

# The impact of African animal trypanosomosis and Tsetse fly on the livelihood and well-being of cattle and their owners in the BICOT study area of Nigeria

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## Abstract

Nasarawa State, and most especially Lafia Local Government Area of the state which is the study area, is an area with huge agricultural potentials. In order therefore to assess the impact of African animal trypanosomosis and its vectors, entomological, epidemiological and questionnaire surveys were carried out within the area covered by the Biological Control of Tsetse Fly Project (BICOT). The project area covers approximately 1,500 sq. km of land. Epidemiological surveys were carried out by taking blood samples of 200 slaughter cattle and 200 settled cattle followed by parasitological examination of these samples, using thin and thick blood smears, the haematocrit centrifugation and Buffy coat techniques. Entomological surveys were also conducted using the blue biconical traps. The traps were set at an interval of about 250 m (depending on vegetation) along the river system within the study area. The questionnaire survey involve the use of structured questionnaire to collect information on the impact of African Animal trypanosomosis and its vector on the livelihood and well-being of cattle and their owners in the study area. A total of 200 questionnaires were administered during the study period. The impacts assessed include knowledge about African Animal trypanosomosis and its vectors, their effects on cattle and owner's income, and treatment of the disease and willingness to participate in control of the vectors among others. All species of pathogenic trypanosomes were identified during the epidemiological survey. 18 (9%) and 21 (10.5%) of blood samples from settled and slaughter cattle being positive for trypanosomosis respectively. The entomological surveys revealed the presence of *Glossina palpalis palpalis* and *Glossina tachinoides* as the main glossina species in the area. In all, 466 tsetse flies were caught out of which 454 were *G. p. palpalis*. The result of dissection showed that 9 (1.9%) of the total flies caught were positive for trypanosomes. 185 out of the 200 questionnaires administered were returned. Between 152 (82.2%) and 165 (89.2%) of the respondents were aware of the negative impact of African Animal trypanosomes and its vector on their livelihood and the well-being of their cattle. Some of such impacts mentioned include poor growth, ill health, disturbance, emaciation, anemia and eventually death, all of which resulted in losses to the farmers. Because of the importance of livestock farming in providing livelihood for the respondents and their family, 142 (about 77%) are prepared to make commitment to livestock development programme such as vector control.

## INTRODUCTION

African animal trypanosomosis and its vectors occur in vast areas of sub-Saharan Africa with devastating impact on livestock productivity. Its epidemiology and impact on livestock (especially cattle) production are determined largely by the prevalence and distribution of the disease and its vectors in the affected areas. The limitations imposed by the tsetse and trypanosomes problem continue to frustrate efforts and hamper progress in crop and livestock production, thereby contributing to hunger, poverty and the suffering of entire communities in Africa (PATTEC, 2001). Tsetse transmitted trypanosomosis in man and domestic animals poses a serious threat to the lives and livelihood of entire communities and constitutes the greatest single

constraint to livestock and crop production.

The problem is classified as severe in the majority of the 37 sub-Saharan countries affected where it figures among the first three priorities veterinary diseases (FAO, 1992). Tsetse-transmitted trypanosomes are accorded little attention and priority because it is essentially a rural problem, which occurs only in Africa. However, its negative impact on the history and socio-economic development of most of the continent has been, and continues to be, very devastating (PATTEC, 2002). According to Oluwafemi et al. (2002), the negative economic impact of the desertation of Fulani herdsmen and their cattle from Umuaisha in Toto Local Government area of Nasarawa State, due to the problem of tsetse/trypanosomes complex, prompted the Emir (King) of

the town to send a save our soul message to the federal department of livestock and pest control services. Owing to trypanosomosis among other constraints, the report revealed that the use of animal draught power in agriculture and transport, and the practice of mixed farming are not well developed in the study area.

Tsetse flies infest about 10 million km<sup>2</sup> of fertile land spread across 37 countries on the African continent, from Senegal in the North to South Africa in the south. Many areas that are infested with Tsetse flies are the most suitable areas for livestock and crop production. Out of the 165 million cattle found in Africa, only 10 million are found within the Tsetse fly belt, and these are mostly low producing breeds which are maintained on high drug management regimes to keep trypanosomosis in check (PATTEC, 2001). The cattle per caput ratio, that is the average number of cattle per head of the population, is almost as high in Africa as in the developed world and the small ruminant per caput ratio is considerably higher but productivity is much lower in Africa.

Indeed, it has been found over the years that in a large number of African countries, agricultural development as a whole has fallen behind overall economic growth and the shortfalls is particularly serious in the livestock sub-sectors (Sabine, 1993). The availability of livestock foods per head of the population has not improved and whatever increases in production there is, is mainly due to herd and flock increases rather than productivity increase. The report further stated that in fact, demand for livestock foods in tropical Africa has out run the supply. The Food and Agriculture Organization (FAO) of the United Nations has estimated that, every year, Africa loses over 3 million cattle and other domestic livestock through deaths caused by trypanosomosis.

Approximately 35 million doses of trypanocidal drugs (worth about US \$35 million) is bought every year in futile efforts to maintain livestock free of the disease (PATTEC, 2000). The annual loss directly attributed to trypanosomosis, in terms of reduced meat and milk production and in terms of cost related to treating the disease or controlling the vector, has recently been estimated at US \$1.2 billion. This figure rises to over US \$4.5 billion per year, if losses in potential crop and livestock production attributable to the disease are considered, and excludes the losses attributable to the effects of sleeping sickness in humans. Reports of reinfestation of areas that had previously been cleared of the

fly are wide spread. One of such area is the Biological control of tsetse fly project (BICOT) area in Lafia local government area of Nasarawa State, Nigeria (Oluwafemi et al, 2001).

The control strategies of animal trypanosomosis in Nigeria over the years have been directed against both the parasites and the vector. Strategies developed against the vectors have been those of bush clearing (Steiner, 1964 and Ford, 1970), the use of traps and screens (Challier and Laveissiere, 1973) and the use of sterile insect technique (SIT) (Oladunmade, 1990). The main approach to controlling the parasite in the host has been by chemotherapy and chemoprophylaxis. Experience has however shown that no one single technology or approach will result in the eradication of tsetse flies from an area.

The benefits of tsetse and trypanosomosis eradication will include improved human and livestock health, diversified agricultural systems, increased food production and security and improved livelihood of the community and more responsible utilization of available natural resources. Therefore there is the need for an integrated approach and the use of appropriate combinations of available technologies in the tsetse eradication effort. According to PATTEC (2001), sustained participation and contribution by communities will be ensured through training, motivation mechanism and awareness creation. The objective of the present study therefore was to assess the impact of the tsetse/trypanosomosis complex and the feasibility of tsetse control partnership with cattle owners (mostly Fulani) in the study area.

## **MATERIALS AND METHODS**

The study was carried out in the Biological control of tsetse fly project (BICOT) area in Lafia Local Government Area of Nasarawa State, Nigeria, covering approximately 1,500 km<sup>2</sup>. The natural vegetation is predominantly woody savanna of the southern guinea type. Situated in the tropical zone of the country, Nasarawa State experiences both hot and cold weather. Data for this study were obtained from the entomological, epidemiological and questionnaire surveys carried out in the study area. Entomological survey involves the use of blue biconical traps. The traps were set at an interval of about 250 m (depending on vegetation) along the river systems within the study area. The epidemiological survey was carried out by taking blood samples from 200 slaughter Cattle and another blood samples from 200 settle cattle.

The blood samples were then examined parasitologically using thin smear, buffy coat and the haematocrit centrifuge techniques. Trypanosome infection in the flies was confirmed through dissection of the tsetse flies caught using both dissection and high power microscopes. The questionnaire survey involves the use of 200 structured questionnaires to collect information on this study from cattle owners in the study area. The questionnaires were administered to obtain information on tsetse fly and trypanosomosis, their effects on cattle and owners income, treatment of the disease and willingness to participate in the control of the vectors among others.

## **RESULTS**

The total number of tsetse fly caught during the study period was 466 out of which 454 were *G. p. palpalis* while the remaining 12 were *G. tachinoides*. Out of the 454 *G. p. palpalis* recorded, 196 were males and 258 were females. Out of the 12 *G. tachinoides* caught, 4 were male while 7 were females. The results of the dissection showed that 9 (1.9%) of the 466 flies caught were positive for trypanosomes with all being *Trypanosoma vivax*. All infected flies were *G. p. palpalis*. The small number of *G. tachinoides* caught could be responsible for the absence of infection in this species during the study period. The results of the parasitological examination carried out on the 200 blood samples collected from settled cattle and another 200 blood samples from slaughter cattle shows that 18 (9%) and 21 (10.5%) from settle and slaughter cattle respectively were positive for various trypanosomes. There was, however, no significant difference ( $P > 0.05$ ) between trypanosome infection detected in the field and that of the abattoir.

Almost all the cattle slaughtered were from the study area. This situation is testifying to the fact that bovine trypanosomosis exists as a problem in the study area. Most of the infections in settle cattle (67%) and slaughter cattle (81%) were due to *Trypanosoma congolense*. Finally, a total of 200 structured questionnaires were administered in the study area to collect information on the impact of tsetse and bovine trypanosomosis on the livelihood and well-being of cattle and their owners. Out of the 200 questionnaire administered, 185 were returned with 131 (70.81%) of the respondents being cattle owners, 39 (21.1%) are either their children or keepers whose services are to assist cattle owners while 15 (8.1%) are those who keep for others based on commission.

The results of the questionnaire survey revealed that major

breeds of cattle in the area are white Fulani (Zebu) and Sokoto Gudali. 175 (67%) of the respondents keep only white Fulani while 86 (33%) keep both white Fulani and Sokoto Gudali. The main source of drinking water for the cattle is the stream where 165 (89.2%) respondents get water for their cattle. However 8 (4.3%) respondents provide water for their cattle at home. 152 (82.2%) respondents are aware of disease(s) or conditions that usually affect their cattle. Some of the diseases/conditions named include trypanosomosis, skin disease/conditions, worm infestations, foot rot, and liver fluke among others. 148 (80%) are familiar with tsetse and trypanosomosis. Signs or conditions listed as the affect of tsetse and trypanosomosis include poor growth, emaciation, rough hair coat, anaemia, general ill health and sometimes death. 153 (83%) of the respondents usually treat their cattle against trypanosomosis and they believe that the treatment charges are expensive. As revealed by this study, the use of trypanocides is a common practice in the area. Nearly all the cattle owners are familiar with these trypanocides (mostly berenil, samorin and homidium). This is one of the reasons why cattle owners can settle in the study area despite the problems of tsetse and trypanosomosis. 172 (93%) respondents agreed that their income would increase if trypanosomosis is controlled. Other benefits mentioned include reduction in morality, increases in stock, reduction in cost of drugs and rest of mind and improvement in well-being for owners. Because of the importance of livestock farming in providing livelihood for the respondents and their family, 142 (about 77%) are prepared to make commitment to livestock development programme such as vector control.

## **DISCUSSION**

The present study indicates that tsetse and trypanosomosis are still of much concern and represents a major obstacle to livestock production and development of allied industries. The study further revealed that *G. p. palpalis* which was eradicated from the study area about two decades ago (Anon, 1985) have again become established in the area. The presence of infected *Glossina*, which constitutes about 1.9% of the total tsetse flies caught, indicates that the transmission cycle has not been broken. Unless a genuine policy and realistic measures as regards tsetse and trypanosomosis are accorded due priority, the situation will persist or probably increase in the nearest future.

One of the greatest impediments being lack of sustained effort both in terms of provision of infrastructure, logistics

and finance. This lack, in fact, is characteristic of tsetse and trypanosomosis control in the study area in particular and Nigeria in general. The parasitological examination revealed a prevalence rate of 9% for bovine trypanosomosis with *T. vivax*, *T. congolense* and *Trypanosoma brucei* being the pathogenic trypanosomes identified. This study is in agreement with the findings of other researchers (Ajayi et al., 1997 and Ilemobade, 1994). That *T. congolense* is the predominant species is also in agreement with the results of earlier surveys in the area (Ajayi et al., 1997; Onyiah, 1997 and Ilemobade, 1994). The importance of involving the livestock owners in decision-making cannot be overemphasized. These are the producers. The farmers' perceptions and expectations have to be respected, and can be put to good use. This then necessitated the use of questionnaire.

The questionnaire survey has revealed the concern of livestock farmers on the problem of tsetse fly and trypanosomosis. Their responses to questions about the presence of tsetse fly and trypanosomosis, the symptoms or signs of the effect of this disease and its vector and the high cost of trypanocidal drugs among other questions show that there is a good correlation between their responses and actual situation on ground as reflected in the result of the tsetse fly dissection and the parasitological examination of the blood samples. About 93% of the farmers believed that their income would increase if trypanosomosis is controlled and that they stand to gain more from such assistance as most of the effect of the disease and its vectors will be removed.

In conclusion therefore, the readiness of the livestock farmers to make commitment towards tsetse and trypanosomosis control should be considered. Although it is easier said than done, Government and donor agencies can start a pilot project, which will involve only a few of the cattle owners. A suitable and simple basic control technology is more likely to be accepted and practiced by

farmers than a complex and comprehensive scheme. The use of insecticide impregnated screens and traps are some of such simple techniques, which are of ready application by an average livestock farmer, and this will go a long way to complement large-scale effort at controlling tsetse and trypanosomosis.

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