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Periodic Variation in Trypanosoma Infection Rates in Trade Small Ruminants at Slaughter in Kaduna Central Abattoir

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Abstract: The prevalence of trypanosomoses in trade small ruminant such as sheep and goats slaughtered at in Kaduna state central abattoir was investigated for the periods; before, during and after the rainy season. Parasitological and concentration methods were used to detect trypanosomes in the blood collected from the jugular vein of slaughtered animals. A total of 347 goats and 172 sheep were screened and the Packed Cell Volume (PCV) was determined. The overall infection rate was 1.54%. However, the infection rates during the rainy season (2.08%), were higher than before the rainy season (1.08%) and after the rainy season (1.05%). The infection rates in females (1.98%) were higher than that of males (0.93%). The overall infection rate in goats (1.73%) were higher than in sheep (1.16%). The infection rates in goats during the rainy season were higher than before and after the rainy season. The infection rates in rams were higher than the in does and the infection rates in nanny goats were higher than in Billy. In this study, the infection rates were higher during the rainy season and lowest during the dry season with *Trypanosoma congolense* the dominant infective trypanosome in this study followed by *T. brucei* and *T. vivax*. Infection rates observed here were relatively high and confirmed the resurgence of animal trypanosomiasis in the country, its threat to sustainable livestock production and the rural economy.

Key words: Periods, trypanosome, abattoir, small ruminant, sex, trypanotolerant breed, goats, resurgence, season, sheep, trypanosomiasis

INTRODUCTION

The upsurge in the menace of African trypanosomiasis in man and animals in the last decade in Nigeria (Abenga *et al.*, 2005), constitutes a major obstacle to food security in spite of previous attempts towards chemotherapeutic and tsetse control (Onyiah, 1997; Samdi *et al.*, 2008). Like other parts of Sub-Saharan Africa, the disease is most devastating in terms of poverty and loss of agricultural production (Hursey, 2000). These losses include; reduction in herd sizes as a result of livestock deaths and drop in calving rate, reduced market value of animals as a result of loss in condition, drop in milk production, reduced work efficiency of draft animals and prevention of mixed farming (Swallow, 2000). The lack of adequate information on the true prevalence status of the disease has prevented proper

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planning for control in several endemic countries including Nigeria (Esuruoso, 1973; Abenga *et al.*, 2004; Samdi *et al.*, 2008). Similarly, natural trypanosomosis in small ruminants has not been adequately investigated, as emphasis is placed more on diseases in cattle. This has resulted to the exclusion of small ruminants from control campaign by governments and has enhanced their carrier status in the spread of trypanosomosis to man and animals. Trypanosomes of major threat to ruminants include *Trypanosoma vivax*, *T. congolense*, *T. brucei* (Swallow, 2000; Samdi *et al.*, 2008).

Surveys conducted between 1989 and 1991 in Northern Nigeria (which falls within the guinea and Sudan savannah vegetation belts with an annual rainfall of 500-1200 mm) where two thirds of the nation's livestock resources are concentrated show prevalence rates of 1.6% in sheep and 1.0% in goats (EEC Mid-Term Report, 1992). Higher prevalence rates of 8.6 and 8.1% were obtained in the same group of animals in a wider survey of all agro ecological zones between 1993 and 1996 (NITR/NARP External Review, 1996; Onyiah, 1997). This study seeks to monitor the prevalence of trypanosomiasis in small ruminants at slaughter as well as observe the difference in incidence in the relation to the onset and end of the rainy season.

MATERIALS AND METHODS

The sheep and goats sampled in this survey were mostly transported by road from Kaduna State and from neighboring Northern States of Kano, Sokoto, Zamfara, Kebbi, Borno States and arrived at the abattoir around May and November 2009. A total of 347 goats and 172 sheep were screened covering the period of May (before the rainy season), June to July (in the rainy season) and October to November (after the rainy season). Five milliliters of jugular blood was collected randomly at the point of slaughter in bottles containing one milligram powder Ethylene Diamine Tetra Acetic Acid (EDTA) per millimeter of blood between 6.30 and 9.00 a.m. The blood samples were kept cool by placing them in cold boxes containing ice packs after collection. Parasitological examination was done in the Laboratory using the haematocrit centrifugation technique, HCT (Woo, 1971), Buffy Coat Method (BCM) (Murry and McInter, 1997) and Giemsa stained thin films made after BCM examination. The Packed Cell Volume (PCV) of each animal was also determined through capillary centrifugation of blood with centrifuge and hamatocrit read. Trypanosome species were identified based on their motility using the BCM and morphological features from Giemsa stained films. The physical condition of the animals was also examined.

RESULTS

The overall infection rate of trypanosomiasis in sheep and goat (small ruminant) was 1.54%. However, the overall infection rates in sheep 1.16%, the infection rate during the raining season (2.78%) appeared higher than the infection rate before rainy season (1.08%) and after the rainy season (1.05%). The overall infection rate in sheep was 1.16%, the infection rate during the rainy season (2.4%) appeared higher than the infection rate before rainy season (0%) and after the rainy season (1.4%).

The overall infection rate in goats 1.73%, the infection rate during the rainy season (3.0%) appeared higher than the infection rate before rainy season (1.6%,) and after the rainy season (0.83%). Three *Trypanosoma* species were identified as a single infection namely *T. congolense* (5 cases, 50%), *T. brucei* (3 cases, 37.5%), *T. vivax* (1 case 12.5%). The infection rate in sheep is slightly lower than the infection rate in goats and small ruminants are susceptible to all the economically important *Trypanosomes* as presented in Table 1.

Table 1: Trypanosome infection rates in small ruminants at slaughter in Kaduna, North Central, Nigeria

Small ruminant	Raining season	No. of examined	No. of positive	Infection (%)	<i>T. vivax</i>	<i>T. congolense</i>	<i>T. brucei</i>	Overall infection rate (%)
Sheep	Before	61	0	0.00	-	-	-	1.16
	During	41	1	2.40	-	-	1	
	After	70	1	1.40	-	1	-	
	Total	172	2	1.16	-	1	1	
Goat	Before	124	2	1.60	-	1	1	1.73
	During	103	3	2.90	1	-	2	
	After	120	1	0.80	-	1	-	
	Total	347	6	1.73	1	2	3	

Table 2: Sex distribution of trypanosome infection rates in small ruminants at the Kaduna Central Abattoir Nigeria

Small ruminant	Sex	No. of examined	No. of positive	Infection (%)	Overall infection rate (%)
Sheep	Male	40	1	2.50	1.16
	Female	132	1	0.75	
	Total	172	2		
Goat	Male	176	1	0.57	1.73
	Female	171	5	2.92	
	Total	347	6		

Over all packed cell volume of parasitologically positive animals was lower compared to that of negative animals. The overall prevalence rates in males (0.93%) appeared lower than the prevalence rates in females 1.98%. The infection rates in does (0.75%) appeared higher than the infection rate in nanny goats (0.56%). The infection rate in rams (2.56%) appeared higher than the infection rate in Billygoats (0.75%) as presented in Table 2.

DISCUSSION

The overall infection rate of 1.54% in small ruminants at slaughter in Kaduna central abattoir is not the true status of the disease but was significantly lower than the national trypanosomiasis prevalence of 8.6 and 8.1% obtained in the same group of animals in a wider survey of all agro ecological zones between 1993 and 1996 (EEC Mid-Term Report, 1992; Onyiah, 1997). These rates indicate a general menace of trypanosomiasis in Nigeria with negative economic impact on meat quality of animals at slaughter (Abenga *et al.*, 2002). These increases may be attributed to the problems of drug resistant trypanosome strains, increased vector activities and insufficient policies for control of the disease in small ruminants. Higher infection rates observed in goats (though not statistically significant) may have arisen from the husbandry practice in this part of Nigeria where sheep and goats are usually taken out for grazing to nearby vegetations by children and are more exposed to tsetse flies bites and other vectors. The higher infection rates arising from *T. congolense* confirms the economic importance of *T. congolense* infection in livestock in Nigeria given the complementary roles played by other haematophagous flies despite epidemiological studies support only the mechanical transmission of *T. vivax* but not *T. congolense* experimental studies confirm that both species can be mechanically transmitted (Onyiah, 1997; Desquesnes and Dia, 2003). Mechanical transmission of trypanosomes by other vectors other than *Glossina* has been identified as a factor responsible for spread of the parasite to many parts of the world and maintenance of transmission in the presence of tsetse control (Davila and Silva, 2002; Samdi *et al.*, 2010).

The higher infection rates during rainy season may be attributed to increase in both tsetse and other biting flies population during this part of the year making such vectors to also encroach on settlement areas however, the low infection rates or absence of infection

may be attributed to decrease in both tsetse and other biting flies population as a result of environmental/weather and anthropological changes. This study suggests that trypanosomiasis in small ruminants is still prevalent in Nigeria and constitute a threat to meat supply to the nation. Higher infection rates are likely to have been the case if molecular techniques were used given the superiority of such techniques over the parasitological diagnostic methods in detection of trypanosomes in animals and also the possible trypanotolerant trait in sheep and goat. Seasonal control of trypanosomes in sheep and goats is therefore essential in limiting the current losses arising from the disease in small ruminants and their roles as reservoir hosts for both human and animal trypanosomiasis (Raheem *et al.*, 2009). Furthermore, mechanical spread of the parasites beyond Africa suggests a need for global and collaborative initiatives against this trypanosomes that are an important threat to livestock production.

The overall trypanosome infection rate in small ruminants brought to the Kaduna Central Abattoir for the periods before, during and after the raining season are summarized on Table 1.

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