attacking them in the free-living phase like birds, arthropods etc. Predators are most effective, especially ants and birds. Depending on the conditions, these predators can consume a large number of ticks [20]. Biological control refers to situations where humans attempt to use naturally occurring species of living organisms as antagonists to reduce pest populations. Practically, biological control is intended to reduce the density of a pest population to an equilibrium level low enough to avoid appreciable economic or clinical effects. Certain small parasites of ticks parasitize especially the nymphs, in which they lay their eggs and which are literally ‘eaten out ‘by the larvae of the parasite [17].

Tick Distribution of Ethiopia: Primary factors in the extensive distribution and prevalence of many tick species and tick borne disease agents are movement of tick infested livestock over great distances and introduction of livestock to tick species and tick borne agents that they have not previously experienced and against which they have no immunity or innate resistance [12]. In Africa, ten genera of ticks commonly infest domestic animals: three are argasids; seven are ixodids. The ticks that are important to the health of domestic animals in Africa comprise approximately 40 species, plus other very similar species with which they may be confused but which are of unknown importance. Some of these ticks are also a threat to human health, but in Africa it is domestic animals that are severely affected by ticks and the pathogens they transmit. The diseases associated with ticks cause much suffering to animals and economic loss to their owners. They continue to be a major impediment to the improvement of livestock industry in Africa and this continent is particularly affected because of the large number of tick species and variety of diseases caused [4]. The main tick genera found in Ethiopia are *Amblyomma, Boophilus, Haemaphysalis, Hyalomma* and *Rhipicephalus.* The most important and widespread tick species are *A. variegatum* (vector of *Cowdria ruminantum* and *Theileria mutans*) and *B. decoloratus* (vector of *Anaplasma marginale* and *Babesia bigemina*). There is no report of the presence of *R. appendiculatus* (vector to *T. parva*). The effects of ticks on indigenous cattle compared to exotic breeds shown to be minimal. However, over 50 species are known to exist in the country [21 , 22].

CONCLUSION AND RECOMMENDATIONS

Ticks are blood feeding ectoparasites of mammals, birds and reptiles which tend to flourish more in countries with warm and humid climates because low temperatures inhibit their development from egg to larva. All ticks are obligate temporary parasites of vertebrate animals in which they cannot survive without blood. Tick infestations in livestock may have both direct and indirect impact as far as production and health of animals and impact to the herders is concerned. The impact of ticks on livestock production and health includes tick borne morbidity and mortality, huge loss of milk and meat production, damage on the quality of skin and hide and cost for tick and tick borne disease control and prevention. Each tick bite causes stress and weakens the host’s immune responses which affect the performance and productivity of the animals. The economic losses due to ticks can be expressed either in terms of body weight or milk production lost or treatment cost employed for its prevention and control. Ticks can act as vector of pathogens transmitted to both humans and animals. The implementation of rational and sustainable tick control programs in grazing animals is dependent upon the knowledge of the ecology and epidemiology of ticks. Major tick controlling techniques such as biological and control methods, grazing management, genetic manipulation and vaccination could be employed. The prolonged and incorrect use of tick chemicals can lead to resistance in ticks, enabling the ticks to tolerate and survive chemical applications and making tick control in the future much more difficult. Therefore, ecological status and epidemiology of ticks should be continuously studied before any control measure is employed, appropriate method of control and prevention of ticks should be formulated and applied to reduce its impact on livestock health productivity and deep investigation should be done on the preparation and application of vaccines which could be a successful prevention method in the future.

REFERENCES

1. Furman, D.P. and E.C. Loomis, 1984. The Ticks of California (Acari: Ixodida). University of California Publications, Bulletin of the California Insect Survey, University of California Press, California, 25: 1-239.

2. Wall, R. and D. Shearer, 2001. Veterinary Ectoparasites: Biology, Pathology and Control, 2nd ed. Blackwell Science Ltd, pp: 55-82.
3. Jongejan, F. and G. Uilenberg, 1994. Ticks and control methods. Rev. Sci. Tech. Off. int. Epiz., 13(4): 1201-1226. Alfort, France.
4. Walker, A.R., A. Bouattour, J.L. Camicas, A. Estrada-pena, I.G. Horak, A.A. Latif, R.G. Pegram and P.M. Perston, 2003. Ticks of Domestic Animals in Africa: a Guide to Identification of Species.
5. Latif, A.A. and A.R. Walker, 2004. An Introduction to the Biology and Control of Ticks in Africa. ICTTD-2 Project, pp: 1-29.
6. Zajac, A.M. and G.A. Conboy, 2006 Veterinary Clinical Parasitology. 7th ed, Blackwell Publishing, Asia, pp: 210-212.
7. Morel, P., 1989. Manual of Tropical Veterinary Parasitology: Tick-Born Disease of Livestock in Africa. CAB International, UK, pp: 299-460.
8. Urquhart, G.M., J. Armour, J.I. Dunean, A.M. Dunn and F.W. Jennings, 1996. Veterinary parasitology. 2nd ed. Black Well Science. The University of Glaskow, Scotland, UK, pp: 181-188.
9. Pegram, R.G., R.J. Tatchell, J.J. De Castro, H.G.B. Chizyuka, M.J. Creek, P.J. McCosker, M.C. Moran and G. Nigarura, 2001. Tick Control: New Concepts. Harare, Zimbabwe.www-old.caribvet.net/upload/Tick.
10. Pegram, R.G., H. Hoogstraal and H.Y. Wassef, 1981. Ticks (AcariIxodidea) of Ethiopia, Distribution, Ecology and host relationship of species infesting livestock. Bull. Entomol. Res., 71: 339-359.
11. Abebaw, G.K., 2010. Seasonal dynamics of ticks (Amblyommacohaerensand Boophilusdecoloratus) anddevelopment of a management plan for tickand tick born diseases control on cattle inJimma zone, Southwestern Ethiopia. Institute of Agronomy and Animal Production in the Tropics. Georg-August-University, Göttingen, Germany.
12. Kahn, C.M., 2005. The Merck Veterinary Manual. 9th ed. Merck and co., INC. Whitehouse Station, N.J., U.S.A, pp: 749-762.
13. Radostitis, O.M., C.C. Gay, K.W. Hinchcliff and P.D. Constable, 2006. A text book of the Disease of cattle, sheep, pigs, goats and horses. 10th ed., pp: 1599-1600.
14. Feleke, A., 2003. A Comparative Study of Four Indigenous Cattle Breeds for Tick Resistance and Tick- Borne Diseases in Ghibe Valley. A Thesis submitted to The School of Graduate Studies, in partial fulfilment for the Degree of Master of Science in Biology (Parasitology). Addis Ababa University, School of Graduate Studies, Department of Biology.
15. European Food Safety Authority (EFSA), 2013. Scientific Opinion on the Role of Tick Vectors in the Epidemiology of Crimean-Congo Hemorrhagic Fever and African Swine Fever in Eurasia1 EFSA Panel on Animal Health and Welfare. EFSA Journal, 8(8): 1703. Parma, Italy.
16. Rajput, Z.I., S.H. Hu, W.J. Chen, A.G. Arijo and C.W. Xiao, 2006. Importance of Ticks and Their Chemical and Immunological Control in Livestock. Journal of Zhejiang Univ. Sci. B., 7(11): 912-921.
17. Soulsby, E.J.I., 1982. Helminths, Arthropod and Protozoa of Domesticated Animals, 7th ed. Bailliere, Tindall and Cassel Ltd., London, pp: 456-473.
18. Willadsen, P., 2006. Tick control: Thoughts on a research agenda. Veterinary Parasitology. CSIRO, Livestock, Industries, Queensland, Bioscience, Precinct., Australia. www.elsevier.com/locate/vetpar.
19. International Livestock Research Institute (ILRI), 1996. Epidemiology of Ticks and Tick-borne Diseases in Eastern, Central and Southern Africa. Nairobi, Kenya.
20. Mesele, A., 1998. Bovine Tick Survey in Bahir Dar Awraja. DVM Thesis, Faculty of Veterinary Medicine, Addis Ababa University, Debrezeit Ethiopia.
21. Morel, P., 1989. Manual of Tropical Veterinary Parasitology: Tick-Born Disease of Livestock in Africa. CAB International, UK, pp: 299-460.
22. Mekonnen, S., I. Hussein and B. Bedane, 2001. The Distribution of Ixodid Ticks in Central Ethiopia. Onderstepoort Journal of Veterinary Research, 68(4): 243-251.