

Insufficient Veterinary Service as a Major Constraints in Pastoral Area of Ethiopia: A Review

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Abstract

The pastoral population occupies a large area of Ethiopia mainly the arid and semi-arid lowlands that are characterized by high spatial and temporal variability in rainfall distribution and pattern. Pasture constitutes 63% of Ethiopia's agricultural land area and Livestock and livestock products provide about 10% of Ethiopia's foreign exchange earnings. Additionally, livestock are highly valuable to the nation as direct sources of consumption for the pastoral and agro-pastoral population, as sources of cash income and foreign currency for the nation and for provision of draught power for small-holders in the highland areas. The aim these reviews were to assess major constraints of livestock production and productivity in pastoral areas of Ethiopia with special attention to the role veterinary service in improving livelihood of pastoralists. Even though the livestock sub-sector contributes much to the national economy, its development is hampered by different constraints such as rampant animal diseases, poor nutrition, poor husbandry and marketing systems, poor infrastructure, and shortage of trained manpower. Specially, Livestock diseases have impacts that include loss of livestock and farm productivity, reduction of market opportunity, disturbance of human health and impairment of human welfare. Moreover, disease control activities may have negative impacts on improper use of chemicals and drugs. Therefore Veterinarians, researchers and other responsible governmental and non-governmental bodies have to assist the development of herd health strategies and the selections of possible interventions that will ultimately assist in poverty alleviation, by improving the health and productivity of the animals thus improve of livelihood of pastoralists and to enhance national development as general.

Keywords: pastoral, livestock, veterinary service, Ethiopia

INTRODUCTION

Livelihood systems in pastoral areas Pastoralists in Ethiopia are mainly found in four lowland regions, Afar, Oromiya, Somali and the Southern Nations, Nationalities and People's (SNNP) regional states. Pastoral groups are also found in Gambella and Benishangul areas (Pantuliano and Wekesa, 2008). The main livelihoods systems include pastoralism, farming and ex-pastoralism (Headey *et al.*, 2014). The pastoral population occupies a disproportionately large area of Ethiopia and produces much more than its share of national livestock output (Salami *et al.*, 2010). According to the FAO, pasture constitutes 63% of Ethiopia's agricultural land area. Livestock and livestock products provide about 10% of Ethiopia's foreign exchange earnings, with hides and skins constituting about 90% of this (Behnke, 2008).

Even though the livestock sub-sector contributes much to the national economy, its development is hampered by different constraints. These include rampant animal diseases, poor nutrition, poor husbandry and marketing systems, poor infrastructure, and shortage of trained manpower. Livestock diseases have impacts that include loss of livestock and farm productivity, reduction of market opportunity, disturbance of human health and impairment of human welfare. Moreover, disease control activities may have negative impacts on improper use of chemicals and drugs (Desta, 2015).

According to Tolera and Abebe (2007) Pastoralists are mainly found in the arid and semi-arid lowlands that are characterized by high spatial and temporal variability in rainfall distribution and pattern. Although there are general rainy and dry seasons, the rains may start at different times in different years, increasing irregularity and distorting the normal pattern. Chances for prolonged dry spells at the end of the dry season and the beginning of the rainy season are very high. In such conditions meaningful crop production cannot be attained in rain-fed agriculture and extensive livestock production appears to be a better means of exploiting the grazing and browse resources in the arid and semi-arid lowlands. The semi-arid southern rangelands of Ethiopia support the livestock that are highly valuable to the nation as direct sources of consumption for the pastoral and agro-pastoral population, as sources of cash income and foreign currency for the nation and for provision of draught power for small-holders in the highland However, burdens of diseases ,extended dry season and drought very often result in critical decline in quantity and quality of feed and shortage of water leading to decreased productivity and increased mortality of animals. During severe drought the whole herd may be decimated.

According to Admasu (2003) Curative and preventive services are presently not available to the vast majority livestock owners in pastoral areas of Ethiopia. The few public clinics present are located in major towns and provide services mostly to cattle owners residing around these towns. The animal health staffs in these areas are small in number and cannot cover such a vast area and adequately address the veterinary needs of

livestock keepers. Besides, government staffs need adequate mobile facilities, for which currently the government does not have the capacity to provide. The problem is not only the shortage of staff but also inadequate operational budget for animal health services compared to the magnitude of the disease problems in the country. Staff mobility is very limited; only occasionally does staff venture outside their clinics to investigate outbreaks and render services. Furthermore service delivery is extremely difficult as the community and the animals are on the move throughout the year. Therefore the poor public animal health services delivery in the pastoral areas of Ethiopia are related to lack of finance, manpower, cultural and professional biases against pastoralists.

Despite the wide spread of different animal health problems in the tropical countries, experiences has shown that information on animal health was never a significant focus of research (Haftu *et al.*, 2014). However, knowing the type and extent of the common and major health problems is very important so that Veterinarians, researchers and other responsible governmental and non-governmental bodies can assist in the development of herd health strategies and the selections of possible interventions that will ultimately assist in poverty alleviation, by improving the productivity of the animals as it is already set by the regional governments plan.

Animal health

Animal diseases which are widespread in all agro-ecological zones of the country cause major economic and social losses to the livestock owners. The impacts of these diseases are devastating in pastoral and remote areas, where the lives of the communities entirely depend on their livestock. However, provision of veterinary services becomes very difficult in these areas due to a number of reasons including poor infrastructure and limited resources. Besides, since the human population tends to be small and highly mobile, there are difficulties in reaching them since they travel much in search of water and grazing resources. Therefore, in order to be benefited from the livestock resources, emphasis has to be given to the pastoral communities since they possess huge livestock population and their livelihood depends on the health of their animals (Desta, 2015).

Diseases such as foot and mouth disease (FMD), anthrax, black leg, contagious bovine pleuropneumonia (CBPP), contagious caprine pleuropneumonia (CCPP) and trypanosomiasis are reported to be occasional health problems in the pastoral areas. External parasites, particularly ticks and mange mites are also of significant health problem. Ticks suck blood thereby reducing the condition and productivity of animals. They can also predispose the animals to tick-borne diseases. However, internal parasites are not a serious threat in the area since the relatively dry conditions are not suitable for multiplication of most of the internal parasites that are known to cause animal health problems in the humid areas (Osofsky, 2005).

Veterinary services can be classified as curative services, preventive services, production of pharmaceuticals, human health protection, and advisory and extension services. Even though, Ethiopia has huge livestock population and the prevalence of animal diseases is high, the animal health service is steadily deteriorating similar to other many African countries. The national animal health service delivery in Ethiopia covers only 40-45% of the country's population. This low service coverage is attributed to lack of personnel, shortage of drugs and equipment, poor mobility, and highland oriented animal health service delivery (Rajkumar *et al.*, 2011).

There are also some poisonous plants that are known to cause ill-health and even death when consumed by animals. The most important of such plants are plants that are locally known as *Gaaddalla*, *Gora*, *Bobiya*, *Garbicha*, *Tabari* and others. *Gaaddalla* is reported to affect all classes of animals except donkeys and the pastoralists in Dhokisu indicated that it is the major cause for high mortality rate of camels and other animals during the dry season in the area. Due to acute shortage of alternative feed resources animals would be forced to consume such plants during the dry season. Mineral deficiency has also been reported to be one of the factors affecting productivity of animals. Traditionally there is a practice of using minerals supplements from Chewbet (Mana Sogda), Dillo, Magado and other sources. However, if the pastoralists fail to supply the mineral supplements at the right time the deficiency problems could be manifested in the form of poor body condition and decreased productivity (decreased milk yield) of animals. As shown by Kabaija (1989) these locally extracted mineral supplements are also deficient in the essential minerals phosphorus and copper. Animals may also be attacked by predators such as hyena, lions, cheetah and foxes

Disease prevention, control and eradication

No one doubts about the importance of disease prevention as opposed to reaction to introduction of a foreign disease or outbreak of endemic diseases. Prevention is the best policy for avoiding the occurrence of disease whenever and wherever this is possible. However, some diseases do not have reliable means of preventing as their mode of transmission and spread is either unknown or difficult to control. Animal disease prevention, control and eradication in Ethiopia to-date could be considered as a function and responsibility of the public sector. The contribution of the private sector is at its infantile stage, although there is a genuine drive at Federal and Regional levels to improve the private role, especially in clinical services and control of endemic diseases

and parasites (Peterson, 2002).

3.2.1. Disease prevention

Although there is apparent control and check for International Animal Health Certificate and International Sanitary Certificate at legal entry points for avoiding the incursion of exotic diseases, the possibility of clandestine entry of animals and animal products across the long borders of the country cannot, at least at the moment, be guaranteed as border control for TADs is also not very strong in this large country with rugged terrain. The major arm of disease prevention and control in Ethiopia for some time to come, therefore, is applying quarantine measures whenever a TAD of internal or external origin is detected and ring immunization/vaccination supported by other sanitary and bio-security measures, implying the necessity of emergency planning and preparedness for tackling such events. Immunizing susceptible animals and stockpiling necessary vaccines for potential threats is the strategy that the country is adopting (Geering *et al.*, 2002).

The NVI, as revealed in the 2009-2010 Yearbook, is a holder of IQNet DQS ISO 9001:2008 Certificate. The Institute's role in animal disease prevention, control and eradication is commendable. As mentioned in preceding section, the Institute also provides critical service in animal disease surveillance and diagnosis, training on laboratory techniques, conducting research on improving and developing vaccines, in feed analysis services and in developing diagnostic kits. Domestic vaccine consumption ranges between 25 million and 40 million doses according to annual vaccination figures of different years. There is a wide margin, from production view point, to increase the foreign trade of most of vaccines under production and intensified promotion effort would seem beneficial. Technology transfer, especially in the area of FMD vaccine production is becoming imperative, as there is already a national and regional plan of controlling this important hurdle of animal production and anathema to livestock and livestock trade on international market (Rich *et al.*, 2008).

Disease control

Disease control in Ethiopia is also dominated by prophylaxis, but chemoprophylaxis and chemotherapy have wider roles. While selected diseases are planned and coordinated by the Federal Government with collaboration and support of Regional Authorities, the bulk of animal disease and other animal health problem control activities are performed by local public veterinary clinics with support of diagnostic RVLs, as well as other non-governmental organizations (NGOs) and private clinics. The VACNADA project (018/AU-IBAR/2010/VACNADA) signed on 4 October, 2010 between AU-IBAR and FDRE, coordinated by the AU-IBAR and funded by EU with a budget of €1,201, 526, mentioned under Disease Surveillance earlier, is one of the nationally planned and executed disease control activities. It performed vaccination of 5 million head of shoats against PPR and 1.84 million goats against CCPP during the 2010-2011 in eight Regional States. Significant capacity building work has also been performed in areas of field, laboratory and office equipment and in staff training. Some Birr 3,899,999 was consumed by the project during and prior to the 2010-2011 budget years the APHRD together with the NAHDIC were involved with the preparatory phase of developing a national program for controlling ecto-parasites in sheep and goats, which constitute among the top causes of skin rejection in external trade and consequential heavy economic losses. All the pre-launching procedures have been completed and the MoA has commenced the operation as of January 2012 (activities underway at the time this document is being prepared) through assigning the NAHDIC for nationally coordinating the program planned to last for five years and targeted to contribute to leather external trade of US\$500 million at the end of Five Year Growth and Transformation Plan (GTP), in 2015(Perry, 2002).

Disease eradication

The Ethiopian Government, the animal health personnel and particularly the livestock breeders have still fresh memory of what a threat and curse rinderpest had been to the health of livestock populations and to the livelihood of the whole country's inhabitants. The success of eradicating rinderpest should serve as a springboard to take-on another serious animal disease for repeating the success story. Currently, only one disease is under eradication scheme, and that is the Southern Tsetse Eradication Project (STEP). It involves an area of 25000-30000 in the southern Rift Valley of Ethiopia infested by *Glossina pallidipes* and a very restricted population of *G.fuscipes fuscipes*. As briefly discussed in the preceding Animal Health Yearbook 2009/2010, this project was a joint venture between the FDRE and the International Atomic Energy Agency (IAEA) that commenced functioning in 1997. The two components of the project, i.e. fly control/eradication field operation and fly mass-rearing plant have continued in the 2010-2011 FY. Up until now, fly suppression and disease treatment at the field and mass-rearing of the two species at the Kalitti fly mass-rearing plant are being carried out together with other relevant activities such as staff training, equipment acquisition and surveillance and monitoring of the field activities. As the fly colony at the mass-rearing facility has not been grown to the desired level, sterile fly release operation proper, apart from test releases, could not be undertaken to-date. Fly suppression activities using insecticide treated animals and target screens have continued over the 25000 km² of the project area and survey has been conducted over additional 35000 km² to expand the project activities in

new areas. Sequential aerosol technique (SAT) is being considered to be used in the control and eradication operation. Ethiopia's infrastructural resources are still not adequate to deliver animal health care to the required standards at all levels. There still exists wide margin for improvements and the trained and skilled manpower resource ratio to that of livestock size is low. Essential facilities and equipment are still not fully adequate and not of the highest standards (Abebe *et al.*, 2011). As a developing country, however, the infrastructural and financial resource that Ethiopia is allocating to animal health sector is considerable. For ensuring better animal health, food safety, and emergency response to animal health threats and for enhancing animal and animal products foreign trade, the APHRD, Regional Authorities and other stakeholders are all committed to work hard and develop animal health delivery to the required standards. For discharging these duties and responsibilities, some 800 professionals, of whom more than 660 are veterinarians with varied specializations, 7156 veterinary para-professionals are involved at different capacities all over the country (Table 17). More than 2600 community-based animal health workers (CAHWs) also deliver animal health services, particularly in pastoralist areas where public and private services are weak. Manpower status is a dynamic condition which varies from day to day, month to month and year to year. The trend, nevertheless, is on constant increase and this increase is expected to step up with the new national plan, the five-year GTP of the country in order to achieve the highly set (ambitious, but achievable with appropriate management and implementation provisions and dedication of all actors) objectives from the animal health point of view (Hueston *et al.*, 2013).

Marketing of livestock and livestock products

As cited in Tolera and Abebe (2007) the sale of livestock and livestock products is the main source of cash income. Small ruminants (sheep and goats) are used as immediate sources of cash income. However, cattle and camels are sold when there is a need for a higher amount of cash. Camels fetch a higher price than any other animals. The price of animals is influenced by the size and condition of the animals, the season of the year and the distance from the main marketing centers. There is seasonal fluctuation in the price of animals coming to the market. In general, animal prices are higher during the rainy season and falls during the dry season. During the dry season animals lose body condition due to shortage of feed and the pastoralists also desperately need to sell their animals before further loss of condition and death and to buy grain for family consumption. These are the main reasons for the significant decline of the price of animals during the dry season.

Animal products are marketed in towns and market places. Donkeys and light trucks (ISUZUs) are used for transporting milk from the local markets to the nearby towns, mainly to Moyale town. The price of animal products is dictated by the season of the year and the distance from the main towns. The price of milk and milk products is generally higher during the dry season due mainly to limited supply of the products than during the wet season. The price is also higher in places that are closer to towns as there is a higher demand for milk in the towns than in the rural areas. *Ittitu*, sour milk similar to yogurt, is also sold in some places, especially in Dirre district particularly in small towns or market places like 147, Melbana and Dubluq. According to Coppock (1994) the frequency of sale of dairy products is inversely related to the distance from the nearest market (Tolera and Abebe, 2007).

Livestock production constraints

Lack of feed and water during the dry season and drought is the main constraint affecting livestock production in the area. Shortage of rain and the frequently recurring drought in the area is a major cause for reduced forage production and quality. Shortage of feed and water and the harsh climatic condition of the area seriously affect the health and productivity of animals. Bush encroachment is exacerbating the problem of feed shortage. Encroachment of the rangeland by some undesirable plant species such as *Acacia drepanolobium* reduces accessibility of forage leading to reduction of effective grazing areas. The prolonged dry season and drought are the causes for high mortality rate. Diseases such foot and mouth disease (FMD), black leg and anthrax; parasites such as ticks and mange mites; predators (especially hyenas) and poisonous plants such as *gaaddalla* also have a significant effect on the health and productivity of animals. Expansion of cropping and land grabbing for cultivation and private enclosure are causing shrinkage of grazing areas and loss of key resources for dry season and drought period grazing. Demarcation of regional boundaries and ethnic conflicts also hinder movement of the pastoralists in search feed and water thereby hampering the indigenous coping mechanisms (Peden *et al.*, 2013).

Reproduction and production performance of animals

Cattle reach sexual maturity at about three to four years of age and heifers calve for the first time at about four and a half years of age with a calving interval of about one year and three to four months. The average age at first calving and the calving interval are comparable to the values reported in previous studies (Nicholson and Cossins 1984, Assefa 1990). Camels reach sexual maturity at about four years and a half and females give birth for the first time at about five and a half years of age with an average calving interval of about 2 years and 2

months. These values are comparable to the values reported by Mukasa-Mugerwa (1981) on reproductive performance of camels. Sheep and goats reach sexual maturity at about one year of age and they give birth (lambing/kidding) for the first time at about one year and a half, which is comparable to the age at first parturition reported by Cossins and Upton (1987) for sheep and goats in Borana rangelands. The parturition (lambing/kidding) interval for both sheep and goats is about seven months and a half (Wathes *et al.*, 2008).

On average, both cattle and camels produce about 10 offspring (calves) in their lifetime. Goats and sheep also produce an average of about 11 and 14.7 kids and lambs, respectively, in their lifetime. Twinning is uncommon in sheep and very rare in goats. This is consistent with the results of previous studies (Cossins and Upton 1987) and appears to be one mechanism of adaptation to the harsh environmental conditions of the rangelands and to seasonal scarcity of feed resources. Kids and lambs reach market weight at about 12 and 10 months of age, respectively (Tolera and Abebe, 2007).

The average daily milk yield of cows and camels is about 2.23 and 5.3 liters, respectively, excluding the milk suckled by the calf. In the case of goats and sheep the average daily milk yield is about 0.53 and 0.34 liters, respectively. Cattle are the most preferred milk animals among the Borana Oromos followed by camels and goats in decreasing order of importance. The respondents from Borana zone indicated that they have preference for the taste of cow's milk as compared to camel's milk. On the other hand, camels are the most preferred milk animals among the Garri Somalis because of their ability of producing higher amount milk on the available feed resources as compared cattle and goats. Goats are valued as important milk animals next to camels and cattle. Only very few respondents reported milking of sheep. The average lactation length is about 8 months for cattle, one year and three months for camels and two and a half months for goats. According to Mukasa-Mugerwa (1981), the average lactation length of camels is about 12 months and may vary from 9 to 18 months ((Tolera and Abebe, 2007).

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Crop production

Although livestock production is the dominant mode of production, crop production is also practiced to some extent in the three districts covered by the assessment. The practice is gradually expanding from the agro-pastoral to the pastoral areas. The main cropping season is from February 15 to May 15 during the main rainy season whereas the small rainy season cropping extends from September 15 to November 15. Available unpublished reports from Dirre district Rural and Agricultural Development Coordination Office shows that cultivated land constitutes only 1.2% of the total land area of the district whereas pastureland and bush land constitute 27.5% and 33% of the total land area, respectively. Nearly half of the interviewed pastoralists indicated that they are currently practicing crop production in addition to livestock rearing. The main crops grown in the area include maize, haricot bean, wheat, barley, tef and sorghum. Traditionally the Borana Oromo and the Garri Somalis are pastoralists whose livelihood depends mainly on extensive pastoral livestock production. Thus crop production is a recent experience for most of them. Most of the pastoralists engaged in cultivation reported that they started cultivation since the last 3-15 years. Coppock (1994) also showed that crop production is a recent experience for most pastoralists of the southern rangelands. However, around the towns, where cultivation was initially introduced by highland migrant settlers it was practiced for a longer period of time (Tache, 2008).

Farming is one means of economic diversification. The ecological crisis in the area has made it difficult for the pastoralists to rely on livestock alone for food. Growing of crops is a response to food insecurity. The interviewed pastoralists asserted that grains when available delay sale of livestock thereby boosting livestock production. On the other hand, farming is practiced in the bottomlands where moisture conditions are favorable. The bottomlands are traditionally used for calf grazing reserves. Thus loss of the bottomlands to cropping makes livestock vulnerable during drought, when the landscape is in a greater demand. Farming is causing transfer of

the communal grazing land to private use with negative consequences on the indigenous management system. Cultivation also accelerates nutrient depletion from the soil and exposes the soil to erosion as the soils of the arid and semi-arid lowlands are very fragile. Moreover, crop failure is a common feature of the area due to unreliable rainfall and frequent drought. On average, crop failure is experienced every 4-5 years in 10 years. Most respondents indicated that they are able to achieve a reasonable harvest only for one or two years in five years time. Although there is a general trend of shifting from pure pastoral to agro-pastoral production system the agro-pastoralists rarely make meaningful harvest from their cropping activities due to very frequently recurring drought and very unreliable and unpredictable pattern and timing of rainfall. Thus, livestock production remains to be the mainstay of their livelihood (Luseno *et al.*, 1998).

Means of livelihood and sources of cash income

Livestock rearing is the main means of livelihood of the population in the three districts. This was confirmed by 93% of the interviewed pastoralists and agro pastoralists from Liben zone and by 90% of those from Borana zone. This indicates that an increase in productivity of animals would have a significant effect on improving the livelihood of the community. Cropping is a secondary activity followed by petty trade and brokering of livestock. Charcoal production and selling is also becoming an important means of earning income for few of the pastoralists. The main possibilities for off-farm employment in Dirre and Moyale districts of Borana zone include petty trade, which includes brokering of animals, and charcoal production. In the case of Moyale district of Liben zone, the most important possibilities for off-farm employment include petty trade, charcoal burning, sale of firewood and poles and collecting gold especially in Dhokisu area. The pastoralists are resorting to the sale of charcoal, firewood and poles due to lack alternative means of livelihood. However, widespread extraction of these natural resources may have an adverse long-term effect on the environment. Only about 7% of the respondents indicated that they are engaged in gum production or incense collection. The sale of animals and animal products constitute the main sources of cash income. Similarly a previous study conducted by Desta and Coppock (2004) showed that sales of livestock and dairy products constitute the main source of cash income in the North-Central Borana plateau. The contribution of animal products to the cash income of the pastoralists is higher in Dirre and Moyale districts of Borana zone than in Moyale district of Liben zone because of the proximity of the former to the main highway as well as to the small towns and marketing centers. Petty trade, brokering in livestock markets, occasional sale of crops and sale of charcoal play a secondary role as sources of cash income in the area (Manger, 2000).

Interaction between crop and livestock production

Both positive and negative interactions between crop and livestock production have been reported by the interviewed pastoralists. Both crop and livestock production activities compete for resources particularly for land and labour. Crop production requires wet areas that are suitable as dry season grazing areas. Thus expansion of cropping is causing shrinkage of dry season grazing area as suitable cropland is usually the best grazing land. It could also lead to the problem of land grabbing and enclosing for private use for grazing and cropping. In the process, herders lose critical resources and their coping strategies may break down due to changes in indigenous management regimes. This situation could introduce instability as the population becomes compressed, creating an artificial density-dependent condition (Tolera and Abebe, 2007). The herders not only experience loss of critical resources, but their coping strategies breakdown. In order to avoid such problems in some areas land for cropping is allocated by the *Qabale* Administration, the lowest administrative body under the district (woreda), or by the community elders (*jaarsa ardaa*). Due to occasional migration of livestock in search of feed and water it is not easy to manage both crop and livestock production activities effectively. Both activities demand close attention of the owner and when he gives attention to one activity the other could be overlooked. On the other hand, if the production activity is properly handled, crop and livestock production can complement each other as sources of food and cash income. If grain is produced on each farm there is no need of selling animals to buy grain for human consumption and the need for slaughtering of animals as sources of food will be minimized. Thus crops can supplement the family diet and cash income of the agro pastoralists. Moreover, crop residues can be used as sources of feed for animals and the manure can be used as a fertilizer thereby enhancing soil fertility and crop production. Animals also provide traction power for cultivation of land for crop production. In general, the area is more suitable for livestock production than for cropping and other activities. The variable and unpredictable nature of rainfall and the ensuing moisture stress, the frequently recurring drought and poor soil fertility make the area less suitable or marginal for crop production. Gum production or collection of incense is practiced in some areas especially where *Acacia seyal* and *Acacia mellifera* are widely found. There is interest in bee keeping in some areas. However, most of the areas are not suitable for bee keeping due to shortage of water and flowering vegetation during the long dry season ((Tolera and Abebe, 2007).

Conclusion

The pastoral population occupies a large area of Ethiopia mainly the arid and semi-arid lowlands that are characterized by high spatial and temporal variability in rainfall distribution and pattern. Pasture constitutes 63% of Ethiopia's agricultural land area and Livestock and livestock products provide about 10% of Ethiopia's foreign exchange earnings. Even though the livestock sub-sector contributes much to the national economy, its development is hampered by different constraints. These include rampant animal diseases, poor nutrition, poor husbandry and marketing systems, poor infrastructure, and shortage of trained manpower. Livestock diseases have impacts that include loss of livestock and farm productivity, reduction of market opportunity, disturbance of human health and impairment of human welfare. Moreover, disease control activities may have negative impacts on improper use of chemicals and drugs. Therefore Veterinarians, researchers and other responsible governmental and non-governmental bodies have to assist in the development of herd health strategies and the selections of possible interventions that will ultimately assist in poverty alleviation, by improving the productivity of the animals to improve of livelihood of pastoralists and to speedup national development as general.

REFERENCES

- Abebe, R., Tatek, M., Megersa, B., & Sheferaw, D. (2011). Prevalence of Small Ruminant Ectoparasites and Associated Risk Factors in Selected Districts of Tigray Region, Ethiopia. *Global Veterinaria*, 7(5), 433-437.
- Admassu, B. (2003). Primary animal healthcare in Ethiopia: the experience so far. *Primary animal healthcare in the 21st century: shaping the rules, policies and institutions*. Mombasa: African Union.
- Behnke, R. H. (2008). The economic contribution of pastoralism: Case studies from the Horn of Africa and southern Africa. *Nomadic Peoples*, 12(1), 45-79.
- Bekele, B. (2015). *Phenotypic Characterization of Camels and Their Production System in Yabello and Melka Soda Districts Oromia Regional State Ethiopia* (Doctoral dissertation, Haramaya University).
- Desta, A. H. (2015). Major Constraints of Veterinary Services Delivery System and Its Solution in Pastoral Areas of Ethiopia. *International Journal of African and Asian Studies* 12(2015).
- Geering, W. A., Davies, F. G., & Martin, V. (2002). *Preparation of Rift Valley fever contingency plans* (No. 15). Food & Agriculture Org..
- Haftu B, Asresie A, Haylom M (2014) Assessment on Major Health Constraints of Livestock Development in Eastern Zone of Tigray: The Case of "Gantaafeshum Woreda" Northern Ethiopia. *J Veterinar Sci Technol* 5:174. doi:10.4172/2157-7579.1000174.
- Headey, D., Taffesse, A. S., & You, L. (2014). Diversification and development in pastoralist Ethiopia. *World Development*, 56, 200-213.
- Hueston, W., Travis, D., & van Klink, E. (2011). Optimising import risk mitigation: anticipating the unintended consequences and competing risks of informal trade. *Revue Scientifique et Technique-OIE*, 30(1), 309.
- Luseno, W. I. N. N. I. E., Swallow, B. M., & Kamara, A. B. D. U. L. (1998). *Pastoralism in Ethiopia, Kenya and Somalia: a selected annotated bibliography* (No. 04/98). SR/GL- CRSP Pastoral Risk Management Project Technical Report.
- Lynn, S. J. (2010). *Cultivating the Savanna: Implications of land use change for Maasai livelihoods and wildlife conservation in East Africa* (Doctoral dissertation, Colorado State University).
- Manger, L. (2000). East African pastoralism and underdevelopment: An introduction. *Pastoralists and environment: Experience from the Greater Horn of Africa*.
- Osofsky, S. A. (2005). Conservation and Development Interventions at the Wildlife/livestock Interface: Implications for Wildlife, Livestock and Human Health: Proceedings of the Southern and East African Experts Panel on Designing Successful Conservation and Development Interventions at the Wildlife/Livestock Interface: Implications for Wildlife, Livestock and Human Health, AHEAD (Animal Health for the Environment And Development) Forum, IUCN Vth World Parks Congress, Durban, South Africa, 14th and 15th September 2003 (No. 30).
- Pantuliano, S., & Wekesa, M. (2008). Improving drought response in pastoral regions of Ethiopia.
- Peden, D., Alemayehu, M., Amede, T., Awulachew, S. B., Faki, H., Hailelassie, A., & Tadesse, G. (2009). Nile basin livestock water productivity.
- Perry, B. D. (2002). *Investing in animal health research to alleviate poverty*. ILRI (aka ILCA and ILRAD).
- Peterson, S. (2002). Epidemic disease and national security. *Security Studies*, 12(2), 43-81.
- Rajkumar, A. S., Gaukler, C., and Tilahun, J. (2011). *Combating Malnutrition in Ethiopia: An evidence-based approach for sustained results*. World Bank Publications.
- Rich, K., Perry, B. D., Kaitibie, S., Gobana, M., & Tewolde, N. (2008). Enabling livestock product exports from Ethiopia: understanding the costs, sustainability and poverty reduction implications of sanitary and phytosanitary compliance. *Final report for the Texas A&M University Sanitary and Phytosanitary*

- Livestock and Meat Marketing Program, Addis Ababa, Ethiopia, 72.*
- Salami, A., Kamara, A. B., & Brixiova, Z. (2010). *Smallholder agriculture in East Africa: trends, constraints and opportunities*. Tunis, Tunisia: African Development Bank.
- Tache, B. (2008). *Pastoralism under stress: Resources, institutions and poverty among the Borana Oromo in southern Ethiopia*. Norwegian University of Life Sciences, Department of International Environment and Development Studies.
- Tolera, A., & Abebe, A. (2007). Livestock production in pastoral and agro-pastoral production systems of southern Ethiopia. *Livestock Research for Rural Development*, 19(12), 4-7.
- Wathes, D. C., Brickell, J. S., Bourne, N. E., Swali, A., & Cheng, Z. (2008). Factors influencing heifer survival and fertility on commercial dairy farms.