Biomedical Sciences
2025, Vol. 11, No. 3, pp. 42-47
https://doi.org/10.11648/j.bs.20251103.11

Research Article

Testing for Trypanosomes in Sheep and Cattle, Slaughtered at Kwatta- Awka and Amansea Abattoirs in Anambra State, Nigeria

Anameze Chioma Irene*

Biology Education Department, Federal College of Education (Technical), Umunze, Nigeria

Abstract

Trypanosomes are haemoflagellates that live in the blood and tissues of their hosts. Trypanosomiasis ruminates with a great influence on animal production it is a major disease affecting food security and healthy living for human in sub-Saharan Africa. This study examined 1,215 animals (942 sheep and 273 cattle) for the presence of trypanosomes. The animals were from the 2 Anambra State Owned abattoirs located in Kwatta-Awka and Amansea. The animals used for the study were sourced from Adamawa, Bauchi, Borno, Gombe, Jigawa, Kano and Taraba States of Nigeria. Blood sample were collected from each animal at the points of slaughters and examined using the buffy coat technique and Leishman Stained thick film for trypanosome identification. Packed cell volume (PVC) determination was conducted to assess the level of anaemia. Result indicated that 25 animals (23 cattle and 2 sheep) were infected. The overall trypanosome infection rate is 3.4%. The trypanosomes observed were *Trypanosoma congolense*, *Trypanosoma brucei* and *Trypanosoma vivax*. In addition, the results of this study has shown that sources of livestock slaughtered at various abattoirs can be useful indicator in quantifying the risk of contacting and spreading trypanosomiasis. Public enlightenment and awareness creation among herders at the grass root level is recommended for effective management and complete control of animal human transmission of the disease.

Keywords

Trypanosomes, Sheep, Cattle, Kwatta- Awka, Amansea, Abattoirs

1. Introduction

African trypanosomes is an insect borne parasitic infection of humans and other animals. It is caused by different species of trypanosomes and clinically transmitted by the tsetse fly of the Glossina Genus [1]. Two forms of the disease exist, namely the African Animal Trypanosomiasis (AAT) and Human African Trypanosomiasis (HAT).

Animal Trypanosomiasis, also known as nagana, nagana pest or sleeping sickness is a disease of vertebrates [2]. The disease is caused by trypanosomes of several species in the genus trypanosoma, *Trypanosoma brucei*, *Trypanosoma vivax* which caused nagana mainly in West Africa. Trypanosomes infects the blood of the vertebrate host, causing fever, weakness, and lethargy, which lead to weight loss and anaemia if untreated, the disease is fatal in some animals. Trypanosomes are transmitted by tse-tse flies [3]. AAT is one of the major constraints to livestock production in Africa and a sig-

*Corresponding author: ireneanameze@gmail.com (Anameze Chioma Irene)

Received: 7 April 2025; **Accepted:** 18 April 2025; **Published:** 2 September 2025

nificant threat to food security [3]. According to [3], more than 46 million cattle are at the risk of infection and more than 3 million livestock deaths have occurred because of trypanosomiasis. The incubation period ranges from 4 days to approximately 8 weeks. The disease cannot be diagnosed with certainty except physically detecting parasites by blood microscopic examination for various serological reactions [4].

The methods of controlling AAT include quarantine, movement control, and euthanasia of infected animals. Tse-tse fly population can be reduced or eliminated by use of traps, insecticides, and treatment of infected animals with anti-parasitic drugs. Tse-tse fly can be control by alteration of vegetation [5, 6]. Prophylactic drugs can be used to prevent trypanosomiasis. The drugs are very effective in protecting animals when they are exposed to diseases [7]. Chemical odours produced by waterbuck and other animals repel tse-tse flies. This has led to the development of collars that store and gradually release these chemicals. This has led to the reduction of tse-tse fly attacks and control of trypanosomiasis for cattle wearing these collars [7].

2. Materials and Methods

The study was carried out in May 2024 and a total of 1, 215 slaughtered animals were used. These comprised 500 cattle and 150 sheep from Amansea Abattoir and 450 cattle and 115 sheep from Kwatta-Awka Abattoir. Both abattoirs are government-owned and located in Anambra State, Nigeria. Amansea abattoir has operated for over 40 years, while that of Kwatta- Awka has existed for over 30 years. According to the Butchers Association of both abattoirs, the animals were sourced as follows: from Adamawa State 170 (100 cattle & 70 sheep), Bauchi 282 (232 cattle & 50 sheep), Borno: 120 (90 cattle & 30 sheep) Gombe: 123 (95 cattle & 28 sheep), Jigawa: 95 (80 cattle & 15 sheep), Kano: 75 (55 cattle & 20 sheep), and Taraba: 350 (290 cattle & 60 sheep).

Livestock officers of veterinary services, Anambra State ministry of Agriculture and Rural development inspected and certified all the livestock brought to the Abattoirs before slaughtering. The average number of cattle and sheep slaughtered daily in Kwatta-Awka abattoirs are 60-130 cattle and 30-80 sheep. In Amansea abattoir the number slaughtered are 90-130 cattle and 60-100 sheep respectively.

The 2 abattoirs of this study provide good services to the public but are faced with some challenges which the State Government are yet to attend to. Animals in the abattoirs are not tested for parasitic infection before slaughtering. Unlike Kwatta-Awka, Amansea abattoir is not provided with water borehole. In Kwatta-Awka there is no standby electricity generating plant to pump water when there is no regular electricity supply. These are the challenges faced by the 2 abattoirs of this study. However, it was observed that butchers in both Kwatta-Awka and Amansea abattoirs are organized and are guided by some regulations. They are licensed, dressed in uniform wears and are supervised by a national body. Butchers in both Kwatta-Awka and Amansea wash their abattoirs daily and fumigate them on weekly basis.

Kwatta-Awka and Amansea are located in Southeast Nigeria and lie between latitudes 6 ° 13’0 ”N and Latitude 7 ° 5’ 0 ”E and 60 ° 15’ 0” N and latitude 7 ° 10’ 0 ”E respectively. The average monthly temperature 24 ℃ and 27 ℃. Anambra State is characterized by 3 distinct sessions: Rainy, Dry and Harmathan.

The following parameters were used to obtain the sample size as at a 95% confidence level, 5% desired level of precision, and an average prevalence rate reported by [8] and [9] with 3.98% and 40.90% respectively were applied in [10] formula $N=Z^2 P(1-P)/d^2$ and 287.46 for N. This becomes the minimum sample size of 288 for collection.

2.1. Collection of Blood Sample

Three milliliters (3 ml of blood was collected from each animal (950 cattle and 165 sheep) at the point of slaughter into appropriately labelled heparinized sample bottles, kept in ice-packed to prevent deterioration and moved into the laboratory within two hours of examination. Individual animal profiles (age, sex, animal source& body condition) were appropriately documented.

2.2. Sample Analysis

All the samples collected were analyzed by centrifuging blood-filled heparinized tube at 11,000 rpm for 5 minutes to determine their packed cell volume (PCV). The Buffy Coat Method (BCM) was carried out as described by [11] and thick film was stained with Leishman-stain, examined at X100 magnification using the oil immersion lens for the presence of trypanosomes.

2.3. Data Analysis

Data entry was carried out using Microsoft Excel and group mean ± SEM was calculated for each analyte and between mean was evaluated by analysis of variance (ANOVA) for more than two variables t-test for two variables: post -test analysis was done using Newmann Kelil`s comparison. Values of $P<0.05$ were considered statistically significant. All statistical analysis was performed using the graph pad prism software package (version 5). The prevalence of infection was calculated by the number of animals examined and the result was recorded in percentage.

3. Results

The blood sample of 1,215 slaughtered animals (950 cattle and 165 sheep) was examined for the presence of pathogenic trypanosomes among animals brought to Kwatta-Awka and Amansea abattoirs. The parasitological study using the Buffy coat Method and Leishman – stained film revealed the pres-

ence of *Trypanosome congolense*, *Trypanosome brucei* and *Trypanosome vivax* within an overall prevalence of 2.39% (23 cattle and 2 sheep).

The number, type, sex and location of the animal sampled are shown in Table 1. By state, Adamawa recorded the highest infection rate of 4.11% mostly among female cattle and sheep. Borno had more infected female cattle (11.11%) than the male (4.1%). From the results obtained, only 2 sheep were infected with trypanosomes out of the 265 examined: 1 from Gombe state and 1 from Adamawa state. There was no trypanosome infection in animals brought from Jigawa and Kano states.

African animal trypanosomiasis causes anaemia manifested by a drop of PCV values below the normal range. Anaemia in trypanosome infected animal remains one of the indicators of infection. There is a significant decrease *(P<0.05)* observed in the average Pack Cell Volume (PCV) of the trypanosome infected cattle compared with the non-infected ones. The sheep also share varying degrees of anaemia of the infected and non-infected. However, there was no significant difference *(P>0.05)* among the sheep.

In Kwatta-Awka abattoir, 15 animals (13 Cattle and 2 Sheep) were infected with trypanosomes out of the 500 which were considered clinically good by the animal health personnel. Five (5) cattle harboured trypanosomes among the 150 with poor body conditions with the following physical symptoms exhibited: ocular discharge, weight loss, intermittent fever, nasal discharge, sleeping disorder, rough hair coat and crippling. It was observed that the average PCV of the animals in poor body condition significantly differed *(P<0.05)* compared with those in good body condition (Table 3).

In Amansea abattoir, 7 cattle were infected with trypanosomes out of 450 which were considered clinically good, while 6 cattle were infected with trypanosomes out of 115 which are considered clinically poor with an infection rate of 5.21%. Animals with good and poor body conditions did not significantly differ *(P<0.05).*

Table 1. *Trypanosome infection in slaughtered cattle and sheep from Anambra state based on Animal source and sex.*

Cattle	**Sheep**									
	M	**No. infected (%)**	**F**	**No. infected (%)**	**M**	**No. infected (%)**	**F**	**No. infected (%)**	**Total no. of animals examine d (%)**	**Total no. infected (%)**
Adamawa	72	3 (4.1)	28	3(10.71)	3732	0(0)	33	1(3.03)	170	7(4.11)
Bauchi	185	2(1.80)	47	2(4.25)	22	0(0)	18	0(0)	282	4 (1.41)
Borno	71	0(0)	19	1(11.11)	22	0(0)	8	0(0)	120	1(0.83)
Gombe	55	1(1.81)	40	0 (0)	11	1(4.54)	6	0(0)	123	2(1.62)
Jigawa	62	0(0)	18	0(0)	13	0(0)	4	0(0)	95	0(0)
Kano	42	0(0)	13	0(0)	47	0(0)	7	0(0)	75	0(0)
Taraba	230	7(304%)	60	4(6.67)		0(0)	13	0(0)	120	1(0.83)
	717	13(10.75)	225	10(32.74)	184	1(7.24)	89	1 (3.03)	1,215	25 (11.11)

Note: M=Male; F=Female, No=Number

Table 2. *Average Packed Cell Volume of Trypanosome infected and non-infected animals examined at Kwatta –Awka and Amansea abattoirs.*

Animal	**Condition**	**No of animal examined**	**Highest PCV**	**Lowest PCV**	**PCV+SEM**	**P-Value**	**Significance difference (P<0.05)**
Cattle	Infected	23	47	12	30.26 ±1.576	0.002	Yes
	Non infected	927	56	14	30.49 ±0.306		
Sheep	Infected	2	30	20	25.00 ±5.000	0.563	No
	Non infected	263	48	13	28.97 ±0.809		

Table 3. *Trypanosome infection in slaughtered cattle and sheep in Kwatta-Awka and Amansea, Anambra state based on body condition and Average Packed Cell Volume.*

Abattoir	Body Condition	No of animals examined	Number infected (%)	Mean PCV ±SEM	P-Value	Significance difference *(P<0.05)*
Kwatta-Awka	Good	500	15(3.0)	36.78 ±0.354	0.001	Yes
	Poor	150	5(3.33)	32.92 ±0.478		
Amansea	Good	450	7(1.55)	34.83 ±0.770	0.0815	No
	Poor	115	6(5.21)	32.29 ±1.110		

4. Discussion

Three species of trypanosomes were identified in this study namely: *Trypanosoma congolense, Trypanosome brucei* and *Trypanosome vivax*. These seriously causes morbidity and mortality of livestock in Nigeria. The findings is in agreement with similar study carried out in the northern part of Nigeria by [12-14].

This study has discovered that *Trypanosoma brucei* is one of the trypanosomes in animals sourced from the Northeast and Northwest parts of Nigeria, and other studies have shown that the livestock serves as a reservoir host for both animal and human pathogenic trypanosomes [15-19]. The study has also shown that the animals sourced from Adamawa and Taraba have the highest infection rate, and this could be attributed to poor sanitation practices. The presence of human-infective trypanosomes in Southeast residents is therefore suggested. It follows that there is need to examine human who consume animals sourced from the Northern part of Nigeria to ascertain the level of infection. In other words, there is need for proper assessment of health condition of livestock transported to the southeast and other parts of Nigeria by veterinary experts to reduce or totally prevent transmission of the disease from cattle/sheep to humans.

Considering trypanosomes infection in relation to animal species, the study indicates that the infection rates in cattle (23) is larger than that of sheep (2). Cattle were reported to be more infected than sheep, and also more vulnerable to identified species of trypanosome compared to the other livestock.

With respect to trypanosome infection rate based on source of animal, it is discovered that animals from Adamawa [20], Taraba [21], Gombe [22] and Bauchi [21] have significantly higher rates of infection *(P<0.05)* than those from Borno, Jigawa and Kano states. Three species of the trypanosome infections identified are *T. congolense, T. brucei* and *T. vivax*.

Trypanosome infection rate in relation to animal gender was examined. The results show that female cattle from the 7 sources have a higher infection rate than the male. This is in agreement with the findings of [15, 24-26], who respectively sourced their research animals from Taraba, Benue, Borno, Adamawa and Niger states. A similar study [23] carried out in Cameroon Republic yielded a similar result. This result could be traced to low immunity, hormone imbalance and vulnerability of female cattle to infection during the periods of pregnancy and lactation, which are characterized by stress, etc. [27]. With respect to sheep, on the other hand,

there is a higher trypanosome infection rates in males than in females. This is in agreement with the findings of [28], who reported that the higher infection rate in male sheep is as a result of coming in contact with trypanosome vectors through wandering to mate with females in searching for fodder and water in areas infested with tsetse flies [29].

In relation to average packed cell volume of trypanosome. This study found statistically significant difference *(P<0.05)* between infected and non-infected cattle examined in Kwatta- Awka and Amansea abattoirs. This is in agreement with the findings of [16, 14]. In sheep, on the other hand, no significant difference *(P<0.05)* was found between the infected and non- infected.

With respect to Lowest Packed Cell Volume analysis of this study. It was found that cattle (14%) and sheep (13%) were below the normal range of 24%-48% [30]. This result indicates that the research animals were anaemic, the cause of which could be protozoal infection other than trypanosomes. It was observed that both infected and non-infected animals of this study have varying degrees of anaemia as show by decreased PCV Values below 24%. However, there was no significant difference in their PCV Values. The low PCV in infected animals is a clear indicator of anaemia caused by trypanosomiasis, and this is an important pointer to the negative effect on animal health [31, 32].

Trypanosoma infection in relation to body condition and Average Packed Cell Volume was analyzed. Livestock with good body condition tolerate trypanosome infection and maintain the parasite at a reasonable low level with no clinical symptoms [33]. A drop in PCV consequent upon trypanosome anaemia infection and other factors could compromise the immunity of animals resulting clinical signs [34]. Low PCV and poor body condition in the infected animals are concomitant with chronic animal trypanosomiasis [35]. In this

regard, the link between the infection and body condition in relation to average Packed Cell Volume of animals from Kwatta-Awka abattoir was found to be significant. This is in agreement with the finding of the similar study [36] carried out in Northern Cameroon. Clinical diagnosis and microscopic examination (Buffy coat and thick film methods) used in this study are good enough to confirm that the identified disease is trypanosomiasis and enable control measures to be suggested.

5. Conclusion

Animal trypanosomiasis also known as nagana pest on sleeping sickness, is a disease of vertebrates. This disease is caused by trypanosomes of several species in the genus of trypanosomes. This study is discovered that *Trypanosoma conglense*, *Trypanosoma brucei* and *Trypanosoma vivax* are trypanosome common infections in some animals slaughtered at Kwatta-Awka and Amansea abattoirs of Anambra state, Nigeria. The animals were sourced from 7 states of the Northern part of Nigeria.

Animals from Adamawa and Taraba states recorded the highest trypanosome infection rate in this study and this could be attributed to poor sanitation practices. To reduce or completely curtail animal –human infection of the disease, it has been suggested that sanitation practices be improved and the services of qualified vertinary personnel be engaged at animal markets and abattoirs to examine the fitness of the animals for human consumption.

Abbreviations

PCV	Packed Cell Volume
BCM	Buffy Coated Method
M	Male
F	Female

Author Contributions

Anameze Chioma Irene is the sole author. The author read and approved the final manuscript.

Conflicts of Interest

The author declares no conflicts of interest.

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