# A preliminary study on *Trypanosoma evansi* vectors (*Diptera: Tabanidae*) in Somaliland

Abdullahi Sheikh Mohamed,[1] Abdulkareem Osman Essa[2] and Mohamed Abdulatif Hagi[2]

**Abstract:**

The camel as an important animal in the traditional and cultural setup of the Somali pastoralist communities is facing widespread challenges, including disease, drought and mismanagement, amongst others. Trypanosomosis arising from *Trypanasoma evansi* is one of the most important diseases that affects camel in Somaliland. Camel disease caused by *Trypasoma evansi*, also known as *surra*, is transmitted by biting flies. This paper presents a preliminary study of the vectors that transmit *surra*. The study was carried out in four villages of Sheikh District. Three genera of *Tabanidae*, namely, *Tabanus, Pangonia* and *Haematopota* and one genus of *Muscidae* were found to be present in the study area. The geographical and seasonal patterns of the flies were also noted. The authors also recommended some control measures to reduce the flies, as they are the vehicles for the transmission of the most economically important tropical disease affecting camels.

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## Introduction

Communities living in the arid and semi arid areas around the world, and in the Somali eco-system in particular, rear a substantial number of camels, on which the livelihood of the pastoralist household is based. The camel is reared mainly for milk and meat. Because of its resistance to harsh environments and the fact that it can stay for long periods without water, camel rearing is significant in fighting food insecurity in the pastoralist world. In addition to its nutritional value, camel milk has become increasingly popular for its reported medicinal value. The milk has anti-bacterial qualities that help the bodies of consumers to keep diseases at bay (Elagamy 200). The actual number of camels in Somalia is not known; in 1986 the FAO estimated around 5,750,000 (Payne 1990).

Opportunities to improve camel reproductive and productive efficiency are limited by many factors including wasting diseases. Amongst the most dangerous camel wasting disease is trypanosomosis (Payne 1990). Camel trypanosomosis has been reported in Somalia/Somaliland (M.F.Dirie 1989, M.F.Dirie 1993, R.M. Edelstein 1996, A. Sheikh 2007).

The first and foremost sign of camel trypanosomosis according to Somali pastoralists is sudden drop of milk production in the female and break of rut (breeding activity) in the male. And the sudden drop of milk has a serious impact on household sustenance, because their children will miss milk – their primary food staple – let alone surplus to sell for cash. All other clinical signs such as lacrimation, anemia, lymph node swelling, emaciation, ventral abdominal oedema and sometimes, abortion and death come after this major sign which is very important for the pastoralists alerting them about a possible outbreak of trypanosomosis on which they decide whether to move the camels to a safe place or keep them where they are and face the risk.

Both curative and prophylactic treatments of the disease are becoming expensive and are a huge burden on the camel herders in terms of shortages and sometimes non-availability of quality drugs, and increasing drug resistance of *Trypanosoma evansi* to trypanocidal drugs (Intisar *et al*. 2006, Jinlin *et al*. 2004).

According to Somali camel herders, camel trypanosomiasis, locally known as "dhukaan" is transmitted by biting flies. In addition to the pastoralists' knowledge, *Haematophagus Diptera (Tabanidae* especially *Pangonidae)* mechanically transmitting camel trypanosomosis are reported to be present in the area (Mohamed F. Diriye 1989, A. Sheikh 2007). And in addition to trypanosomiasis, *Tabanidae* can potentially transmit many other infectious diseases (Coetzer and Tustin 2004).

The types and behaviours of the transmitting vectors of camel trypanosomosis, their abundance, distribution and control methods, are not well studied, and are therefore not known in Somalia/Somaliland. This makes the epidemiology of the disease unclear and difficult, and also obstructs possible eventual strategic intervention

This study intends to investigate the types, abundance, distribution and behaviour of the vectors transmitting *Trypanosoma evansi*, in order then to suggest environmentally friendly vector control methods that might alleviate the huge losses incurred by camel herders.

**Materials and methods**

The study was carried out between April and December 2010 in a pastoral area of Sheikh District, Sahil region of Somaliland.

**Traps:** Biconical traps (fabrics (blue and black)), attractant 1 (bovine urine), attractant 2 (acetone) were used.

In each trap was pinned a small plastic container full of concentrated bovine urine (attractant 1). Bottles of 100 ml each were filled with acetone. A small hole is made on the lid of the bottles, then the bottles are covered with a surgical glove to minimise the acetone dispersal, and then it is put at the base of the trap (Fig 1).

Two traps 150 metres apart were assembled in each of the following villages/locations of Sheikh District, Sahil region of Somaliland, namely Hudusa (Lat. 10.0009º N, Long.45.1858º E), Klabaydh (Lat. 10.0791º N, Long. 45.1756 º E), Hul qabobe (Lat.10.0116º N, Long. 45.1858º E) and Bioleey (Lat. 10.1384º N, Long. 45.253º E) in different dates of April 2010 as per table 1 below. One person in each location had been given the responsibility of guarding and maintaining the traps

| Village | Date | Remarks |
|---|---|---|
| Hudusa | 03 April 2010 | |
| Kala Baydh | 06 April 2010 | |
| Hul qabobe | 06 April 2010 | The traps were removed from Hul qabobe village by late June, 2010 due to reluctance from the community |
| Bioley | 22 April 2010 | |

Table 1: Dates of establishing traps in the different locations

A weekly collection protocol was set up. Samples transferred to STVS laboratory were pinned on a board and classified up to genera level. Types of biting flies attracted by the trap, numbers and distribution per month, per village and per season were studied.

**Field observation:** Grazing animals were observed, to note the kind of flies landing on and biting them

**Interview:** Elderly herders were also verbally interviewed

## Results and discussion

This preliminary study established different types of *Trypanasoma evansi* vectors in targeted villages/locations of Sheikh district.

**Fig. 1**

**Fig. 2**

Fig. 1: Biconical trap in a location

Fig. 2 Photos of the three biting flies captured in the trap: (a) *Tabanus*; (b) *Pangonia* and (c) *Haematopota*)

Due to its relative small size, the *Haematopota* photo was taken under stereomicroscope while the other two pictures were taken normally. These three flies were also observed biting grazing animals. Other biting flies such as the *Muscidae Hematobia* were observed feeding on animal bodies during both rainy and dry seasons, but were never observed in traps.

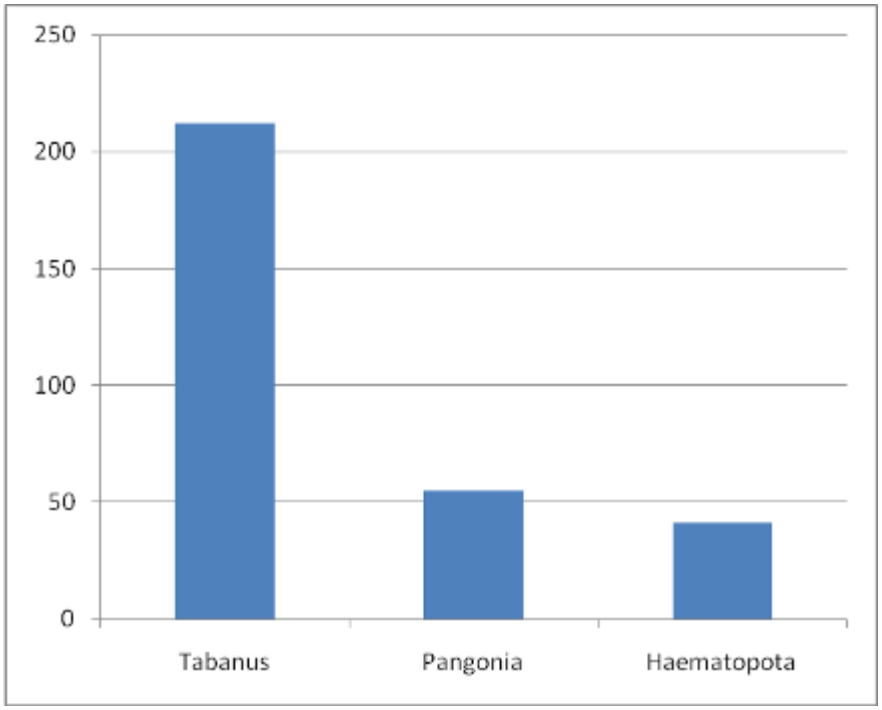


Chart 1: The quantity of different biting flies caught by the trap.

*Tabanus* is the most abundant (out of 308 biting flies caught during the nine months, 69% weres found to be *Tabanus*, followed by *Pangonia* with 18% and *Haematopota* with 13%, as illustrated in Chart 1). More than 20 different species of *Tabanus* have been shown experimentally to transmit *Trypanosoma evansi* (Lukins, 1998).

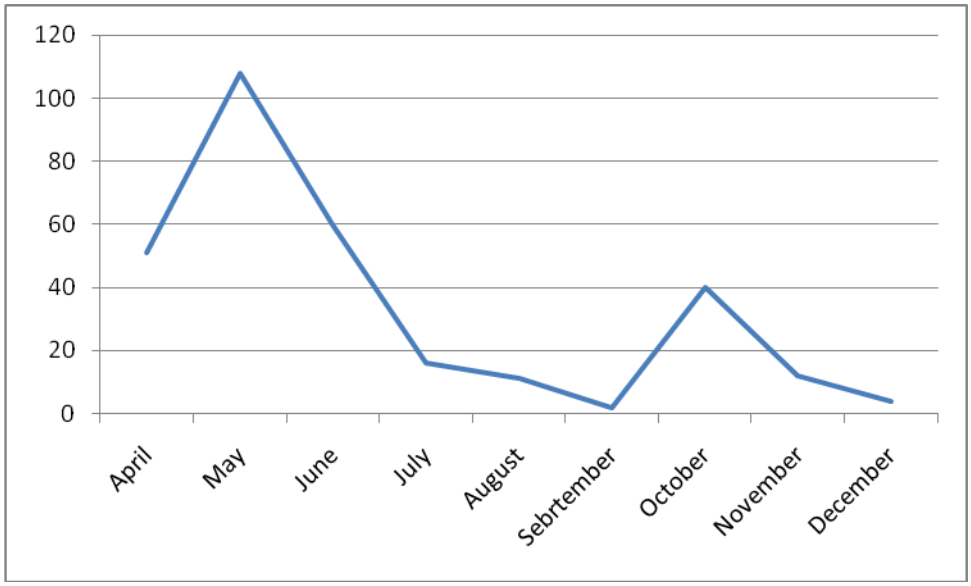


Chart 2: Cumulative numbers of biting flies per month

Chart 2 shows the cumulative distribution pattern of the biting flies among the nine months of the investigation period. The number is affected by the season. In rainy season especially the Gu' or long rains (April—June) and the Dayr or short rains (October November), the biting flies are relatively numerous and seriously disturb animals from grazing, whereas in the relatively dry and windy season (July – September), the numbers decrease dramatically. A similar pattern was reported in Sudan (Mohamed and Mihok 2009). Studies of *Tabanus* in various tropical areas

have shown a definite correlation between the seasonal outbreaks of *Trypanosoma evansi* infections and the increase in number of *Tabanus* during the rainy seasons (Felicia and Anthony 2005).

During the month of May when precipitations were at their peak in Hudusa village all Tabanus and Haemotopota trapped were females, while only one Pangonia male was trapped. It was also observed that a differently coloured Pangonia (black Pangonia, Fig. 3) appeared only in Hudusa village near the base of Golis range in mid May in the middle of regular and consistent rains.

Fig.3: Brown/red and black *Pangonia*

The drop in number of biting flies is attributable to the seasonal winds that blow from late June to mid September, and the fact that the coastal lowland area is hot and dry; therefore most of the flies either hide themselves under trees shade or die. In fact, the number of dead and broken flies in the traps increased from 8% in late May to 68% in early September because both wind and ambient temperature were rising during this period of the year.

*Tabanus* proved to be more resistant to wind and heat followed by *Haematopota*. Starting from June, *Pangonia* disappeared; in fact none was trapped from mid June to December 2010. September was the lowest in fly-catch but it never reached zero. The presence of some *Tabanus* spp. and *Haematobia* all year round ensures that transmission of the parasite occurs wherever reservoir hosts, vectors and susceptible hosts co-exist. With the assumption that *Tabanus*, *Haematopota* and *Haematobia* persist from January to March the dry season of the year, this explains the sporadic and chronic occurrence of the disease during the dry season and outbreaks during the rainy season.

This study also showed that the overall fly-catch of the magnitude of hundreds in nine months is far lower compared to other studies using different traps such as Nzi traps (Vanhennekeler et al 2008, S. Mihok and H. Mulye 2010) with a catch magnitude of thousands and 10 thousands respectively).

When asked, most of the respondents ascertained to the fact that there were less challenges as far as camel production was concerned. This could have a relationship with the low catch of flies evidenced during the study. According to pastoralist

elders, this was mostly attributed to climatic change: the heavy rains of early February (FAO SWALIP 2010), would have affected the life cycle of the biting flies

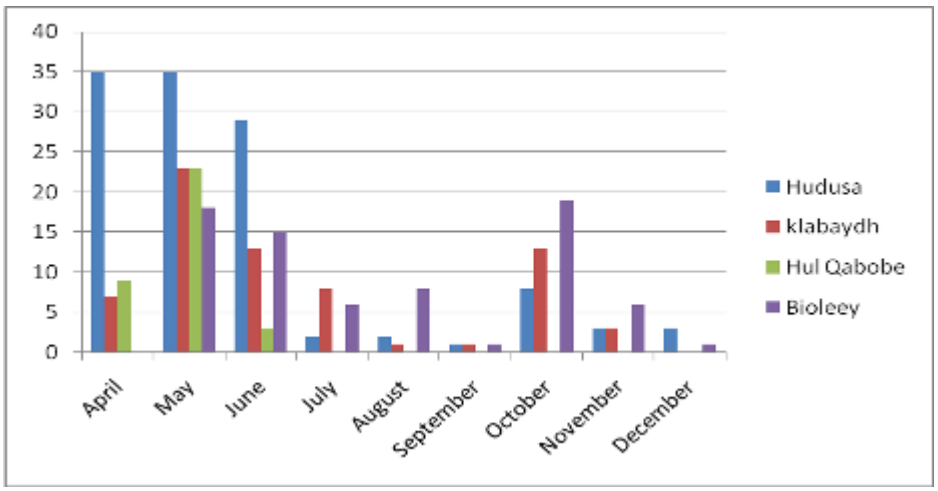


Chart 3: Cumulative biting flies' distribution per village/location.

The macro and micro climate of *Dipterans* are not known in Somali ecosystem, but these results show that all the three trapped biting flies are relatively more concentrated near the base of Golis range (Hudusa and Hul Qabobe villages) during the long rainy season, while in the short rainy season and in the dry seasons only *Tabanus* and *Haemtopota* are persistent and spread in locations such as Klabaydh and Bioleey a bit far from the mountains where salty water streams are available (Chart 3 and Chart 4).

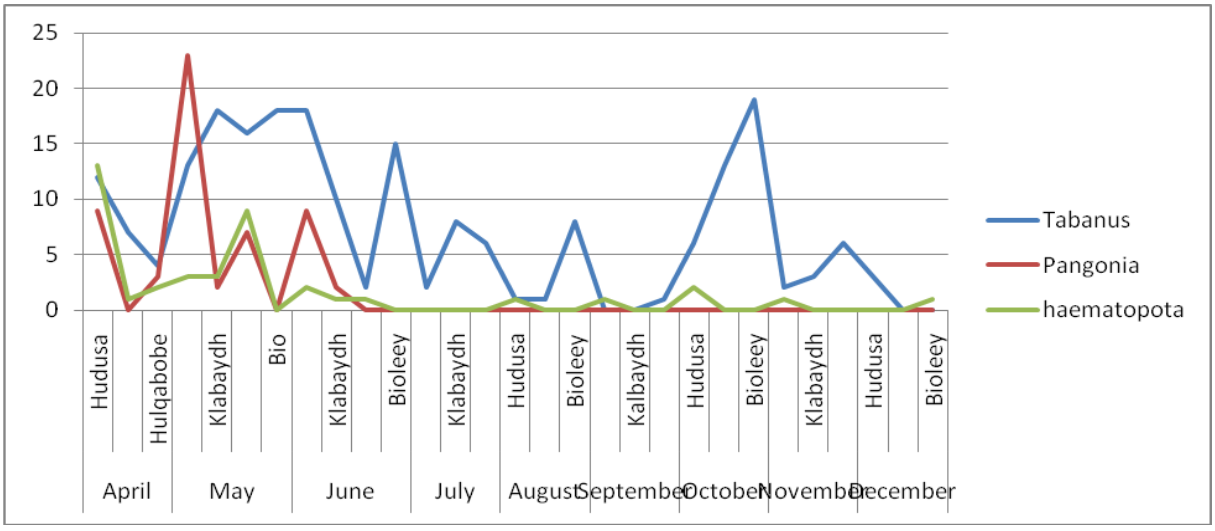


Chart 4: Individual biting flies, distribution per village and month

*Pangonia* is relatively concentrated near the base of Golis range (Fig.3) only during the long rainy season and totally disappears even during the short rainy season. *Haematobia* was also observed to be persistent and spread in all villages increased in numbers in rainy seasons and decreased during the dry seasons.

Fig. 3: Some views of Golis ranges in (a) dry and (b) rainy seasons

**Conclusion and recommendation**

The pattern of vectors presence during both rainy and dry seasons is similar to what Ahmed, A.B, Okiwelu, S.N, Samdi, S.M; and M.M. Mohamed and S. Mihok 2009 reported in Sudan and Nigeria respectively. The effect of wind and temperature during dry seasons reduce dramatically vector numbers. However as has been mentioned, *Tabanus* and *Haematopota* resist to some extent the harsh climatic conditions. This explains the complaint of the community (A. Sheikh 2007) from the disease affecting camel herds any time in the year; acute in rainy seasons and mostly chronic in dry seasons.

Camel herders experience heavy losses during rainy seasons when the challenge of biting flies is relatively high due to loss (mainly of milk), abortion and some animal deaths. According to the pastoralist elders interviewed many herders move away with their animals to other areas where the disease and its vectors are not present. Livestock herders who remain in the area use both curative and prophylactic therapy with the only available drugs Noroquine and Gquina. Both Noroquine and Gquina are a combination of Quinapyramine Sulphate and Quinapyramine Chloride. Herders explained that they administer these drugs by intravenous route instead of subcutaneous route. The challenge faced by the pastoralists is lack of awareness on drugs use and there is growing resistance to trypanocidal drugs used to treat the disease especially Quinapyramine-based drugs (Ross and Sutherland 1995) which are widely used in the area both as treatment and prophylaxis of Camel Trypanosomosis, and new drugs are not available. Therefore, since there is no vaccination for trypanosomosis (G. Ulienberg 1998) we suggest and recommend the following to alleviate the economic loss incurred by pastoralists:

*Chemotherapy and chemoprophylaxis*: Awareness creation and training of pastoralists on proper drug use both as prophylactic and curative to avoid drug misuse which may exacerbate drug resistance.

*New drugs*: Drug companies and pharmaceuticals should possibly research other potential alternative drugs to use in case this growing resistance of *Trypanosoma evansi* to the drugs become a serious problem that will be difficult to solve.

*More study*: Continue the study on trapping methods and attractants to find out the most suitable combination of fabrics, colours and attractants (especially natural) to help and alleviate this problem of the pastoralists. Acetone as *Tabanidae* attractant is good but is expensive and pastoralists cannot afford it.

*Vector control*: Governments and training institutions should investigate and implement other relevant feasible and cheap control measures such as use of good traps complementing the treatment and prophylaxis.

*Trap use*: Create pastoralist awareness on trap use and maintenance, although this will need long term effort. Some of the pastoralists totally refused to establish traps in their village at the beginning of the investigation. Others accepted after long persuasion and explanation that these traps will finally help them to reduce the number of biting flies in their area. Trapping can be planned mainly in the rainy seasons when good pasture is available and biting flies' challenge is relatively high, especially near and at the base of Golis range, so that animals may have relative comfort to graze and to reduce losses.

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1 Lecturer of Clinics, Dean of Studies, Sheikh Technical Veterinary School (STVS). Author to whom communication be sent

2 Tutor Assistant of Clinics, STVS, and Tutor Assistant of Pharmacology and Therapeutics, STVS

**E-mail:** shemanur@yahoo.com

**Origami Camels, by Justyna Hellebrand of the SOAS Origami Society**