Review Article

Review on epidemiology of bovine hemoparasites in Ethiopia

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Abstract

A literature-based review was made to assess available information on bovine hemoparasites related to their epidemiology, distribution, and economic importance in Ethiopia. Babesiosis, anaplasmosis, cowdriosis, theileriosis, and trypanosomosis are the major hemoparasitic diseases of bovine in Ethiopia. Their adverse effects on the health of the animals can decrease production and productivity. Hemoparasites generally cause fever, anemia, jaundice, anorexia, weight loss, milk drop, malaise, swelling of lymph nodes, dyspnoea, diarrhea, nervous disorders, and death by affecting blood vessels and/or lymphatic system of the animal. Reports from different parts of the country displayed there is a high distribution of bovine hemoparasitic disease throughout the country. Anaplasmosis, Babesiosis (redwater), Ehrlichiosis (Heartwater), Theileriosis, and Trypanosomosis are the major hemoparasitic diseases with heavy economic losses. Their mode of transmission was by arthropod vectors ticks and flies. Applying effective vector control and using vaccines drugs are the two most important control methods for hemoparasites diseases. Also having knowledge of parasite life cycles, their biological vector, and the immune response of bovines to vectors and parasites were also used in the successful application of control strategies. Creating awareness of the mode of transmission, method of control, and prevention of hemoparasitic disease of bovine to livestock owners were warranted to decrease the effect of the disease.

Introduction

Bovine hemoparasites are vector-borne diseases of tropical and subtropical parts of the world including Ethiopia [1]. Hemoparasites can affect about 80% of the world’s cattle population which causes a great economic impact on livestock resources. The major Hemoparasitic diseases of bovines such as babesiosis, anaplasmosis, cowdriosis, theileriosis, and trypanosomosis are considered some of the major impediments to the health and productive performance of cattle. They can cause fever, anemia, jaundice, anorexia, weight loss, swelling of lymph nodes, dyspnoea, diarrhoea, nervous disorders, and even death by affecting the blood and/or lymphatic system of the animals [2].

Anaplasmosis is caused by gram-negative bacteria genus Anaplasma which is obligatory intracellular that infects the blood cells of mammals [3]. In bovine it is caused by A. bovis, A. marginale and A. centrale infecting monocytes and red blood cells [4]. Babesiosis is caused by the protozoa genus Babesia and it is zoonotic tick-transmitted hemoparasites. The causative agents of Babesiosis are specific for particular species of animals. In cattle: Babesia bovis, Babesia bigemina, Babesia divergens and Babesia major. Two species, B. bigemina and B. bovis, have a considerable impact on cattle health and productivity in tropical and subtropical countries [5].

Heartwater is caused by a rickettsia, previously known as Cowdria ruminantium, but recently reclassified as Ehrlichia ruminantium. It is a tick-borne disease in cattle, sheep, goats, and some wild ruminants. Heartwater is also known that there is far more genetic variability among E. ruminantium organisms than had ever been suspected [6].

Theileriosis is a disease caused by protozoan parasites belonging to the genus Theileria. Theileria annulata and Theileria Parva are the most important tick-transmitted pathogenic species causing bovine theileriosis [7]. In another way, Trypanosomosis is also an important protozoan disease that is caused by the genus Trypanosoma. It is transmitted through bites by different species of Glossina and mechanically by a number of biting flies such as Tabanus and Stomoxys species [8]. Three species of trypanosomes are recorded in Ethiopia. These are T. congolense, T. vivax and T. brucei. T. vivax and T. congolense are the main pathogens of cattle [9].
In Ethiopia, the widespread occurrence of many parasitic especially hemoparasites of bovines extremely reduces the production of livestock through morbidity and mortality. Thus, the objectives of this review were to assess available information on the epidemiology of bovine hemoparasites in Ethiopia.

**Distribution of bovine hemoparasites in Ethiopia**

In Ethiopia, quite several conducted epidemiological studies showed that there is the high distribution of hemoparasites of bovine. The major ones were trypanosomosis, anaplasmosis, babesiosis, theileriosis and ehrlichiosis. These epidemiological studies were carried out using conventional parasitological techniques such as dark phase buffy coat, thin and thick smear, and different serological and molecular techniques (Table 1 & Figure 1).

**Economic importance of bovine hemoparasites**

Anaplasmosis poses important economic constraints to animal breeders, mainly due to the high morbidity and mortality in susceptible cattle herds. Besides the costs of the additional veterinary care, anaplasmosis causes abortion in animals, reduction of milk production, and body weight, and frequently leads to death [4].

In another way, Babesiosis in bovines also causes the most serious economic loss endangering half a billion cattle across the world [19]. Babesiosis, especially in bovines 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 the 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 [20].

A serious economic problem can occur with Heartwater in a massive area covering most of sub-Saharan Africa, its offshore islands, and several islands in the Caribbean. The disease generally prevents livestock farmers from upgrading their herds to modern high-yielding breeds, as these are more susceptible to infection than traditional stock breeds, which often have a measure of resistance. Since heartwater is so common in the endemic areas of Africa, farmers are usually unwilling or unable to pay for definitive diagnoses, so it is difficult to quantify the economic impact of the disease [21].

Tropical theileriosis is hemoparasitic infection responsible for substantial production losses. About 250 million cattle are...
at risk of Tropical theileriosis worldwide. This intracellular infection imposes an economic burden on cattle breeders in terms of mortality and morbidity as well as expenses spent on prophylactic measures against disease and treatment [22].

Trypanosomosis remains one of the largest causes of livestock production losses in Ethiopia. About 15% - 20% of the land believed to be suitable for livestock production is affected by one to two species of tsetse flies [23]. The effects of trypanosomosis are not only the direct losses resulting from mortality, morbidity, infertility of the infected animals, and costs of controlling the disease, but also due to indirect losses, which include exclusion of livestock and animal power-based crop production from the huge fertile tsetse infected areas. Since, bovine trypanosomosis is a highly devastating disease that has a great economic impact on the country’s development [24].

Conclusions and recommendations

Bovine hemoparasites are the main constraints of livestock production in Ethiopia. The major hemoparasitic diseases with heavy economic losses are mainly Protozoal and Rickettsial diseases such as Anaplasmosis, Babesiosis (redwater), Ehrlichiosis (Heartwater), Theileriosis, and Trypanosomosis. These diseases are transmitted by arthropod vectors ticks and flies. Potential control methods for hemoparasitic diseases include vector control, and vaccines drugs (Against vectors and parasites). Successful application of control strategies will be dependent upon a thorough understanding of parasite developmental cycles, the biology of the vectors, and the immune response of cattle to vectors and parasites. Therefore, based on this conclusion the following recommendations are forwarded:

- Proper identification and characterization of arthropod vectors should be done in order to control hemoparasitic diseases.
- Proper vaccines and drugs should be produced that can eliminate/eradicate the hemiparasite diseases.

References


