Bovine trypanosomosis in Bukanga County, Western Uganda: prevalence, farmers knowledge and livestock management practices

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Bovine trypanosomosis in Bukanga County, Western Uganda: prevalence, farmers knowledge and livestock management practices

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ABSTRACT

Trypanosomosis is considered as a threat to the ongoing efforts on poverty alleviation in Uganda despite attempts to control it. Understanding current prevalence and level of knowledge of local farmers influences the extent to which they adhere to and the success of existing control interventions. Prevalence of bovine trypanosomosis was determined from a total of 200 cattle blood samples randomly selected and screened for trypanosomes by microhaematocrit centrifugation method (HCT) and blood smear microscopy; a questionnaire was used to establish the level of knowledge and livestock practices. STATA software was used for descriptive data analysis and Ashur's scale to assess farmers' knowledge. Four blood samples (4/200) were positive for trypanosomes by both HCT and smear microscopy techniques giving a prevalence of 2% (95% CI: 1.94 – 2.06); *T. congolense* and *T. vivax* species were identified with *T. congolense* contributing 75% of all infections. Farmers level of knowledge was low and nomadic farming system was mainly practiced. Trypanosomosis remains an economically important challenge in the study area. There is need to encourage farmers to adopt integrated tick and tsetse control practices by using acaricides that kill both ticks and tsetse and there is need for community sensitization and enhancement of the prevailing trypanosomosis control interventions.

Keywords: Bovine trypanosomosis; prevalence; management practices; African Animal Trypanosomiasis

INTRODUCTION

African Animal Trypanosomosis (AAT) a disease of livestock & game animals is caused by an infection with different species of the genus *Trypanosoma*. *T. brucei*, *T. congolense* and *T. vivax* being species of livestock economic importance (Lelisa et al., 2015). It is a zoonotic disease transmitted cyclically by blood sucking flies of the genus Glossina, commonly known as tsetse (Holt et al., 2016). It is a problem in the livestock industry in Western Uganda (Alingu et al., 2014). The natives of Bukanga County in Isingiro district are traditionally pastoralists with 180,345 herds of cattle (National population and housing

census report, 2014). This disease has been tentatively diagnosed in Bukanga County (Personal communication from District Veterinary Officer, Isingiro district).

The ecological system in the area is prone to chronic drought and the terrain is characterized by bare hills and rangelands. The natives are traditionally pastoralists who mainly keep Ankole long horned cattle, goats and sheep (Wurzinger and Sölkner, 2008). Understanding prevalence of trypanosomosis, farmers knowledge and livestock practices is critical to knowing the epidemiology of the disease; and acts as a guide in designing suitable and locally acceptable control programmes. However, the above critical information was missing in Bukanga County located in south western Uganda; an information gap this study sought to bridge.

The aim of the study therefore was to determine prevalence of bovine trypanosomosis, farmers knowledge and livestock management practices in Bukanga County, Isingiro District; Southwestern Uganda.

MATERIALS AND METHODS

Study area and design

A cross-sectional field and laboratory based study was carried out to determine the prevalence of bovine trypanosomiasis, farmers knowledge and livestock management practices in Bukanga County, Isingiro district located in south western Uganda (Fig. 1) in August 2018.

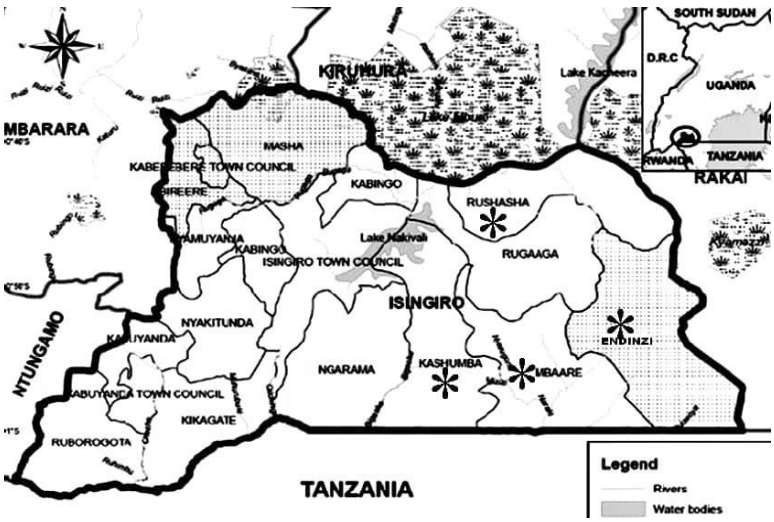

Fig. 1. A map showing sub counties in Isingiro district; Western Uganda. * Studied sub counties.

Study population and sample size

The target populations included local breeds of Ankole long horned cattle, exotic cattle and cross breed of all age groups raised under different farming systems. The sample size was estimated using Kish formula (Kish L, 1965) taking precision assumed to be +/-

0.05 at 95% level of confidence. Expected prevalence of 15.3% was used to calculate the sample size (Dennis et al., 2014). Two hundred cattle selected from 200 herds were sampled and seventy farmers were recruited for assessment of knowledge and livestock management practices.

Sampling technique

The study area was stratified into sub counties, parishes and villages and herds. Herds and farmers were selected using simple random sampling method. The study area was stratified into sub counties and selected a minimum of fifty heads of cattle were randomly selected from each of the four sub counties. After identifying animals with unexplained poor body condition in each sub county, a sampling frame was constructed and fifty animals were selected from each sub county.

Sample collection and processing

Laboratory reagents and materials were purchased from Joint Medical Stores, Uganda. Blood samples were collected aseptically from two hundred cattle selected from 200 herds, 50 blood samples from each of the four sub counties for laboratory examination. Wet blood films were used for identification of the *Trypanosoma* species based on morphological descriptions as well as motility. Thin and thick smears were made on separate slides, air dried and thin smear fixed in absolute methyl alcohol for three minute and later stained using 3% Giemsa staining protocol for 30 minute and both were examined using a light microscope using an oil emersion objective lens. Thick smears were used to detect parasites and thin smears for species typing and identification based on morphology.

Packed cell volume (PCV) determination was carried out using standard operating procedure for microhaematocrit centrifugation method and individual results were then read from a hematocrit reader and recorded in percentages. Animals with PCV ≤ 24% were considered to be anaemic, this lower limit has been previously used by Gemeda F (2015). The Buffy coat was examined microscopically for trypanosome motility under × 40 objective and ×10 eye piece.

Data analysis and management

Data obtained was entered into MS Excel spreadsheets, cross checking and editing done; validation done to ensure correctness of entry. STATA software was used for descriptive data analysis and outputs were presented in form of charts, graphs, bar graphs and tables. The prevalence was calculated as the number of infected individual animals divided by the number of cattle examined and multiplied by 100 using 95% confidence interval. Level of knowledge about AAT was measured using Ashur's knowledge measurement method (Ashur, 1977).

Ethical considerations

The study was approved by Research Ethics Committee (Ref: MUREC 1/7) and Faculty of Medicine Research Ethics committee (Ref: DMS-6) at Mbarara University Science and Technology.

RESULTS

Demographic characteristics

Two hundred cattle from two hundred farms or herds from four sub counties in the study area were sampled and a data collection guide was used to assess farmers the level of awareness about AAT and livestock management practices for AAT. The sub counties in the study area were Rushasha, Mbare, Kashumba and Endizi. The study recruited seventy farmers of different levels of formal education with the majority 91.43% (64/70) having primary as their highest level of formal education. Farmers who were recruited into the study had different tenures in the livestock industry with the majority 91.43% (64/70) with over 6 years' in the livestock industry. Besides cattle, farmers who were recruited into the study also kept goats, sheep, dogs and pigs.

General prevalence of Bovine trypanosomosis and isolated trypanosome species

Of the 200 blood samples that were collected and examined, 4/200 were positive for trypanosomes giving a prevalence of 2.0% (4/200) (95% CI: 1.94 – 2.06); the mean PCV result for all cattle sampled was 20.85% ± 4.46% (Mean ± Standard deviation, range 7 – 33%) below the lower limit of 24% (Gemeda, 2015); this signified that cattle recruited into the study were anaemic on average. Infections were identified from two sub counties of Rushasha and Mbare; each 4 % (2 out of 50) of cattle in Rushasha and Mbare sub-county were infected with trypanosomes, while none of trypanosome positive cattle were identified in Kashumba and Endizi sub-county. Rushasha is bordered by Lake Mburo National park while Mbare is bordered by Tanzania. From thin blood smear microscopy findings, only two trypanosome species (*T. congolense* and *T. vivax)* were isolated with different prevalence's at 75% (3/4) and 25% (1/4) respectively with *T. congolense* being more prevalent. No mixed infections were identified.

Farmers level of awareness about AAT

Levels of knowledge regarding identification of signs and symptoms and preventive measures were assessed following the Ashur's knowledge measurement scale (1977). According to Ashur, a score of less than 40 percent of the total correct responses is taken as an indicator of low level of knowledge, 40 – 59 percent is considered average and 60 – 80 per cent is considered good, while over 80 percent is regarded as excellent level of knowledge. Farmers knowledge about signs, symptoms and prevention was found to be low as per Ashur's knowledge level scale (1977), with only 33.30% and 22.10% correctly identifying right options about signs and symptoms and preventive measures, respectively. Only 14.28% (10/70) of study participants knew that avoiding tsetse infested areas and bush burning were important practices to prevent their animals against AAT as shown in Table 1.

Table 1. Respondent's level of knowledge about AAT infections

Variable	Frequency (n = 70)	Percentage (%)
Recognition of signs and symptoms of AAT		
a. Poor body condition	36	51.4
b. Weight loss	14	20.0
c. Standing hairs	44	62.9
d. Fever	36	51.4
e. General body weakness	14	20.0
f. Low milk production	18	25.7
g. Abortion	24	34.3
h. Loss of appetite	2	2.9
i. Lacrimation	24	34.3
j. Diarrhoea	26	37.1
Mean value		**33.3**
Awareness about appropriate preventive & control measures		
a. Spraying/ dipping	64	91.4
b. Avoiding tsetse infested areas	4	5.7
c. Bush burning	6	8.6
d. Prophylactic treatment	12	17.1
e. Treatment of cases	4	5.7
f. Use of tsetse fly traps	2	2.9
Mean value		**22.1**
Cumulative mean		**27.7**

Livestock management practices

From the study findings, all farmers 100% (70/70) could move with their cattle in search for either pasture or water Mburo National park and sprayed their animal against flies and ticks; 94.29% (66/70) reported seeking professional advice and treatment for only sick animals, 87.14% (61/70) spray their cattle, 28.57% (20/70) reported avoiding infested areas, 14.29% (10/70) use tsetse traps and 17.14% (12/70) practice bush burning as shown in Fig. 2.

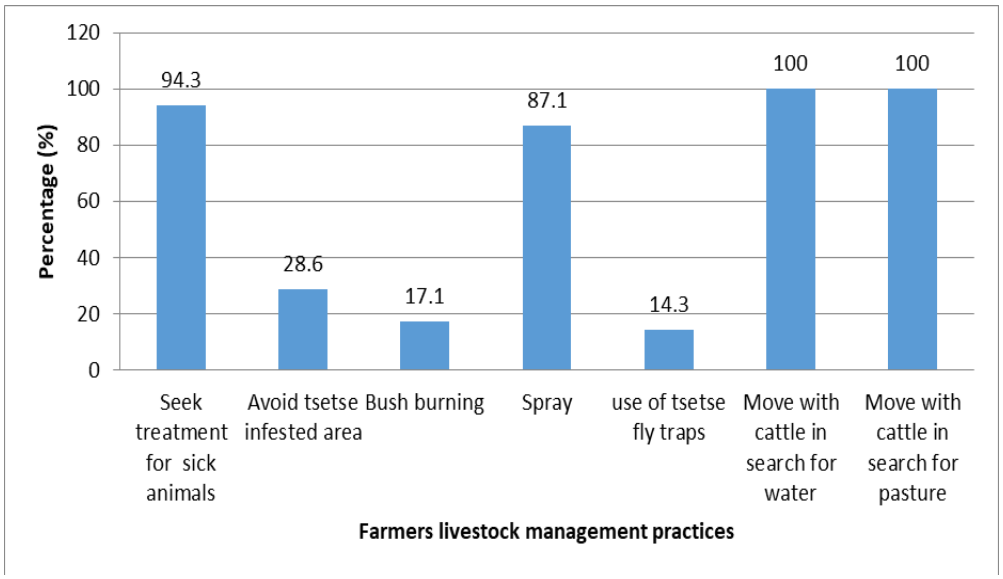

Fig. 2. A column graph showing farmers livestock management practices against AAT.

DISCUSSION

The prevalence of bovine trypanosomiasis in this study was 2%. These findings are in agreement with similar studies in Kashaari, Uganda 2.4 % (95% CI; 1.0% - 4.8%) (Alingu et al., 2014), Nigeria (1.8%) (Fajinmi et al., 2011) and West Ethiopia (2.86%) (Tadesse et al., 2015). This could be attributed to similarities in utilization of AAT livestock management practices, diagnostic methods used and good average knowledge levels exhibited by farmers. These findings however are in disagreement with those observations from other similar studies to determine the prevalence of trypanosomosis in Tororo District 15.3% (Dennis et al., 2014), trypanosomiasis in the districts of Amuru and Nwoya, Northern Uganda was 41% (Angwech et al., 2015). This could be attributed to the differences in the diagnostic methods used where more sensitive method (PCR) was used while the current study used microhaematocrit centrifugation technique, thick and thin smear microscopy where some cases could have been missed. This could also be attributed to variation in utilization of AAT livestock control practices and average levels of knowledge exhibited by farmers in his specific studies and differences in climatic conditions and vegetative cover.

In the current study, two *Trypanosoma* species were identified that is *T. congolense* and *T. vivax*; 3/4 (75%) infections were due to *T. congolense* and 1/4 (25%) infections due to *T. vivax* species; *T. congolense* was the most predominant species (75%) followed by *T. vivax* causing 25% of the infections with no mixed infections. The current findings are in agreement with observations from other studies in Mbarara (Waiswa, et al., 2013), North West Ethiopia (Tadesse et al., 2015) and Western Oromia (Kassaye and Tsegaye. 2016). This could be attributed to bushy forest cover, climatic changes and the presence of water bodies in these areas which provides suitable breeding environment for the vectors.

However, this finding disagrees with observation in Tororo District, Uganda (Dennis et al., 2014) where *T. vivax*, *T. brucei* and *T. rhodesiense* were the species isolated. Presence of *T. congolense* transmitted cyclically by tsetse flies and *T. vivax* which can be transmitted by tsetse flies and mechanically by Tabanidae and Stomoxys suggests the presence of these vector flies in the ambits of the study area and calls for their control. This could be attributed to bushy forest cover, climatic changes and the presence of Lake Nakivale and River Kagera surrounding the study area which provide suitable breeding environment for the vectors.

Most prevalent *Trypanosoma* species identified in this current study was *T. congolense*. These findings are in agreement with the studies in south Eastern Uganda (Magona et al., 2005), Western Oromia (Kassaye and Tsegaye, 2016) and Kwale District, Kenya (Ohaga et al., 2007). However, the current findings differ from observations from similar studies in Mbarara (Waiswa and Katunguka-Rwakishaya, 2013), Tororo District, Uganda (Dennis et al., 2014), in Amuru and Nwoya district, Northern Uganda (Angwech et al., 2015), west Nigeria (Tadesse et al., 2015), Bure and Womberma districts of West Gojjam zone, North West Ethiopia where *T. vivax* was the most prevalent trypanosome species. This could be attributed to differences in the relative abundance of cyclical and mechanical vectors, differences in climatic changes, vegetative cover and presence of infected animals in close proximity of many other susceptible animals.

Farmers exhibited low level of knowledge about bovine trypanosomosis scoring 27.7% on average. Most farmers' showed low level of knowledge about recognition of sick animals and understanding of control and preventive measures of AAT as per Ashur's knowledge method (Ashur SS, 1977) with only 33.3% and 22.1%, respectively, correctly identifying right options (Table 2). These findings are in agreement with studies in Western Oromia (Kassaye and Tsegaye, 2016) and Kenya (Ohaga et al., 2007). The low level of knowledge about signs, symptoms, preventive and control measures could be attributed to low level of formal education since most of them of the participants stopped at primary level for formal education and lack of community based programmes against AAT.

These findings however, differ from findings of the survey in Burkina Faso, Mali and Guinea that indicated that most farmers (96%) recognized common signs of trypanosomiasis (Grace et al., 2009) compared to the mean recognition value of 33.30% for signs and symptoms of AAT this study. This could be attributed to differences in levels in formal education levels where most farmers in these particular studies had stopped at secondary schools as their highest level of formal education as compared to primary level in the current study and presence of community based programmes against AAT in these areas and difference in livestock tenure.

From the current study, most farmers spray/dip, sought treatment for sick cattle and administer prophylactic treatment as major livestock practice to manage AAT on their farms. These findings are in agreement with observations from similar studies in Mbarara (Waiswa and Katunguka-Rwakishaya, 2004), Tanzania (Fox et al., 1993) in Kenya (Baylis and Stevenson, 1998) and Ethiopia (Leak et al., 1995). These could be attributed to similarities in area settings, availability and accessibility of these particular services by farmers, level of knowledge about these methods. Few farmers used tsetse traps, avoided tsetse infested places and practiced bush burning to manage AAT on their farms. These findings are in agreement with the study in Bugiri District, Uganda (Okoth, 1991). This could be attributed to low level of knowledge about these methods and lack of community based programmes against AAT, similarities in climatic conditions shared by the two study areas where long dry spell forces farmers to move in search for pasture and water for their animals.

CONCLUSIONS

Bovine trypanosomiasis remains an economically important disease in Bukanga with a prevalence of 2%. Trypanosome species identified were *T. congolense and T. vivax*; *T. congolense* was the most prevalent trypanosome species responsible for most infections in the area. The persistence of the disease in this area is perpetuated by seasonal movement of farmers with their cattle to tsetse infested Lake Mburo National Park and across the Tanzanian border while in search of pasture and water for their animals during the dry season and back during the rainy season. The farmers knowledge about AAT disease recognition, control and prevention was low with only 27.7% of respondents' correctly identifying right options. Nomadic system of farming where they could move with their animals in search for pasture and water and spraying were the main livestock practices; however, only few farmers reported avoiding infested areas, using tsetse traps or practiced bush burning.

RECOMMENDATIONS

Before moving with animals in search for pasture and water, farmers should have their herds covered with blanket prophylactic treatment against AAT and when coming back to their residences, they should give blanket sanative treatment to cover any cattle that could have been infected. Farmers should be encouraged to adopt integrated tick and tsetse control practice by using acaricides that kill both ticks and tsetse to contain any flies that stray from the park or across the border to their permanent place of residence. There is need for community sensitization and enhancement of the current AAT control interventions if the condition is to be eliminated in this area.

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CONFLICT OF INTEREST

All authors declare no conflict of interest in the study.

SUBMISSION DECLARATION AND VERIFICATION

The authors declare that this manuscript is original, has not been published before and is not currently being considered for publication elsewhere.

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