Review Article

Bovine babesiosis and its current status in ethiopia: a review

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ABSTRACT

Bovine babesiosis also known as redwater, or tickfever is the worldwide most important arthropod-borne disease of cattle that causes significant morbidity and mortality. It is caused by intra-erythrocytic protozoan parasites of the genus Babesia, which is transmitted by ticks and affects a wide range of domestic and wild animals and occasionally humans. Two important Babesia species: B. bigemina and B. bovis infect cattle. They are widespread in tropical and subtropical areas including Ethiopia and are vectored by one host tick Rhipicephalus species and transmission is mainly transovarially. The objective of this paper are reviewing available literature in relation to epidemiology, diagnosis, public health importance, control and prevention of bovine babesiosis and highlighting the disease status in Ethiopia. During the tick bite, sporozoites are injected into the host and directly infect red blood cells. Babesia produces acute disease by hemolysis and circulatory disturbance mechanism. Microscopic examination is still cheapest and fastest methods used to identify Babesia parasites. But not reliable for detection of carrier animals; in these cases molecular detection methods, or serological diagnostic procedures to demonstrate specific antibodies are required. Although some species of Babesia such as B. microti can affect healthy people, cattle parasitism seems to cause disease only in people who are immunocompromised. Early detection of blood parasites is highly beneficial active prevention and control of Babesiosis and it is achieved by three main methods: immunization, chemoprophylaxis and vector control. Imidocarb is the drug of choice for bovine babesiosis. The use of genetically resistant cattle such as B. indicus is proposed as sustainable approach to decrease the incidence of disease.

1. Introduction

Ethiopia has the largest livestock population in Africa. This livestock sector has been contributing considerable portion to the economy of the country, and still promising to rally round the economic development of the country. Estimate indicates that the country is a home for about 54 million cattle, 25.5 million sheep and 24.06 million goats. From the total cattle population 98.95% are local breeds and the remaining are hybrid and exotic breeds (Leta and Mesele). In spite of having the largest livestock population in Africa, the contribution for the economic aspect of the country is still lowest and disease can be considered as major constrain (Nejash, 2016). Livestock disease is among the major factors that affect the production and productivity having negative effects on the health of the livestock. The presence of diseases caused by haemoparasi tes is broadly related to the presence and distribution of their vectors. Arthropod transmitted haemoparasitic disease are economical y important vector borne diseases of tropical and subtropical parts of the world including Ethiopia (Sitotaw et al., 2015). Ticks and tick-borne diseases (TBDs) affect the productivity of bovines and leads to a significant adverse impact on the livelihoods of resource-poor farming communities (Jabbaretal., 2015). Four main TBDs, namely anaplasmosis, babesiosis, theileriosis, and cowdriosis (heartwater) are considered to be the most important tick-borne diseases (TBDs) of livestock in sub-Saharan Africa, resulting in extensive economic losses to farmers in endemic areas (Eggelaaret al., 2015). They are responsible for high morbidity and mortality resulting in decreased production of meat, milk and other livestock by-products (Simuunza, 2009).

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Babesiosis is a tick-borne disease of cattle caused by the protozoan parasites Babesia bovis, B. bigemina, B. divergens and others. Rhipicephalus (Boophilus) spp., the principal vectors of B. bovis and B. bigemina, are widespread in tropical and subtropical countries. The major vector of B. divergens is Boophilus microplus (OIE, 2010). Bovine babesiosis is the most important arthropod-borne disease of cattle worldwide that causes significant morbidity and mortality. It is the second most common blood-borne parasitic
disease of mammals after the trypanosome (Hamsho et al., 2015). Babesiosis is a haemolytic disease and characterized by fever (40-42°C) which may be sudden in onset, anemia, icterus, hemoglobinuria, listless, anorexic, jaundice and death (Demessie and Derso, 2015). Although some species of Babesia such as B. microtican affect healthy people, cattle parasitism seem to cause disease only in people who are immunocompromised. B. divergens causes serious disease in humans who have had splenectomies (CFSPH, 2008). Active prevention and control of Babesiosis is achieved by three main methods: immunization, chemoprophylaxis and vector control (Demessie and Derso, 2015). The use of genetically resistant cattle such as B. indicus can also ease the incidence of disease (Spickler et al., 2010).

In Ethiopia, now days no adequate emphasis has been given to livestock disease, particularly, to Bovine Babesiosis, despite of its devastating effect on cattle and other livestock’s (Lemma et al., 2015). Bovine Babesiosis is one of the most important diseases in the country because it occurs sometimes in acute forms with serious recognized clinical manifestations yet lowering the productive performance of the affected animals (Wodajnew et al., 2015). The disease widespread in the country but there is paucity of well documented information. Recognitions of this situation and motivated the author of this review. Therefore the main objectives of this paper are reviewing available literature in relation to epidemiology, diagnosis, public health importance, control and prevention of bovine babesiosis. Furthermore, the paper highlights the disease current status in Ethiopia.

2. LITERATURE REVIEW

2.1 Etiology and taxonomy

Babesiosis is an infectious tick-borne disease of livestock that characterized by fever, anemia, haemoglobinuria and weakness. The disease is also known by such names as bovine babesiosis, piroplasmosis, Texas fever, redwater, tick fever, and tristeza (Sahinduran, 2012). Bovine babesiosis caused by an apicomplexan haemoprotozoan parasite under family Babesiidae, order Piroplasmida (Sharma et al., 2013). It is caused by multiple species but three species found most often in cattle are B. bovis, B. bigemina and B. divergens. Additional species that can infect cattle include B. major, B. ovata, B. occultans and B. jakimovi (Spickler et al., 2010). Two species, B. bigemina and B. bovis, have a considerable impact on cattle health and productivity in tropical and subtropical countries (El-Ashker et al., 2015). Babesia belongs to protozoan parasites of the genus Babesia, order Piroplasmida (figure 1), phylum Apicomplexa and subclass Piroplasms and are commonly referred to as ‘piroplasms’ due to the pear-like shaped merozoites which live as small parasites inside RBC of mammals (Hamsho et al., 2015).

2.2 Epidemiology

Babesiosis is an infectious tick-borne disease of livestock that characterized by fever, anemia, haemoglobinuria and weakness. The disease is also known by such names as bovine babesiosis, piroplasmosis, Texas fever, redwater, tick fever, and tristeza (Sahinduran, 2012). Bovine babesiosis caused by an apicomplexan haemoprotozoan parasite under family Babesiidae, order Piroplasmida (Sharma et al., 2013). It is caused by multiple species but three species found most often in cattle are B. bovis, B. bigemina and B. divergens. Additional species that can infect cattle include B. major, B. ovata, B. occultans and B. jakimovi (Spickler et al., 2010). Two species, B. bigemina and B. bovis, have a considerable impact on cattle health and productivity in tropical and subtropical countries (El-Ashker et al., 2015). Babesia belongs to protozoan parasites of the genus Babesia, order Piroplasmida (figure 1), phylum Apicomplexa and subclass Piroplasmia and are commonly referred to as ‘piroplasms’ due to the pear-like shaped merozoites which live as small parasites inside RBC of mammals (Hamsho et al., 2015).
2.2.2. Host range

Babesiosis commonly infect cattle, sheep, goats, horses, pigs, dogs and cats and occasionally man. More than 100 known Babesia spp. have been identified which infect many types of mammalian host, out of these, 18 spp. cause disease in domestic animals (Hamsho et al., 2015). B. bovis and B. bigemina are found in cattle, which are the main reservoir hosts. They also affect water buffalo (Bubalus bubalis) and African buffalo (Syncerus caffer). B. bovis and B. bigemina were recently discovered in white-tailed deer (Odocoileus virginianus) in Mexico. The importance of this finding is unknown, but animals other than cattle have generally been considered of little epidemiological significance as reservoir hosts (CFSPH, 2008).

2.2.3. Risk factor

2.2.3.1. Host factor

Host factors associated with disease include age, breed, and immune status (Jabbaret et al., 2015). Bosindicus breeds of cattle are more resistance to Babesiosis than Bos Taurus. This is a result of evolutionary relationship between Bosindicus cattle, Boophilus species and Babesia (Radostits et al., 2007). Because of natural selection pressure, indigenous populations, having lived for a long time with local ticks and tick-borne diseases, have developed either an innate resistance or an innate ability to develop a good immuneresponse to the tick or tick-borne hemoparasitic disease in question. Sheep were highly susceptible to B. ovis than goats. It is frequently stated that there is an inverse age resistance to Babesia infection in that young animals are less susceptible to Babesiosis than older animals; the possible reason is passive transfer of maternal antibody via colostrum (Demessie and Derso, 2015). The severity of the clinical Babesiosis increases with age so adult are more infected by Babesiosis as compared with calves (El Moghazy et al., 2014).

2.2.3.2. Host factor

Strains vary considerably in pathogenicity: how ever, B. bovis usually more virulent than B. bigemina or B. divergens (CFSPH, 2008). Many intra-erythrocyte hemoparasites survive the host immune system through rapid antigenic variation which has been demonstrated for B. bovis and B. bigemina (Radostits et al., 2007).

2.2.3.3. Environmental Factor

There is a seasonal variation in the prevalence of clinical Babesiosis, the greatest incidence occurring soon after the peak of the tick population. Of the climatic factors, air temperature is the most important because of its effect on tick activity; higher temperatures increase its occurrence. Heaviest losses occur in marginal areas where the tick population is highly variable depending on the environmental conditions (Radostits et al., 2007). Babesiosis infection in cattle mostly reaches peak in summer (33.33%) (El Moghazy et al., 2014).

2.2.4. Transmissions

Babesia species is transmitted by hard ticks in which Babesia passes transovarially, via the egg, from one tick generation to the next (Demessie and Derso, 2015). Ticks become infected when they ingest parasitized blood of infected cattle. Bovine Babesiosis is principally transmitted by means of ticks. Tick vectors of Babesia bigemina: Rhipicephalus microplus (formerly Boophilus microplus) and Rhipicephalus sanguineus (formerly Boophilus sanguineus); Rhipicephalus decoloratus, Rhipicephalus geigyi, and Rhipicephalus evertsi are also competent vectors. B. bigemina transmitted by feeding of adult and nymphal stages of one-host Rhipicephalus spp. ticks. Tick vectors of Babesia bovis: Rhipicephalus microplus and Rhipicephalus sanguineus; Rhipicephalus geigyi is also a competent vector. B. bovis transmitted by feeding of larval stages of one-host Rhipicephalus spp. ticks (Yadhav et al., 2015). Inside the tick, Babesia zygotes multiply as “vermicules,” which invade many of the tick’s organs including the ovaries; Babesia species are readily passed to the next generation of ticks in the egg. These parasites can sometimes be passed transovarially though several generations, although this varies with the species of Babesia and the species of tick (Spickler et al., 2010).

B. divergens can survive in tick populations for at least 4 years even if cattle are not present. When an infected tick attaches to a new host, Babesia is stimulated to undergo their final maturation. B. bovis parasites usually become infective within 2-3 days after larval ticks attach, and can be transmitted by larvae. In R. microplus, B. bovis does not persist after the larval stage. In contrast, B. bigemina matures in approximately 9 days after a larval tick attaches, and it is only transmitted by nymphs and adults. All three stages of I. ricinus can transmit Babesia. Babesiaspecies can also be transmitted between animals by direct inoculation of blood. Biting flies and fomites contaminated by infected blood might act as mechanical vectors, although this method of transmission is thought to be of minor importance (CFSPH, 2008).

2.2.5. Morbidity and Mortality

Morbidity and mortality vary greatly and are influenced by prevailing treatments employed in the area, previous exposure to a species/strain of parasite, and vaccination status. In endemic areas, cattle become infected at a young age and develop long-term immunity. However, outbreak breaks can occur in otherwise endemic areas if exposure to ticks by young animals is interrupted or immunonive cattlear e introduced. The introduction of Babesia infected ticks into previously tick-free areas may also lead to outbreaks of disease (Yadhav et al., 2015). In endemic areas where tick transmission is highly earrour, animals tend to become infected when they are young, do not become ill, and become immune. This endemic stability can be up set and outbreaks can occur if climate changes, acaricide treatment or other factors decrease tick numbers and animals don’t become reinfected during the critical early period. Outbreaks area are seen in areas where cold season sinterrupt tick-borne transmission for a time, as well as when susceptible animals are introduced to endemic tick-land where areas (Spickler et al., 2010).
The life cycle of all Babesia species is approximately similar but slight difference exists because in some species transovarial transmission occur (Babesia spp. sensu stricto) while not in other species (Babesia microti) (Saad, et al., 2015). Cattle are infected by feeding ticks, which inoculate the sporozoite stage in the tick gut (Simuunza, 2009). Babesia species produce acute disease by two principle mechanisms: hemolysis and circulatory disturbance. The rapidly dividing parasites in the red blood cells produce rapid destruction of the erythrocytes with accompanying haemoglobinuria, haemoglobinemia and fever. This may be so acute as to cause death within a few days, during which the packed cell volume falls below 20% which will lead to anemia. The parasitaemia, which is usually detectable once the clinical signs appear, may involve between 0.2% up to 45% of the red cells, depending on the species of Babesia (Demessie and Derso, 2015). The clinical signs vary with the age of the animal and the species and strain of the parasite. Most cases of bovine babesiosis are seen in adults; animals younger than 9 months usually remain a symptomless. Strains vary considerably in pathogenicity; however, B. bovis is usually more virulent than B. divergens (CFSPH, 2008).

### 2.4. Pathogenesis and clinical signs

Despite, being closely related and transmitted by the same Boophilus ticks, B. bovis and B. divergens cause remarkably different diseases in cattle. In B. bovis infections, the disease pathology can be both due to over-production of pro-inflammatory cytokines and the direct effect of red blood cell destruction by the parasite. During an acute infection, macrophages activated by the parasite produce pro-inflammatory cytokines and parasitocidal molecules (Simuunza, 2009). Babesia produces acute disease by two principle mechanism; hemolysis and circulatory disturbance. During the tick bite, sporozoites are injected into the host and directly infect red blood cells. In the host, Babesia sporozoites develop into piroplasms inside the infected erythrocyte resulting in two or sometimes four daughter cells that leave the host cell to infect other erythrocytes. It invades erythrocyte and cause intravascular and extravascular hemolysis. The rapidly dividing parasites in the red cells produce rapid destruction of the erythrocytes with accompanying haemoglobinuria, haemoglobinemia and fever. This may be so acute as to cause death within a few days, during which the packed cell volume falls below 20% which will lead to anemia. The parasitaemia, which is usually detectable once the clinical signs appear, may involve between 0.2% up to 45% of the red cells, depending on the species of Babesia (Demessie and Derso, 2015). The clinical signs vary with the age of the animal and the species and strain of the parasite. Most cases of bovine babesiosis are seen in adults; animals younger than 9 months usually remain asymptomatic. Strains vary considerably in pathogenicity; however, B. bovis is usually more virulent than B. divergens (CFSPH, 2008).

B. bovis is the most pathogenic of the bovine Babesia. In animals with acute B. bigemina infections, the disease pathology may involve 40% of the red cells (Sahin duran, 2012). Babesia bovis infections are characterised by high fever, ataxia, anorexia, general circulatory shock, and sometimes also nervous signs as a result of sequestration of infected erythrocytes in cerebral capillaries. Anaemia and haemoglobinuria may appear later in the course of the disease. In acute cases, the maximum parasitaemia (percentage of infected erythrocytes) in circulating blood is less than 1%. This is in contrast to B. bigemina infections, where the parasitaemia often exceeds 10% and may be as high as 30%. In B. bigemina infections, the major signs include fever, haemoglobinuria and anaemia. Intravascular sequestration of infected erythrocytes does not occur with B. bigemina infections. The parasitaemia and clinical appearance of B. divergens infections are somewhat similar to B. bigemina infections (OIE, 2010).

In animals with acute B. bigemina only a relatively small proportion of cases are fatal. In contrast, mortality rates over 50% are common for animals infected with B. bovis. Infections in cattle are characterized by fever, anorexia, listlessness, dehydration and progressive hemolysis, and may be followed by hemoglobinuria and hemoglobinemia are suiting in...
jaundice. Both *B. bigemina* and *B. bovis* have the above-mentioned clinical signs in common, but show differences in pathogenesis and manifestation. Hence *B. bigemina* can be characterized as a peripheral babesiosis with severe anemia, whereas *B. bovis* often induces a visceral babesiosis because of thrombus formation (Pohl, 2013).

### 2.5. Diagnosis

Babesiosis can be diagnosed by identification of the parasites in blood or tissues, polymerase chain reaction assays (PCR), serology, or transmission experiments. Babesiosis should be suspected in cattle with fever, anemia, jaundice, and hemoglobinuria (CFSPH, 2008).

#### 2.5.1. Direct microscopic examination

Microscopic examination still cheapest and fastest methods used to identify Babesia parasites. Identification of the different stages of the parasite in mammalian or arthropod host tissues can be used for direct diagnosis purpose. Thin and thick Blood Smears Blood smear examination has been considered to be the standard technique for routine diagnosis, particularly in acute cases, but not in sub-clinical infections where the parasitemia is usually much lower (Demesie and Derso, 2015). Species differentiation is good in thin films but poor in the more sensitive thick films. This technique is usually adequate for detection of acute infections, but not for detection of carriers where the parasitaemias are mostly very low. Parasite identification and differentiation can be improved by using a fluorescent dye, such as acridine orange, instead of Giemsa (OIE, 2010). Blood film examination requires very much expertise to differentiate between Babesia species from one or more animal species which look similar under standardized preparation (Salih et al., 2015).

Samples from live animals should preferably be films made from fresh blood taken from capillaries, such as those in the tip of the ear or tip of the tail, as *B. bovis* is more common in capillary blood. Babesia bigemina and *B. divergens* parasites are uniformly distributed through the vasculature. If it is not possible to make fresh films from capillary blood, sterile jugular blood should be collected into an anticoagulant such as lithium heparin or ethylene diamine tetra-acetic acid (EDTA). Samples from dead animals should consist of thin blood films, as well as smears from cerebral cortex, kidney (freshly dead), spleen (when decomposition is evident), heart muscle, lung, and live (OIE, 2010).

#### 2.5.2. Indirect Diagnostic methods

When parasites occur at densities below the sensitivity of direct method employed or cannot be directly demonstrated in a biological sample due to the life-cycle in the host, in those cases indirect methods of diagnosis are used, which include serological tests either used for detection of antibodies or antigens. Among the various serological tests, most important once include complement fixation test (CFT), indirect fluorescent antibody technique (IFAT) and enzyme-linked immunosorbent assay (ELISA) (Salih et al., 2015). Blood smears are not reliable for detection of carrier animals in these cases molecular detection methods, serological diagnostic procedure or demonstrating specific antibodies, are required (Pohl, 2013). Serology is most often used for surveillance and export certification. Antibodies to Babesia are usually detected with an indirect fluorescent antibody (IFA) test or enzyme-linked immunosorbent assay (ELISA). Complement fixation has also been used, and agglutination assays (latex and card agglutination tests) have been described. Serological cross-reactions can complicate the differentiation of some species in serological tests (Spickler et al., 2010).

Polymerase chain reaction (PCR) assays can detect and differentiate Babesia species, and are particularly useful in carriers (CFSPH, 2008). Immunofluorescent and immunoperoxidase labeling have also been described. These parasites are found within RBCs, and all divisional stages ring (annular) stages, pear shaped (pyriform) trophozoites either singly or in pairs; and filamentous or amorphous shapes can be found simultaneously. Filamentous or amorphous forms are usually seen in animals with very high levels of parasitemia. *B. bovis* trophozoites are small (usually 1–1.5 μm × 0.5–1.0 μm), often paired and usually centrally located in RBCs. *B. divergens* resembles *B. bovis*, but the pairs are often found at the edge of the RBC. *B. bigemina* is much and can fill the RBC (Spickler et al., 2010).

### 2.6. Public health and economic significance of bovine babesiosis

#### 2.6.1. Public health significance

Human babesiosis was first described in 1957 but is now known to be world-wide in distribution. The incidence in reported cases is likely due to increases in the rates of human exposure to infected ticks (YadHAV et al., 2015). Although some species of Babesia such as *B. microti* can infect healthy people, cattle parasites seem to cause severe disease in humans who have had splenectomy. This infection is rare in Europe; approximately 30 cases had been reported as of 2003. It is characterized by acute onset of fever, hemoglobinuria, jaundice, persistent high fever, chills and sweats, headache, myalgia, lumbago and abdominal pain, and sometimes vomiting and diarrhea. Shock and renal failure may also be seen. *B. divergens* infections in humans are medical emergencies. They usually progress very rapidly, and most cases in the past end edith death within a week. In veterans, antiparasitic drugs and supportive therapy, the case fatality rate is approximately 40%. Mild cases may resolve without drug treatment alone (CFSPH, 2008).

To prevent infection with *B. divergens*, immunocompromised individuals should be cautious when visiting tick-infested regions where babesiosis is endemic, especially during the tick season. Exposure to ticks should be prevented by wearing appropriate clothing (e.g., long g-sleeved-shirts and long pants) and tick repellents. Skin and clothing should be inspected for ticks after being outdoors, and any ticks found should be removed. There is no definitive evidence that *B. divergens* can infect immunocompetent individuals, or those who...
are immunosuppressed but not splenectomized. However, antibodies to Babesia were found in two of 190 French blood donors. B. bovis may also be zoonotic, but this is uncertain. At least some historical cases attributed to B. bovis were probably caused by B. divergens (Spicker et al., 2010).

2.6.2. Economic significance

Bovine Babesiosis causes most serious economic loss to the livestock industry, endangering half a billion cattle across the world (Saad et al., 2015). Babesiosis, especially in cattle has great economic importance, because unlike many other parasitic diseases, it affects adults more severely than young cattle, leading to direct losses through death and the restriction of movement of animals by quarantine laws. The disease is also a barrier to improving productivity of local cattle by cross-breeding due to the high mortality of genetically superior but highly susceptible cattle, especially dairy cattle, imported from Babesia-free areas. The consequence is that the quality of cattle in endemic areas remains low, therefore impeding the development of the cattle industry and the wellbeing of producers and their families (Demessie and Derso, 2015).

2.7. Prevention and Control

Active prevention and control of Babesiosis is achieved by three main methods: immunization, chemoprophylaxis and vector control. Ideally, the three methods should be integrated to make the most cost effective use of each and also to exploit breed resistance and the development and maintenance of enzootic stability (Demessie and Derso, 2015). Eradication of bovine babesiosis has been accomplished by elimination of tick vector in areas where eradication of tick is not feasible or desirable; ticks are controlled by repellents and acaricides (Beckley, 2013). Reduce the exposure of cattle to tick and regular inspection of animals and premises. Cattle develop a durable, long-lasting immunity after a single infection with B. bovis, B. divergens or B. bigemina, a feature that has been exploited in some countries to immunize cattle against Babesiosis (OIE, 2009).

Babesia can be prevented and controlled by using different types of vaccine e.g. live vaccine, killed vaccine and others. Most live vaccines contain specially selected strains of Babesia (mainly B. bovis and B. bigemina) and are produced in calves or in vitro in government supported production facilities as a service to the livestock industries (OIE, 2010). Live, attenuated strains of B. bovis, B. bigemina or B. divergens are used to vaccinate cattle in some countries. These vaccines have safety issues in order to maintain the potential for virulence in adult animals, possible contamination with other pathogens, and hypersensitivity reactions to blood proteins. They are best used intranasally as inhalation of infected plasma in lactating cattle can decrease the incidence of disease. Natural endemic stability is unreliable as the sole control strategy, as it can be affected by climate, host factors and management (Spicker et al., 2010).

2.8. Treatment

Imidocarb are the drug of choice for bovine babesiosis, which can prevent clinical infection up to 2 months, (Saad et al., 2015). Sick animals should be treated as soon as possible with an antiparasitic drug. midicarb (Imizol) and the allied drug amicarbalide are effective babesiocides for cattle at the dose rate of 1-3 mg/kg and 5-10 mg/kg body weight respectively (Beckley, 2013). Treatment is most likely to be successful if the disease is diagnosed early; it may fail if the animal has been weakened by anemia. A number of drugs are reported to be effective against Babesia, but many of them have been withdrawn due to safety or residue concerns (CFSPH, 2008). The first specific drug used against bovine Babesiosis was Trypan blue, which is a very effective compound against B. bigemina infections, however, it did not have any effect on B. bovis and it had the disadvantage of producing discoloration of animal’s flesh, so it is rarely used. Diminazene aceturate, which is widely used currently in the tropics as a Babesiacide, was withdrawn from Europe for marketing reasons (Demessie and Derso, 2015). Blood transfusions and other supportive therapy may also be necessary. Chemophrophylaxis with one drug (imidocarb) can protect animals from clinical disease while allowing the development of immunity. However, there are concerns about residues in milk and meat, and this drug is not available in all countries (CFSPH, 2008).

2.9. Status of bovine babesiosis Ethiopia

Tick-borne diseases and their vectors are widespread in Ethiopia. They affect production in various ways, such as growth rate, milk production, fertility, the value of hides and mortality. Major cattle tick-borne diseases in Ethiopia are anaplasmosis, babesiosis, cowdriosis and theileriosis (Sileshi, 1996). Ticks and tick borne diseases cause considerable losses to the livestock economy, ranking third among the major parasitic disasters after trypanosomes and endoparasitism (Desalegn et al., 2015). Furthermore, Babesiosis is one of the most important diseases in Ethiopia because it occurs sometimes in acute forms with serious recognized clinical manifestations yet lowering the productive performance of the affected animals (Wodajnew et al., 2015). Different researchers have reported the prevalence of bovine babesiosis from different area of Ethiopia (table 2).

The study from Western Ethiopia Benishangul Gumuz Regional State, by Wodajnew et al. (2015) reported the overall prevalence of 1.5% from which B. bovis was found to be 1.24% and B. bigemina was 0.248%. Furthermore, the reviewed study revealed that the highest prevalence was compiled during the autumn season (2.99%) followed by extremely low prevalence in the winter season (0.88%). Another study in and around Jimma town, southwest Ethiopia by Lemma et al. (2015) reported overall prevalence rate of Babesiosis as 23% by Giemsa stained
blood smears out of which 33.33% is B. bovis and 62.96% is B. bigemina. Similarly the study at the same place revealed an overall prevalence rate of Bovine Babesiosis to be 12.8% (Alemayehu, 2014). Furthermore, another study from Bishoftu, Central Ethiopia found prevalence of 0.6% of which equal prevalence of babesia bigemina, and babesia bovis(0.3%) was found (Sitotawet al., 2014). The result of microscopic examination of more recent study from Southern Ethiopia in Teltele District, Borena Zone, indicated the overall prevalence of 16.9% out of which two species of Babesia comprising of B. bovis (9.9%) and B. bigemina (7%) (Hamsho et al., 2015).

**Table 2 : Prevalence of bovine babesiosis from different area of Ethiopia**

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<thead>
<tr>
<th>area</th>
<th>Diagnostic methods</th>
<th>Prevalence</th>
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<tr>
<td>Western Ethiopia</td>
<td>microscopic examination</td>
<td>1.5%</td>
<td>(Wodajnewet et al., 2015)</td>
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<tr>
<td>Southern Ethiopia</td>
<td>microscopic examination</td>
<td>16.9%</td>
<td>(Hamsho et al., 2015)</td>
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<tr>
<td>South Western Ethiopia</td>
<td>microscopic examination</td>
<td>23%</td>
<td>(Lemma et al., 2015)</td>
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<tr>
<td>Central Ethiopia</td>
<td>microscopic examination</td>
<td>0.6%</td>
<td>(Sitotawet al., 2014)</td>
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High prevalence of bovine babesiosis was reported in and around Jimma town, southwest Ethiopia (table 1) compared to other study which is 23% (Lemma et al., 2015). In contrast, the study from Central Ethiopia, bishoftu indicated low prevalence of bovine babesiosis (0.6%) (Sitotawet al., 2014).

**3. CONCLUSIONS AND RECOMMENDATIONS**

Bovine babesiosis is the most important arthropod-borne disease of cattle worldwide that causes significant morbidity and mortality. The most prevalent species, Babesiabovis and B. bigemina, are found throughout most tropical and subtropical regions including Ethiopia. All Babesia are transmitted by tickswithalimited hostrange. The principal vectors of B. bovis and B. bigemina are Rhipicephaluspp. Ticks and these are widespread in tropical and sub tropical countries. Calves are virtually resistant to the Babesia. Babesiabovis causes more severe clinical signs as compared to Babesia bigemina. Bovine Babesiosis causes most serious economic loss to the livestock industry, endangering half a billion cattle across the world. The disease is also a barrier to improving productivity of local cattle by cross-breeding due to the high mortality of genetically superior but highly susceptible cattle. Currently bovine babesiosis is widespread in Ethiopia with most prevalent species being B. bovis and B. bigemina. Therefore based on the above conclusions the following recommendations can be forwarded.

Ethiopia should develop and implement surveillance systems and action plans to prevent bovine babesiosis from spreading.

Epidemiological studies should be conducted on bovine babesiosis to provide the necessary incidence and prevalence data.

Various control strategies should be adopted in order to prevent the day by day increasing losses to livestock in dustry and vaccines should be practiced in control and prevention of babesiosis.

Awareness should be given livestock owners in relation to vector control as one option of controlling bovine babesiosis.

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**4. REFERENCE**


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