

# Bovine Trypanosomosis and Glossina Flies Density in and Around Chelo Settlement Areas of Didesa District of Buno Bedele Zone, Western Oromia

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**Abstract:** The study was conducted in Chelo settlement area of Didesa district to estimate prevalence of the parasite (Trypanosomosis) and identify Tsetse fly species involved. Out of the total of 384 local breeds of cattle examined, 27 animals were found positive for trypanosomosis. The overall trypanosomosis prevalence was 7.03% which is composed of (n=5) 1.3%, (n=11) 2.87%, (n=7) 1.82% and (n=4) 1.04% in Doyo, Chelo, Cheti and Other area respectively was recorded and peak prevalence was observed in Chelo (n=11) 2.87%. A total of 2551 tsetse and other biting flies were caught during the study period. Out of these, *Glossina* accounts n=2333 (91.45%) and other biting flies includes n=218 (9.34%). The apparent fly density was found to be Fly/Trap/Day (FTD)=13.89 for *Glossina* species with the only identified species was *Glossina tachinoides* and Fly/Trap/Day (FTD)=1.23 was accounted for other biting flies. Finally, despite the continued interventions were applied on tsetse and trypanosomosis control in the study area, significant numbers of *Glossina tachinoides* were caught FTD=13.89 with 7.03% of overall prevalence of trypanosomosis.

**Keywords:** Didesa District, Trypanosomosis, FTD, Prevalence, Western Oromia

## 1. Introduction

In Ethiopia about 180,000 to 200,000km<sup>2</sup> of agriculturally suitable land in the west, southwest and north western low lands and the associated river basins of the country are infested by tsetse fly and Trypanosomosis. In those areas, there are more than 14 millions heads of cattle, an equivalent number of small ruminants, nearly 7 million equines and 1.8million camels are at risk of contracting Trypanosomosis at any time [1]. To control the disease and its vector; tsetse fly, first monitoring survey concerning tsetse density and trypanosomosis prevalence in the endemic areas like Chelo settlement area of Didesa district is mandatory. So that, the objective of this study was to determine prevalence of Trypanosomosis and associated risk factors, Tsetse flies density and involved species.

## 2. Materials and Methods

### 2.1. Study Area Description

The study was conducted in Oromia regional state, BunoBedele Zone Didesadistrict. This district is bordered by Gechi and Borechadistrict in North, LimmuKosa in East, Settama in West and Agaro in South. It's found at south west of Ethiopia in the distance of about 420 km far from Addis Ababa and 80km from local center Bedele. The topography of this district is characterized by plateaus of central and western plains of Didesa valley. The main river for this district is Didesa River and the tributaries Mulade, Asha and Dibo. The total area coverage of the district is estimated to 615 km<sup>2</sup>. The elevation varies in this area from 1360-2340 meter above sea level. The annual mean temperature for most part of the district is 13°C-28°C and annual rain fall is about 900-1000 mm. the climatic condition of the area includes:

Dega, woinaDega and kola cover 16%, 64%, and 20% of the district respectively. The lands used for cultivation are cultivated land 4719.57 hectare, grazing and 9848.45 hectare, forest 10682.7 hectare and the other 724 hectare [2].

## 2.2. Study Design and Sample Size Determination

A cross-sectional study was performed to estimate the prevalence of bovine trypanosomosis and tsetse species composition in the study area. The targeted populations were local breeds of cattle of all age group and sex found in each site with sample size was determined by using Thrusfield formula [3]. The expected prevalence of this disease in respective of the area was based on the previous study conducted by [4] 5.47% with 95% confidence, 5% absolute precision was used. Simple random sampling techniques were followed to select the animals to be used for the study and the sample size was increased to 384 cattle.

## 2.3. Hematological Study

Paired blood samples were collected from the auricular vein (marginal ear vein) of each animal using two hematocrit capillary tubes by recording all associated risk factors like age, sex, peasant association (PA's), altitude and body condition of each animal according to Bekele *et al.*, 2018 [4]. Hematocrit capillary tubes were filled  $\frac{3}{4}$  of its height and sealed with crystal sealant and also used to measure the PCV values for the determination of anemia and comparison of infected animals with non-infected animals. Then cut 1mm below the Buffy coat layer to include the top layer of RBCs and content of the capillary tube was expressed on to a clean microscopic slid, mixed and covered with cover slip.

Then the slides were examined for trypanosomes based on patterns of movement in the microscopic field. Confirmation of trypanosome species by morphological characteristics were done after staining with Giemsa and examination with oil immersion microscopy under  $\times 100$  power of magnification according to Murray *et al.*, 1977 [5].

## 2.4. Entomological Study

To study the FTD of different tsetse fly species; entomological samples were collected and studied in selected sites of the study area. These entomological data were collected only at one time during the rainy period. The flies were caught with monopyrimal traps baited with acetone, octanol and 3 days old cow urine according to Drans field *et al.*, 1990 [6]. The tarps were placed in selected sites (places where animals stay for longer period i.e. watering and grazing areas) of the study area and 84 traps were deployed (21 traps/site) before sun rise in the morning and kept in position for 48 hours.

The different fly catches in each trap were counted and the species of tsetse fly were identified based on the characteristic morphology [7]. Sexing was done just by observing the posterior end of the ventral aspect of the abdomen by hand lens and stereomicroscope hence; male flies were identified by enlarged hypopygium in the posterior

ventral part of the abdomen. Tsetse fly apparent density mean catches in traps deployed was expressed as the number of tsetse catch/trap/day [8].

## 3. Data Analyses

Data collected from each study animal and laboratory analyses were coded in to appropriate variables and entered in Microsoft excel, 2007 spread sheet. All data were analyzed using STATA-7 soft ware. The prevalence was calculated for all data as the number of infected individuals divided by the number of individuals sampled times 100. Categorical data were analyzed by using chi-square ( $X^2$ ) test of independence where as t-test was used to examine the difference in mean PCV between the study variables. In all cases, 95% of confidence intervals were used and p value less than 0.05 were considered as significant [9].

## 4. Result

### 4.1. Hematological Results

Out of the total of 384 local breeds of cattle examined for the Trypanosomosis, 27 animals were found positive. The overall prevalence was 7.03% which is composed of (n=5) 1.3%, (n=11) 2.87%, (n=7) 1.82% and (n=4) 1.04% in Doyo, Chelo, Cheti and Other area respectively was recorded and peak prevalence was observed in Chelo (n=11) 2.87%. Oppositely, least trypanosomosis prevalence was observed in (n=4) 1.02% another area.

This study confirmed the presence of *Trypanosome vivax*, *Trypanosome congolense* and *Trypanosome brucei* with the prevalence of (n=7) 1.83%, (n=15) 3.9% and (n=5) 1.3% respectively. Therefore, *Trypanosome congolense* was the most prevalent parasite at the study area with 3.9% rate.

The prevalence of trypanosomosis with in different age group was found to be (n=2) 0.52% in young's and (n=25) 6.51% in adults. To evaluate the debilitating effect of trypanosomosis in diseased cattle which were living under similar environment and management systems, showed the following prevalence levels in different body condition scores of 0%, (n=4) 1.04%, (n=23) 5.99% in Good, Medium and Poor body condition respectively. In this study relatively high prevalence was recorded in animals with poor body condition; followed by medium, therefore, the differences in prevalence of the parasite (s) was statistically significant ( $p=0.00$ ) among animals with different body condition scores.

Pack Cell Volume for all study animals was analyzed to estimate the degree of anemia. From the total n=384 animals; (n=72) 18.75% are anemic and (n=312) 81.25% are non-anemic. The mean Pack Cell Volume of the present finding of parasitemic cattle were 20.5 (n=6.13%) which was significantly lower than that of non parasitemic 31 (93.87%). Therefore, almost all parasitemic cattle were anemic and trypanosomosis strongly cause anemia ( $p=0.00$ ).

## 4.2. Entomological Result

A total of 2551 tsetse and other biting flies were caught during the study period. Out of these, *Glossina* accounts  $n=2333$  (91.45%) and other biting flies includes  $n=218$  (8.54%). The apparent fly density was found to be  $FTD=13.89$  for *Glossina* species with the only identified species was *G. tachinoides* and  $FTD=1.23$  was accounted for other biting flies.

## 5. Discussion

The present study was conducted in Chelo settlement area of Didesa District of Buno Bedele zone of south western Ethiopia from April to November 2015. The overall prevalence of bovine trypanosomosis in the study area was 7.03%. This result was in line with the finding of Gemtessa T and Dera KL [10] which was reported to be 12.28% Dale Wabera District, KellamWollega Zone. It was also lower than the report of Ayele *et al.* (2012) [11] which were 23.0% in Daramello District of southwestern Ethiopia which was as result of different associated factors like involved tsetse fly species (morisitans or savanna species are highly infective than riverine species of *Glossina tachinoides*), fly animal contact and wide ecological factors.

The present work revealed that *T. congolense*, *T. vivax* and *T. brucei* were the main species of trypanosomes causing cattle trypanosomosis. The predominance of *T. congolense* infection in cattle under sufficient number of cyclical and mechanical vectors of trypanosomosis may be due to the high member of *T. congolense* as compared to *T. vivax* and *T. brucei* and the development of better immune response to other species of trypanosomes by infected animals Leak 1999 [12]. The lower infection rate of domestic animals by *T. brucei* than *T. congolense* and *T. vivax*, may be due to the seasonal absence of the parasite in circulation (Parasitaemia) or one might miss many latent infection which only become apparent after rat inoculation [13].

Among potential risk factors, age was considered as significant with adult cattle were relatively had high infection rate than younger's. This could be associated to the fact that older animals travel long distance for grazing and draught as well as harvesting crops in tsetse challenge areas [14] besides, young animals are also naturally protected to some extent by maternal antibodies [15].

The highest prevalence was recorded in animals with poor body condition followed by medium body condition however, there was no infection rate was recorded in animals with good body conditions [16].

The presence of wide different types of host animals was essential component for tsetse fly distribution. The distribution and abundance of some species of tsetse flies such as *G. tachinoides* which are often known as game tsetse flies are closely related to the number and habitats of certain wild animals and also described that the highest densities of certain tsetse fly species are reported from areas with very high densities of wild animals and low human population

areas [17].

Pack Cell Volume can be affected by many factors other than trypanosomosis, but these factors are likely to affect both trypanosomosis negative and positive animals. The resulting low PCV value may not solely be due to trypanosomosis; however, the difference in mean PCV between parasitaemic and aparasitaemic animals indicates that trypanosomosis significantly reduces the PCV values in infected animals and cause anemia [18].

## 6. Conclusion

In Ethiopia, tsetse transmitted trypanosomosis is one of the major important parasitic disease in most parts of the country and causes a huge economic loss every year. This may have contributed to the country left undeveloped. Despite the continued interventions were applied on tsetse and trypanosomosis control in the study area, significant numbers of *Glossina tachinoides* were caught  $FTD=13.89$  with 7.03% of overall prevalence of trypanosomosis.

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