

Review on the Major Infectious Animal Diseases in Livestock

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Abstract: Livestock in Ethiopia provides drought power, incoming to farming communities, means of investment and important source of foreign exchange earnings to the nation. Even though the livestock sub sector contributes much to the national economy, its development is hampered by different constraints mainly infectious diseases. Livestock diseases are the major cause of economic losses to the peasant farmer and pastoralists in Ethiopia amounting to hundreds of millions of birr annually. Because livestock is the chief source of cash income to small holders, up to 88% in the highland livestock-cropping system, diseases are an important cause of reduced productivity of meat and milk as well as draft, hides and dung fuel. Although many of the diseases could be controlled by available vaccine technology, timely recognition of the disease followed by acquisition of the pharmaceuticals is lacking due to the remoteness of the livestock holder and the shortage of infrastructure facilities to support health services delivery. Consequently, in Ethiopia the majority of disease intervention consists of mass inoculations following outbreaks rather than preventive measures.

Key words: Food Animals • Diseases • Zoonosis • Prevention • Control

INTRODUCTION

Ethiopia is one among the nations that possesses the largest livestock population in the African continent estimated to be 56 million cattle, 29 million sheep and 29 million goats. In contrast to the huge livestock resource, the livestock productivity is however, found to be very low. The major biological and socioeconomic factors attributing to the low productivity includes: the low genetic potential and performance, poor nutrition (in quality and quantity terms), the prevailing of different diseases, traditional way of husbandry systems and inadequate skilled manpower, among others [1].

Livestock in Ethiopia provides rough power, incoming to farming communities, means of investment and important source of foreign exchange earnings to the nation. On the basis of statistics acquired from different sources, livestock provides 16% of the total GDP (equivalent to 30% of agricultural GDP) and generates 14% of the country's foreign exchange earnings [2]. The most important constraints to cattle production are widespread endemic diseases including viral, bacterial and

parasitic infestation, poor veterinary service and lack of attention from government [3]. Of the health constraints, tick and tick borne disease, Foot and Mouth Diseases (FMD), Contagious Bovine Pleuro Pneumonia (CBPP), Brucellosis, Lumpy Skin Diseases (LSD), PPR, Sheep and Goat Pox contribute to the great financial losses and the socio-economic development of poor farmers in the area. These diseases cause a huge mortality and morbidity. Moreover, the diseases make problem on international livestock markets and about 1.5-2.5 billion birr is annually lost from animal diseases [4].

However, various alternative options are initiated by different actors (private sector, governments and international organizations). These initiatives are often regional encompassing more than one country in east Africa and attempt to find sound solutions to overcome barriers to trade so that Ethiopia and other countries could effectively use their rich livestock resources for the improvement of the live hood of their populations [5]. Currently, Ethiopia is exporting livestock (bulls, sheep and Camels) to Middle East countries mainly Yemen, Egypt and Jordan [6]. Even though the complete data are found

the Adama-Modjo quarantine stations, there is no well documented on the prevalence of the diseases at country level especially in the academic areas. Thus, the present study was designed to determine the prevalence of the major infectious animal diseases hinder the Livestock Export Enterprises and estimate the financial losses at Adama-Modjo Quarantine Stations.

Most Important Food Animal Diseases in Ethiopia

Lumpy Skin Disease (LSD): Lumpy skin disease (LSD) is a generalized skin disease which is an infectious, eruptive, occasionally fatal disease of cattle caused by a virus associated with the Neethling poxvirus in the genus Capri poxvirus of the family Poxviridae. LSD was first described in Zambia and occurs in other most African countries and sporadically in the Middle East region. Mechanical vector insects might play a major role in the epidemiology of LSD and wildlife plays a potential role in its maintenance [7]. In Ethiopia, lumpy skin disease was first observed in the northwestern part of the country (southwest of Lake Tana) in 1983, Mebratu *et al.* [8].

After its first appearance, an explosive sudden epidemic spread from the north through the central to the southern part of the country. LSD is one of reported diseases in Ethiopia which deserves outbreak notification to the National veterinary services. The national disease report showed LSD has spread virtually to all the regions in the country and in different agro-climatic zones. Because of the wide distribution of the disease and the size and structure of the cattle population in Ethiopia, LSD is one of the most economically important livestock diseases in the country. Across different agro-ecological zones in Ethiopia an overall observed LSD prevalence is 8.1% and a mortality of 2.12%. The case fatality is estimated to be 2%. The highest frequency of LSD outbreaks in the country have been reported between September and December, with the highest numbers in October and November; which is the end of the main rainy season in most parts of the midland and highland agro-ecological zones and the lowest number is reported in May [9]. Among indigenous local zebu cattle Fogera breed located in the northwest of the Ethiopia is reported to manifest severe clinical disease in epizootic occurrence of LSD. A study in Ethiopia also shows that communal grazing, watering points and movement of infected stock have been found to be associated with the occurrence of LSD. Lumpy skin disease is reported from all regions of the country. The majority of outbreaks are frequently reported from midland agro-climate zone of Oromia, Amhara and the Southern Nations, Nationalities and People's Region, which is known to be favorable for the

breeding of the blood feeding insect vectors of LSD and has the highest population density of livestock in Ethiopia.

The disease causes serious economic losses in most African countries including Ethiopia due to the prolonged loss of productivity from high morbidity, restrictions to the global trade of live animals and animal products, costly control and eradication measures. Factors associated with communal grazing and watering point and introduction of new cattle are significantly high risk of LSD occurrence. The diagnostic tests currently available like the clinical examinations and laboratory tests (Virus isolation / identification and Serological tests) are needed to confirm it. LSD needs to stop if occurred and to block if new either by sanitary (import restrictions on livestock, carcasses, hides, skins and semen) or medical prophylaxis (Vaccination) [7].

Foot-and-Mouth Disease (FMD): A highly contagious disease of the mucosa membranes and the foot tissue adjacent to the hoof, this disease is known over most of the Tropics with outbreaks still being common in Ethiopia. The virus, which occurs in 7 serotypes with many subtypes, is transmitted mainly by ingestion of forage contaminated by infected animals. The virus can survive over a year on infected premises, for months on clothing, hair, hay, straw packing and vegetables and in meat that is incompletely frozen or boiled. It can be carried by motor vehicles from infected areas and is resistant to strong disinfectants. After incubation of 3-8 days, a high fever, especially in young stock, is followed by sleeplessness and swelling of the lining of the mouth. Slow, smacking chewing along with reddened vesicles on the mucosa tissues is common by the third day. One or more of the feet may show swelling and the lame animal may go down over a 2 week period. Lameness is the main symptom in pigs, sheep and goats and though the disease is usually milder, abortion and shedding of the hoof may occur [10].

Control is by slaughter and mass vaccination however the former may be prohibitively expensive. All animate things should be disinfected and inanimate burned or buried. The pasture area should be quarantined for at least 1 month. Since there is little cross-immunity among sub-types, vaccines are best prepared from locally isolated viruses. Vaccines are only effective for up to 8 months and a booster is best used after 3-4 months. A single yearly vaccination has been effective in areas where the virus commonly occurs. There is no control program in Ethiopia except in large farms due to the high cost of the vaccine (*Ibid*) [10].

Peste Des-Petitis Ruminant (PPR): Small stock and mainly sheep and goats are the main farm animals owned by the poor in most developing countries. A Peste des petitis ruminant (PPR) is a wide spread, acute highly contagious, virulent and devastating animal disease of domestic and wild ruminants. It is mainly the disease that affects sheep and goats and is caused by Morbillivirus. With its associated high morbidity and mortality, PPR virus constitutes one of the major obstacles to subsistence farming [11].

Peste des petits ruminant (PPR) is an economically important disease of small ruminants with a rapidly expanding geographical distribution. There are fragmented reports to the occurrence and distribution of the disease in Ethiopia. A total of 700 serum samples were collected from goats and sheep to detect the presence of antibodies against PPR virus using Competitive Enzyme-Linked Immunosorbent Assay (C-ELISA). An overall PPR sero-positivity was reported to be 48.43% in the area. There is no statistically significant difference in the sero-prevalence of the disease between sheep and goats (50.85% and 46.68%), respectively. However, there was statistically significant variation (< 0.05) in the sero-prevalence of the disease in young (33.9%) and adult (55.8%) age categories. The sero-prevalence in male and female was 42.07% and 50.09%, respectively, where the variation was statistically not significant (> 0.05). High sero-prevalence of Peste des petites ruminants in the study area indicated the virus circulation and endemicity of the disease. The disease causes substantial economic losses by affecting the livelihood of the farmers. Therefore, control measures should be put in place to minimize the loss associated with the disease [12].

Rabies in Ethiopia: Rabies, a viral disease caused by lyssa virus of family Rhabdoviridae, is a fatal zoonotic disease with worldwide occurrence and endemic in developing countries of Africa and Asia. Rabies generally affects all warm-blooded animals, but it is primarily a disease of dogs in Ethiopia because access to suspected domestic canids and pets are not controlled indoors or by immunization. The major means of transmission of the disease is through any types of bite, scratch, or other situation in which saliva, cerebral, spinal fluid, tear, or nervous tissues from suspected or known rabid animal or person enters an open wound, is transplanted into, or comes in contact with mucus membrane of another animal or person. One of the retrospective studies of rabies in Addis Ababa from 1990-2000 indicated that an average of

2, 200 people per year received post-exposure anti-rabies treatment while 95% of the reported fatal human rabies case was due to dog bite [13].

The widespread use of traditional medicine among urban and rural population of Ethiopia could be attributed to cultural acceptability, physical accessibility and economic affordability. Individuals who are exposed to the rabies virus often see traditional healers for the diagnosis and treatments of the disease. Once the virus entered into the body of exposed individuals through wound (abrasion) or direct contact with mucosal surface, then there, it replicates in the site of deposit (bitten site), where local viral proliferation occurs and gets access (viral attachment) to motor endplates. The clinical sign of the disease is nonspecific and difficult to differentiate without laboratory test, but some of the signs such as pupil dilation in some cases, paralysis (last stage) and hydrophobia are some characteristic signs. The control of access to domestic canids to other suspected animals is not only a prevention method but also a treatment measure. Mass vaccination of dogs and removal of stray canids are the best measures of control (*Ibid*) [13].

Sheep and Goat Pox: Sheep and goat pox are caused by a genus of Capripox virus causing a severe problem and great economic loss in Ethiopia and also in sheep and goat rearing countries in many parts of the world. The objective of this review is to give insight on epidemiology, diagnosis, treatment and control measures of sheep pox and goat pox disease [13]. Generally, the disease is less commonly seen in indigenous breeds in areas where it is endemic as compared to exotic breeds. Mostly the disease is transmitted by direct contact [14]. After it enters, goat pox virus replicates locally in the tissues. In endemic areas the morbidity rate reaches 70-90% whereas the mortality rate is up to 5-10% and approaches 100% in newly imported animals. In Ethiopia, the disease is distributed in all parts of the country and in endemic areas it is economically important due to loss of production, loss of weight, decreased milk yield, damage to hide and skin, cause abortion and exposure to other diseases, while also being a direct cause of death [14]. Diagnosis of SGP depends on clinical signs, laboratory confirmation and post mortem examinations. Sheep pox and goat pox require an urgent and precise laboratory confirmation as the diseases are severe and contagious. Samples for test must be collected during the first week of illness. Sheep pox and goat pox (SGP) disease can affect trade, import export and intensive production of animals

[13, 14]. Since the disease has no effective treatment, control measure is targeted by effective vaccination and limitation of animal movement and their products between different nations. Even though live attenuated vaccine has been produced at National Veterinary Institute (NVI) in Ethiopia, there is low coverage of vaccination throughout the country [14].

Newcastle Disease of Fowl: Newcastle disease is an acute, highly contagious viral disease that occurs throughout the world. It results in drastic lowering of egg production and death or delayed maturity of layers and broilers. The virus can survive 6 months in infected eggs or chicken houses and can be carried by birds or on workers' clothing. The disease spreads rapidly within the flock by sneezing, coughing and consumption of common drinking water [10]. Precipitous drop in egg production as well as soft shells within 2-3 days of infection is accompanied by lack of alertness, gasping and sneezing. Paralysis of the legs, wings and neck causes strange contortions. Usual morbidity of 100% is followed by mortality of around 50%, especially in young and baby chicks. Control consists of sanitation of chicken houses before re-use and isolation of infected birds. Preventative vaccination can be administered in drinking water at age 2 weeks and again 2-3 months later which brings about adequate immunity levels within 1-2 weeks and lasts for about 6 months. Although the vaccine is produced in Ethiopia, it is routinely used only by the large farms [10].

Contagious Bovine Pleuropneumonia (CBPP): Contagious bovine pleuropneumonia (CBPP) is highly contagious and infectious respiratory disease of cattle caused by *Mycoplasma mycoides mycoides* Small Colony type (MmmSC) which is widely spread in Ethiopia regardless of any variation in agro-ecological parameters and found to be threat to cattle health and production [15]. CBPP is an oldest and the noticed disease in Ethiopia. Although combined blanket vaccination was given with Rinderpest vaccine in the former times, it was not eradicated in Ethiopia. Rather the disease is distributed all over the country in various magnitudes of prevalence and made the controlling process very complex. Little is known about the Epizootiology of CBPP in Ethiopia and was thought to be the problem of low land pastoral area in which the adjacent high land do have probability to be exposed, unlike the research result of many literatures which has revealed its outbreak in high

lands of Addis Ababa and North Shewa [14]. In Ethiopia the average physical losses from contagious bovine pleuropneumonia (CBPP) in terms of cattle deaths, traction power, cost of treatment and control is so magnificent and incalculable both in endemic and epidemic areas that many changes are expected from this sector to save the immense potential loss arising from this problem. As a disease of intensification, animal husbandry and associated cattle movement were incriminated to be the risk factors. In general small holder farmers of Ethiopia that covers the largest portion of agrarian community was underestimated and not understood because of which no noticeable economic change was seen despite the huge potential of livestock population in the country [15].

ORF - Contagious Ecthyma: Antigenic to goat pox but not sheep pox, this highly infectious virus causes pustular, scabby lesions of the muzzle and lips. It is common in the highlands during the rainy season when shoats graze wet, dewy grass [10]. Mortality may reach 25-75% in lambs due to respiratory lesions. Spread in the flock is very rapid and occurs by contact, abrasion and breaks in the skin. Affected lambs may be discouraged from suckling and grazing, causing decline and death. Control consists of isolation of infected individuals and flocks. Persistence in a flock from year-to-year is common in which case lambs should be vaccinated within 6-8 weeks while still suckling. Vaccination, which is effective for 2 years, is by painting a saline suspension of scabs onto the scarified inside the thigh. No vaccine exists in Ethiopia and local treatment consists of disinfection of the mouth [10].

African Horse Sickness (AHS): This is a highly fatal disease of horses, mules and donkeys which is spread by biting midges or gnats (*Culicoides spp.*). The disease is most common in low lying swampy areas after heavy rainy periods when the insect is present. Fever, labored breathing and nasal discharge are followed by sweating, staggering and lying down [10]. The nasal discharge becomes voluminous and labored breathing inhibits ingestion with death in 4-5 days. Vaccination of all equine in the area and a broad buffer zone is recommended to restrict spread by infested wind-blown midges. Also, care should be exercised to quarantine animals in infected areas until the passage of the rainy season. The disease occurs over a large area of Ethiopia and use of vaccination has started [10].

Tuberculosis: Ethiopia is one of the African countries where tuberculosis is wide spread in both humans and cattle and the endemic nature of tuberculosis in humans and cattle has long been documented. The disease is considered as one of the major livestock diseases that results in high morbidity and mortality, although the current status on the actual prevalence rate of bovine tuberculosis (BTB) at a national level is yet unknown [1]. Detection of BTB in Ethiopia is carried out most commonly on the basis of tuberculin skin testing, abattoir meat inspection and very rarely on bacteriological techniques. Recently undertaken studies indicated the prevalence rate of BTB with a range of 3.4% (in small holder production system) to 50% (in intensive dairy productions) and a range of 3.5 to 5.2% in slaughterhouses in various places of the country. BTB in cattle remains to be a great concern due to the susceptibility of humans to the disease [15, 16]. The infections mainly take place by drinking raw milk and occur in the extra-pulmonary form, in the cervical lymphadenitis form in particular. This paper reviewed the current status of BTB in Ethiopia in relation with the existing animal husbandry systems, conducive. Risk factors and Zoonotic and economic importance of the disease are also addressed [1].

Anthrax Diseases: Anthrax, caused by *Bacillus anthracis*, is world-wide and is characterized by sudden death with black tar-like exudates from natural orifices. Following incubation of 1-2 weeks, muscle tremors, mucosal congestion and fever may precede collapse and terminal convulsions followed by the dark bloody discharge [10, 16]. In less acute cases, listlessness, hemorrhage of the mucosa membranes, abortion, swelling of the perineum, throat and abdomen can last for about 2 days. Sudden death of animals in the area of known outbreaks is cause for suspicion of anthrax [10]. The soil around an infected carcass becomes heavily infected with spores which can remain viable for re-infection for 20 years. Carnivores readily spread the spores to forage in the surrounding area. Although antibiotics are effective in the treatment of anthrax, the usually rapid course of the disease limits their effectiveness. When confirmed, stringent regulations prescribe burying carcasses at 2 meters or complete burning and quarantine of the area for 6 months. Vaccination of cattle in areas of known outbreaks is recommended for three successive years [10].

Blackleg: Among many livestock diseases, blackleg is one of particular interest in Ethiopia this disease outbreak and its spatial distribution report. The study was

conducted on all cattle population of the country. The total cattle population for the country is estimated to be about 53.99 million. Out of this total cattle population, the female cattle constitute about 55.48% and the remaining 44.52% are male cattle. Regarding age groups, the majority of the cattle population (that is about 63.64 percent) is in the 3 years and less than 10 years age category, with about 27.5 % male and 36.13% where female, moreover about 16.43% are between age one and three years [16]. There is no any report on blackleg disease regarding its controlling strategies and economic importance in Ethiopia. Hence, all livestock population within the country is at risk from endemic strain of this bacterial disease. In addition, there is no clear picture regarding the distribution pattern and prevalence of the disease in different regions of the country [16]. Therefore, the objective of the present report is to visualize the spatial distribution of blackleg disease outbreaks in different regional states of Ethiopia. As the result of spatial distributions of blackleg outbreak shows, all most all parts of livestock population of the country except Somali and Gambella regions, affected by blackleg disease [16]. Especially, Amhara and Oromia were highly affected regions of the county. Generally, as the result confirmed that blackleg is an endemic disease in Ethiopia and can be considered as one of the bottleneck diseases in livestock industry of the country. Therefore based on above conclusions the following recommendations are forwarded; a regular and strategic vaccination should be given uniformly throughout the country. Further research should be done in line with the epidemiological situation of the disease and their controlling methods as general [16].

Brucellosis in Cattle, Sheep and Goats: Brucellosis has been recognized since ancient times inciting uteral and fetal infections resulting in abortion and infertility. *Brucella abortus* in cattle and *Brucella melitensis* in sheep and goats (known as undulant fever in man) can be contacted through ingestion, respiration, conjunctiva or broken and unbroken skin [17]. Depending upon the titer of bacteria contracted an incubation of days to weeks result in the occurrence of nodes in the lymphatic, lactinal, uterus, spleen, liver and joints. Abortions occur in the 5th month of pregnancy. Retention of the placenta and infertility commonly result, those which do breed can carry the bacteria to other first calf heifers causing another round of abortions [17]. Common means of transmission are through infected forage containing fetal membranes, discharges, faeces and urine or, in the case of man, through milk from infected cows. Control consists of

vaccination of young female animals before pregnancy. Blood testing (Bang's test) and disposal of carrier stock is recommended for cattle but not effective for sheep and goats since complete elimination is almost impossible. Sanitation of infected fetuses, membranes and the surrounding area is essential. Animals from infected herds are best isolated during parturition and new herd animals should be kept separate until they have given birth. Milk from infected herds must be boiled before it is consumed by humans [10]. The diagnosis of brucellosis focuses on culture, serological tests and molecular investigations. Because of the high relapse rate associated with the disease, the use of a multidrug therapy is recommended. Brucellosis can be prevented by implementing appropriate animal-disease control measures; avoiding the consumption of undercooked meat and unpasteurized dairy products; and using appropriate barrier precautions to exclude exposure to aerosols in humans [17].

Ovine Pasteurellosis: Small ruminant management is seriously hindered by diseases in the tropics. Diseases are very important to farmers and affect the production of small ruminants in several ways. It increases cost of production, lowers production level, reduces the quality and quantity of animal products and generally causes great loss to the farmer [18]. Respiratory diseases caused by concurrent infections have been identified as the leading health problem of small ruminants which accounts for up to 54% of the overall mortality of sheep in Ethiopian central highlands [19]. *Mannheimia haemolytica* (formerly called *Pasteurella haemolytica*) and *Pasteurella multocida* are known to be the most prominent pathogens causing great economic losses in the domestic animal industry. Pasteurellosis is a complex disease that develops when the immune system of the animal is compromised by stress factors mainly environmental stresses including inclement weather, feed shortage usually assisted by inadequate management and husbandry practices [19].

In Ethiopia, pasteurellosis is considered to be the major sheep health problem and there have been a report on high rates of mortality and morbidity associated with the disease. And also, despite annual vaccination programs against pasteurellosis with the only commercially available Killed *P. multocida* biotype A containing vaccine (National Veterinary Institute, Ovine pasteurella vaccine) in the study areas, high mortality and morbidity continued to be observed and complaint by

farmers and veterinarians. So far in the Ethiopia, it was the only vaccine type given to the farmer's sheep and was available in the market during the time [20].

Infectious Bovine Keratitis (IBK): IBK or pinkeye is nonfatal and rarely causes loss of the eye. It is caused by the bacterial (*Moraxella bovis*) inflammation or keratization of tissues around the eye. Bacteria are spread by face flies and ocular fluid on tall grasses in late summer and autumn. Opacity of the cornea in infected cattle causes partial blindness, reduction in grazing and loss of milk production. Weight loss in calves and reduced weaning weights result. Acute cases respond to daily injection of the conjunctival sacs with antibiotics and surface applications of ophthalmic ointments [10].

Mastitis: Mastitis is an inflammation of the mammary gland that can be caused by physical or chemical agents but the majority of the causes are infectious and usually caused by bacteria [21]. Over 140 different microorganisms have been isolated from bovine intra-mammary infection, but the majority of infections are caused by Staphylococci, Streptococci and Enterobacteriaceae [21, 22]. Mastitis is the most important and expensive disease of dairy industry. It results in severe economic losses from reduced milk production, treatment cost and increased labor, milk withheld following treatment and premature culling [23].

In Ethiopia, mastitis has long been known [24, 25]; however, the information on the magnitude, risk factors and causative agent of the disease is inadequate. Such information is important when designing appropriate strategies that would help to reduce its prevalence and effects [24]. This might be probably due to the difficulty to attend farms for a relatively longer period. A study conducted at Alemaya University Dairy Farm by Tefera [26] for 6 years (from 1993 to 1998) revealed a clinical mastitis incidence of 34 cases per 100 cows per year. There are no similar studies conducted in Amhara Regional State, except few unpublished reports. Therefore, this study was undertaken to measure the incidence rate of clinical bovine mastitis in selected dairy farms in Gondar town [27].

Contagious Caprine Pleuropneumonia (CCPP): Goats play a significant role in the socio-economy of Ethiopia because of their better adaptation to unfavorable arid environment and their suitability for resource poor farmers. Diseases affecting goats and sheep such as peste

des petitis ruminants (PPR), contagious caprine pleuropneumonia (CCPP), pasteurellosis and pox cause substantial losses through high morbidity and mortality. CCPP is one of the most severe infectious diseases of goats, causing major economic losses in goat farming in Africa and Asia where it is endemic [28]. Considerable losses occur frequently as a result of outbreaks. Many *Mycoplasma* species were frequently infecting goat's and sheep's lungs by inducing pleuropneumonia. CCPP is a disease which is caused by *Mycoplasma capricolum subsp. capripneumoniae*, which was previously known by strain name of its species, F38. In Ethiopia, CCPP was reported in most of the goat rearing areas namely Afar, Borana, Omo Valley, West Gojjam and in the lowlands of Tigray [28].

Trypanosomiasis: Trypanosomiasis or Tryps (Sleeping sickness in humans) is a group of diseases caused by the widely distributed and highly variable members of the Trypanosome species. In most of Africa transmission occurs by cyclical passage and multiplication in one of several species of the biting Tsetse fly (*Glossina*) [10]. Of the three main groups of flies, one is adapted to open woodland savanna which is the most common type of cattle country. Another is adapted to riverine and lake shore habitats where cattle congregate for water and to escape heat. The third group inhabits highland forest areas where cattle are moved during the dry season. This includes the forested areas of western and southwestern Ethiopia, where expansion of agricultural production could be possible. The disease is constantly present depending upon the fly population and has caused an estimated loss of 500 million birr in 5 Zones of Western Oromia (Region 4) [10]. Warm and cold-blooded animals are hosts and so control is difficult. With all Trypanosome parasites, common symptoms of hosts include intermittent fever, progressive anaemia and loss of weight. The nutritional status of the animal and the stress/activity required can accelerate the progress of the disease. Dehydration may occur when infected animals are too weak to trek for water. Ploughing or physical exertion can induce acute anaemia and death within 1 week. On the other hand, nutritional intervention and a non-stress environment can allow gradual recovery but relapse will occur under stress [10, 22].

Treatment with a number of drugs is complex, unavailable in Ethiopia and relative expensive for the small holder. Berenil, intramuscular and Homidium, deep intramuscular are the most effective and must be

alternated because the Trypanosome can alter its protein coating to resist the drug over time. It is essential to make frequent blood examinations of cattle under drug treatment and switch drugs whenever animals show relapse indicate a build-up of resistance to one of the drugs by the trypanosome. Repeated re-injection every 3-4 months is common but should be accompanied with examination to determine whether to continue one drug or switch (*Ibid*) [10, 22].

Vector control consists of two practical interventions, trapping and spraying the Tsetse fly. Traps constructed of black cloth with a blue center were found to be attractive to the flies. These are placed near the corals where dung and urine also attract the flies. Insecticide baited jars are placed at the center of the trap to dispose of those which enter. Also animals are treated to discourage flies by spraying or pouring on insecticides [21]. Clearing of brush and trees destroys the flies' habitat in the highland but can hardly be encouraged on a large scale for environmental reasons. Trypano-tolerant cattle are a long-term possibility but of little current hope. The N'Dama cattle were introduced to Africa over 7000 years ago and have evolved a level of tolerance but even this breaks down under poor nutrition and stress. Meat production is good but milk production is low and animal size does not favor use for draft. Cross-breeding to the Zebu type, which has been in Africa only 1300 years, is a difficult procedure with complicated bio-technological techniques for identification of chromosomes involved in tolerance traits. Recently introduced European breeds are extremely susceptible (*Ibid*) [10, 22].

Babesiosis: Babesiosis or tick fever in many animal species is caused by several widely distributed species of *Babesia* which are transmitted by blood-sucking ticks. Generally, 7-10 days after contaminated ticks attach to the animal, the temperature rises followed by anorexia, weakness, salivation and diarrhea. Destruction of red blood cells causes increased respiration, heart rate and a change in urine color to dark brown [10, 17]. The transmitting tick may go through 1-3 stages of attachment to different hosts before becoming an engorged adult, dropping off and laying eggs. It is known that the parasite multiplies in the tick and it is thought that sexual reproduction also occurs. Treatment is recommended only for valuable breed stock since there is a narrow range in dosage between therapy and toxicity. Control of the disease consists of control or elimination of tick vectors, control of cattle movement from infested areas to disease

free areas and in areas where the disease is common, vaccination with a small amount of blood from a known carrier. The majority of animals will develop an increased level of tolerance, though some may succumb and the number of carriers will be increased [10, 22].

CONCLUSION

The livestock production system in Ethiopia is categorized as pastoral, agro-pastoral, mixed crop-livestock farming, urban and peri-urban farming and specialized intensive farming systems. The economic contribution of livestock sub-sector in Ethiopia is about 12% of the total and 33% of agriculture GDP and provides livelihood for 65% of the population. Despite the contribution of the livestock to the economy and to smallholders' livelihood, the production system is not adequately market-oriented. Trans-boundary animal diseases pose a serious risk to animal production and jeopardize international trade. The objectives of this paper were to give a general overview of major trans-boundary diseases of ruminants and their economic effect in Ethiopia. Ethiopia has been facing devastating economic losses from major outbreaks of trans-boundary animal diseases (TADs) such as foot and mouth disease, contagious bovine pleuropneumonia, lumpy skin disease in cattle and pest des petites ruminants, contagious Caprine pleuropneumonia, sheep and goat pox and brucellosis in small ruminants. These diseases impose major economic costs and risks to the country, the neighbors and trading partners. Even though both the direct and indirect impact of these diseases causes devastating economic losses to the country, the indirect effect is more serious. The trade implication of TADs can cause a greater economic impact than the direct production losses themselves. The trade ban due to the existence of these major trans-boundary disease and other negative domestic impacts on agriculture and other sectors, can be raised as an example. Among other factors affecting the economic benefit of the country from livestock sector, increased outbreaks of highly contagious trans-boundary animal diseases (TADs) are considered a major cause of economic losses.

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