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Knowledge, Attitude and Practices of Smallholder Farmers Towards the Control of Bovine Trypanosomosis in Gidami and Sayo Districts, Kellem Wollega Zone,Oromia Regional State, Ethiopia

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Abstract: The present study was conducted from December, 2016 to April 2017 in Gidami and Sayo Districts of Kellem Wollega Zone, Oromia regional state, Western Ethiopia. The objectives of the study were to assess the farmers' knowledge, attitude and practices toward the control of bovine trypanosomosis and its vectors. In this survey, a total of 100 farmers were interviewed, of which 50 were from Gidami and 50 from Sayo districts. Based on the questionnaire survey, all of the respondents from Gidami and Sayo district indicated that, trypanosomosis as the major important disease of livestock health and production causing considerable direct and indirect economic losses. Tsetse flies (*Glossina*) were known to most of the farmers as it was shown that, 87% of the respondents knew and have observed in the field. However, 13% of the respondents did not know tsetse flies. Diminazene aceturate and Isometamidium chloride are the commonly used drugs to treat trypanosomosis in both study districts. The present findings revealed high trypanocidal drug treatment frequencies and the practice of trypanocidal drug treatment by farmers themselves, which signals rampant misuse of the medications and possible presence of drug failures due to trypanocidal drug resistance. Therefore, beside awareness creation of the farmers on control of bovine trypanosomosis; trypanocidal drug efficacy studies should be undertaken using the common drugs circulating in the area, which is essential to avoid the emergence of trypanocidal drug resistance.

Key words: Cattle · Trypanosomosis · Gidami · Sayyo · Kellem Wollega · Oromia · Ethiopia

INTRODUCTION

African animal trypanosomosis (AAT), also called nagana which means 'powerless/useles' [1] is the most important disease constraint to livestock and mixed crop-livestock farming in tropical Africa [2], including Ethiopia [3, 4]. Animal trypanosomosis affects several domestic animals, but it is most important in cattle and small ruminants [5]. Bovine trypanosomosis is cyclically transmitted by tsetse flies [6, 7] and mechanically by a number of biting flies [8, 9]. The main tsetse-transmitted trypanosomes include *T. congolense*, *T. vivax*, *T. brucei brucei* and *T. simiae* [10].

Bovine trypanosomosis causes a significant negative impact on animal health, in food production and economic growth [11], particularly in sub-Saharan Africa [12]. According to the Food and Agricultural Organization (FAO), around 50 million animals in Africa are at risk of contracting AAT [13]. About 35 million doses of trypanocidal drugs are used every year in an attempt to control trypanosomosis [14], but farmers lose 3 million cattle every year because of the disease [13, 15]. All impacts of the disease combined results in an estimated economic loss of US$ 4.5 billion per annum across the continent [16]. It is estimated that the removal of trypanosomosis would lead to as much as a

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three fold increase in cattle numbers in the affected countries and to economic benefits of billions of dollars per year [17].

Ethiopia is believed to have the largest livestock population in Africa. An estimate indicates that the country is a home for about: 59.50 million cattle, 30.70 million sheep, 30.02 million goats, 11.01 million equines, 1.21 million camels and 56.53 million chickens [18]. However, in Ethiopia, trypanosomosis is one of the most important diseases with about 14 million cattle and a comparable number of small ruminants are at risk of contracting the disease [19]. Currently, about 220,000 km² of arable land is infested by five species of tsetse flies namely *Glossina pallidipes*, *G. morsitans morsitans*, *G. fuscipes*, *G. tachinoides* and *G. longipennis* [20]. The most important trypanosome species affecting livestock in Ethiopia are *T. congolense, T. vivax* and *T. brucei* in cattle, sheep and goats, *T. evansi* in camels and *T. equiperdum* in horses [21]. The direct loss due to bovine trypanosomosis in Ethiopia is estimated to amount to 1.5 to 2 billion birr per year [22].

Despite considerable research efforts directed at the development of vaccines against trypanosomes, no vaccine has so far been developed [23]. Hence, control of animal trypanosomosis relies primarily on control of the vector [24], farming of trypanotolerant breeds [2], use of trypanocidal drugs [25], or a combination of them [26]. Surveys of knowledge, attitudes and practices (KAP) serve as a tool to collect information and identify knowledge gaps, practices, cultural beliefs and behavioural patterns that may influence disease control [27] and used for sucessful practices of trypanosomosis and tsetse fly control [28].

Gidami and Sayo districts of Oromia regional State, Ethiopia have suitable climate for livestock production and richly endowed with livestock resources, but are ravaged by animal trypanosomosis. *Trypanosoma congolense*, *T. vivax* and *T. brucei* species have been demonsrated in these two districts. Four species of tsetse flies, *G. m. submorsitans, G. pallidipes*, G*. tachinoides* and *G. f. fuscipes* and other biting flies (*Stomoxys, Tabanus* and *Haematopota*) were also identified in western Ethiopia [4, 29]. Although a number of studies have reported the prevalence of bovine trypanosomosis in Western Oromia [30, 31, 32] the information on the farmer's knowledge, attitude and practices towards the control of bovine trypanosomosis and its vectors on livestock production are scanty. Hence, the present study was conducted to address the gap.

MATERIALS AND METHODS

Study Area: This study was conducted in Gidami and Sayo districts of Kellem Wollega Zone, Oromia Regional State, Ethiopia. Kellem Wollega Zone is located at about 680 Km´s to the west of Addis Abeba. The altitude of the area ranges from 1200 to 2200 meter above sea level. The mean annual rainfall and temperature ranges of the area are 1200 to 2000 mm and 15 to 25°C respectively. Based on the altitude the area is subdivided into three climatic zones: highland 14%, midland 48% and lowland 38% [33].

In Kellem Wollega, mixed crop-livestock farming is the main source of livelihoods. The vegetation cover is dominated by savanna grassland, forest, riverine and bush lands. Gullary forests are also encountered around

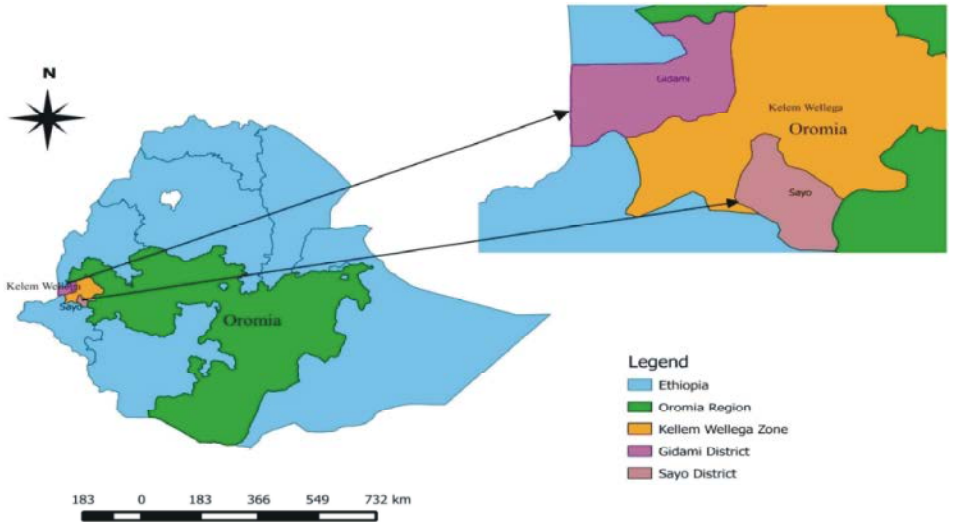

Fig. 1: Map of Study Area, Gidami and Sayo Districts, Western Oromia

Table 1: Livestock population of Gidami and Sayo districts, Kellem Wollega Zone, Oromia Regional State, Ethiopia.

Study area	Cattle	Sheep	Goats	Equines
Gidami district	73,000	47,000	24,000	12,000
Sayo district	59,593	53, 377	6, 225	10,714
Kellem Wollega Zone	569, 399	230,2 4 2	11 9, 5 2 8	38, 891

permanent surface of rivers [18]. Wild games like buffalos, bush pig, warthog, antelopes, hyena and monkeys are commonly found in the area. The major cattle breeds found in the study area were Horro breed, but the Abigar cattle breeds are also scantly distributed. Cattle are kept mainly for animal traction, manure, savings and social obligations and only secondary for milk and meat production. Communal grazing without any supplementary feeding is the major livestock traditional husbandry system throughout the year. As most of the land is intensively cultivated during the long rainy season, cattle are moved to the vicinity of the forests where there is permanent grassland. According to the data obtained from [17], the total livestock population of the study area is indicated below in the (Table 1). The total human population in the two districts is estimated to be 227,849 [18].

Study Population: The study populations for questionnaire survey were consisted of farmers from purposively selected eight villages of Gidami and Sayo districts. These villages were chosen because of their higher bovine trypanosomosis prevalence [4, 30].

Study Methodology and Design: A structured questionnaire was administered to a total of 100 randomly selected farmers (50 from Gidami and 50 from Sayo districts). The questionnaire focused mainly on farmer's knowledge attitude and perception on the livestock management, occurrence of bovine trypanosomosis, transmission, seasonality, control methods, sources and type of trypanocidal drugs used, treatment frequency and incidence of relapses experienced after treatment. The questionnaires were administered by the researcher and veterinary officers. Before the interview, the objective of the research was explained to each participant and consent of the interviewee was obtained.

Sampling Strategy and Sample Size: A multistage random sampling procedure was applied as per [34] to select the districts, peasant associations and farmers. Based on the formula given by Arsham [35], for questionnaire surveys, a total of 100 farmers were randomly selected and interviewed from both districts.

$$N = \frac{0.25}{SE^2}$$

where
N=sample size
SE= standard error assuming the standard error of 5% at a precision level of 0.05 and the confidence interval of 95%.

Data Analysis: SPSS 20 and STATA 13 softwares were used to analyze and interpret the data. Descriptive statistics (frequency, percentage and chi-square test) were used to analyze the qualitative data.

RESULTS

Livestock management: Above 98% of the farmer's livelihood dependeds on mixed agricultural farming system. The number of cattle owned by each respondent was variable. Only 26% of respondents from both districts owned more than ten cattle while 74% owned on average 5-7 cattle. Communal or free grazing practices are predominant in the study areas. Apart from cattle, the other types of animals kept in the study areas were, goat (16%), sheep (26%), poultry (40%) and equines (18%) of the farmers.

Livest Ock Constraints: Based on the finding of the questionnaire survey, the major problems of livestock in Gidami and Sayo districts were: diseases (65%), biting flies (18%), scarcity of veterinary supplies and services (15%) and insufficient pasture (2%). As indicated in (Table, 2), all the respondents of the questionnaire survey ranked trypanosomosis as the most important cattle health problem in the current study.

Knowledge about the Disease: All farmers from both districts were able to describe trypanoscomosis, which is known locally as "Ghendi" or "Soofaa"and mostly affects cattle. About 96% of the respondents were aware of the clinical signs suggestive of bovine trypanosomosis, which are used as basis for treatment. Most frequently reported signs for trypanosomosis by the farmers include rough hair coat, emaciation, weakness and constipation. Only 4% of farmers cited signs inconsistent with bovine

Table 2: The Main Livestock Diseases in Gidami and Sayo Districts, Kellem Wollega Zone, Oromia Regional State, Ethiopia

Diseases	Sayo (%)	Gidam (%)	Overall (%)
Trypanosomosis	100	100	100
Ectoparasites	72	87	79.5
Endo-parasites	70	68	69
Pasteurollosis	40	50	45
Lumphy skin disease	20	24	22
Foot and mouth disease	15	19	17
Black leg	12	16	14
Anthrax	8	10	9

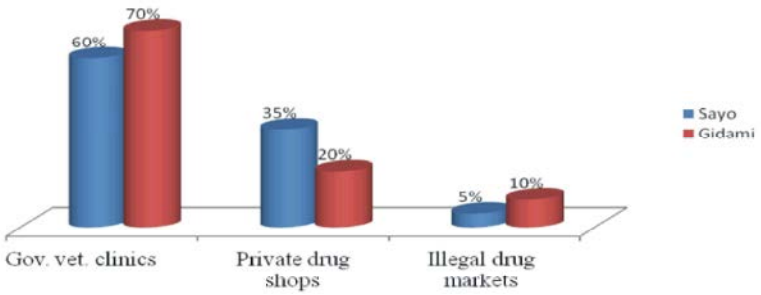

Fig. 2: Sources of trypanocidal drugs in Sayo and Gidami districts, western Ethiopia.

trypanosomosis, such as diarhoea, cough, lameness and lacrimation. Overall, 85% of farmers think that the incidence of trypanosomosis is higher in early rainy season, while 15% of them replied that as occurring throughout the year.

Means of Transmission: Eighty seven percent of the respondents knew about tsetse flies and locally named as "Titissa gamojjii". However, 13% of them did not know tsetse flies. Out of 100 respondents, 78% were aware of the causal association between biting flies (called Warannaa) and bovine trypanosomosis. However, 22% of the respondents associated trypanosomosis with tick bite, wild animals and drinking stagnant water. Most respondents from both districts (82%) believed that the tsetse fly population is higher in the early rainy season and in low land areas. On thecontrary, 18% of them replied the tsetse fly populations occur throughout the year. Ninty percent of the respondents have identified riverside, forest and grazing areas as the most risky places for tsetse fly and trypanosomes exposure.

Control Measures of Trypanosomosis: Trypanocidal drugs were the only way of combating bovine trypanosomosis in Gidami district. In Sayo district, the National Tsetse and Trypanosomosis Investigation and Control Center has been conducting control schemes through integration of pour-on with odor baited and insecticide impregnated target technologies for the last few years. The most frequently cited drug of first choice for bovine trypanosomosis treatment was Diminazene aceturate (65%), followed by Isometamidium chloride (35%) in both study districts. When considering the control of trypanosomosis, 97% and 82% of the respondents from Gidami and Sayo districts preferred treatment of their animals with trypanocidal drugs rather than other control options. The study showed that 85% of respondents from Gidami district had not used any control methods against tsetse flies. Very few (15%) respondents indicated that they use deltamethrin pour-on for control of tsetse flies only during early rainy season. Even though 90% of the respondents from Sayo district indicated positive attitude towards tsetse control program, about 10% of them responded negatively. Farmers from Kure Gaib village complained on the pour-on and indicating as, as it cause hair losses and skin damage on the back of cattle.

Sources of Trypanocidal Drugs and Practices: According to the questionnaire survey result, the main sources of trypanocidal drugs were: 60 % and 70% from government veterinary clinics, 35% and 20% from private drug shops and 5% and 10% from illegal drug markets in Sayo and Gidami districts respectively (Figure 2).

Overall, 86% and 80% of trypanocidal drugs were administrated by animal health personnels, while 14% and 20% of cases were treated by animal owners in Sayo and Gidami districts respectively, thus, opening the space for rampant misuse and under-dossage of the medications.

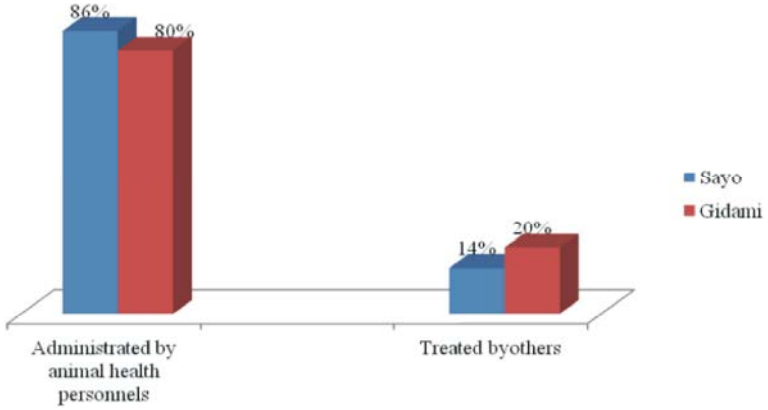

Fig. 3: Trypanocidal drug treatment in Sayo and Gidami districts, western Ethiopia

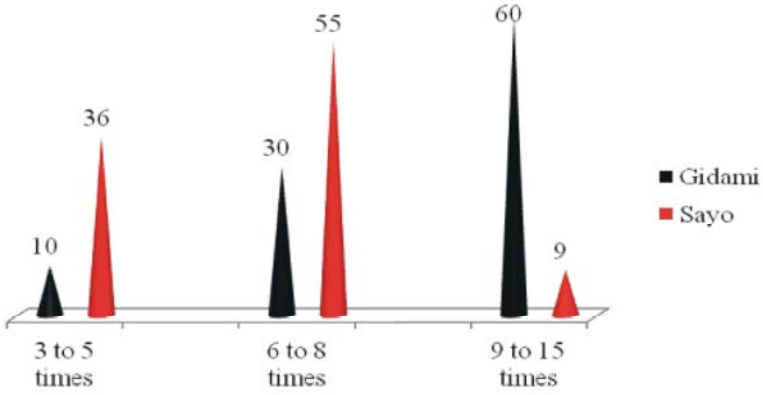

Fig. 4: Treatment frequency of animal trypanosomosis in Gidami and Sayo districts, Western Ethiopia.

Decreased Efficacy of Trypanocidal Drugs: Based on the results of the questionnaire survey trypanocidal treatment failures were reported by 98% and 76% of the respondents from Gidami and Sayo districts, respectively,which reveaed a statistically significant diffirence ($P<0.05$) between the two districts. Eighty seven percent of the farmers complained that the commonly used drugs became less effective over time, which indicate trypanocidal drug resistance in the area. Responses on intervals of trypanocidal drug treatment showed considerable variation. Sixty percent of respondents in Gidami district treat their animals nine to fifteen times per animal per year, whereas only 9% of those from Sayo district treat nine to fifteen times per animal per year with staststically significant diffirence ($P<0.05$) (Figure, 4).

DISCCUSSION

The current study disclosed that trypanosomosis was the primary disease constraint of livestock production in Sayo and Gidami districts as perceived by the respondents. All of the respondents indicated that, trypanosomosis as the first important livestock constraint limiting the overall agricultural activity and livestock productivity in the both districts. Similar observations have been reported by Zewdu *et al.* [36] and Mersha *et al*. [37] from Western and Southwestern Ethiopia, where trypanosomosis were perceived as the number one among other diseases affecting cattle production. Studies from Kenya [38], Nigeria [39] and Tanzania [40] reported that farmers considered bovine trypanosomosis as the most important cattle disease. All farmers interviewed from Wetern Ethiopia [41] and Nigeria [42] replied trypanosomosis as the number one important disease in their areas.

Farmers in the present study areas were aware of the clinical signs suggestive of bovine trypanosomosis, which are used as the basis for treatment [43]. Most frequently reported signs for trypanosomosis were weakness, rough hair coat, constipation, emaciation and coughing. Similarly, studies conducted in tsetse infested areas of Ethiopia [44] and from West African countries

[45, 46] also revealed that most of the interviewed farmers were able to mention the common symptoms of trypanosomosis.

Most of the interviewed farmers seemed to be well aware of the seasonality of the disease, indicating the incidences of disease reach to its peack at the beginning of rainy season (April-June) while infection is persistent throughout the year. Seasons of peak trypanosomosis challenge identified in our studies are in line with the findings of Kebede *et al*. [47] and Stein *et al.,* [48] from Ethiopia and Grace *et al.* [46] from West Africa. However, Tewelde [49] in west Ethiopia reported that incidence of bovine trypanosomosis was high throughout the year. Acorrding to Kebede and Animut [50], extreme environmental conditions in the dry season could be unfavorable for the survival and reproduction of tsetse and other biting flies.

In the present study, significant number of respondents knew the causal association between biting flies (Waranaa) and bovine trypanosomosis, indicating that grazing areas as the most risky places for fly exposure. Similar findings were reported by Zewdu *et al*., [36] and Mersha *et al*. [37] from Western and Southwestern Ethiopia, Magwisha *et al.* [51] in Tanzania and Gumel *et al*. [52] in Nigeria, where they found that livestock keepers had a good knowledge on tsetse and bovine trypanosomosis. However, few respondents associated bovine trypanosomosis with tick bite, wild animals and drinking stagnant water. Based on the present finding tsetse flies were known to most of the farmers (87%) and had local name for the flies "Titissa gamojjii". However, 13% respondents did not know tsetse flies.

This study revealed that Diminazene aceturate and Isometamidium chloride were commonly used drugs for treatment and control of animal trypanosomiasis in both study districts. The average number of treatments per year/cattle as indicated by the respondents was 8 times (range: 3-15). Trypanocidal treatment frequencies are higher in Gidami district as compared to those in Sayo district, because of the absence of tsetse and trypanosomosis control program in the area. In Sayo district, the National Tsetse and Trypanosomosis Investigation and Control Center has been conducting control schemes through integration of pour-on with odor baited and insecticide impregnated target technologies for the last few years, which decreased the treatment frequency. The treatment frequency reported in the present study is higher than earlier reports from other parts of Ethiopia [36, 53, 54]. According to Uilenberg [55] and Maudlin *et al*., [56] the number of treatments over a year reflects the magnitude of trypanosome and tsetse fly challenge and drug resistance presence in the area. The drug most reported showing a decreasing efficacy was isometamidium chloride (78 %) followed by diminazene aceturate (22%).

Above 80% of animals were treated by animal health personnels while significant number of cases were reported to be treated by animal owners, yet farmers complained on the decreasing efficacy of these trypanocidal drugs. Reasons for the miss use of trypanocidal drugs could be related to the availability of trypanocidal drugs in informal markets, treatment failures and absence of policies on the importation of trypanocidal drugs, distribution and treatment that would allow them to treat by themselves. According to Maudlin *et al*., [56], the number of treatments over a year reflects the magnitude of trypanosomosis and drug resistance presence in the area. This finding is in agreement with various reports done in Ethiopia.

CONCLUSION

The present study wa assessed the farmers' knowledge, attitude and practices towards the control of the bovine trypanosomosis and its vectors in Gidami and Sayo districts of Kellem Wollega Zone, Western Ethiopia. The study revealed that trypanosomosis is the most important disease constraint of livestock, limiting the overall agricultural activity and livestock health in the study districts. The study also indicated high trypanocidal drug treatment frequencies and the practice trypanocidal drugs treatment by farmers themselves, which signals rampant misuse of the medications and possible presence of drug failures due to trypanocidal drug resistance. Therefore, beside awareness creation of the farmers on the control of bovine trypanosomosis; trypanocidal drug sensitivity study should be undertaken using advanced molecular techniques, which is essential to plan the control of the disease in the area. Efforts should be made to implement vector control methods in Gidami and strengthen the ongoing control prgrame in Sayo district. In addition, policies on the importation of trypanocidal drugs, distribution and treatment arevital to avoid misuse these drugs.

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Ethical Considerations: The objectives of this study were well explained to all selected farmers. The identity of study participants and data on their livestock population were kept confidential. This research was approved by the Animal Research Ethics Committee of the College of Veterinary Medicine and Agriculture of the Addis Ababa University, Ethiopia (Ref. No. VM/ ERC/004/08/07/2015).

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