

## Epidemiology of Ruminant Trypanosomiasis in Riyom L.G.A of Plateau State, Nigeria.

\*Balak, G.G.<sup>1</sup>; Abdullahi, S.U.<sup>2</sup>; Omotainse, S.O.<sup>1</sup>; Shamaki, B.U.<sup>1</sup>; Kalejaiye, J.O.<sup>1</sup>; and Eche, T.A.<sup>1</sup>.

<sup>1</sup> Nigerian Institute for Trypanosomiasis Research Vom Plateau State Nigeria.

<sup>2</sup> School of Agricultural Sciences A.T.B.U; Bauchi.

\* Corresponding Author

### ABSTRACT.

293 blood samples collected randomly from 1101 cattle (34.5%), 87 Sheep(29.8%) and 105 goat (35.8) from 12 villages in 3 districts (Bachit, Ganawuri and Riyom) of Riyom LGA were examined. The total number of male animals was 113 (38.5%) while female were 180 (61.4%) for *Trypanosoma* infections. 39(34.5%) of the males were cattle, 32(28.3%) sheep and 42 (37.17%) goat. While 62(34.4% of the Cattle were female, 55(30.5%) sheep and 63(35.0%) goats. The blood samples were analyzed for parasitaemia using a combination of blood (Thin, Thick and wet) film techniques and concentration methods. (Haematocrit centrifugation technique [HCT] and Buffy Coat method [BCM]). 21 (7.2%) of the total blood screened from the three districts were positive for both *Trypanosoma vivax*, *T. congolense* and *T. theileri*. The average packed cell volume (PCV %) for infected males and non-infected males is  $21.4 \pm 4.4$  and  $25.7 \pm 5.0$  while that of female is  $18.6 \pm 4.7$  and  $26.4 \pm 11.6$ , respectively. *T. vivax* is higher 17(8.1%) in occurrence than *T. congolense* 3(14.3%) and *T. theileri* 1 (4.8%). An incidental low infection of microfilaria was found in cattle, sheep and goats in Bachit 7(6.3%) and Riyom 2(6.7%). Other details are discussed.

**Key words:** Epidemiology, Ruminant Trypanosomiasis and Plateau State.

### INTRODUCTION

Trypanosomosis is a zoonotic protozoan disease cause by parasite of the genus *Trypanosoma* transmitted either mechanically or cyclically by biting flies or biologically by about 30 species and subspecies of the insect *Glossina*. Other mechanical transmitters include the Tabanid and stomoxys, As a zoonotic disease, it affects man (*Trypanosoma gambiense* and *T. rhodesiensis*) and animals (e.g *T. congolense*, *T. brucei* *T. vivax*). The course of the disease can be per acute, acute or chronic depending on host and parasite. (Masake 1980; Ikede 1981). It is clinically characterized by pyrexia, progressive anaemia, emaciation, muscular atrophy, lacrimation, and nasal discharge and diarrhoea. Other signs of the disease include Oedematous swelling of the external genitalia, lower abdomen and thorax, ventral region of the neck, sometimes supra- or bital fossa and limbs in per acute cases and in chronic cases lumbar paralysis (Ikede 1981).

The Jos Plateau including the Bokokos area was said to be TseTse fly-free in the past. However, of recent epidemiological reports reveals trypanosomosis on the Plateau by Joshua (1986), and Kalu and Magaji (1986) Kalu and Uzoigwe (1996). There were followed by others works especially on the lower Plateau by Omotainse and Kalejaiye, (1999), Kalejaiye and Omotainse, (2000), Kalejaiye, Omotainse and Omoogun (2001) and Shamaki et al (2002). However, the prevalence of Trypanosomiosis in Plateau state is due to its contiguous nature with established trypanosome infected state e.g Kaduna, Nassarawa and Bauchi state

where cattle routes traverse Plateau State. It is also noticed that there have been change in climatic conditions of Plateau state such as increase in temperature makes the environment conducive for the vector (*Glossina*) to develop and spread the disease. The impact of Trypanosomiasis is mostly felt by farmers by loss of traction, loss of the animals, reduced market value.

This work is aimed at determining the prevalence and economic significance of Trypanosomiasis in the study area besides to identify the vectors and compare the efficacy of various detection techniques routinely employed in the diagnosis of Trypanosomiasis.

## MATERIALS AND METHODS

**Study Area.** Riyom Local Government Area of Plateau State Nigeria lies  $9^{\circ}10-9^{\circ}40$  North and  $8^{\circ}36-9^{\circ}10$  East. It has an annual rainfall of 1300-1500 mm (April-October) and is 1200-1500m above sea level (Anon 1 987). Jos-South and Bassa LGA's form its Northern boundaries while Mangu in West and Jama'a and Kaura LGAS of Kaduna state in the East and South respectively. It falls within the northern limit of the Sudan Guinea Savannah vegetation but like other parts of the Plateau enjoys mountain type climate. A total of twelve villages of the 3 districts (Bachit, Ganawuri and Riyom) of the LGA was surveyed between the months of September and October 1999.

**Herds.** The animals are from Sedentary and semi nomadic herds. They are White Fulani Zebu cattle and their crosses aged between 1- 6 years, Yankassa sheep grazing with the bovine herds aged between six months and 2 years, and African dwarf goats aged 6 months and 3 years respectively. Clinical signs were observed in the herd history obtained from owners prior to bleeding.

**Blood collection.** 2- 3mls blood samples were collected from Jugular veins of the animals using clean syringe and needle, into bijoux bottles containing EDTA as anticoagulant. The bottles are labeled to indicate sex, specie and age and placed in an ice box containing ice pack to enhance survival of Trypanosomes.

**Diagnosis.** Diagnosis is achieved by standard trypanosome defection methods (STDM): wet, thick thin films and concentration method: Haematocrit centrifugation technique (HCT) and buffy coat method (BCM) (Woo and Kanffmann, 1972).

**Analysis.** Blood samples were examined for parasitaemia using STDM, HCT and BCM methods in the field and parasite identification was carried out using Giemsa stained thick and thin films thick and thin films in the Laboratory at the Nigerian Institute for Trypanosomiasis Research (NITR) Vom, Plateau state. These films were stained with Giemsa and morphological examination of the parasites was carried out with microscope X100 oil immersion objective.

## RESULTS AND DISCUSSION

Table I: Distribution of Trypanosome species in Riyom LGA

District	No. of sample	No. positive	Species		
			<i>T. vivax</i>	<i>T. congolense</i>	<i>T. theileri</i>
Bachit	111	12 (10.8%)	9 (8.11 %)	3 (2.7%)	0 (0%)
Riyom	95	1 (1.1%)	-	-	1 (1.1%)
Ganawuri	87	8 (9.2%)	6 (6.9%)	2 (2.3%)	0 (0%)
Total	293	21 (7.2%)	15 (71.4%)	5 (23.8%)	1 (4.8%)

Table II. Mean PCV % of Trypanosome infected and Non-infected Ruminants in Riyom L.G.A.

PCV (%) Examined	Sex	No. of Animals	Mean+ SD
Infected	Male	8	21.4 ± 4.4
	Female	13	18.6 ± 4.7
	Total	21	19.7 ± 4.7
Non - Infected	Male	105	25.7 ± 5.0
	Female	167	26.4 ± 11.6
	Total	272	26.1 ± 5.0

Table III Trypanosome detection using some diagnostic methods.

S/No.	Method of diagnosis	No. of samples examined	No. of samples positive % sensitivity	% of Total sample positive
1	Wet blood examination	293	8 (13.3%)	2.7
2	Giemsa stained thin blood film		16 (26.7%)	5.5
3	Giemsa stained thick film		7 (11.7%)	2.4
4	Buffy coat method (BCM)		9 (15.0%)	3.1
5	Haematocrit centrifugation technique(HCT)		20 (33.3%)	6.8

Table IV. Distribution of Trypanosome species in different sexes of Ruminants in Riyom L.G.A.

Animal	Sex	Sample Size	No. positive	<i>T. vivax</i>	<i>T. congolense</i>	<i>T. theileri</i>
Cattle	Male	39	5 (12.8%)	4 (80.0%)	0 (0%)	1 (20.0%)
	Female	62	9 (14.5%)	8 (88.9%)	1 (11.1%)	0 (0%)
	Total	101	14 (13.8%)	12 (85.7%)	1 (7.1%)	1 (7.1%)
Sheep	Male	32	3 (9.4%)	2 (66.7%)	1 (33.3%)	0 (%)
	Female	55	1 (1.8%)	1 (100%)	0 (0%)	0 (0%)
	Total	87	4 (4.6%)	3 (75%)	1 (25%)	0 (0%)
Goat	Male	42	0 (0%)	0 (%)	0 (%)	0 (0%)
	Female	63	3 (4.8%)	2 (66.7%)	1 (33.3%)	0 (0%)
	Total	105	3 (2.9%)	2 (66.7%)	1 (33.3%)	0 (0%)
Grand total		293	21 (7.2%)	17 (81%)	3 (14.3%)	1 (4.8%)

21 (7.2%) from the total ruminant blood sample collected (293) were found to be positive for trypanosomes. The blood samples were collected from three districts (Bachit, Riyom and Ganawuri) Local Government Area (L.G.A.). 111 samples collected from Bachit district comprise cattle, (41) sheep (30) and goats (40) respectively. 12 (10.8%) of the ruminants were found to be positive with *T. vivax* 9 (8.1%), *T. congolense* 3(2.7%) and 0% *T. theileri* in Riyom district 95 blood samples were analysed, only 1(1%) was positive for *T. theileri*. While Ganawuri district has, from the 87 blood samples analyzed, 8(9.2%) were positive out of which 6(6.9%), 2(2.3%) and 0% represents *T. vivax*, *T. congolense* and *T. theileri* respectively

as seen in Table 1 . A total of 113(38.6%) ruminants were examined. 39 (34.5%) were from bulls, 32(28.3%) from rams and 42 (37.2%) from goats while 180(61 .43%) is of female ruminants 62(34.4%) from cows, 53(30.6%) ewe and 63(35.0%) goats.

The average PCV % of the infected male is  $21.4 \pm 4.4$  and  $18.6 \pm 4.7$  from 8 infected male and 13 infected females. While Non infected male is  $25.7 \pm 5.0$  and  $26.4 \pm 11.6$  of the 105 and 167 non infected females respectively. (Table II) from the method of diagnosis in Table III we will notice that HCT and Giemsa stained thin blood film are more sensitive compared to the rest of the methods in the table.

In Table IV cattle and sheep are more susceptible to goats based on the higher infection rate of the two animals. These phenomena may be due to preference of the cattle and sheep as the host than goats and possibly because goats graze in the immediate surroundings therefore not much exposed to vectors (*Glossina* sp) carrying the parasite. The low PCV % values were seen in infected animals only confirms association of anaemia with trypanosomiasis (Anosa and Isoun 1974). Trypanosomiasis is found more in cattle than sheep and goats as seen in the result shown in table IV. This is because cattle are preferred feeding host of tsetse flies Esuruoso (1974) and Stephen (1970) females ruminants are more infected but this result is possibly due to large number of female ruminants from which blood samples was collected.

Riyom district has low infection rate which may be due to long period of exposure thereby leading to adaptive tolerance with a host - parasite balance and self cure intervention. (NITR 1990) and or, exposure to various anti trypanosomal drug before the survey study. Age and sex do not influence infection rate.

In conclusion, the result from this study is in agreement with past investigation; Joshua (1986), Kalu (1996 a and b), Kalejaiye, Omotainse (2000), Shamaki et al (2002); in which *Trypanosoma vivax* 17(81%) is the most prevalent in the area and considering these years of prevalence may in Plateau state, the state is becoming an endemic area. This is because of surrounding pockets of game reserves and wild life park within the state and from neighboring states, Nassarawa and Bauchi state thereby providing pockets of reservoir host, and equally conducive environment for vector (*Glossina*) proliferation associated with climatic condition of Plateau state.

#### ACKNOWLEDGEMENT

We wish to acknowledge the assistance of staff in the VLS Division of NITR Vom, the secretarial assistance of Mr. Morris Dasong and the entire management of NITR for facilitating the investigative work, and allowing its publication.

#### References.

1. Anon Tounsts (1987) Plateau printing and publishing Company Jos pp. 5-9
2. Anosa V.O. and Isoun T.T. (1974) Control of animal trypanosomiasis in Nigeria as a strategy for increased livestock production Proc. Of a preparatory workshop. Vom Plateau state pp. 5-9, As quoted by Anosa, V.O. (1989).
3. Esuruoso G.O. (1974) The Epizootiological prevalence and economic aspects of bovine trypanosomiasis in Nigeria. Proc. US Afr. Hlth. Ass. 27:160 - 175.
4. Ikede B.O. (1981) The understanding of the pathological effects of Trypanosomiasis in ruminants as a basis for diagnosis. Proc. 1st Nat. Conf. Tsetse and tryps. Res. Nig. Ed. Aug. 10-12, 1981:96 -107.

5. Jodhus T.S. (1986) The prevalence of trypanosomiasis in cattle at the lowland zone of Jos Plateau. Nrg. Bull. Trop. Am. Hlth. Prod. In Africa: 55 -57.
6. Kalejarye J.O. Omotamse S.O. and Omoogun G.A. (2001) Prevalence and distribution of ruminant trypanosomiasis in Bokkos L.G.A. of Plateau state. NVMA Bk of Abstract 38th annual National Congress. Topo Badagy Lagos, Nigeria. p. 49.
7. Kalejarye, J.O. and Omotainse, S.O. (2000): Occurrence of animal trypanosomiasis in Ganawuri district of Riyom L.G.A. of Plateau state NVMA Bk of abstract. 37th annual National Congress, Uyo Nigeria. p. 13.
8. Kalu A.U. (1996a) Current status of tsetse fly and animal trypanosomiasis on the Jos Plateau. Nigeria Prev. Vet. Med. 27:107-133.
9. Kalu A U (1996b) Acute trypanosomiasis in a sedentary herd on the tsetse free Jos Plateau, Nigeria. British Vet. J. 1 52: 477 -479.
10. Kalu, A.U. and Magaji, Y. (1986). An endemic focus of Trypanosomiasis in Benue State. NITR Annul Report Vom-Jos. Plateau State Nigeria.
11. Kalu A.U. and Uzorgwe N.R. (1996) Tsetse fly and trypanosomiasis on the Jos Plateau Observations on outbreaks on Barkin-Ladi LGA. Trop. Vet. 14:117 -126.
12. NITR (1990). NITR's external review mission report for visiting NARP officials.
13. Omotainse, S.O. and Kalejaiye, J.O. (1999). Prevalence of ruminant trypanosomiasis on the high Plateau of Jos. NVMA Bk of Proc. 36 annual national Congress Kaduna, Nigeria, October 1999. pp. 114 -115.
14. Shamaki B.U. et al (2002) Prevalence of trypanosomiasis and other blood parasite in some parts of Plateau state, Nigeria-Current status. Proc. of 39th annual Congress of NVMA Sokoro (2002).
15. Stephen, L.E. (1970). Clinical manifestation of trypanosomiasis in livestock and other domestic animals in Mulligan, H.W. Ed. The African Trypanosomiasis London, Ailen and Unwin, pp. 774 -794.
16. Woo, P.T.K and Kauffmann, M. (1972). The haematocrit centrifugation technique for the detection of low virulent strains of Trypanosomes of the *T. congolense* subgroup. Acta Trop. 28:304 -308.