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Detection of trypanosomosis in cattle and goats for slaughter at Umuahia ultra-modern abattoir, Abia State

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Abstract

Trypanosomiasis is a fatal disease that threatens the economy of many countries in sub-Saharan Africa, particularly with regard to livestock farming. An understanding of the susceptibility of different species of animals to trypanosomosis in sub-Sahara Africa can facilitate the formulation of effective control measures against the ravaging spread of African animal trypanosomosis. This study was carried out to investigate the prevalence of trypanosomosis from ruminants slaughtered at an abattoir. Blood samples were collected at slaughter from 340 cattle and 260 goats and screened using Wet mount, Buffy Coat technique and thin blood smear techniques. Packed Cell Volume (PCV) was used as haematological index. Data obtained were expressed as means+ standard error, and the prevalence was recorded in percentages. Out of the 340 blood samples examined from cattle, 20 (5.8%) were positive for trypanosomes while of the 260 blood samples from goats, 10 (3.8%) were positive for trypanosomes. The white Fulani breed of cattle had slight significant ($p<0.05$) higher trypanosome prevalence rate of 6.1% when compared to 5.7% prevalence rate of Adamawa Gudali. Red Sokoto goats had a significant ($p<0.05$) higher trypanosomes prevalence of 4.7% when compared with WAD goats which had a prevalence rate of 2.2%. Female cows and goats were more infected having a prevalence rates of 9.2% and 4.3% respectively when compared with the male cattle and goats which recorded a prevalence rate of 3.5% and 3.0% respectively. The young cattle and goats had higher trypanosomes infection rates of 3.5% and 6.6%, respectively when compared with adult cattle and goats which had a prevalence rate of 2.5% and 3.0% respectively. The infection rates in both cattle and goats were higher during the dry season with prevalence rates of 6.1% and 4.1% respectively when compared with 5.3% and 3.3% recorded in cattle and goats respectively during the rainy season. The mean PCV + standard error of infected cattle of 20.33+3.31 and 22.29+2.40 of infected goats was significantly ($P<0.05$) lower when compared with the uninfected cattle of 35.08+4.61 and 31.65+6.21 of the uninfected goats respectively.

Keywords: Trypanosomes, Ruminants, Anaemia, Prevalence

Détection de la trypanosomose chez les bovins et caprins destinés à l'abattage à l'abattoir ultramoderne d'Umuahia, État d'Abia

Résumé

La trypanosomiase est une maladie mortelle qui menace l'économie de nombreux pays d'Afrique subsaharienne, notamment en ce qui concerne l'élevage. Une compréhension de la

sensibilité des différentes espèces animales à la trypanosomose en Afrique subsaharienne peut faciliter la formulation de mesures de contrôle efficaces contre la propagation dévastatrice de la trypanosomose animale africaine. Cette étude a été réalisée pour étudier la prévalence de la trypanosomose chez les ruminants abattus en abattoir. Des échantillons de sang ont été prélevés à l'abattage sur 340 bovins et 260 chèvres et analysés à l'aide des techniques de montage humide, de couche leucocytaire et de frottis sanguins minces. Le volume de cellules concentrées (VCC) a été utilisé comme indice hématologique. Les données obtenues ont été exprimées en moyenne + erreur standard et la prévalence a été enregistrée en pourcentage. Sur les 340 échantillons de sang examinés sur des bovins, 20 (5,8 %) étaient positifs pour les trypanosomes tandis que sur les 260 échantillons de sang provenant de chèvres, 10 (3,8 %) étaient positifs pour les trypanosomes. La race bovine Fulani blanche avait un taux de prévalence de trypanosomes légèrement plus élevé (p < 0,05), de 6,1 %, par rapport au taux de prévalence de 5,7 % de l'Adamawa Gudali. Les chèvres Red Sokoto avaient une prévalence de trypanosomes significativement plus élevée (p < 0,05) de 4,7 % par rapport aux chèvres WAD qui avaient un taux de prévalence de 2,2 %. Les vaches et les chèvres femelles étaient plus infectées, avec des taux de prévalence de 9,2% et 4,3% respectivement, par rapport aux bovins et chèvres mâles qui ont enregistré un taux de prévalence de 3,5% et 3,0% respectivement. Les jeunes bovins et caprins présentaient des taux d'infection trypanosomiennes plus élevés, respectivement de 3,5 % et 6,6 %, par rapport aux bovins et caprins adultes qui avaient un taux de prévalence de 2,5 % et 3,0 % respectivement. Les taux d'infection chez les bovins et les caprins étaient plus élevés pendant la saison sèche avec des taux de prévalence de 6,1% et 4,1% respectivement, contre 5,3% et 3,3% enregistrés respectivement chez les bovins et les caprins pendant la saison des pluies. L'erreur type moyenne PCV + des bovins infectés de 20,33 + 3,31 et 22,29 + 2,40 pour les chèvres infectées était significativement inférieure (P <0,05) par rapport aux bovins non infectés de 35,08 + 4,61 et 31,65 + 6,21 pour les chèvres non infectées respectivement.

Mots-clés: Trypanosomes, Ruminants, Anémie, Prévalence

Introduction

Animal trypanosomosis still constitute a major threat to food security in several parts of Sub-saharan Africa (Abenga *et al*,2008).Trypanosomosis is one of the most important diseases restricting livestock development, limiting crop agricultural and forestry development (Ayele *et al*., 2012; Denbarga *et al*., 2012). It is estimated that not less than 46 million livestock are at risk of becoming infected by tsetse transmitted trypanosomosis (Samdi *et al*., 2010).These infections had resulted in significant mortalities in these animals. Anaemia is a predominant feature and a major symptom of trypanosome infection. Trypanosomes have the capacity of causing immunosuppression in the affected hosts. (Mbaya *et al*., 2012).

Trypanosome species of major threat to cattle and goats include: *Trypanosomavivax*, *T. congolense*, *T. bruceibrucei* (Desquesnes *et al*., 2004). Prevalence of trypanosomosis have been reported by a number of workers. Kalu and Lawani (1996) showed a prevalence rate of 1.2% in small ruminants in Kano state, Nigeria while in the Abakaliki area of Eastern part of Nigeria,Agu and Amadi (2000) reported a prevalence rate of 4.6% for small ruminants. Livestock production system has been considered an important activity towards sustaining human development through the provision of food,

employment and maintaining national economy (Anyanwu*et al*., 2016). There is dearth of information on the prevalence of ruminant trypanosomosis in Umuahia area of Abia state, therefore, this study focuses on preliminary investigation of ruminant trypanosomosis at slaughter at Umuahia area of Abia state, Nigeria, using the Parasitological diagnostic techniques.

Materials and Methods

The study was conducted at Umuahia abattoir. A total of 340 cattle and 260 goats, making a total of 600 animals were sampled and examined, 5 mL of blood was collected at slaughter from the animals into ethylene tetra-acetic acid (EDTA) bottle. Each sample was kept cool by placing in a box containing ice packs immediately after collection and transported to the Veterinary Parasitology and Entomology laboratory Micheal Okpara University of Agriculture, Umudike for examination.

Parasitological diagnosis:

5mls of blood collected in the EDTA bottle were subjected to diagnostic techniques of wet mount, thin blood smear and buffy coat technique. The PCV was determined as a haematological index using the haematocrit centrifugation technique.

Wet mount technique was carried out as described by Taylor *et al.* (2016). A drop of blood was placed on a clean glass slide and covered with clean coverslip. This was examined for trypanosomes under the X10 objective of the microscope. Thin blood smear was prepared using standard method as described by Cheesbrough (2006). A drop of blood was placed on one end of a clean, grease-free glass slide and made into thin film with aid of a spreader (a clean glass slide). This was done by allowing the spreader to touch the blood at an angle of 45º, and then spread gently but firmly along the surface of the horizontal slide so that the blood is dragged behind the spreader to form the film with a feathered edge. The prepared thin film was then air-dried, fixed in methanol and stained in freshly prepared 10% Giemsa stain at pH 7.2 for 25-30 minutes. Afterwards, the stained blood smear was rinsed in buffered water and allowed to dry. The smears were then examined at X100 objective magnification (oil immersion) on a microscope for the presence of trypanosomes according to Soulsby (1986).

Buffy coat technique was carried out by placing one end of the capillary tube in the blood sample and allowing it to fill to about three-quarters by capillary action and then seal it by plastacine at the other end. It was placed in the haematocrit centrifuge machine and centrifuged for five minutes at 10,000 rpm. The capillary tube was then placed on a glass slide and the buffy coat region of the capillary tube was then examined microscopically at low magnification (10×) as described by Cheesbrough (2006). The PCV reading was carried out by placing the capillary tubes from the buffy coat technique on the haematocrit reader. The tubes were adjusted on the slider so that the top of the plasticine was level with the bottom line (0%). The slider was also moved so the top of the plasma fraction levels with the top line. The adjuster on the left was used to align the middle line with the top of the red cells. The PCV was read from the right-hand side scale.

Data Analysis

The data obtained from the study were analysed descriptively with the use of IBM SPSS 21 software package. Descriptive statistics was deployed in determining the prevalence estimates. One-way analysis of variance (ANOVA) was used for analysis.

Results

Table 1: Trypanosome infections among breeds of sampled animals at the Umuahia abattoir

Animal	Breed	No. of animals sampled	No. of animals positive	% prevalence
Cattle	Adamawa Gudali	210	12	5.7
	White Fulani	130	8	6.1
Goats	WAD goat	90	2	2.2
	Red Sokoto	170	8	4.7

The white Fulani and the Red sokoto breeds of cattle and goats respectively have the highest prevalence among the breeds.

Table 2: The relationship between trypanosome infections in sampled animals by sex at the Umuahia abattoir

Animal	Sex	No. of animals sampled	No. of animals positive	% prevalence
Cattle	Male	200	7	3.5
	Female	140	13	9.2
Goats	Male	100	3	3.0
	Female	160	7	4.3

Table 3: The relationship between Trypanosome infections in sampled animals by age at the Umuahia abattoir

Animal	Age	No. of animals sampled	No. of animals positive	% prevalence
Cattle	Young	100	12	3.5
	Adult	240	8	2.5
Goats	Young	60	4	6.6
	Adult	200	6	3.0

Table 4: Seasonal variation in trypanosome infections among sampled animals at the Umuahia abattoir

Animal	Season	No. of animals sampled	No. of animals positive	% prevalence
Cattle	Dry	210	13	6.1
	Rainy	130	7	5.3
Goats	Dry	170	7	4.1
	Rainy	90	3	3.3

Table 5: Mean packed cell volume of different animals slaughtered at Umuahia abattoir

Animal	Trypanosome infected (PCV)	Trypanosome uninfected (PCV)
Cattle	20.33±3.31	35.08±4.61
Goats	22.29±2.40	31.65±6.21

Discussion

Out of the total 600 animals (340 cattle and 260 goats) examined for trypanosomes infection, the overall infection rate in cattle was 5.8% which is higher than the prevalence rate of 2.2% , 3.0% and 4.1% reported by Abenga*et al.* (2002) in cattle slaughtered at Kaduna abattoir, Ameen *et al*. (2008) in slaughtered cattle in Ogbomoso area of Oyo state and Ohaeri (2010) in cattle slaughtered in Abia state. Though the present work is in agreement with Qadeer *et al.* (2009) who reported a prevalence rate of 5.5% in cattle slaughtered at Adamawa state.

The overall prevalence rate of (3.8%) recorded in goats from this work is in agreement with the report of Ameen *et al.,* (2008) who revealed a prevalence rate of 3.5% in goats slaughtered in Ogbomoso area of Oyo state, but is higher than the prevalence rates of 1.2% reported by Ohaeri, (2010) in Abia state and 2.3% reported by Samdi *et al.* (2008) in Kaduna state but appreciably lower than 33.9% reported by Omotainse *et al.* (2000) in Benue state and 13.6% reported by Fakae and Chiejina (1993) in Nsukka area of Eastern Nigeria. This result especially when compared with Ohaeri (2010) could imply resurgence of trypanosomosis in the study area though with negative economic impact on meat quality in slaughter house (Abenga *et al.,* 2002).

Breed related prevalence revealed no significant difference (P> 0.05) in the percentage prevalence of Adamawa gudalli and White Fulani breed of cattle while there was an increase in the prevalence of Red sokoto goats when compared with West African dwarf goats. This findings are in agreement with the findings of (Ogunsanmi *et al.,* 2000).This result may be due to transportation of cattle and red sokoto goats to the southern markets as well as stressful effect of trekking both of which results to higher trypanosome infection rates.

Sex prevalence of animal trypanosomosis was higher in the female cattle (9.2%) and goats (3.5%) compared with their male counterparts of (4.3%) in cattle and (3.0%) in goats. This result is in agreement with Sobhy *et al*. (2017) and Bhutto *et al.* (2010) but differ from the findings of Sam-wobo *et al.* (2010). This differences that occurred may be due to physiological changes associated with pregnancy and lactation that tend to reduce the host immune system.

Age related prevalence revealed that younger cattle (3.5%) and goats (6.6%) were more infected than adult cattle (2.5%) and goats (3.0%) which may be due to easy penetration of tsetse fly proboscis through the less dense coat possessed by younger cattle and goats, though this contradicts the reports of Sam-wobo *et al*. (2010) and Fasanmi *et al*. (2014).

The infection rate in this study in dry season was higher in cattle (6.1%) and goats (4.1%) than that of rainy season of (5.3%) in cattle and (3.3%) in goats respectively. This findings are in agreement with Anosa *et al*. (1983) in South western Nigeria (Kalu and Lawani,1996) in Kano state, Nigeria and Agu and Amadi (2001) in Ebonyi state, Nigeria. The reasons for higher prevalence in dry season could be due to presence of few ponds during dry season which were available for many animals to drink and immediate surroundings of the surviving ponds also provided enabling environments for tsetse flies with high results of the fly-animal contact.

In this study, there was a significant difference (P<0.05) between mean PCV of infected cattle (20.33+3.31) and infected goats (22.29+2.40) and non-infected cattle (35.08+4.61)and non-infected goats (31.65+6.21). This findings observed in infected animals as compared to the uninfected ones agrees with the findings of Marcothy *et al*. (2008) that trypanosomosis is accompanied by anaemia.

Conclusion

This study concludes that our local breeds of ruminants are more resistant to trypanosomiasis and their production should be encouraged.

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