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Parasitological prevalence of bovine trypanosomosis in the Faro and Deo division valley of the Adamaoua plateau, Cameroon

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ABSTRACT

A cross sectional survey to determine the distribution and prevalence of trypanosomosis was conducted in the Faro and Deo division valley, on the Adamaoua Plateau in Cameroon. A total of 334 adult cattle from 5 sedentary herds were examined in 5 villages. Dark field buffy coat method, as well as stained thin blood film examination and packed cell volume (PCV) evaluation were the diagnostic techniques used. The overall prevalence of bovine trypanosomosis in the area was 23%. Among the positive animals, 44 (57.1%), 26 (33.8%), 5 (6.5%) and 2 (2.6%) were due to *Trypanosoma congolense*, *Trypanosoma brucei*, *Trypanosoma vivax* and mixed infection (*T. congolense* and *T. brucei*) respectively. The mean PCV of the positive and negative animals ranged between 21.1-27% and 28.2-30.1% respectively. The mean PCV of negative animals (29.1±0.7%) was significantly higher than the mean PCV of positive animals (24.2±2.5%) ($P < 0.005$). In view of the high risk of trypanosomosis, in the area, an integrated intervention approach to which combines the strategic application of appropriate tsetse fly control methods to reduce host fly contact and chemotherapy and chemoprophylaxis against trypanosomosis is recommended.

Key words: Adamaoua, Cameroon, Cattle, Prevalence, Trypanosomosis, Tsetse.

INTRODUCTION

African Animal Trypanosomosis (AAT) is one of the major constraints to the development of the cattle sector in Cameroon, because 2/3 of the territory and 90% of the cattle herd is at risk of infection with trypanosomes (Hamadama, 2001). In particular, the Adamaoua Region (central part of Cameroon), the most important cattle rearing region of the country, is threatened by tsetse and trypanosomosis. Tsetse (*Glossina morsitans submorsitans*, *G. fuscipes fuscipes* and *G. tachinoides*) and consequently trypanosomosis appeared on the Adamaoua plateau in the 1950s (Banser, 1979; Hurault, 1993). Since then, trypanosomosis has been considered as the major livestock production constraint in the area (Mamoudou, 2007).

Between 1960 and 1975 the Cameroonian Government organized large-scale trypanocidal treatment campaigns and later tsetse control activities comprising ground spraying using DDT and in the early 1990s aerial spraying campaigns (Cuisance and Boutrais, 1995). To prevent reinvasion of tsetse flies from the plain of Koutine (north of the Adamaoua plateau), a barrier consisting of targets and traps was put in place. However, bush fires destroyed most of the targets and traps soon after deployment in 1994 resulting to the replacement of this barrier by a program of insecticide-treatment of cattle (Cuisance and Boutrais, 1995). For this purpose, cattle were supposed to be treated regularly with pyrethroids. Accurate data on the number and frequency of treatment are not available, but given the financial constraints of livestock owners in the area, treatments are expected to have been irregular (Mamoudou et al., 2008).

Nowadays chemotherapy in the area is used as preventive treatment with isometamidium chloride at the start of the transhumance and curative treatment upon return or in the case of illness with diminazene aceturate.

Up to now only few reports have been published on bovine trypanosomosis in the Faro and Deo division of Cameroon (Mamoudou et al., 2006; Mamoudou et al., 2008; Mbahin et al., 2008). The present study was therefore undertaken with the main objectives of determining the prevalence of trypanosomosis in this area and identifying the species of trypanosomes infecting cattle as a benchmark to instigate strategic control intervention.

MATERIALS AND METHODS

Sampling area

The Faro and Deo Division, is located in the northern part of Cameroon and has a Soudano-Sahelian climate. It lies at an altitude of 1000-1100m above sea level with an average rainfall of 1800 mm. The rainy season lasts from March/April to October while most of the rainfall occurs between June and September. The Adamaoua plateau is covered with savannah-type vegetation, more than 90% of which consists of *Daniellia olivert* and *Lophira lanceolata* (Letouzey, 1969). Other common tree and grass species are *Isoberlinia doka* and *Sporobolus africanus* respectively (De-Wispelaere, 1994). The environment is very suitable for intensive cattle rearing. The Zebu cattle (White and Red Fulani and Goudali or Peuhl of the Adamaoua) are kept under traditional extensive husbandry systems with communal herding.

The Faro and Deo Division, which covers 11,000 km^2, has an approximately 74,559 head of cattle (PACE, 2005) and 67,413 inhabitants (PNVRA, 2001). At the end of the tsetse eradication campaigns in 1994, the territory was divided in the following three zones from South to North: the plateau, the buffer zone and the valley (Figure 1).

The valley (our study area) is an agricultural zone where the cattle from the plateau, the buffer zone and some herds from neighbouring Nigeria spend most of the dry season (transhumance). The transhumance occurs from October to March. However during the rainy season, only about five sedentary cattle herds remain in the Valley. High densities of wildlife are also found inside and adjacent to the area (Figure 1). Tsetse fly density remains high in the Gashaka forest and Faro Game Reserve as a result of absence of effective tsetse control activities in the area (Boutrais and Cuissance, 1995)

Sampling size

Between October and December 2005, a survey of bovine trypanosomosis was conducted in 5 villages involving sedentary cattle keepers.

A total of 334 adult cattle from 5 herds were randomly selected and sampled from a population of 74, 559 in the area.

Sampling method

Blood used for examination was collected from the ear vein into heparinized microhaematocrit centrifuge capillary tubes and onto glass slides, as thick and thin blood smears and examined parasitologically using the buffy coat, thin and thick blood film techniques described by Paris et al. (1982). After centrifugation, the packed cell volume

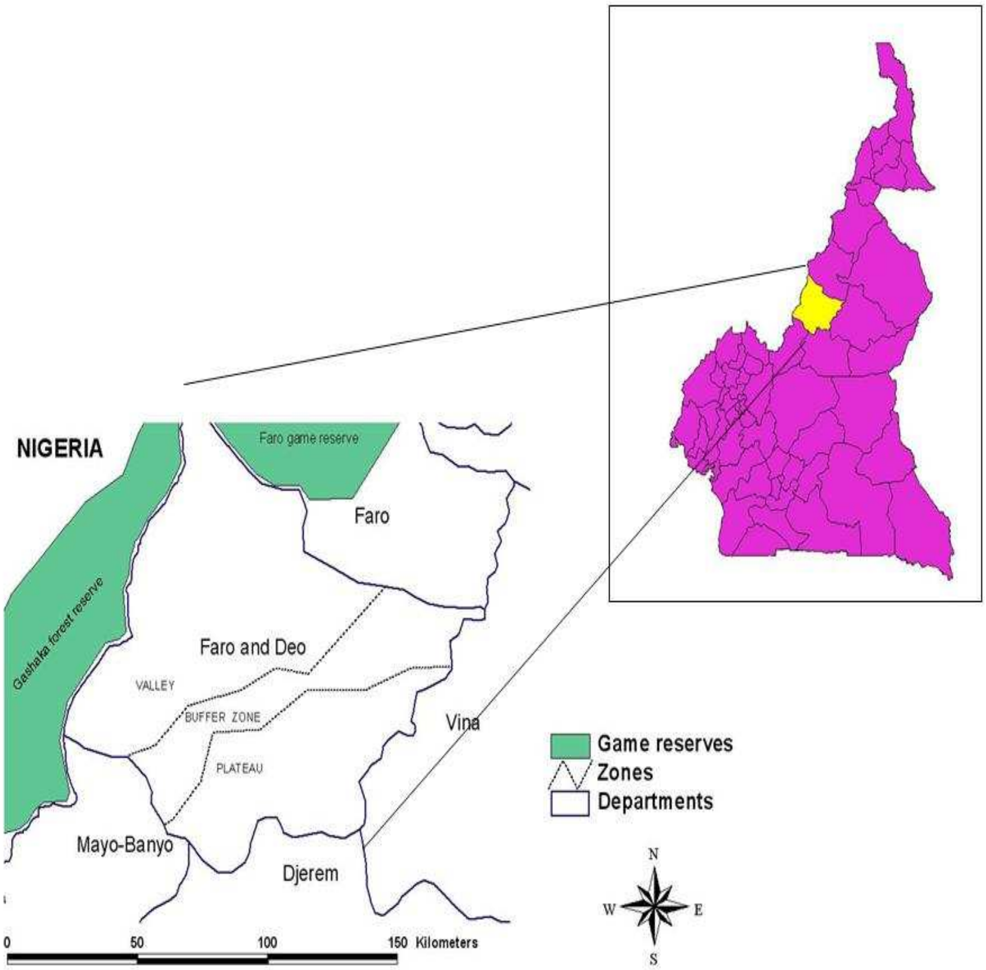

Figure 1: Map of the study area, indicating the three zones of the Faro and Deo Division.

(PCV) of each sample was also determined while animals with PCV reading below 24% were considered as anaemic (Kelly, 1967). Samples were examined with a phase-contrast microscope with a 40 x objective lens.

When the sample was found positive for a trypanosome, a thin smear was prepared, fixed, stained with Giemsa and examined under 100 x oil immersion objective lens for morphological characterisation of trypanosome species.

.**Statistical analyses**

Data were managed using Microsoft Excel. The mean PCV of negative and positive were compared by using Matlab version 6.5 Test ANOVA 1 (Matlab, 2002) at significance level of P< 0.005.

RESULTS AND DISCUSSION

Of the total of 334 cattle examined, trypanosomes were detected in 77 cattle (23%).

The trypanosome species involved were *T. congolense* (57.1%), *T. brucei* (33.8%), *T. vivax* (6.5%) and mixed *T. congolense* and *T. brucei* (2.6%). The prevalence of trypanosome varied among sampling sites (Table 1). The highest infection rate was recorded in Kontcha (47%) and the lowest in Mayo Baléo (10%). Infections due to *T. congolense* were highest in Kontcha

(78.1%), Almé (58.8%) and Gourwalti (44.4%), while *T. brucei* infection was proportionally high in Gadziwan (75.0%) and Mayo Baléo (71.4%).

The mean PCV of positive and negative animals ranged between 21.1-27% and 28.2-30.1% respectively (Table 2). The mean PCV of negative animals (29.1±0.7%) was significantly higher than the mean PCV of positive animals (24.2±2.5%) ($P < 0.005$).

Only 68.8% (53/77) of positive animals revealed PCV readings of less than 26% while 31.2% (24/77) of positive animals showed PCV readings of higher than 28%. Thirty seven animals (14.4%) with PCV readings of below 24% were negative for trypanosomes.

The distribution of the trypanosomosis, as suggested by the prevalence, showed that trypanosomosis is an important disease of cattle in the Faro and Deo Division valley of Cameroon. A previous study found that the prevalence of trypanosomosis was highest in the valley (Mamoudou et al., 2006).

The dominant infecting trypanosome in the study area was *T. congolense.* This high proportion of *T. congolense* infections is in accordance with previous observations made in this area of the Adamaoua plateau by Mamoudou et al. (2006). Similarly, in many studies, *T. congolense* has been reported as the most prevalent trypanosome species in cattle in Cameroon (Leak et al., 1993; Abebe and Johre, 1996).

The higher trypanosome infection rates observed in Kontcha and Almé (41.1% and 22%) respectively can be attributed to the location of our sampling sites, which were around the game reserve where the density and thus tsetse challenge were higher (Mamoudou et al., 2008).

During the dry season, tsetse can move freely throughout most of the valley where hosts (wildlife or cattle) are readily available. At the same time herds migrate from the plateau and neighbouring Nigeria into the valley where they spent most of the dry season (October-March) (Mamoudou et al., 2008). Cattle are allowed to roam freely and feed unattended, mainly on crop residues.

On the basis of the PCV readings, an assumption can perhaps be made on the health status of animals with trypanosomes. Anaemia, which is best measured by PCV, remains one of the indicators of trypanosomosis in cattle (Stephen, 1986). In the present survey, however, only 68.8% (53/77) of parasitologically positive animals revealed mean PCV values of < 26%. The remaining 31.2% (24/77) of positives animals showed PCV values of > 28%, which is beyond the normal minimum PCV for cattle (Kelly, 1967). The high infection rate observed can be explained by the fact that the microhaematocrit buffy coat technique of detecting trypanosomes in the blood is more sensitive, since it detects slight infections, than that of direct smear examination (Paris et al., 1982). Similarly, the microhaematocrit buffy coat technique also has the advantage of permitting PCV determination during the course of sample analysis.

The significantly lower PCV reading and yet trypanosome-negative finding in 14.4% of the animals examined could suggest the concomitant occurrence of other anaemia-causing factors, presumably tick infestation, helminthosis, heamoparasitosis (other than trypanosomosis) and nutritional deficiencies, in the area.

The present survey indicated the distribution and the risk of trypanosomosis as well as the species of trypanosomes involved in the cattle infection in the area. It can thus be concluded that trypanosomosis is an important disease and a potential threat to sustainable cattle production in the Faro and Deo Division of Adamaoua, Cameroon. It is recommended therefore that a tsetse control strategy to brake host-tsetse transmission cycle besides chemotherapy and chemoprophylaxis against trypanosomosis is important in maximizing utilization of abundant fodder in this area. One of the ideal strategies to reduce tsetse-cattle contact is the PATTEC plan of action (Kabayo, 2002) which seeks to apply area-wide techniques to

Table 1: Trypanosome infection rates detected at study locations.

Sites	Animals tested	Positives (prevalence)	Trypanosomal infections			
			T. congolense	*T. brucei*	*T. vivax*	Mixed
Almé	45	17 (37.70%)	10 (58.8%)*	5 (29.4%)	2 (11.8%)	-
Gadziwan	75	12 (16.00%)	3 (25.0%)	9 (75.0%)	-	-
Gourwalti	76	9 (11.80%)	4 (44.4%)	3 (33.3%)	2 (22.2%)	-
Kontcha	68	32 (47.00%)	25 (78.1%)	4 (12.5%)	1 (3.1%)	2 (6. 2%)
Mayo Baléo	70	7 (10.00%)	2 (28.5%)	5 (71.4%)	-	-
Total	334	77 (23.00%)	44(57.1%)	26 (33.8%)	5 (6.5%)	2 (2. 6%)

* Number in parenthesis indicate the relation proportion of *T. congolense*, *T.brucei* and *T.vivax* infection at each site

Table 2: Mean PCV values of examined animals.

Sites	Animals tested	Mean PCV (%)	
		positive animals	negative animals
Almé	45	25.6±3.8	29±4.1
Gadziwan	75	27±4.1	30.1±5
Gourwalti	76	21.1±3.1	29.5±4.9
Kontcha	68	25.3±3.3	28.7±5.4
Mayo Baléo	70	22±2.5	28.2±4.6
Total	334	24.2±2.5	29.1±0.7

PCV: Packed cell volume ; Mean ± standard deviation ; The mean PCV of negative animals was significantly higher than the mean PCV of positive animals at $P < 0.005$ level.

eliminate pockets of tsetse infestation, thereby creating tsetse- free zones with the ultimate goal to eradicating tsetse from the African continent.

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