



**BUSITEMA
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**THE PREVALENCE OF TUBERCULOSIS LIKE LESIONS IN CATTLE FROM
PROTECTED KRAALS;**

A CASE STUDY OF MOROTO MUNICIPAL ABATTOIR



BY

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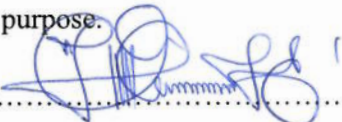
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**A DISSERTATION SUBMITTED TO THE FACULTY OF AGRICULTURE AND
ANIMAL SCIENCES IN PARTIAL FULFILLMENT OF REQUIREMENTS FOR THE
AWARD OF A DEGREE OF BACHELOR OF ANIMAL PRODUCTION AND
MANAGEMENT OF BUSITEMA UNIVERSITY**

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DECLARATION

I, OBIN GORDON, REGISTRATION NUMBER BU/UG/2013/135 declares that this thesis is an affirmation of the research activities I carried as a partial requirement for an award of a degree of bachelor of Animal production and management of Busitema University and that this report has never been submitted to any university or other institutions of learning for any academic purpose.

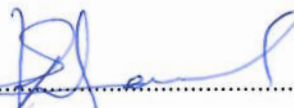
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The research process up to the documentation of this report has been developed under guidance and supervision of an academic supervisor and the approval there after

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DEDICATION

I dedicate this report to my parents Mr. and Mrs. Omega, my dear siblings Awidi Evalyn, Okech Innocent, Achen Vicky, Okwii Calvin Owiny Isaac and Agenorwot Jacklin together with Moroto Municipal Council and Busitema University.

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LIST OF ABBREVIATIONS AND ACRONYMS

APM	:	Animal Production and Management
BCG	:	Bacilli Calmette-Guérin
BTB	:	Bovine Tuberculosis
C&D	:	Institute for international Cooperation and Development
CDC	:	Center for Disease Control
CIS	:	Community Information System
Dept	:	Department
DPMO	:	District Production and Marketing Officer
DVO	:	District Veterinary Officer
FAAS	:	Faculty of Agriculture and Animal Sciences
FAO	:	Food and Agricultural Organization of the United Nations
FMD	:	Foot and Mouth Disease
GPS	:	Global Positioning System
LG	:	Local Government
M. bovis	:	Mycobacterium bovis
MTC	:	Mycobacterium Tuberculosis Complex bacteria
N	:	Number
NGOs	:	Non-Governmental Organizations
PM	:	Postmortem

SN	:	Serial Number
TB	:	Tuberculosis
TST	:	Tuberculin Skin Test
UK	:	United Kingdom
UN	:	United Nations
UNOCHA	:	United Nations Office for Coordination of Humanitarian Affairs
UPDF	:	Uganda Peoples Deafens Forces
WHO	:	World Health Organization

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ABSTRACT

The study was to determine the prevalence of Tuberculosis like lesions in cattle from protected kraals of Moroto district through post-mortem inspection in Moroto Municipal abattoir by examining clinical and subclinical lesions of organs like tonsils, lungs, liver, spleen, kidneys, cavities and lymph nodes that drain them with the main objective of determining presence and prevalence rate of bovine tuberculosis in protected kraals. The study was carried out in a period of three weeks.

The results obtained showed that more cattle originated from protected kraals (95.4% of all slaughters came from kraals) only 4.6% came from homesteads. Equally all the cases with positive bovine TB lesions were from protected kraals, i.e. 6 cattle representing 5.6 % of all slaughtered cattle and 5.8 % of cattle from protected kraals. Observations were made on all the cattle slaughtered during the time of study totalling to 108 cattle

The protected kraals in Moroto are similar in operation to all other protected kraals in pastoral areas of karamoja and this system was introduced during the disarmament program in Karamoja in the early 2000 where animals from several herds are confined into same paddocks during night protected by UPDF, yet herd mixing has been seen as a major risk factor for bovine TB spread. Thus this study was to investigate the relationship between protected kraals and BTB incidences. This results proves that protected kraals increase the risk to bovine TB.

The conditions in protected kraals features mixed herds from several households and different age groups, large stock size, animals closely interacting with humans, poor/lack of adherence good livestock management practices and transhumance system of livestock keeping.

The major challenge was difficulty in detection of non-obvious lesions in the abattoir thru reliance on only gross pathological lesions; this can be improved in future by establishing a laboratory for the abattoir. Note that TB here means bovine TB.

Key recommendations drawn from this study targets the local government and other stakeholders in karamoja region, these include sensitization of pastoral communities on BTB, need to establish and fully equip a veterinary laboratory at Moroto Municipal abattoir for effective diagnosis, provision of protective gears to abattoir personnels and creating better design for community kraals in a manner that controls spread of bovine TB.

CHAPTER ONE: INTRODUCTION

1.0. Introduction

Presented in this chapter are the background, problem statement, objectives, significance, justification, research questions and scope

1.1. Background

Karamoja has been characterized by rampant cattle rustling and chronic insecurity (Eguru *et al.*, 2014). After the disarmament took place most pastoralists lacked the capacity to protect their livestock from raiders this prompted government to create protected kraals where several herds are confined in the evening under protection of Uganda Peoples Defense Forces (UPDF) and there were over 38 protected kraals existing in Karamoja by 2009 (UN OCHA, 2009)

The process of combining several herds in one kraal exposes animals to several risks one of which is Bovine TB as discussed by Humblet *et al.*, (2009) who said large herd size is major among several risk factors that enhances the spread of BTB, the more cattle there are on a farm, the greater the probability that one of them will acquire this infection thus increasing the risk of cattle-to-cattle spread

A study in 1998 by WHO in the report by Cosivi *et al.*, (1998) stated that Of the 55 African countries by that time, 25 reported sporadic/ low occurrence of bovine TB; six reported enzootic disease; two, Malawi and Mali, were described as having a high occurrence; four did not report the disease; and the remaining 18 countries did not have data. Of all nations in Africa, only seven apply disease control measures as part of a test-and slaughter policy and consider bovine TB a notifiable disease; the remaining 48 control the disease inadequately or not at all this therefore shows that there is high risk of silent negative impacts of bovine tuberculosis whose study needs to be done but first the surveillance of the disease needs to be carried out in every part, this justifies why we need to start in Uganda to first begin from high risk areas like Karamoja TB can be diagnosed clinically, but usually only in the later stages of the disease. Many cattle with bovine TB are clinically normal. Some cows with extensive miliary tuberculous lesions also appear clinically normal, therefore clinical manifestations can be best observed at post mortem (Ayele *et al.*, 2004).

REFERENCES

- Asimwe, B. B., Asimwe, J., Kallenius, G., Ashaba, F. K., Ghebremichael, S., Joloba, M. & Koivula, T. (2009). Molecular characterisation of Mycobacterium bovis isolates from cattle carcasses at a city slaughterhouse in Uganda. *Veterinary Record: Journal of the British Veterinary Association*, 164(21).
- Asseged, B., Lübke-Becker, A., Lemma, E., Taddele, K., & Britton, S. (2000). Bovine tuberculosis: a cross sectional and epidemiological study in and around Addis Ababa. *Bulletin of Animal Health and Production in Africa*, 48(2), 71-80.
- Ayele, W. Y., Neill, S. D., Zinsstag, J., Weiss, M. G., & Pavlik, I. (2004). Bovine tuberculosis: an old disease but a new threat to Africa. *The International Journal of Tuberculosis and Lung Disease*, 8(8), 924-937.
- Bernard, F., Vincent, C., Matthieu, L., David, R., & James, D. (2005). Tuberculosis and brucellosis prevalence survey on dairy cattle in Mbarara milk basin (Uganda). *Preventive Veterinary Medicine*, 67(4), 267-281.
- Control, C. f. D. and Prevention (2005). "Human tuberculosis caused by Mycobacterium bovis-- New York City, 2001-2004." MMWR. Morbidity and mortality weekly report 54(24): 605.
- Control, C. f. D. and Prevention (2009). "Plan to combat extensively drug-resistant tuberculosis: recommendations of the Federal Tuberculosis Task Force." MMWR. Recommendations and reports: Morbidity and mortality weekly report. Recommendations and reports/Centers for Disease Control 58(RR-3): 1.
- Corner, L. (1994). "Post mortem diagnosis of Mycobacterium bovis infection in cattle." Veterinary microbiology 40(1): 53-63.
- Cosivi, O., Grange, J. M., Daborn, C. J., Raviglione, M. C., Fujikura, T., Cousins, D & Meslin, F. X. (1998). Zoonotic tuberculosis due to Mycobacterium bovis in developing countries. *Emerging infectious diseases*, 4(1), 59.
- D. Herenda, P.G. Chambers, A. Ettriqui, P. Seneviratna and T.J.P. da Silva (2000). Manual on meat inspection in developing countries 2(2) ISBN 92-5-103304-8.

- Daborn, C. J., Grange, J. M., & Kazwala, R. R. (1996). The bovine tuberculosis cycle—an African perspective. *Journal of Applied Bacteriology*, 81(s25), 27S-32S.
- Fairchild, A. L. and G. M. Oppenheimer (1998). "Public health nihilism vs pragmatism: history, politics, and the control of tuberculosis." *American Journal of Public Health* 88(7): 1105-1117.
- Humblet, M. F., Boschirolu, M. L., & Saegerman, C. (2009). Classification of worldwide bovine tuberculosis risk factors in cattle: a stratified approach. *Veterinary research*, 40(5), 1-24.
- Inangolet, F. O., Demelash, B., Oloya, J., Opuda-Asibo, J., & Skjerve, E. (2008). A cross-sectional study of bovine tuberculosis in the transhumant and agro-pastoral cattle herds in the border areas of Katakwi and Moroto districts, Uganda. *Tropical animal health and production*, 40(7), 501-508.
- Israel, G. D. (1992). Determining sample size, University of Florida Cooperative Extension Service, Institute of Food and Agriculture Sciences, EDIS.
- Kazwala, R., D. Kambarage, et al. (2001). "Risk factors associated with the occurrence of bovine tuberculosis in cattle in the Southern Highlands of Tanzania." *Veterinary Research Communications* 25(8): 609-614.
- Michel, A. L., B. Müller, et al. (2010). "Mycobacterium bovis at the animal-human interface: A problem, or not?" *Veterinary microbiology* 140(3): 371-381.
- Olea-Popelka, F., Z. Freeman, et al. (2012). "Relative effectiveness of Irish factories in the surveillance of slaughtered cattle for visible lesions of tuberculosis, 2005-2007." *Irish veterinary journal* 65(1): 1.
- Olmstead, A. L. and P. W. Rhode (2004). "An impossible undertaking: the eradication of bovine tuberculosis in the United States." *The Journal of Economic History* 64(03): 734-772.
- Olmstead, A. L. and P. W. Rhode (2007). "Not on my farm! Resistance to bovine tuberculosis eradication in the United States." *The Journal of Economic History* 67(03): 768-809.

- Oloya, J., Kazwala, R., Lund, A., Opuda-Asibo, J., Demelash, B., Skjerve, E., ... & Djenne, B. (2007). Characterisation of mycobacteria isolated from slaughter cattle in pastoral regions of Uganda. *BMC microbiology*, 7(1), 1.
- Omer, M. K., Skjerve, E., Woldehiwet, Z., & Holstad, G. (2001). A cross-sectional study of bovine tuberculosis in dairy farms in Asmara, Eritrea. *Tropical animal health and production*, 33(4), 295-303.
- O'neil, B. D., & Pharo, H. J. (1995). The control of bovine tuberculosis in New Zealand. *New Zealand Veterinary Journal*, 43(7), 249-255.
- O'Reilly, L. M. and C. Daborn (1995). "The epidemiology of Mycobacterium bovis infections in animals and man: a review." *Tubercle and Lung Disease* 76: 1-46.
- Oxfam, G. B. (2007). Evaluation of North Karamoja (Uganda) Pastoral Development Programme: Community Based Animal Health. *Oxfam Policy and Practice: Agriculture, Food and Land*, 7(2), 197-235.
- Phillips, C. J. C., Foster, C. R. W., Morris, P. A., & Teverson, R. (2003). The transmission of Mycobacterium bovis infection to cattle. *Research in veterinary science*, 74(1), 1-15.
- Phillips, C. J., Foster, C. R., Morris, P. A., & Teverson, R. (2002). Genetic and management factors that influence the susceptibility of cattle to Mycobacterium bovis infection. *Animal Health Research Reviews*, 3(01), 3-13.
- Stead, W. W. (1997). "The origin and erratic global spread of tuberculosis: how the past explains the present and is the key to the future." *Clinics in chest medicine* 18(1): 65-77.
- Stites, E., D. Akabwai, et al. (2007). "Angering Akujū: Survival and Suffering in Karamoja." Boston: Feinstein International Center 33
- Teddle, C. and F. Yu (2007). "Mixed methods sampling a typology with examples." *Journal of mixed methods research* 1(1): 77-100.
- Wint, G. W., T. P. Robinson, et al. (2002). "Mapping bovine tuberculosis in Great Britain using environmental data." *Trends in microbiology* 10(10): 441-444.
- Zinsstag, J., Schelling, E., Roth, F., & Kazwala, R. (2006). Economics of bovine tuberculosis. *Mycobacterium bovis infection in animals and humans*, 2, 68-83.