

**STUDIES ON PREVALENCE OF TRYPANOSOME INFECTION IN ABATTOIRS IN ASABA, DELTA STATE, NIGERIA**

\*<sup>1</sup>Chibuogwu, F. U., <sup>1</sup>Ajunwa, L. O., <sup>2</sup>Oyo, A. E., <sup>2</sup>Preye, T. M., <sup>2</sup>Ebulue, R. O., <sup>1</sup>Achagwa, S. M., <sup>1</sup>Onyeagu, C. L., <sup>3</sup>Enoh, E., <sup>4</sup>Ofikwu, P. O. and <sup>1</sup>Jonah, A. O.

<sup>1</sup>Nigerian Institute for Trypanosomiasis Research (NITR), Suleja, Niger State, Nigeria.

<sup>2</sup>Nigerian Institute for Trypanosomiasis Research (NITR), Asaba, Delta State, Nigeria.

<sup>3</sup>Nigerian Institute for Trypanosomiasis Research (NITR), Kaduna, Kaduna State, Nigeria.

<sup>4</sup>Department of Microbiology, University of Abuja.

\*Corresponding authors' email: [cisca4sacredheart@gmail.com](mailto:cisca4sacredheart@gmail.com)

**ABSTRACT**

This study investigated the prevalence of trypanosome infection in cattle and Red Sokoto (R.S) goats slaughtered at abattoirs in Asaba, Delta State. 304 animals comprising 265 cattle, 39 R.S goats were examined. Blood was collected from the jugular vein of each animal into EDTA containers, placed in cold boxes and transported to the Nigerian Institute for Trypanosomiasis Research (NITR) laboratory in Asaba where standard trypanosome detection methods (STDM), Haematocrit centrifugation technique (HCT) and Buffy coat methods were used to detect trypanosomes and determine Packed Cell Volume (PCV). The result of the investigation showed that seventeen (17) animals were infected giving an overall prevalence of 5.59%. Fifteen (5.66%) of the cattle and two (5.13%) of the R.S goats were infected. Female cattle had higher prevalence of trypanosomiasis (6.78%) than the male cattle (4.76%). Difference in prevalence in female and male cattle was statistically significant ( $p < 0.05$ ). In R.S goats, 6.45% prevalence was observed in the males while no infection was found in the females. Three species of *Trypanosoma* namely, *Trypanosoma vivax*, *T. congolense* and *T. brucei brucei* were recorded in infected animals. *T. vivax*, *T. congolense* and *T. brucei brucei* were found in the cattle while only *T. congolense* was found in R.S goats. There was a significant difference between the mean PCV value of infected animals and the non-infected animals ( $p < 0.05$ ). The result of this study clearly indicates the presence of trypanosome species in the abattoir animals.

**Keywords:** Prevalence, Trypanosome, Infection

**INTRODUCTION**

World Health Organisation (1998) has described trypanosomiasis as a complex, debilitating, zoonotic disease of man and animals. It is caused by the protozoan parasite of the genus *Trypanosoma*. Several species of trypanosomes are found in the blood and other tissues of vertebrates (WHO, 2006). The disease in animals is known as Animal African Trypanosomiasis (AAT) also known as Nagana (Ajakaiye *et al.*, 2013). It is a neglected tropical disease of public health importance and is endemic in 36 African countries (WHO, 2006).

Animal trypanosomiasis accounts for three (3) million livestock death annually in agriculture and mixed farming (Abenga *et al.*, 2002; Samdi *et al.*, 2010a). Bovine (cattle) trypanosomiasis is an important protozoan disease and is transmitted through bites of different species of *Glossina* and mechanically by a number of biting flies such as Tabanids and *Stomoxys* sp. (Oluwafemi *et al.*, 2007). Trypanosome species of economic importance include *Trypanosoma vivax* which affects domestic and wild ruminants and equines, *T. congolense* which affects most domestic ruminants and also horses, pigs, camels, dogs as well as wild animals, *T. brucei* which is infective to all domestic mammals, elephants, *T. simiae* which occurs in domestic and wild pigs and is also infective to sheep, horses and monkey. The disease is characterized by parasitaemia, fever, anaemia, which among other factors limit the pace of rural development in tropical Africa (Abenga *et al.*, 2002; Fajinmi *et al.*, 2011). Animal African trypanosomiasis causes impaired bovine fertility, reduction in herd size, low milk production, retarded growth, reduced work output and high mortality rate among infected animals (Ilemobade, 2009).

Beef is one of the most widely consumed meats in the world as it is an excellent source of protein, minerals and B vitamins. Red meat is the most significant dietary source of carnitines and like any other meat such as veal, pork it is a source of creatine (Okoroafor and Nzeako, 2014).

Small ruminant such as sheep and goats are largely major sources of animal protein in Nigeria, contributing greatly to total meat consumption in the country. They are also sources of income to small farmers. Red Sokoto goat has superior quality skin and is used to produce one of the best leathers in the Nigerian market.

Animal African Trypanosomiasis is a continuing threat to livestock production, agricultural development and is a major source of economic loss. Inadequate information on the prevalence of a disease of such economic and health importance in the South-South region of Nigeria especially in Delta State necessitates research into its prevalence in the city where cattle and small ruminants play significant role in the economy of the State.

**MATERIALS AND METHODS****Study Area**

The study was carried out at selected abattoirs in Asaba, Oshimili South Local Government Area of Delta State. This local government lies within the coordinates of longitude 6° 40' E and 6° 45' E and latitude of 6° 10' N and 6° 15' N. It has a land area of 603km<sup>2</sup> and a population of 150,032 (National Population Commission (NPC), 2006).

**Sample Size**

A total of three hundred and four (304) animals comprising two hundred and sixty-five (265) cattle (*Bos taurus*), thirty-nine (39) Red Sokoto goats (*Capra aegarus*) were examined.

### Blood Sample Collection

Three (3ml) of blood was collected from individual animal (cattle and goats) from the jugular vein using 5ml syringe and put into specimen bottle containing Ethylene Diamine Tetra-acetic Acid as anticoagulant (EDTA). The specimen bottles containing blood samples were placed in cold box and conveyed to Nigeria Institute for Trypanosomiasis Research (NITR), South-South zonal laboratory in Asaba where further investigations were undertaken.

### Parasitological Study

Some of the centrifuged blood-filled capillary tubes were broken using tipped pencil 1mm below the Buffy coat to include the red blood cells layer and 3mm above the Buffy coat to include the plasma. The content was expelled on microscopic slides and was smeared, and then the slides were covered with cover slip and were examined under  $\times 40$  objectives and  $\times 10$  eye piece using dark ground Buffy coat techniques, to see the movement of the parasite. Once the presence of the parasite was determined, small drop of the blood in the capillary tube was placed on a clean glass slide and spread by another slide at an angle of  $45^\circ$  to make a thin blood film and the slide was air dried and fixed with methyl alcohol, stained with Giemsa stain and air dried. Identification of the different species of trypanosomes was carried out based on their motility, morphology and size under microscope with oil immersion objective lens.

### Haematological Study

Blood was collected from the EDTA bottle containing the 3ml of blood using heparinized capillary tubes filled to their 3/4

length. The capillary tubes were sealed with plasticine at each end and centrifuged at 12000 rpm for 5 minutes in a micro-haematocrit centrifuge. Packed cell volume (PCV) was determined using PCV haematocrit reader.

### Statistical Analysis

The prevalence of trypanosome infection among animal species, sex of animals and species of parasite were expressed as percentage of the total number of animals examined (Bush et al. 1997). Data was subjected to chi-square test to ascertain the relationship between trypanosome infection, animal species, sex of animals and species of parasite. Student t-test was also used to analyse difference in mean PCV values of animals sampled. The chi-square test and student t-test were carried out using Microsoft excel 2019 package.

$$\text{Prevalence} = \frac{\text{Number infected}}{\text{Number examined}} \times 100\%$$

## RESULTS AND DISCUSSION

### Result

Seventeen (17) out of the 304 livestock examined were positive for trypanosome infection, giving an overall prevalence of 5.59%. Fifteen (15) out of the 265 cattle examined were infected while two (2) out of the 39 Red Sokoto goats were positive for trypanosomes. Thus, the prevalence of trypanosome infection in cattle and Red Sokoto goats was 5.66% and 5.13% respectively. The difference in the prevalence of trypanosome infection in cattle and Red Sokoto goat was not statistically significant ( $p > 0.05$ ) (Table 1).

**Table 1: Prevalence of Trypanosomiasis in the Animal Species Studied**

Animal species	No Examined	No. infected	Prev. (%)	$\chi^2$	p-value
Cattle	265	15	5.66	0.018	0.893
Red Sokoto Goat	39	2	5.13		
Total	304	17	5.59		

Key: NE= Number examined; NI=Number infected; Prev. =Prevalence

Figure 1 shows the sex related prevalence of trypanosomiasis in cattle and goats. Among the cattle, 7(4.76%) males out of the 147 examined were infected, while 8(6.78%) females out of the 118 examined were infected. For the Red Sokoto goats, 2(6.45%) out of the 31 males examined were infected, while

no infection was observed in the females. The chi-square test ( $\chi^2$ ) carried out showed that there was no significant difference ( $P=0.156$ ) in the prevalence of trypanosomes by sex in the animal species sampled.

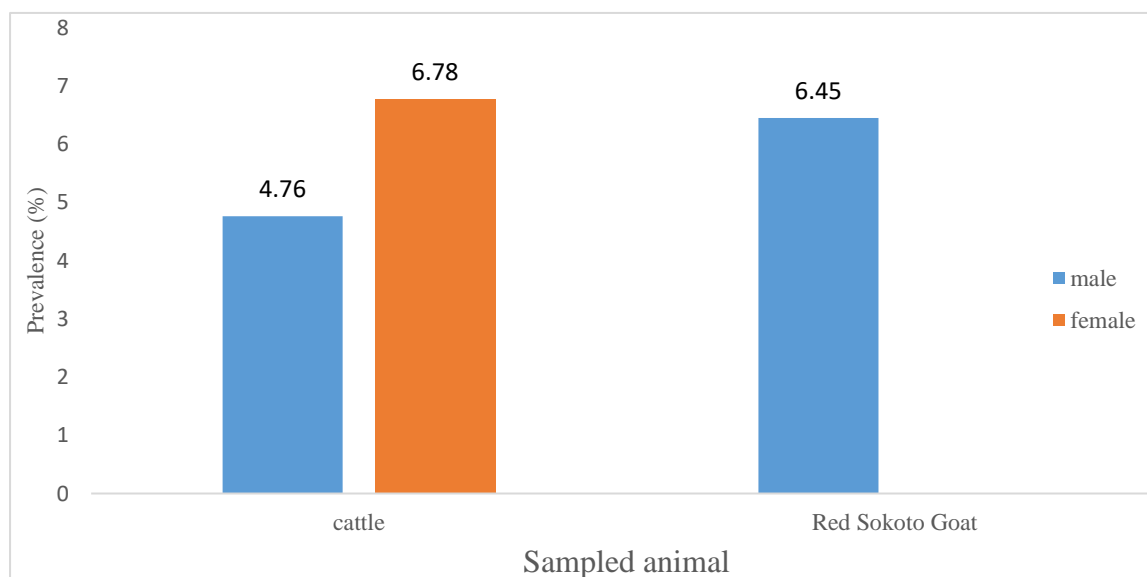


Figure 1: Sex related Prevalence of Trypanosomiasis in Cattle and R.S Goats

The prevalence of *Trypanosoma species* in cattle and R.S goats sampled is shown in Figure 2. Of the 265 cattle sampled, 10(4.10%) were infected with *T. vivax*, 2(0.75%) with *T. congolense* while 3(1.13%) were infected with *T. brucei*. Out of the 39 Red Sokoto goats sampled, only 1(2.56%) R.S goat was infected with *T. congolense*, similarly 1(2.56%) was infected with *T. brucei*. The overall prevalence of

*Trypanosoma species* in this study were 3.29%, 0.99% and 1.32% for *T. vivax*, *T. congolense*, and *T. brucei* respectively. Chi-square ( $\chi^2$ ) test showed that there was no significant difference ( $P=0.187$ ) in prevalence of trypanosome species that infected the animal species sampled.

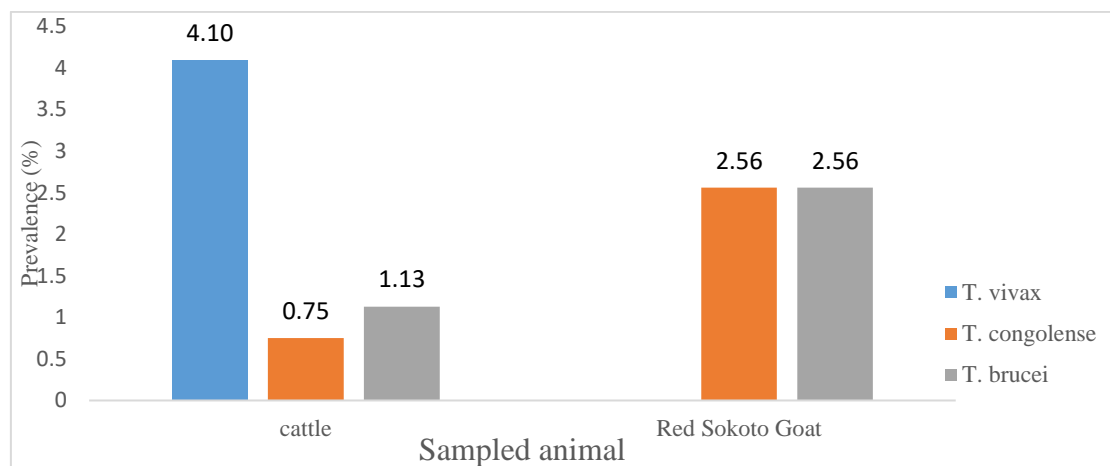


Figure 2: Prevalence of Trypanosoma Species in Cattle and R.S Goats sampled

The relationship between mean PCV and trypanosomes infection in cattle and goats is shown in Table 2. Out of the 265 cattle examined, 15 were infected while 250 were not infected having mean PCV values of 27.00% and 32.46% respectively. Two (2) R.S goats out of the 39 examined were infected and had a mean PCV of 30.50% while the 37 not

infected had a mean PCV value of 31.81%. Student t-test showed that there was significant difference ( $P=0.039$ ) between the mean PCV values of infected animal species (infected cattle and infected goats). Also at ( $P=0.000$ ), the mean PCV values of the infected and non-infected animals showed a significant difference.

**Table 2: Prevalence of Trypanosomes in Relation to Mean PCV in Cattle and R.S Goats.**

Animal Species	NE	NI	Mean PCV (%)	NNI	Mean PCV (%)
Cattle	265	15	27.00±11.1	250	32.46±8.70
R.S Goat	39	2	30.50±0.00	37	31.81±3.08
Total	304	17	28.75±10.4	287	32.14±8.19

Key: NE= Number examined; NI =Number infected; NNI= Number non-infected.

The effect of trypanosome infection on mean PCV in relation to sex of cattle and goats is shown in table 3. The table shows that 7 male cattle were infected having a mean PCV of 29.92% and the 140 male cattle not infected had a mean PCV of 32.95% while 8 female cattle infected had a mean PCV of 27.00% and the 110 females not infected had a mean PCV of

37.01%. For Red Sokoto goats, infected and non-infected males had mean PCV values of 2(30.50%) and 15(33.08%) respectively. All female R.S goats were non-infected and had a mean PCV value of 32.71%. Student t-test showed that there was a significant difference ( $P=0.000$ ) between mean PCV and sex of the infected animal species.

**Table 3: Trypanosome Infection in Relation to Mean PCV and Sex of Cattle and Goats.**

Animal groups	Sex of animal	Status	No. examined	Mean±SD
Cattle	Male	Infected	7	29.92±10.5
		Non infected	140	32.95±8.96
	Female	Infected	8	27.00±12.3
		Non infected	110	37.01±8.45
R. S. Goat	Male	Infected	2	30.50±0.00
		Non infected	29	33.08±2.97
	Female	Infected	-	-
		Non infected	8	32.71±3.44

## Discussion

Results obtained from this study showed an overall prevalence of 5.59%, which is within the range of studies reported by Samdi *et al.* (2010b) who reported 5.5% prevalence in Angwan Ninzom Keffi Local Government Area of Nasarawa State, though it is higher than the 3.3%

previously reported by Elele *et al.* (2021) in Oshimili North and South Local Government Area of Delta State and also higher than those observed in the reports by Ohaeri, 2010 in Abia State; Samdi *et al.* (2011) in Kaduna State, Maigari *et al.* (2015) in Kano State, having prevalence of 1.94%, 2.2%, and 1.8% respectively. The result also shows lower

prevalence than the 9% obtained by Oluwafemi *et al.* (2007) in Nasarawa State, Nigeria. This suggests that trypanosome prevalence diverge from one epidemiological zone to the other. It is noteworthy that most of the cattle and Red Sokoto goats investigated in this study were brought from the northern part of Nigeria (Taraba State), so it is difficult to determine the exact point of infection in animals that tested positive.

In this study, cattle showed higher prevalence of 5.66% than the R.S goats which had 5.13% prevalence. The result was within range of the reports of Ezebuio *et al.* (2009) in Kaduna abattoir who reported 5% and 4.67% prevalence in cattle and goats respectively but contrasted with the report of Maigari *et al.* (2015) in which goats did not have trypanosomal infection. The prevalence in cattle was higher than 4.69% reported by Fasanmi *et al.* (2014). The reason for the differences in the result is not clear but could be due to varying ecological and epidemiological factors.

The prevalence of trypanosomiasis in this study agrees with most observations as reported in previous abattoir studies in North-Central, North-West, South-West and Eastern parts of the country (Ameen *et al.*, 2008; Ohaeri, 2010; Fanjinmi *et al.*, 2011; Samdi *et al.*, 2011).

Female cattle had a higher prevalence (7.14%) than the males (4.55%) and the difference was not statistically significant. This agrees with the report of Maigari *et al.* (2015) who recorded 3.17% and 0.06% in females and males respectively, but differs from the reports of Ohaeri (2010); Samdi *et al.* (2011) and Fasanmi *et al.* (2014) and who all recorded higher prevalence in males. The higher susceptibility of female cattle does not tend itself to unequivocal interpretation at this point but could be associated with reduced immunity resulting from lactation and stress due to pregnancy. In the R.S goats, males had higher prevalence than the females, which contrasted with the result obtained in Kaduna by Ezebuio *et al.* (2009). More studies on the matter would help establish the true situation as concerns prevalence of trypanosomiasis with reference to sex in both cattle and goats.

From this study, *T. vivax* had the highest prevalence followed by *T. brucei* and *T. congolense* at 3.28%, 1.32% and 0.99% respectively. *T. vivax* having the highest prevalence (4.10%) in cattle was also reported by Samdi *et al.* (2010b) from Nasarawa State, Ohaeri (2010) and Richard *et al.* (2014) in Uganda. However, the finding differs from the reports of works carried out in Kaduna central abattoir by Samdi *et al.* (2011) who reported *T. vivax* as having the least prevalence in Kaduna abattoir, so also did Oluwafemi *et al.* (2007) in Nasarawa State and Abraham and Tesfaheywet (2012) in Wozeka, Southern Ethiopia where *T. congolense* was the predominant trypanosome species observed.

In the R.S goats examined, *T. congolense* and *T. brucei brucei* were the only parasites found in infected animals. This is similar to that of Ameen *et al.* (2008) from Ogbomoshos and the report from Leigh and Fayemi (2011) but contrasted with the report of Ezebuio *et al.* (2009) where *T. vivax* had the highest prevalence in goats. The higher prevalence of *T. vivax* in this study would seem to confirm the species as the most economically important trypanosome species affecting livestock in Nigeria and could be due to its molecular biology which may have been involved in conferring it with resistance against host defences and drugs as suggested by Fasanmi *et al.* (2014). *T. brucei brucei* in this study had a prevalence of 1.32% while cattle and R.S goat had 1.13% and 2.56% prevalence respectively. The prevalence of *T. brucei brucei* in this study was lower than that reported by Fajinmi *et al.* (2011). The incidence of infection due to *T. brucei brucei* in

this study is of zoonotic importance as human population could be susceptible host (Sam-wobo *et al.*, 2010).

This study showed that there was a significant difference in mean PCV between infected and non- infected cattle and goats ( $P < 0.05$ ). This is in consonance with reports of Maigari *et al.* (2015) but differs from the report of Mulugeta *et al.* (2013) for animals in Western Ethiopia who reported no significant difference in PCV values between infected and non- infected animals.

The mean PCV values for infected cattle and R.S goats were 30.25% and 30.50% and 35.52% and 31.98% for non-infected cattle and goats respectively. These values are higher than those reported in Ogbomoshos area of Oyo State, South-Western Nigeria by Ameen *et al.* (2008) for infected and non-infected animals but correspond with report of investigation in Kaduna central abattoir, North central Nigeria by Ezebuio *et al.* (2009). The difference in mean PCV values may be due to differences in the breeds of animals involved in the study. In the present study, the PCV of aparasitaemic and parasitaemic animals were within the range of 12-35% and 10-40% respectively. This implies that anaemia in ruminants is one of the most typical signs of trypanosomiasis. The PCV level usually gives an indication of disease status, though it can also be affected by different factors other than trypanosomiasis. These factors are not always identifiable but are likely to affect infected and non- infected animals (Mulugeta *et al.*, 2013). This is evident from the PCV ranges in this study. Ilemobade (2009) indicated that anaemia associated with trypanosomiasis causes weakness, lethargy and lack of stamina which ultimately reduce efficiency of working animals. However, the effect of trypanosomiasis on the performance of the animals was not determined in this study.

## CONCLUSION

From the present study, it could be deduced that trypanosomiasis is present in cattle and Red Sokoto goats slaughtered at abattoirs in Asaba, Delta State. Though most animals slaughtered in Delta State are imported into the State, it is difficult to ascertain where infection actually took place. The presence or occurrence of trypanosome species in animals in these abattoirs could be an indication of importation of infected animals. This could be of great medical importance as these infected animals predispose other livestock in the area to risk of animal trypanosomiasis. It is recommended that; further studies should be carried out in the study area and other areas in the State to throw more light on these issues so as to devise adequate measures to prevent/ control the spread of trypanosomiasis. Also research should be carried out to establish the occurrence of tsetse vector in study areas if the result of such studies would help to give a more complete picture of the presence of tsetse fly.

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