ASSESSMENT OF VECTOR AND ANIMAL AFRICAN TRYPANOSOMOSIS (AAT) AT TWATWATWA IN KILOSA, TANZANIA

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SUMMARY

Entomological and parasitological surveys were carried out at Twatwatwa Community Based Organization (CBO) composed of Twatwatwa sub-village and Mawale-Lutindi sub-village in Kilosa district in order to assess the tsetse and Animal African Trypanosomosis (AAT) situation during the onset of the rain season of 2004. Blood samples from 73 cattle chosen randomly (plus few animals which were chosen basing on the clinical signs of the disease were collected and examined by heamatocrit centrifugation technique. Entomological surveys were simultaneously conducted using Challier Laveissiere biconical, pyramidal, S3 and sticky panel. Vector trappings were conducted from two sub-villages in the CBO; Twatwatwa sub-village along rivers Wami and Mkata and along the village and forest border at Mawale/Lutindi. The disease prevalence in bled animals was 16.4% and the infection rate in dissected tsetse flies, which mainly were *Glossina pallidipes,* was 31%. The results indicate a presence of a high disease incidence in the area. Tseste flies caught using stationary traps include *Glossina pallidipes, G. morsitans morsitans, G. brevipalpis* and *G. austeni* in the order of decreasing abundance and apparent densities for each species respectively. From the total number of tsetse caught and dissected, it appears that *G. pallidipes* is the major vector. High prevalence of AAT in the area was found to be due to poor grazing range management; high vector density and scarcity of water sources for animals.

INTRODUCTION

Twatwatwa Community Based Organization (CBO) is one of the oldest pastoral settlements in Kilosa District. Other settlements include Kiduhi, Mabwegere, Mbade (Madoto), Luhoza Godes, Kwambe and Mfilisi. The villages of the CBO are situated along Kimamba – Mkata road and covers an area of 30,830 hectares. Human population is estimated at 3510 and is of entirely pastoral community. Livestock number at the CBO is currently over 63,104 cattle, 10,401 goats, 5046 sheep and 520 donkeys. The total number of livestock in the whole district is 173,000 cattle, 87,000 goats and 23,000 sheep (Kilosa District Report, 2004).

Over 40% of the land in Twatwatwa CBO and other Pastoral settlements are tsetse infested. These flies have forced many pastoral communities to encroach farming areas. This saw emergence of serious conflicts, which have become a chronic problem in the district. Again trypanosomosis, which is a tsetse borne disease of livestock, has caused great economic losses to the pastoralists due to abortions and mortalities.

This study was carried out in order to find ways of reducing conflicts between cultivators (farmers) and pastoralists of Twatwatwa CBO, by finding and suggesting ways of stepping up the carrying capacity of the grazing area through community based tsetse control. The study was conducted at two sub villages namely Twatwatwa (S 06º 45'24.5"; E 037º 18' 37.2") and Mawale-Lutindi (S 06º 37'37.0"; E 037º 15' 23.0").

MATERIALS AND METHODS

Entomological survey

Tsetse fly distribution survey was carried out at Twatwatwa and Mawale-Lutindi sub villages by identifying areas along Wami and Mkata rivers that are tsetse infested (abundance and distribution limit). Tsetse flies were sampled using 3 types of traps namely pyramidal, S3, biconical, and stationery sticky panel. The traps were baited with acetone and cow urine in order to increase tsetse attraction and catches. Traps were emptied after every 24 hours for four days and trapped flies were counted and sorted into respective sex and species level for estimation of tsetse apparent density (flies/trap/day). Global positioning system (GPS) units were used to record the location of the trap sites in the villages.

Parasitological survey

Blood sampling within farmers' households were carried out at Twatwatwa and Mawale-Lutindi sub villages. Animals were sampled randomly but clinical signs were used in determining animals to be bled. Data recorded included village, name of owner, age, breed, sex and description of the animal. Age of animals was estimated by numbers of calves produced taking into account age at first calving of 3 years and a calving interval of 2 years. From each animal, blood samples were collected from ear vein into a heparinised micro-haematocrit capillary tube and stored in the cool box. From this sample, blood was taken to prepare a thin and thick smear in situ. Packed cell volume (PCV) was determined using the capillary micro-haematocrit centrifugation method (on the sample collected from the ear vein). All blood samples were examined for the presence of trypanosomes using the Micro-Haematocrit Centrifugation Technique (MHCT) and Dark–Ground/Buffy-Coat technique (DG-BCT). Smears prepared in the field were fixed and stained using Giemsa stain.

Wild animal observed in the area were recorded because these are alternative source of food for the tsetse and they harbor trypanosomes. Questionnaires were also conducted on the vector and AAT situation to few individuals who were willing to be interviewed. A total number of 20 household heads were interviewed.

RESULTS

Questionnaires

Pastoralists expressed their concern about the high prevalence of tsetse and tsetse borne diseases in the area and this was named as a major stumbling block on livestock keeping in the CBO followed by Tick Borne Disease, Contagious Bovine Pleuropneumonia (CBPP) and worms. Villagers wanted tsetse control programs to be initiated in the area. Drugs commonly used to treat animals once they succumb to AAT were identified to be: Diminizen, Novidium, Trypadium and Samorin. These were readily available at the CBO shop at a price of between Tshs 450 - 800 per packet.

Table 1. Total number of flies caught per village and their respective species

Village name	Tsetse species				Total number per village and apparent density, AD, in brackets
	G. pallidipes	*G. m. morsitans*	*G. brevipalpis*	*G. austeni*	
Twatwatwa	1223	121	21	21	1386 (86.6)
Mawale / Lutindi	53	16	27	2	98 (24.5)
Total	1276	137	48	23	1484 (92.8)

Entomological

Four tsetse species were identified in the following order of abundance; *G. Pallidipes, G. morsitans morsitans, G. brevipalpis and G. austeni* as shown in Table 1*.* These were trapped mainly along the two rivers, but the apparent density was high along Wami river compared to Mkata river. The apparent density at Twatwatwa was 86.6 flies/trap/day and 24.5 flies/trap/day at Mawale/Lutindi (Table 1). The vegetation cover, which mostly consisted of acacia woodland, was common throughout the entire area with occasional thickets especially along the two rivers Wami and Mkata. This type of vegetation favour flourishment of tsetse flies especially *G. pallidipes* and *G. m. morsitans.* Wild animals seen were mostly monkeys, impalas, gazelles, elephants and few giraffes. High tsetse density could be attributed by poor range management such that grazing areas are occupied by thickets and bushes which are ideal habitats for tsetse breeding.

Suitability of tsetse trapping devices in the sub villages

Table 2 shows total number of trapped flies per trapping device. The sticky panel trapped 60% of the total. However due to costs of using this device and inconveniences in handling, then the best device, cheap and easy to handle at the community level is the pyramidal trap. This trap retained more live flies compared to Biconical (12%) and S3 (3%). Pyramidal trapped 25% of total tsetse flies from Twatwatwa and Mawale/Litindi sub villages.

Table 2. Performance of trapping devices

Village name	Tsetse trapped per trapping device			
	Pyramidal	Biconical	S3	Sticky Panel
Twatwatwa	362	180	29	815
Mawale/ Lutindi	6	4	16	72
Total per trap	368	184	45	887
Total (%)	25	12	3	60

Suitability of tsetse trapping devices per tsetse species

G. pallidipes was caught by all trapping devices used in the CBO and this applies to *G. brevipalpis* which was caught by all traps at Mawale/Lutindi sub village. Some traps missed catch for other species e.g. *G. m. morsitans*, *G. brevipalpis* and *G. austeni*. The total number of tsetse species trapped by each trap in the respective sub villages are tabulated in Table 3.

Table 3. Suitability of tsetse trapping devices per tsetse species

Trap used	Twatwatwa				Mawale / Lutindi			
	Gp	Gmm	Gb	Ga	Gp	Gmm	Gb	Ga
Biconical	172	45	5	2	2	0	2	0
S3	29	0	0	0	10	4	2	0
Pyramidal	357	2	7	2	5	0	1	0
Sticky panel	665	74	9	17	36	12	22	2
Total	1223	121	21	21	53	16	27	2

Gp, *G. pallidipes;* Gmm, *G. m. morsitans;* Gb, *G. brevipalpis;* Ga, *G. austeni*

Infection rate in tsetse

Dissection of live flies was carried out on *G. pallidipes* to find and assess the level of infection. *G. pallidipes* was chosen for this as it was found to be the main vector in both sub villages as indicated in Table 4. The overall infection rate from the two locations was 31% (22/71).

Table 4. Infection rate in tsetse trapped in large numbers

Subvillage	Tsetse species	Dissected	Infected	% infected
Twatwatwa	*G.pallidipes*	57	16	28.07
Mawale /Lutindi	*G.pallidipes*	14	6	42.9
Total		71	22	31

Parasitological

Trypanosome prevalence in screened animals was 16.4% (12/73) and 5.5% (4/73) had East Coast Fever (ECF) causative parasites. These were treated accordingly. The PCV range of animal screened was 11–35 (Table 5).

Table 5. Animal trypanosomosis prevalence at the CBO

	Twatwatwa	Mawale/Lutindi	Overall for the CBO
Screened	41	32	73
Tryps +ve	8 (19.5%)	4(12.5%)	12 (16.4%)
ECF	4 (9.8%)	0	4 (5.5%)
PVC range	11 - 35	17 - 31	11 -35

DISCUSSION

Tsetse and animal trypanosomosis is a problem at Twatwatwa CBO as shown by the study carried in the area. High number of tsetse with the apparent density of 92.8 flies/day/trap is an indication that trypanosomosis is unavoidable. *G. pallidipes* was found to be the main vector in the area both in terms of abundance and infection rate. *G. pallidipes* is known for being a tsetse species with good vectorial capacity even when present in very low densities (Willet, 1970). Certainly, the presence of this species in the area aggravates the problem of AAT in the CBO.

G. m. morsitans is another tsetse species which cannot be neglected. In some area in Africa, the species has shown to depend or obtain a large percentage of its blood meal from livestock especially when wild animals are rare (van den Bossche and Staack, 1997) as recorded in this area where by the number of livestock is very high (about 63,104 cattle). Hence *G. m. morsitans* is equally important in the transmission of AAT in the CBO. *G. brevipalpis* is also another species for concern (Maloo, 1986). *G. austeni* the only species which was infesting Unguja Island of Zanzibar made it difficult for the Island to have livestock keeping (Horeth-Bontgen, 1992). In Kwazulu Natal (South Africa), *G. brevipalips* and *G. austeni* have been the two major species which have been behind the outbreak of AAT in the area responsible for massive death of livestock in recent years (Kappmeier–Green, 2003) This means the presence of the two species at the CBO posses a great danger to the development of livestock sector if not controlled or eradicated altogether.

In this case, efforts need to be done to control tsetse at the CBO in order to curb the prevalence of AAT because all tsetse species, which were trapped in the area, are good vectors for AAT. As shown by different trapping devices efficiency, pyramidal and biconical trap can be used to reduce the problem of AAT and the vector. However, the use of insecticide impregnated targets and in supplementation with animal baits is the quickest and efficient way of reducing drastically the problem of tsetse and tsetse borne disease in the area (Fox, 1991).

Pyramidal was the best trap for this area as it trapped more flies compared to biconical and S3. However, for control purposes we recommend the use of odour baited insecticide impregnated targets. The pyramidal traps could be used for monitoring the regression of flies during the control program.

The vegetation type in the CBO and bushes are ideal habitats of tsetse. The poor range management found in the area is ideal for tsetse breeding. Grazing areas are covered by thickets which offer good breeding sites for tsetse. Good range management will deny tsetse-breeding habitats thus reduce the vectors. During the study it was found that hot spots for tsetse are situated along the two rivers and these act as seed of infestation to other areas.

Animal screened were randomly chosen but also basing on the clinical presentation of the animal. Some of the animals had been under treatment few days or weeks before the onset of this study. Pastoral communities especially of Maasai origin tend to take care of their animals wherever they show signs of AAT (Roderick *et al.,* 2000). However, the fact that the overall disease prevalence in the area was found to be 16.4% is an indication that trypanocidal drugs resistance is occurring in the CBO. The problem of trypanosome resistance has been reported in several other places (Mbwambo *et al*, 1988)

Pastoralists tend to inject these drugs in the absence of veterinary supervision, obtaining their supplies mainly from local village shops or informal traders. Under dosing with trypanocides is usually uncommon but there is fear and implication that due to high prevalence of AAT there is a possibility of using drugs at dosage rates above the recommended dose. The pastoralist communities administer the drugs when disease is recognized and they rarely use trypanocides as prophylactics. Although necessity forces the livestock owners to obtain and use these drugs without veterinary supervision, there are concerns with regard to the possibility of drug misuse and the development of drug resistance (Roderick *et al.*, 2000). Drugs at Twatwatwa CBO were readily available at a relatively affordable price of Tshs 450 - 800 per packet.

Current livestock management encourages disease (trypanosomosis) transmission especially when animals are forced out of the villages and taken into other tsetse infested areas in search pastures and water during dry season. This increases the cattle–tsetse contact and thus the diseases. Again, this exposes animals to different cocktail of trypanosomes with different levels of sensitivity and susceptibility to trypanocidal drugs. The importance of the AAT is also accelerated by poor availability of food especially if it is of poor quality, plus stress imposed on animals by other diseases like tick borne disease and East Coast Fever (Fox 1991).

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