



**PREVALENCE OF ANIMAL AFRICAN TRYPANOSOMOSIS IN ARUA DISTRICT
A CASE STUDY OF SELECTED SUB-COUNTIES IN ARUA DISTRICT**



BY;

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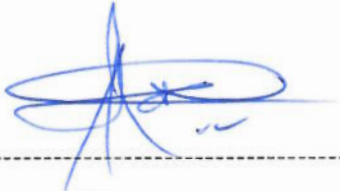
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DECLARATION

I **Abiria Ronny Jacob** hereby declare that the information and data in this report is entirely my effort and has never been submitted for an award of a kind in any institution of learning.



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DEDICATION

I would like to dedicate this report to my lovely children Dawa Prossy and Vera Merlyn Fetaru who endured my absence while for studies and as well as their lovely mother Harriet Endrekuru for all support given. Your guidance and input in this academic venture can only be rewarded by the almighty God.

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May the almighty God abundantly reward your efforts?

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ABSTRACT

This study aimed at determining and comparing prevalence of trypanosomes in indigenous cattle in five selected Sub Counties in Arua district. Haematocrit Centrifugation Technique (HCT) was used as parasitological tool to detect trypanosome infections in cattle. The study was carried out in five sub counties of Ogoko, Omugo, Uleppi, Offaka and Okollo which were purposively selected for carrying out this study. Two villages randomly selected per Sub County formed the herds of cattle from where individual animals were randomly selected. The sample size calculation was based on the estimated proportion of animals with an approximate 95% confidence level, using the following formula: $N_r = (1.96)^2 pq / d^2$. Out of 372 cattle screened for trypanosome infection, 102 tested positive and giving overall prevalence of 27.4%. The highest prevalence was recorded in Ogoko sub county (33.9%) followed by Omugo sub county (29.4%), Uleppi (25.9%), Okollo sub county (24.4%) and lowest prevalence of 21.9% in Offaka sub county. The study on association of the disease with sex of cattle revealed no relationship between the sexes. Chi-square test (X^2) was used to analyze the association of AAT and exposure of animals in different locations or sub counties and also the association of the AAT with sex of animals. The prevalence in males was slightly higher (37.1%) than in females (25.2%). The study reveals that the disease affects both sexes of animals and all the animals in Arua district have chances of being infected with trypanosomes irrespective of the location of Sub County. It is therefore recommended that further study be done on the most prevalent trypanosome species in the district, the potential reservoirs and putting in place interventions to avert the escalation of the disease. The knowledge on the prevalence and distribution of the trypanosome species in a geographical area is essential for understanding of the epidemiology of the disease. There is no information on prevalence of AAT in Arua district due to lack of research on the disease. The objective of the study is to compare the prevalence of Trypanosomosis in indigenous cattle in various locations and its association with sex of cattle.

CHAPTER ONE: INTRODUCTION

1.1 Background

Animal Trypanosomosis commonly known also as Nagana has constrained much the development of livestock productivity on African continent. Trypanosomosis is a zoonotic vector-borne disease which can also be transmitted by other parasitic flies like tabanids and stomoxys apart from tsetse flies. It is closely associated with human African Trypanosomosis (HAT). The disease is mainly caused in livestock by *trypanosome vivax*, *trypanosome congolense*, *trypanosome simiae*, *trypanosome brucei brucei* and *trypanosome suis*. Additionally to the tsetse-borne species, African mammals harbor non-pathogenic *trypanosome theileri* and *trypanosome mgens* which are commonly found in domestic and wild animals (Alsan, 2015).

African animal trypanosomes not only cause severe losses in the productivity of domestic animals due to reduced capacity of doing work, poor growth performance, weight losses, low milk production, infertility and abortions but as well impairs the development of agricultural zones that thrive due to livestock which constitutes 41% of the agricultural land use but which carry merely 26% of the ruminants population (FAO, 1998). (Alsan, 2015). The disease is a major constraint to production and productivity of livestock industry, hence bearing a significant impact on the livelihood of millions people of African developing countries and costing several billions of US Dollars (Chitanga et al, 2011).

Uganda is one of sub-Saharan countries that suffered several Trypanosomosis epidemics since the early 20th century thus the country is endemic to both AAT and Human African Trypanosomosis (HAT) (Bardosh et al., 2013; Berrang-ford, 2007). African animal trypanosome (AAT) is endemic in most regions of Uganda. Change in land use patterns and settlements coupled with strategies for control involving treatment of animals of which the mainly treated animals being cattle with use of acaricides and trypanocides resulted in changes of dynamics of the disease. This parasite greatly hinders the agricultural development of the Sub-Saharan region and an understanding of the mechanisms for increased prevalence is essential for control strategies that will be devised. Therefore, a continuous research to understand the dynamics of the Trypanosomosis as a major livestock disease and hindrance to the development of the sector is very important.

REFERENCES

- Allsopp, R. (2001). Options for vector control against Trypanosomosis in Africa. *Trends in parasitology*, 17(1), 15-19.
- Alsan, M. (2015). The effect of the tsetse fly on African development. *American Economic Review*, 105(1), 382-410.
- Anene, B., Onah, D., & Nawa, Y. (2001). Drug resistance in pathogenic African trypanosomes: what hopes for the future? *Veterinary parasitology*, 96(2), 83-100.
- Angwech, H., Nyeko, J. H., Opiyo, E. A., Okello-Onen, J., Opiro, R., Echodu, R., et al. (2015). Heterogeneity in the prevalence and intensity of bovine Trypanosomosis in the districts of Amuru and Nwoya, Northern Uganda. *BMC veterinary research*, 11(1), 255.
- Baticados, W. N., Fernandez, C. P., & Baticados, A. M. (2011). Molecular detection of *Trypanosoma evansi* in cattle from Quirino Province, Philippines. *Veterinarski arhiv*, 81(5), 635-646.
- Birhanu, H., Fikru, R., Saïd, M., Kidanè, W., Gebrehiwot, T., Hagos, A., et al. (2015). Epidemiology of *Trypanosoma evansi* and *Trypanosoma vivax* in domestic animals from selected districts of Tigray and Afar regions, Northern Ethiopia. *Parasites & vectors*, 8(1), 212.
- Bloit-Potar, M. C., Chamond, N., Cossou, A., Jouvion, G., Droin-Bergère, S., Huerre, M., et al. (2010). *Trypanosoma vivax* infections: pushing ahead with mouse models for the study of Nagana. II. Immunobiological dysfunctions. *PLoS neglected tropical diseases*, 4(8), e793.
- Chitanga, S., Marcotty, T., Namangala, B., Van den Bossche, P., Van Den Abbeele, J., & Delespiaux, V. (2011). High prevalence of drug resistance in animal trypanosomes without a history of drug exposure. *PLoS neglected tropical diseases*, 5(12), e1454.
- Constou, V., Plazolles, N., Guégan, P., & Baltz, T. (2012). Sialidases play a key role in infection and anaemia in *Trypanosoma congolense* animal Trypanosomosis. *Cellular microbiology*, 14(3), 431-445.
- Degneh, E., Ashenafi, H., Terefe, G., Kassa, T., Kebede, N., Shibeshi, W., et al. (2018). A Cross-sectional Study of Bovine Trypanosomosis in Sayo District, Oromia Regional State, Western Ethiopia. *International Journal of Nutrition and Food Sciences*, 7(2), 56.
- Evum, U. P. C. V. V. (2015). Insight into Trypanosomosis in animals: various approaches for its diagnosis, treatment and control: a review. *Asian Journal of Animal Sciences*, 9(5), 172-186.

- Fayer, R., Santín, M., & Xiao, L. (2005). *Cryptosporidium bovis* n. sp. (Apicomplexa: Cryptosporidiidae) in cattle (*Bos taurus*). *Journal of parasitology*, *91*(3), 624-629.
- Giordani, F., Morrison, L. J., Rowan, T. G., De Koning, H. P., & Barrett, M. P. (2016). The animal trypanosomiasis and their chemotherapy: a review. *Parasitology*, *143*(14), 1862-1889.
- Hanill, L., Picozzi, K., Fyfe, J., von Wissmann, B., Wastling, S., Wardrop, N., et al. (2017). Evaluating the impact of targeting livestock for the prevention of human and animal Trypanosomosis, at village level, in districts newly affected with *T. b. rhodesiense* in Uganda. *Infectious diseases of poverty*, *6*(1), 16.
- Holmes, P. (2013). Tsetse-transmitted trypanosomes—their biology, disease impact and control. *Journal of invertebrate pathology*, *112*, S11-S14.
- Joshi, P. P., Shegokar, V. R., Powar, R. M., Herder, S., Katti, R., Salkar, H. R., et al. (2005). Human Trypanosomosis caused by *Trypanosoma evansi* in India: the first case report. *The American journal of tropical medicine and hygiene*, *73*(3), 491-495.
- Kovacic, V., Tirados, L., Esterhuizen, J., Mangwiro, C. T., Torr, S. J., Lehane, M. J., et al. (2013). Community acceptance of tsetse control baits: a qualitative study in Arua District, North West Uganda. *PLoS neglected tropical diseases*, *7*(12), e2579.
- Loker, E., & Hofkin, B. (2015). *Parasitology: a conceptual approach*. Garland Science.
- Meyer, A., Hölt, H. R., Selby, R., & Cuitian, J. (2016). Past and ongoing tsetse and animal Trypanosomosis control operations in five African countries: a systematic review. *PLoS neglected tropical diseases*, *10*(12), e0005247.
- Ngwenya, B., Thakadu, O., Magole, L., & Chimbari, M. (2017). Memories of environmental change and local adaptations among molapo farming communities in the Okavango Delta, Botswana—A gender perspective. *Acta tropica*, *175*, 31-41.
- Picozzi, K., Fèvre, E., Oditi, M., Carrington, M., Eisler, M. C., Maudlin, I., et al. (2005). Sleeping sickness in Uganda: a thin line between two fatal diseases. *Bmj*, *331*(7527), 1238-1241.
- Rodrigues, A. C., Ortiz, P. A., Costa-Martins, A. G., Neves, L., Garcia, H. A., Alves, J. M., et al. (2014). Congopain genes diverged to become specific to Savannah, Forest and Kilifi subgroups of *Trypanosoma congolense*, and are valuable for diagnosis, genotyping and phylogenetic inferences. *Infection, Genetics and Evolution*, *23*, 20-31.
- Safar, E. H., & Azab, M. E. (2009). Anemia and Parasitosis: Part II; Blood and Tissue Protozoa. *PUIJ*, *2*, 1-14.

- Selby, R., Bardosh, K., Picozzi, K., Waiswa, C., & Welburn, S. C. (2013). Cattle movements and trypanosomes: restocking efforts and the spread of *Trypanosoma brucei rhodesiense* sleeping sickness in post-conflict Uganda. *Parasites & vectors*, 6(1), 281.
- Singla, L. D., Juyal, P. D., & Sharma, N. S. (2010). Immune responses to haemorrhagic septicaemia (HS) vaccination in *Trypanosoma evansi* infected buffalo-calves. *Tropical animal health and production*, 42(4), 589-595.
- Torr, S., Eisler, M., Coleman, P., Morton, J., & Machila, N. (2002). Integrated control of ticks and tsetse. *A report for the DFID Advisory and Support Services Contracts*.
- Waiswa, C., Picozzi, K., Katunguka-Rwakishaya, E., Oluho-Mukani, W., Musoke, R., & Welburn, S. (2006). *Glossina fuscipes fuscipes* in the Trypanosomosis endemic areas of south eastern Uganda: apparent density, trypanosome infection rates and host feeding preferences. *Acta tropica*, 99(1), 23-29.
- Wamwiri, F. N., & Changasi, R. E. (2016). Tsetse flies (*Glossina*) as vectors of human African Trypanosomosis: A review. *BioMed research international*, 2016.