Prevalence of Bovine Trypanosomosis in Gena-Bossa Woreda of Dawuro Zone, Southern Ethiopia

Adisu Agaro   Wale Tesfaye
School of Veterianry Medicine, Wolaita Sodo University, Wolaita Sodo, Ethiopia

Abstract
The study was conducted from December, 2015 to June, 2016 in the selected settlement areas of Genna-Bossaworeda of Dawro Zone, Southern Nations, Nationalities and People's Regional States (SNNPR). The goals of the study was to determine the prevalence of bovine trypanosomosis and to assess awareness of the community towards the effect of trypanosomosis and its control methodsin the study area. Community members were interviewed using a questionnaires format and cross-sectional parasitological and haematological investigation were carried out during the study period. According to the response of community members, trypanosomosis is the most economically important disease affecting cattle and agricultural activity in the area. For the parasitological study a total 384 blood samples were colected from randomly selected animals. Blood sample were examined for the presence of trypanosomosis by dark ground buffy coat technique. The overall prevalence of trypanosomosis in the study area was 15.38%. The three kebeles seem to have no great difference in the prevalence of trypanosomosis. During the present study, from the total of 384 cattle examined, 205 were males and 179 females. Male animals were as equally affected as female animals. There was significant difference in trypanosomoseinfection between animals with different body condition scores. The prevalence of 18.09%, 15.54% and 12.37% was observed for animals with poor, medium and good body condition scores respectively. The proper and strict following of trypanocidaldrud utilization and awareness creation to the farmers about risks of drug resistance should be made.
Keywords: Buffycoat, Gena-Bossa, Prevalence, Trypanosomosis

1. INTRODUCTION
Livestock are a'living bank' for the rural and urban poor farmers, or livestock owners. They are as a financial reverse for a period of economic distress such as crop failure as well as primary cash income. Among live stocks, cattle are a primary resource for the people and the government of Ethiopia (ILRI, 1999).

Trypanosomosis is the most serious diseases of cattle which cause great economic (socio-economic) losses in Ethiopia. Its socio-economic impact is reflected on direct losses due to mortality, morbidity, and reduction in production and power and stillborn and abortion. Also costs associated with combating the disease such as cost of drudge, traps and target, in pesticides, labor cost and equipment are direct losses. Agricultural practices like crop production seriously reduced as a result of the influence of trpyanosonosis on draught animals like oxen (Radostits*et al.*, 2007).

Trypanosomosis is a debilitating disease and often fatal disease of various domestic animals. It is caused by protozoan parasites belonging to the family Trypanoso matideaand genus *Trypanosome*which inhabits the blood plasma, various body fluids and tissues of their hosts. Trypanosomes are flagellated protozoa organisms that can produce a variety of serious disease of human and animals although many are non-pathogenic and also they are widespread and economically important diseases in human and animals (Shmith, 2005;Uquhart*et al.,* 1996; ILRAD, 1992).

The disease is the main haemoparasite disease in domestic animals. It is one of major constraints on animal production in area of sub-Saharan Africa which have the greatest potentials for significant increment in domestic livestock productivity. The parasites are transmitted biologically (cyclically) by the tsetse fly (*Glossina*spp.) and infect animals over an area known as the "tsetse belt" which extends approximately 10 million square kilometer area across 37 countries in Africa, from the Sahara desert in the North to South Africa in South (Urquhart *et al.,* 1996).

The most important sprciesserioyusly pathogenic to domestic livestock are *T.vivax, T.congolense, T.brucei, T.evansi, and T.equperdum*. These species are also the economically important animal trypanosome species in Ethiopia (Leak, 1996) Langridge, 1976;Shafo, 1981). However, sleeping sickness may also have a considerable public health importance in the country. They are widely distributed throughout Africa and frequently encountered in infected animals (Radostits*et al.*, 2007).

The most prevalent *trypanosomes* species in Ethiopia are *T.congolense, T.vivax* Rowland *et al.,* (1993) reported that a prevalence rate of *37%* for *T.congolense* in South weat Ethiopia. Abebe and Jobre (1996) reported an infection rate of *58.5%* for *T.congolense*. *31.2%*for*T.vivax* and *3.5 %* for *T.brucei* in South wast Ethiopia the problem of *trypansomosis* was also reported to be very serious in the study area. Therefore, the controlling this economically important diseases in the study area could have enormous benefits to improve the livestock of the rural population by boosting milk and meat production improving the availability of ploughing oxen and

increasing surplus capital from the sale livestock and its products.

The disease, trypanosomiasis, control depends on the trypanocidal drugs, control of vectors and farming trypanotolerant livestock. Each of these options suffer shortcoming. Resistant in trypanosomes to the available trypanocidal is constant and in some areas increasing threat. Chemotherapy and chemoprophylaxis by trypanocids are, however; form most important aspects of controlling and eradication of the case trypanosomosis. However, there are reports of drug resistant in *T. congolense* and *T. vivax* in many parts of Africa (Peregrine *et al.,* 1994). Unfortunately, the use of these drugs (trypanocides) is the best by numeruous limitations including the toxicity of drug and development of resistant by the parasites. The emeregence of multiple drug resistance has hampered the control of the disease in Ethiopia (Keno, 2005), and these factors emphasis the need for research into more compressive, formidable and cheaper sources of trypanocides (Cynthia, 2005).

The problem of *trypanosomosis* was also reported to be very serious in the study area. During a survey carried out by Soddo Regional Veterinary Laboratory, farmers reported that trypanosomosis to be the most important livestock development constraints in the area. Therefore, controlling this economically important disease in area could have enormous benefit to improve livelihood of the rural population by boosting milk and meat production, improving the availability of ploughing oxen and increasing surplus capital from sale of livestock and livestock production. Therefore, the objectives of the study were to determine the prevalence of *bovine trypanosomosis* in the study area and to assess the community awareness regarding the effect of *trypanosomosis*and control method.

2. MATERIALS AND METHODS
2.1. Study area
The study on the prevalence of *bovine trypanosomiasis* was conducted in three selected settlement kebeles (peasant associations) namely: Mella, Deta and Boteat Dawro zone GennaBossaWoreda which is located in the Western part of SNNPRS, surrounded by two other woredas of the zone (Loma and Mareka and Tercha Administrative city) and two other zones (KanbataTembaro and Hadiya zones). These Woredas and zones surround the woreda at south, west, east and north parts respectively. The woreda is located longitudinally and latitudinal at 037°E and 07°N respective. The altitude of the woreda ranges from 800 to 1850 m above sea level with 8 % highland 34 % midland and 58 % lawland. The temperature ranges from 22 °C to 31 °C (GBWADO, 204 and GBWFEDO, 2003 profile).

The occupation of rural population is mixed farming practice both (cropping and animal production)whereby crop and livestock are managed land-in- land together. The livestock population of the woreda is 158219 cattle, 26634 caprine, 32660 Ovine, 5757 equine 58202 poultry. The animals in the area are mainly dependant on communal grazing field as feed sources. Animal goes to water drinking area for long distance. The communities grow or cultivate crop which are earlymaturing, high yield and drought resistant types (Woreda Agriculture office, 2005).

2.2. Study Animals
The study animals for the research were bovine which were expected to come to clinic for the treatment with the suspected case and others too. The local *indigenous zebu* cattle were considered in this study. There are *36* peasant association (rural kebeles) in the woreda, among them *3 kebeles* were selected as the study area.

2.3. Study Design
A cross-sectional study designs was employed to generate the desired data. Parasitological examination of blood samples collected from ear vein of animal using microhaematorit capillary tubes were conducted to determine the prevalence of bovine trypanosomosis in the study areas and identify the risk factors associated with the disease.

2.4. Sampling Method and Sample Size Determination
The sampling method applied in the present study was a simple random sampling. A total of 384 cattle were sampled for bovine trypanosomiasis prevalence during the period from Dec. 2015 to June 2016. The sample size was determined by using 95% level of confidence and 50% expected prevalence and with 5% desired absolute precision.

2.5. Study Methodology
2.5.1. Questionnaire Survey
This survey was undertaken in order to assess the perception of the farmers on the occurrence of the trypanosomiasis, livestock constraints, socio-economic status and other control methods of trypanosomiasis, herd structure, use and source of trypanocidal drugs as well as delivery of the drug for treating their animals. From the total of 36 PA found in the Woreda, of which 3 PA were selected randomly for the study.

2.5.2. Parasitological Survey

Blood samples were collected after properly restrained cattle and after aseptically preparing the site where sample is to be taken. It was collected from the ear veins by using sterile blood lancet and haemotocrit capillary tubes. A pair of heparinized haematocrit capillary tubes were filled with blood from animlas to ¾ of the height and sealed at one end with crystal sealing materials. The capillary tubes were loaded on the microhaematocrit centrifuge symmetrically and centrifuge at 1200 rpm for 5 minutes (Murray *et al*., 1977). Packed Cell volume (PCV) was detrmined using haemotocrit reader, which is used for the determination of aneamia and comparison of infected animals with non – infected animals (Woo, 1969). After the PCV was read, capillar tubes were broken 1mm below the buffy coat (BC) to include the red blood cell layer and the content were expressed on the microscpic slide and mixed and covered with a 22x22 mm cover slip, ground buffy coat technique (Murray *et al.*, 1977). Slides were examined using phase contrast microscope for detection of trypanosomesin the blood. From positive sample, thin blood smears were made and fixed with methanol for 3 minutes and stained with Giemsa solution for 30 minutes.

2.6. Data Management and Analysis

The data collected during the study period were entered in to Microsoft Excel 2007 program. Descriptive statistic was used to determine the prevalence of bovine trypanosomiasis in the study areas.

3. RESULTS

3.1. Results of Questionnaire Review

All farmers in the areas interviewed at the time of study practice on mixed farming (cropping and animal production) system. Livestock are an integral part of agricultural activity and are used as food, sources of income, and sources of draft power and transportation. Major livestock found in the study area are cattle, sheep, goat, donkey horses and mules. Cattle are the predominant species in the area. Mostly the herd is kept together for grazing and watering and is far away from their living area.

About 96% of the farmers agree that trypanosomosis is a major problem for their animals and it causes great losses of animals every year. All respondents ranked the disease, which is locally known as '*golfuwa'*, as the most important disease of cattle, followed by pastuerellosis*,* blackleg*,* and anthraxtogether called locally as '*tsokka'*andsometimes LSD (lumpy skin disease), or by its local name '*galba-hargiya'* but the mortality is low.

Majority of respondent farmers (85%) claimed that the disease did not respond to different types of trypanocidal drugs. As they responded, they understandthat the transmission of the disease (80%) is through the vector known as tsetsefly, locally called '*gaade-udunxe'* and especially animals are affected while grazing and drinking water in the forest land and vegetation covered area.

The responses of 80% of the farmers showed that various trypanocidal drugs are used, the most common one being Deminazineaceturate(Berenil) and Isomethamedium chloride (Trypamedium). According to the questionnaires*,* 86% of the livestock owners were treating their animals themselves at home using the above drugs,even though they don't knowthe right dosage and administration of each drug. All respondents in the study area responded that there was no community based tsetse and trypanosomosis control programmat present in the area.

3.2. Parasitological survey results

A cross–sectional study was conducted on *384* randomly selected local (*zebu*) cattle to determine the prevalence of bovine trypanosomosis and evaluate associated risk factors. The results of the survey showed that out of total cattle examined during the study period, 59cattle were found to be positive for trypanosomosis and an overall prevalence of 15.4 %.The three kebeles seem tohave no significant difference in the prevalence of trypanosomosis (Table 1).

Table 1.The prevalence of Trypanosmesbykebeles (PA's)

PA	No. of animal examined	Total positive	Prevalence (%)
Mella	*109*	*18*	*16.51*
Deta	*145*	*22*	*15.17*
Bote	*130*	*19*	*14.62*
Total	*384*	*59*	*15.38*

During the present study, from the total of 384 cattle examined, 205 were males and 179 females. Male animals were as equally affected as female animals (Table 2).

Table 2.Prevalence of Trypanosomosis infection in both sexes

Sex	No. of animals examined	No. of total positive	Prevalence (%)
Male	205	31	15.12
Female	179	28	15.64
Total	384	59	15.38

The body condition scores were evaluated in cattle which are living under similar environment and management system to see relation of disease status with body condition of the animal. The prevalence of the diseaseis good, medium and poor body condition groups were 12.37%, 15.54% and 18.09%, respectively. More animals with poor body condition were affected(Table3).

Table 3. Prevalence of trypanosomosis in different body condition scores

Body condition	No. of animals examined	No. of total posititve	Prevalence (%)
Good	97	12	12.37
Medium	193	30	15.54
Poor	94	17	18.09
Total	384	59	15.38

There was significant difference in infection among the three coat color of animals. Black coloured animals were more affected (18.28%) than the other groups (Table 4).

Table 4. Prevalence of bovine trypanosomosis in animals with different hair coat colors

Coat colour	No. of animals examined	No. of animals positive	Prevalence (%)
White	113	16	14.16
Red	178	26	14.61
Black	93	17	18.28
Total	384	59	15.38

4. DISCUSSIONS

According to the result of the questionnaire survey, 96% of the interview reported that trypanosomosis is a serious problem to keep livestock in the study area. From the findings, all the farmers interviewed reported that increased trypanosomosis case occur either in the dry season (November – May) or starts of the rainy season (May – November). Afework (1998) and Tewoldie (2001) also reported similar findings.

During the present study, an overall prevalence of 15.43% was found. The result of the present study was similar to the reports of different workers:Shimelis*et al.,* (2006) reported that the epidemiology of bovine trypanosomosis in the Ghibe Valley*was* 16.13%during dry season; Wondowosen (1986)reported 15.8%in Bunno;Abiy (2002) reported 17.08% in Goo district;andAfework(1998)reported 16.02% at Pawe (North-West Ethpiopia). Berhan (1999) in *Ghibe*Valley (South West Ethiopia) reported a prevalence of14.2% and in the same area also Tamirat (1991) reported 18%.Abebe and Jobre (1996) reported 17.67% prevalence for tsetse infected areas of Ethiopia. Higher than the present study was that of Tewolde (2001) at Keto settlement area of South West Ethiopia (21%). Lower prevalence (9%)was reported byHabtewold (1993 and 1995) at Humbo-Larenakebele of Wolaita Zone.

There was siginificant difference in prevalence among three hair coat colored animals at the present study in GennaBossawereda, Dawro Zone. From this, the highest prevalence rate was recorded in black coated/colored animals (18.28 %) whereas the least prevalence rate was recorded in white hair coat animals (14.16 %) and the medium was recorded in the third coat/ colored animals, red colored, (14.61%). This might be due to the prefference of flies toward some colrs. Tsetseflies prefer dark colored animals. This result is different which was reported at North Omo by Haile (1996) and at SoddoZuriaWoreda by Getnet (2008) who reported the prevalnce of black (8.04%), red (5.09%) and white (3.8%) hair coat animals.

In the present study, higher prevalnce was observed in female animals (15.64%) and similar result was reported by Megona*et al.* (2008) who reported that females had a significantly higher prevalence of trypanosomosis than males.

In contrast to this Daya and Abebe (2008), reported that there was no significant differnce in trypanosomose infection between males and female, and Getnet (2008) in SoddoZuriaworeda also said that the prevalence of male (5.74%) and female (5.76%). The possible reason for these findings in this study could be that females are more exposed to many purposes that is due to delibery and production and may lack sufficient feed, at that time there is the challenge of tsetse flies so that these risks expose them to the disease conditions.

There was no significant difference in trypanosome prevalence between the study PA's.This could be due to the geograghical location of the three PA's which are located in the same climatic zones and distribution of tsetse fly challenge in these areas. This is due to the bordering forest which is source of tsetse fly. Similar results were obtainedbyGetnet (2008) at Soddozuriaworeda. But the prevalnce recorded in Mella, one of three PA in the study area, because of its bordering with the Omo River Valley.

The body condition also found to be one of the risk factors in the present finding. There was significant difference in infection rate among poor, medium and good body conditions that are the results observed revealed the marked effectoftrypanosomsis on the body condition of cattle. Animals with poor body condition were more associated with the disease as compared to animals with good body condition.

Trypanosomosis causes weight loss (cachexia), reduced feed intake, erected hair coat, and emaciation and loss of hair on the tip of tail are characteristic sign of trypanosomosis (Urquahart et al., 1996). This result is not different from the result revealed by Getnet (2008) in SoddoZuriaworedawho observed that poor body condition (11.85%) animals are more affected by trpanosomosis than good body condition (1.64%). From the present study, it was also true those animals with poor body condition (18.09%) were more exposed to the trypanosomes than that of good body condition (12.37%).

5. CONCLUSION AND RECOMMENDATIONS

The results of the study revealed that tryapanosomosis is the major constraints to animal production at the study area of selected settlement areas of Dawro Zone gennaBossaWoreda of SNNPRS which have the greatest potential for significant increase in domestic livestock productivity. Bovine trypanosomosis is one of the major impediments to livestock development and agricultural production in study area contributing negatively to the overall development in general and to food security in particular. The prevalence of bovine trypanosomosis was found to be high in females than males. Based on the above conclusion, the following recommendation can be drawn:

➢ Suitable community based tsetse fly and trpanosomosis control program should be designed and implemented.
➢ Attempt to enhance government and private veterinary services to serve the community properly should be made.
➢ Proper and strict following of trypanocidal drugs utilization and awareness creation to the farmers about risks of drug resistance should be made.
➢ Awareness creation should be made to farmers to use prophylaticapplication of trypanocidal drugs than the treatment of sick animals in the study area. Moreover, they should use sraying or pour – on methods on their animals.

6. REFERENCES

Abebe, G., and Jobre, Y. (1996).Trypanosomosis*: A threat to cattle production in Ethiopia. *Rev.Med.vet*. 147: 897.

Abiy, M. (2002).Prevalence of *bovine trypanosomosis* in Goroworeda South West Ethiopia.DVM, thesis, Addis Ababa University.

Afework, Y. (1998). Multiple drug resistence*trypanosomosis*congolense population in village cattleofMetekel district, North-west Ethiopia.

Bekele, J.,Amare, K.,Abebe., G., Ayalew, G.And Esayas (2010).Evaluation of *Deltamethrin* application in the control of tsetse and trypanosomosisin the Southern rift Valley areas of Ethiopia.Between the paraitological prevalence of trypanosomal infection in cattle and herd average packed cell volume.

Berhan, M. (1999).The study on prevalence of *bovine trypanosomosis* and Assessment of Drug resistance in Ghibe Valley South West Ethiopia.

Cynthia, M. K. (2005). The Merk*VetrinaryMedicine*manual, 19th ed. Published by merck and Co.Inc. Whitehouse station N.J., USA. Pp. 32 -34.

Daya, T. and Abebe, G. (2008).Seasonal dynamics of *tsetse and trypanosomosis* in selected sites of southern nation, nationalities and peoples and regional state, Ethiopia.

GBWADO (GennaBossaWoreda Agriculture Development office) (2004): the profile the woreda.

GBWFED (GennaBossaWoreda finance and Economy Development); (2003); the profile.

ILRAD. (1992): International Llaboratory for Research in Animal Disease, annual report Nairobi,   Kenya, Ann. trop.med. Part goes 1-19

ILRI (international livestock research institute) (1999) Handbook of livestock statistic for developing countries *socio-economic* and policy released working paper Nairobi, Kenya. Pp2007.

Itard, J. (1989): African Animal *trypanosmosis*, manual of tropical veterinary phraseology CAB international, UK

Jordan, A.M. (1986).*Trypanosomosis control* and Africa Rural Development. Longman group Ltd. Harlow Essex, New York.

Keno, M. (2005).the current situation of tsetse and trypanosomosis in Ethiopia, Minisrty of Agriculture and Rural Development, *Veterinary* Service Department, in proceeding of 28th meeting of international Scientific council for trypanosomosis research and control (ISCTC).

Leak, S.G.A. (1999); *Tsetse biology and ecology*: the role in the epidemiology and control of trypansomosis.

CAB international walling ford (UK) pp152-200.

Longridge (1976): tsetse and trypanosomosis survey of Ethiopia Ministry of oversee Development, Britain.Uk.

Meclennan, K. J. R., (1980).Tsetse transmitted trypanosomosis in relation to the rural economy in Africa, part one. *Tsetse infection* world animals review:36 2-17.

Megona, J. W., Walubengo, J. and origin J.T., (2008).Acute *haemorrhagic syndrome* of bovine tyrpanosomosisin Uganda. Acct. Trop. 107: 186 – 191.

Murray, N., Murran P. K., and McIntyre W.IM. (1977):- An Improved *parasitilogical Diagnosis* of Africa Trypanososmosis. *Tras.R.Soc.Trop.Med.Hyg*.

Muturi, K. S., Msangi, S., Munstermann, S., Clausen, P., Getachew, and A. Getachew (2000).Trypanosomosis*risk assessment* in selected sites of the southern rift valley of Ethiopia.

Peregrine, A S., Mulatu, Leak, S. G.A and Rowlands, G. J., (1994).Drug managemnet and parasitic resistance in *bovine* trypanosomosis in Africa, *Ken.Vet.J* 18:369 – 371.

Radostatits, O.M., Gay. C.C., Hinchcliff, P.W. and Constable, P.D. (2007). Veterinary Medicine Textbook of Disease of Cattle, Horse, Sheep, Pigs. 10[th]ed. *Elsevier, London*. Pp. 1531-1540.

Rowland, G.J., Mulatu, W, Authei, E., leak, S.G.A. and peregrine, A.S. 1993): Epidemiology of bovineTrypanosmosis in Ghibe valley, south west Ethiopia .

Seifert, H.S.H. (1996). Tropical Animal Health, kluwer Academic publisher.

Shimelis, D., (2004).Epidemiology of bovine trypanosomosis in the Abbay Basin areas of Northwest Ethiopia.Msc thesis faculty of *vetrinary medicine* AA university, DebreZeit, Ethiopia.

Shimth, B.P. (2009); large animal internal Medicine.4th ed. Elsevier.Pp 1160

Sinshaw, A., Abebe, G., Desquesnce, M., and Yoni W., (2006). Biting flies and trypanosomavivaxinfection*in* three highland district bordering Lake Tana, Ethiopia, *Vet. Parasit*.

Tamirat, S., (1991).Prelimianry survey on prevalence of *bovine* trypanosomosisinGhibevalley,DVM., thesis AA. University, DebreZeit, Ethiopia.

Taylor, M.A. Coop, R.L. and Well, R.L. (2007). Veterinary *parasitological*.3rd ed. Pp.42-46.

Tewolde, N., (2001).The study on occurrence of drug resistance oftrypanosomosis in cattle in the farming in tsetse control area (FITCA) project in westrn Ethiopia. Msc thesis, Addis Ababa University, DebreZeit.

Urquhart, GM., dunce, J.L. Dunne, A.M. and Jennings, F.W. (1996); *veterinary parasitological*.2[nd]ed.Back well science, London, pp. 212-19.

Van den Bossche, P., Shumba, W, and Makhambera, P., (2000). The distribution and epidemiology of *bovine* trypanosomosis in Malawi. Vet. *Parasit.88*.

Wondowosen, G., (1986). *Tsetse and* trypanosomosisin Bunno Province, DVM thesis, faculty of *vetrinary Medicine,* AA.University DebreZeit.

Woo. P. J. K., (1969). The hematological Centrifugation technique for the detection of trypanomosi*s.Can. Vet.J*.