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The Distribution of Tsetse Flies Species and other Biting Flies in Mareka District of Dawuro Zone, Southern Ethiopia

BANGU BARATA[1], EYOB ESHETU[*1]
[1]School of Veterinary Medicine, Wolaita Sodo University, Ethiopia
*Corresponding author: *eyobeshetu@ymail.com*

Abstract

A cross-sectional study was carried out to estimate the apparent tsetse density and to identify the prevailing tsetse species and other biting flies in purposely selected areas of Mareka district, Dawuro zone of southern Ethiopia from November, 2015 to April, 2016. The study was also focusing to assess the awareness of society about occurrence of tsetse fly. A total of 30 household heads were randomly selected and interviewed using a standard semi-structured questionnaire. For entomological survey, 20 NGU traps were deployed and the apparent fly density was determined. In this study, the questionnaire survey result disclosed that 33.3% of respondents did not know tsetse fly and its control methods, while 66.7% witnessed their familiarity with it. The overall apparent density of tsetse flies caught in NGU traps were 0.48 F/T/D of which 0.42 F/T/D were *Glossina pallidipes* and 0.06 F/T/D were *G.fuscipes* with considerable number of mechanical vectors (Stomoxys and Tabanus). In conclusion, tsetse and other biting flies are one of the major vectors disposing animals continuous and threats to the production and productivity of livestock sub-sector in the study area. Thus, it requires due attention to strengthen an integrated tsetse flies and other biting vector control.

Keywords: Biting flies; Distribution; Mareka; Tsetse flies

Introduction

The size and diversity of Ethiopia's major agro-ecological zones render it suitable for the support of large numbers and class of livestock. Among the livestock population of Ethiopia, there are about 53.4 million of cattle; 25.5 million sheep and 22.78 million goats (CSA, 2011). Cattle are "Living banks" or "Living accounts" for rural and urban poor farmer or owners, because of they serve as a financial reserve for period of economic distress such as crop failure as well as other cash income. Despite the presence of huge numbers of cattle and their multipurpose; the country is not as such advantageous due to a multitude of problems. This comprises of: - diseases, age old traditional management system, inferior genetic make-up coupled with under nutrition and complicated by malnutrition as well as absence of well-developed market infrastructure. Among the diseases tsetse transmitted animal trypanosomosis has been still remain as one of the largest causes of livestock production losses in the country. As result 14 million heads of cattle, an equivalent number of small ruminants, nearly 7 million equines and 1.8 million camels are at risk of contracting tsetse- borne trypanosomosis at any one time (MoARD, 2004).

About 31 species and sub species of tsetse flies occur exclusively in Africa over an area approximately 10 million km^2 extending on both sides of the equator from 150 N to 300S. Hence, they transmit trypanosomes to humans and animals and darken the public health as well as agriculture sector in 38

African countries via exposing 160 million cattle for the risk of anemia, emaciation and death. Not only had these, but also exposed 60 million people to the risk of sleeping sickness (Jordan, 1996). Trypanosomosis is also mechanically transmitted by tsetse and other biting flies, especially Tabanids and Stomoxys, through the transfer of blood from one animal to another (OIE, 2009). The presence of tsetse flies in Ethiopia was confined to the southern and western region between longitude of 33°and 38°E and latitude of 5°and 12°N which amounts to about 200,000km^2. The five known species of tsetse flies in the country are; *Glossina pallidipes*, *G. morsitans*, *G. fuscipes*, *G. tachinoides* and *G. longipennis*. Out of the nine regions of Ethiopia: Amahara, Benishangul Gumuz, Gambella, Oromiya and SNNPR are infested with more than one species of tsetse flies (Keno, 2005).

Therefore, tsetse transmitted animal trypanosomosis was considered to be an important disease of cattle in different part of the country in general (Shimelis *et al*., 2005; Bitew *et al*., 2011) and Dawuro zone in particular, which is within the tsetse belt, bounded by big rivers and tributaries such as: Omo, Ghibe and Gojab and Mareka district is under this zone. The previous study conducted in this particular study area spotlighting on the impacts of tsetse challenge on herd composition and mortality, lactation and reproductive performance of cattle indicated that, the mortality rate in cattle for one year in the tsetse challenged areas was about 26.73 times higher than in the tsetse free area (Tigicho *et al*., 2012). However, studies have not yet been fully conducted on the determination of its vector density. Therefore, the present study was bringing about with the objectives of to assess the awareness of society about tsetse and other biting flies, to identify prevailing Tsetse flies species and determine their density and to recognize the apparent biting flies available in the area.

Materials and Methods

Description of the Study Area

The study was carried out in Mareka district, which is found in Dawuro Zone of SNNPR, Southern Ethiopia from November 2015 to April 2016: in collaboration with National Tsetse fly and trypanosomosis investigation and control center (NTTICC). The area is located at about 544 and 277 kms south west of Addis Ababa; the capital city of Ethiopia and Hawassa; the administrative town of SNNPR, respectively. Tarcha was the former town of the district, but the current town of district is Waka; while Tarcha became the administrative town of Dawuro Zone. The woreda is bordered on the South by Loma Woreda, on the West by Gena Bosa Woreda, on the North by Tocha Woreda and the Gojeb River which defines its boundary with the Oromiya Region, and on the East by Essera Woreda. The total land coverage of the woreda is 44050 hectare of which 2000 hectare (4.5%) is covered by forest, 11500 hectare (26.1%) is grazing land, 28140 hectare (63.9%) is cultivating land and the remaining 2410 hectare (5.5%) comprises bushes, savanna, rivers, springs, stagnant waters and hills.

According to the agro-ecological classification criteria the woreda is partioned into three agro-ecological zones; namely high land (Dega), midland (Woinadega), and lowland (kola) with their total land holds of 53%, 30% and 17% respectively. The study area's elevation ranges from1000 to 2400 meters above sea level. The mean annual rainfall ranges from 650-1100mm and the rainfall distribution is bimodal with highest fall at wet season (April to September) and lowest fall at last half of dry season (February and march).The mean daily temperature ranges from 18°C to23°C with the highest temperature share at dry season (November to march) and lowest temperature share at wet season. The predominant farming system in the area was crop-livestock production system. The woreda has a total human population of 126022, of whom 65321 are men and 60701 women. The livestock population consists of: 122,084 cattle, 47,438 sheep, 18,854 goats, 4,860 horses, 2,759 mules, 1,699 donkey, and 63,042 poultry and 2,750 traditional and 863 modern bee hives (MWOoA, 2015).

Study Design

A cross-sectional study was conducted to determine the density and to identify the prevailing vectors involved in trypanosomosis transmission.

Sampling Method and Sample Size Determination

The study area was selected by convenience sampling method based on previous information on lack of detailed study on tsetse challenge and trypanosomosis. For the questionnaire survey, a total of 30 randomly sampled household heads were interviewed during the study period. From each selected locations 10 individuals were selected randomly according to their place of settlement and interviewed using prepared questionnaire format. For entomological survey, 20

NGU traps were deployed in three selected sites of the study area, which seem suitable habitat for tsetse flies.

Study Methodology

Questionnaire survey

A semi-structured questionnaire survey was undertaken in order to gather information like grazing site, watering points, constraints for cattle production, control method of trypanosomosis, use and source of trypanocidal drugs as well as delivery of the drug for treating their animal: there by to assess the awareness of farmers about trypanosomosis and tsetse fly.

Entomological Survey

Entomological study was carried out to assess the apparent density, prevailing species of tsetse and other biting flies in the study area by using 20 NGU traps. The species and sex of tsetse flies were identified based on their morphological characteristics described by Leak *et al*. (1987).

Data Analysis

The data collected from questionnaire survey and vector were entered into Microsoft Excel spreadsheet computer program to create database, and handled carefully and analyzed systematically with statistical software program: SPSS-20 for windows version. Information that were generated through questionnaire survey to compute frequency of responses and percentage of summarized data on basic livestock health problems were presented and analyzed for frequency distribution and percentage expression in tabular form. Vector survey data were analyzed using ANOVA to compare the mean catches in different study areas. In order to compare, an apparent density of tsetse fly population is calculated by dividing the number of flies caught by the number traps deployed and number of days of deployment, and expressed as fly/trap/day (F/T/D).

Results

Questionnaire Survey Result

A total of 30 farmers who live in three selected areas of the district were interviewed. They were mainly questioned on herd composition, major health problems, livestock management, socioeconomic activities, occurrence of trypanosomosis and tsetse flies, sources and usage of drugs for treating their animals.

Accordingly, about 66.7% of respondents indicated that they keep their cattle in communal grazing and while the remaining (33.3%) revealed that they keep in their own cattle grazing site and provide crop residue and hay as additional feed. Regarding the watering points about 40%, 30%, 23.3% and 6.7 % of farmers responded that their cattle were watered from river, spring, pump and stream water respectively. The whole interviewed respondents (100%) knew animal trypanosomosis by its local name called "*Golobiya*" and perceive that it is very serious constraint for cattle production followed by Black leg, ectoparasites, pasteurellosis, feed shortage, anthrax, lack of veterinary service and lack of medicine.

Regarding to therapeutics, all respondents practiced the use trypanocidal drug Diminazene acceturate locally called "*kishikishiya*". The source and delivery of drug to animals was responded by interviewers.

Entomological Survey Result

A Total of 124 flies were caught during study period among those 29 were tsetse species *G.pallidepes* (25) and *G.fuscipes* (4), 15 were biting flies; Stomoxys (8) and Tabanus (7) and 80 were others. An overall apparent density of tsetse fly caught was 0.48 F/T/D with highest density of *G.pallidepes* (0.42) and lowest density of *G.fuscipes* (0.06F/T/D). An apparent density of tsetse flies with respect to trapping site was recorded as 1.00, 0.25, and 0.28 F/T/D at Tarcha zuria, Shina Gaburi and Shaba yoyo respectively. With regard to species only *G.pallidepes* with an apparent density of 1.00 F/T/D was caught at Tarcha zuria, *G.pallidepes* and *G.fuscipes* were caught at Shina Gaburi with apparent density of 0.17 and 0.08 F/T/D respectively and *G.pallidepes* and *G.fuscipes* with an apparent density of 0.17 and 0.11 F/T/D respectively were also caught at Shaba yoyo.

Discussion

The livelihood of the farmers are mostly depends on mixed crop-livestock production system predominantly by cattle rearing, but the size of cattle herd belonging to each respondent showed a considerable variation. This in turn determines the economic status of farmers, as revealed by the respondents. The respondents were able to rank major livestock constraints in their area. Accordingly, trypanosomosis locally called "*Golobiya*" is very

serious constraint (all respondents mentioned it) for cattle production in the study area followed by Black leg (86.7%), ectoparasites (63.3%), pasteurellosis (60%), feed shortage (43.3%), anthrax (30%), lack of veterinary service (13.3%) and lack of medicine (10%). This result agrees with previous work of Tigicho *et al*. (2012) in the same district and they reported that; in the tsetse challenge areas trypanosomosis was mentioned by all respondents (100%) as an important disease followed by blackleg (97.1%), ectoparasites (72.1%), endoparasite (61.5%), anthrax (54.8%) and pasteurellosis (52.9%). Similar to this study, Seyum *et al*. (2013) also reported that trypanosomosis has been perceived as the number one obstacle to cattle production in selected districts of Baro-Akobo and Gojeb river basins. Likewise, all respondents answered that; trypanosomosis can cause marked effect/reduction in: body condition, traction power, reproduction rate, and milk and meat production of affected animals.

In the present survey, the awareness of community on the occurrence of tsetse flies and the possible control strategy of trypanosomosis was also assessed. In view of that, about 66.7% of respondents knew tsetse fly vector locally known as "*codiya*" and related its occurrence with season of the year and 56.7% of them responded that ;the highest tsetse infestation was in wet season, 6.7% responded that it occurs in dry season and 3.3% responded that it occur throughout the year. Of the respondents, 66.7% have awareness on the control method of trypanosomosis and mentioned as: tsetse control by using pour-on of chemicals, insecticide impregnated targets and traps and treatment of infected animals as well as keeping animals away from tsetse infested area. About 33.3% of respondents did not know tsetse fly and their control strategy. All of the respondents answered that they have willing to participate in community trypanosomosis control activity. This response is similar with previous report of Seyum *et al*. (2013); that almost all (96.3%) of the respondents had positive attitude for the establishment of trypanosomosis and tsetse fly intervention program in their surroundings.

An overall apparent density of tsetse fly caught was 0.48 F/T/D with highest density of *Glossina pallidipes* (0.42) and lowest density of *G.fuscipes* (0.06F/T/D). An apparent density of tsetse flies with respect to trapping sites were recorded as 1.00, 0.25, and 0.28 F/T/D at Tarcha zuria, Shina Gaburi and Shaba yoyo respectively. With regard to species only *G.pallidepes* with an apparent density of 1.00 F/T/D was caught at Tarcha zuria, *G.pallidepes* and *G.fuscipes* were caught at Shina Gaburi with apparent density of 0.17 and 0.08 F/T/D, respectively and *G.pallidepes* and *G.fuscipes* with an apparent density of 0.17 and 0.11 F/T/D respectively were also caught at Shaba yoyo. This result is in agreement with previous entomological record at Abaya district of Borena zone with an apparent density of *G. pallidipes* in the three areas including 0.46F/T/D at Dibicha, 0.02F/T/D Ledo and 0.016F/T/D Gololcha area with the overall density of 0.5 F/T/D (Amanuel *et al*., 2015). The present apparent density of tsetse flies was also comparable with previous studies of 0.14F/T/D at Kachabirra district of Kembata Tembaro zone (SRVL, 2006) and 1.45F/T/D in two districts of Benchi Maji zone (Tadesse and Tsegaye, 2010).

In present entomological survey the density of tsetse flies was lower than the expected. This is because traps were deployed during late dry season which indicates low fly density since season is an important factor determining the distribution of tsetse fly (Leak, 1999) as well as due to integrated tsetse and trypanosomosis control action performed by STEP.

Conclusion and Recommendations

About one third of the livestock owners did not know the major cyclical vectors of trypanosomes called tsetse fly and their control approach, even though the tsetse and other biting flies were present with considerable distribution in the area. Tsetse flies of *G.pallidepes* and *G.fuscipes* species; and the biting flies; Stomoxys, Tabanus and others are one of the major vectors disposing animals continuous and threats to the production and productivity of livestock sub-sector in the study area. An overall apparent density of tsetse fly caught was 0.48 F/T/D with highest density of *G.pallidepes* (0.42) and lowest density of *G.fuscipes* (0.06F/T/D). Thus, all of the livestock owners should be aware of tsetse fly and other mechanical vectors as well as their control approach as control is better than cure. Moreover, it requires due attention to strengthen an integrated tsetse flies and other biting vector control.

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