



**RETROSPECTIVE STUDY ON THE PREVALENCE OF BOVINE TUBERCULOSIS
IN CATTLE SLAUGHTERED AT UGANDA MEAT INDUSTRIES ABATTOIR,
KAMPALA.**

BY

AMERIT CATHERINE

BU/UG/2010/181

ameritcathy@gmail.com



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

JUNE, 2013



TABLE OF CONTENTS

DECLARATION..... iii

DEDICATION iv

ACKNOWLEDGEMENT v

LIST OF ABBREVIATIONS vi

LIST OF TABLES..... vii

ABSTRACT 1

CHAPTER ONE..... 2

 1.1 BACKGROUND..... 2

 1.2 PROBLEM STATEMENT..... 3

 1.3 OVERALL OBJECTIVE 4

 1.4 SPECIFIC OBJECTIVE..... 4

 1.5 RESEARCH QUESTIONS 4

 1.6 SIGNIFICANCE OF THE STUDY 4

 1.7 JUSTIFICATION..... 5

 1.8 SCOPE..... 6

CHAPTER TWO..... 7

2.0 LITERATURE REVIEW..... 7

 2.1 Introduction..... 7

 2.2 Species range 7

 2.3 Transmission 7

 2.4 Clinical signs..... 8

 2.5 Diagnosis 9

 2.6 Control..... 9

 2.7The global status of bovine TB..... 10

 2.8 Current status of bovine tuberculosis in Africa 10


 2.10Bovine tuberculosis prevalence in small ruminants 13



2.10.1 Goats	13
2.10.2 Sheep	13
2.11 Comparison of bovine tuberculosis infection in cattle and small ruminants.....	14
2.12 Economic importance of bovine tuberculosis.....	14
CHAPTER THREE:.....	16
3.0 Materials and methods	16
3.1 Research Approach.....	16
3.2 Study Area and Sampling design	16
3.3 Operational Designs	16
3.4 Statistical Design.....	16
3.5 Data Presentation.....	17
CHAPTER FOUR	18
4.0 RESULTS.....	18
4.1 Prevalence	18
4.1.1 Prevalence in cattle	18
4.1.2 Trend of prevalence	19
4.2 Prevalence in goats and sheep	19
Animal origin and judgments passed	20
4.2 Comparison of prevalence of TB between the different livestock species.....	21
CHAPTER FIVE.....	23
5.0 Discussion.....	23
CHAPTER SIX.....	26
6.0 CONCLUSIONS AND RECOMMENDATIONS.....	26
6.1 Conclusion	26
6.2 Recommendations	26
7.0 REFERENCES	27
8.0 Appendices	32

DECLARATION

I **AMERIT Catherine** declare that the information in this dissertation is my own work and is never been submitted to any institution of higher learning or university for any academic award.

Sign..........Date..... 06th. 09. 2013

APPROVAL

The dissertation has been submitted for examination with the approval of my supervisor

Ms. AKULLO JOLLY

Department of Animal Production and Management

Faculty of Agriculture and Animal Sciences

Sign..........Date..... 06th/09/2013

DEDICATION

I dedicate this report to all pioneers of Animal Production and Management course at the Faculty of Agriculture and Animal Sciences Busitema University, and to my brothers Okwerede Jeremiah, Osingada John Francis, Akello Getrude, Ocen Titus and Odeke Nobert that let this research be a point to guide us as we fight TB which is increasingly becoming threat in our society.

ACKNOWLEDGEMENT

I would like to thank Dr. Ahimbisibwe and Dr. Sam for availing me the necessary information I needed to carry out my study, the staff of Busitema University especially my Academic Supervisor Ms. Akullo Jolly for the guidance offered throughout the research period, the Head of Department of Animal Production and Management Dr. Matovu Henry for lecturing the course module, the Course Coordinator Dr. Ekou Justine, Brother Osingada John Francis, Uncle Ogwang Joseph for all the material help they have given thought my studies and above all God Almighty for the wisdom and gift of healthy life.

LIST OF ABBREVIATIONS

BTB	Bovine Tuberculosis
M. Bovis	Mycobacterium Bovis
KNP	Kruger National Park
MTC	Mycobacterium Tuberculosis Complex
TB	Tuberculosis
DAFF	Department of Agriculture, Fisheries and Forestry
MAAIF	Ministry of Agriculture Animal Industries and Fisheries
UBOS	Uganda Bureau of Statistics
WHO	World Health Organization
WOAH	World Organization for Animal Health
IFAD	International Fund for Agricultural Development
OIE	Office International Des Epizooties
CBPP	Contagious Bovine Pleural Pneumonia
FAO	Food and Agricultural Organization
SICCT	Single Intradermal Comparative Cervical Tuberculin Test
HIV	Human Acquired Immune Virus
AIDS	Acquired Immune Deficiency Syndrome
UMI	Uganda Meat Industries
US	United States

LIST OF TABLES

Table 1 Prevalence of BTB in livestock slaughtered.....18

LIST OF FIGURES

Figure 1 Transmission cycle of mycobacterium bovis between man and cattle.....	8
Figure: 2 prevalence of bovine tuberculosis in cattle across the study period.....	19
Figure: 3 the trend of prevalence of BTB in cattle across the study period.....	19
Figure: 4 prevalence of BTB in shoats across the study period.....	20
Figure: 5 total condemnation for the different districts.....	21
Figure: 6 Comparison of prevalence between the livestock species.....	22

LIST OF APPENDICES

Appendix: 1 Bovine lung infected with TB	32
Appendix: 2 Bovine lymph nodes infected with BTB.....	32
Appendix: 3 table of cattle numbers slaughtered in the abattoir.....	33
Appendix: 4 table of number of shoats' slaughtered in abattoir	34
Appendix: 5 data collection sheet.....	35

Abstract

A retrospective study was carried out to assess the prevalence of bovine tuberculosis in cattle slaughtered at Uganda Meat Industries abattoir located in Kampala with the main objective of assessing the prevalence, in the different livestock types and finding out their origin. The study was for the period of eight years (2005/2012) and all livestock slaughtered in this time were used as study samples. Carcasses recorded to have been TB infected at post mortem were all recorded as cases. Of the 59682 slaughtered cattle within this period, 76 were condemned as TB cases. This resulted in (0.13%) prevalence which ranged from (0%) to (0.27%) across the study years. The difference in prevalence between livestock types slaughtered in the abattoir was also done and cattle were found to have significantly high prevalence of (0.04%) as compared to small ruminants (goats & sheep) that had (0.004%). Districts with high carcass condemnations due to TB were also identified with Mpigi district having the highest number of total carcass condemnations and the least being recorded in the districts of Masindi, Luwero and Mbarara. The overall livestock prevalence was (0.049%) suggesting that the disease is prevalent in all livestock species and collective efforts are required in the control. Further research should be done in other abattoirs to establish the disease prevalence in the slaughtered animals and also more studies should be done at the national to establish the disease prevalence in the country.

CHAPTER ONE

1.1 BACKGROUND

Bovine tuberculosis remains an important zoonosis that has impact on national and international trade of animal products of any country. The zoonosis is widely spread and is neglected by most developing countries (Maudlin, 2009) and yet it's the major cause of abattoir condemnations and in human, it's ranked the second "killer" in the world (WHO report, 2012).

Mycobacterium bovis is primarily the cause of tuberculosis in cattle and it affects all cattle species although the *Bosindicus* (zebus and Brahmans) are reported to be more resistant to the disease than *Bostaurus* (exotic breeds) mainly because of the long exposure, they have developed resistance (Reilly & Darbon, 1995).

Bovine TB in cattle is almost in every country of the world and infection has been reported in 69% of countries in the tropics and in 80% of countries in Africa (OIE report, 2000). Uganda in particular, there is no clear information available on the overall prevalence and the extent of the disease burden but there is clear evidence that the disease exists among livestock herds in the country and is causing economic losses to farmers evident by abattoir condemnations of carcasses (Asiimwe, 2008).

Efforts by the Ministry of Agriculture, Animal Industry and Fisheries to establish disease free zones in order to penetrate the European market is constrained with prevalence of animal diseases especially this zoonosis which is increasingly becoming multiple drug resistant when transmitted to man (OIE report, 2000).

The Ministry of Agriculture, Animal Industry and Fisheries in (2004) recommended the Meat Parkers now known as Uganda Meat Industries abattoir as a step in production of meat with high quality. The abattoir began to operate fully in 2005 with the expectation that cattle delivered to it would be from specialized ranches of the Country where management especially for diseases has improved to greater levels as compared to the traditional systems which are still practiced by the local communities thus production of disease free carcasses.

However, at the initial stages, animals came from various parts of the country until today when it mainly receives from specialized ranches though in few incidences from the city

7.0 REFERENCES

1. A McGeary., (2008) *Medical Journal of Therapeutics*. The role of *Mycobacterium bovis* in Tuberculosis in Africa University of the Sciences in Philadelphia, 600 south 43rd street, Philadelphia, Pennsylvania, 19104-4495, USA. Vol. 2, no 1 page 59
2. Abel Nkolo., Kalyesubula-Kibuuka Simon., (2006) *Activity report* on the tour of districts in the Eastern zone of Uganda
3. Abubakar U B., Ameh J I., Abdulkadir I.A., Safisu I., Okaiyeto S O., & Kudi A.C., et al., (2007) *Tuberculosis (Edinb)* *Mycobacterium bovis* in rural Tanzania: risk factors for infection in human and cattle populations; 87: 30-43.
4. Amanfu W., (2006): The Situation of tuberculosis and tuberculosis Control in Animals of economic Interest. *Tuberculosis*, 86, 330–335.
5. Ameni G, Aseffa A, Sirak A, Engers H, Young DB, Hewinson RG *et al.*, (2000) *journal of Vet Rec*. Effect of skin testing and segregation on the prevalence of bovine tuberculosis, and molecular typing of *Mycobacterium bovis*, in Ethiopia: 161: 782-786.
6. Ameni G, Hewinson G, Aseffa A, Young D, Vordermeier M., (2008) *Journal of clin vaccine immune*, Appraisal of interpretation criteria for the comparative intradermal tuberculin test for the diagnosis of bovine tuberculosis in central Ethiopia.
7. Ashenafi D., Mamo G., Ameni G., and Simenew K., (2013) *Journal of bacteriol and parasitol*, Epidemiology and Molecular characterization of causative agent of bovine tuberculosis in small ruminants.
8. Ayele W.Y., Neill S.D., Zinsstag J., Weiss M.G., Pavlik I., (2004) *International journal of tuberculosis and lung disease*, Bovine tuberculosis: an old disease but a new threat to Africa.
9. Ayele WY., Neill SD., Zinsstag J., Weiss MG., Pavlik I., (2004) *Int Lung Dis*, Bovine tuberculosis: an old disease but a new threat to Africa; 8: 924-937.
10. Berg S, Firdessa R, Habtamu M, Gadisa E, Mengistu A, Yamuah L *et al.*, (2009) *plos one* The burden of mycobacterial disease in Ethiopian cattle: implications for public health. 4: e5068.
11. Byarugaba F., Etter E M C., Godreuil., S & Grimaud P., (2009) *Uganda letter*, Pulmonary tuberculosis and *Mycobacterium bovis*; Pub Med.
12. Chausse P. (1913) *Des méthodes à employer pour réaliser la tuberculose expérimentale par inhalation*. *Bull. Soc. Méd. Vét*; 31, 267-274.

13. Cleaveland S., Shaw DJ., Mfinanga SG., Shirima G., Kazwala RR., Eblate E Cousins D V., Florisson N., (2009) A review of tests available for use in the diagnosis of tuberculosis in non-bovine
14. Demelash B., Inangolet F., Oloya J., Asseged B., Badaso M., et al., (2009). *Journal of tropical Animal Health Prod.* Prevalence of bovine tuberculosis in Ethiopian slaughter cattle based on post-mortem examination. 41: 755–765. *Doi: 10.1007/s11250-008-9248-9.*
15. Dolin, [Edited by] Gerald L., Mandell., John E. Bennett., Raphael., (2010). *Mandell, Douglas, and Bennett's principles and practice of infectious diseases: (7th Ed.)* Philadelphia, PA: Churchill Livingstone/Elsevier.
16. Francis J. (1958): Tuberculosis in animals and man. Cassell, London, 357 pp.
17. Francis Steveen George. (2011): *Journal of infectious diseases.* Bovine tuberculosis at cattle, small ruminants- human interface in Meskan, Gurage region central Ethiopia
18. Gormley E., Doyle M.B., Fitzsimons T., Mc gill K. & Collins J.D., (2006): *Assay Vetmicrobial*, Diagnosis of *Mycobacterium bovis* infection in cattle by use of the gamma-interferon (bovigam); 112 (2–4), 171–179.
19. Gutiérrez M.M., & García Marin J.F., (1993) *J. comp. Pathol*, Comparison of Ziehl-Neelsen staining & immune histochemistry for the detection of *Mycobacterium bovis* in bovine and *caprine* Tuberculous lesions: 109 (4), 361-370.
20. Hewinson RB., (2006) *nature. Reviews Microbiology*, Bottlenecks and broomsticks: the molecular evolution of *Mycobacterium bovis*; 4: 670-681
21. I.O Igbokw., I Y Madaki., S Danburum., J.A. Ameh., M.M Aliyu., C.O Nuwo., (2001) *journal of Med Vet department of veterinary pathology, faculty of veterinary medicine, university of Maidiguri Nigeria PMB 1069 Maidiguri Nigeria*
22. Ian Maudlin., Mark Charles Eisler., and Susan Christina Welburn., (2009) *Journal of biological sciences*, Neglected and endemic Zoonosis of Africa
23. Inagolet F O., Demelash B., Oloya J., Opuda Asibo J., Askjerve E., (2008) *Journal of tropical animal health production*, Across sectional study of bovine tuberculosis in transhumant and agro pastoral cattle herds in border areas of Katakwi and Moroto district.
24. J E Shitaye., B. Getahun., T. Aleyemahu., M. Skoric., F. Tremli., P. Fictum., V. Vrbas, I.Pavlic., (2006) *Journal of veterinari medicina* prevalence of by using abattoir meat inspection and tuberculin skin testing data, and pathological IS6110 PCR examination of tissues with Tuberculous lesions in cattle in Ethiopia

25. J. Awah-Ndukum., A.C. Kudi., G. Bradley., I. Ane-Anyangwe., V.P.K. Titanji., S. Fon-Tebug., J. Tchoumboue., (2000) *Journal of veterinary medicine*, prevalence of bovine tuberculosis in cattle in the highlands of Cameroon based on the detection of lesions in slaughtered cattle in the abattoir and tuberculin tests in the live cattle Department of Veterinary Medicine, Ahmadu Bello University, Zaria, Nigeria
26. J.E. Shitaye., W. Tsegaye., I. &Pavlik., (2007) *A Review Article on Bovine Tuberculosis Infection In Animal And Human Populations in Ethiopia*: Veterinary Research Institute, Brno, Czech Republic University of Veterinary and Pharmaceutical Sciences, Brno, Czech Republic Shola Veterinary Clinic and Laboratory, Addis Ababa Urban Agriculture Office, Ethiopia
27. Jiwa SFH, Kazwala RR, Aboud AAO, Kalaye WJ., (1997) *Journal of veterinary research communication*, Bovine tuberculosis in the Lake Victoria Zone of Tanzania and its possible consequences for human health in the HIV/AIDS era: 21: 533-539.
28. John H Kirk., (2003) *Journal of veterinary medicine* Tuberculosis in human and animals. School of veterinary medicine, university of university of California Davis Tulare CA 93274
29. M G Baker., L D Lopez., M C Cannon., G W De LISLE., & M D Collins., (2006) *journal of epidemiology and infection*. Continuing mycobacterium transmission from cattle to human in New Zealand
30. Marie France Humblet., Maria Laura Boschilori., & Claude Saegerman., (2009) *Journal of veterinary research*, Classification of bovine tuberculosis risk factors in cattle: A stratified approach
31. Michel AL., Bengis RG., Keet DF., Hofmeyr M., Klerk LM., Cross PC *et al.*, (2006) *journal of Vet Microbiol*, Wildlife tuberculosis in South African conservation areas: implications and challenges; 112: 91-100.
32. Müller B., Steiner B., Bonfoh B., Fane A., Smith NH., Zinsstag J., (2008) *BMC Vet Res*, Molecular characterization of *Mycobacterium bovis* isolated from cattle slaughtered at the Bamako abattoir in Mali: 4: 26.
33. Cosivi O., Meslin F-X., D.J. Daborn D J., and Grange JM., (1995) *Rev. Sci. Tech. Off. Int. Epiz.*, Epidemiology of *Mycobacterium bovis* Infection in Animals and Humans, with Particular Reference to Africa Pg. 14 (3), 733-746
34. O'Reilly. LM. & Darbon C J., (1995) *journal of tuberculosis*. Lung disease

35. Oloya J., Muma J B., Opuda-Asibo J., Djonnie B., Kazwala R & Skjerve E, (2007) *Journal of preventive medicine*, Risk factors for herd-level bovine-Tuberculosis, Seropositivity in Transhumant cattle in Uganda. *Prev Vet med*; 80:318-29
36. Oloya J., OpudaAsibo J., Djonnie. B., Muma. JB., Matope G., Kazwala R., & Skjerve E., (2006) *Journal of Tropical Animal Health Production*, Responses to tuberculin tests among Zebu Cattle in the transhumance regions of Karamoja and Nakasongola District of Uganda.
37. Quirin R., Rasolofo V., Andriambololona R., Ramboasolo A., Rasolonavalona T., Raharisolo C.,*et al.*, (2001) *onderstepoort journal of veterinary research*, Validity of intradermal tuberculin testing for the screening of bovine tuberculosis in Madagascar;68: 231-238.
38. Sidibé SS., Dicko NA., Fané A., Doumbia RM., Sidibé CK., Kanté S., *et al.*, (2003) *Revue Eley Med Vet pays trop*, Tuberculose bovine au Mali : résultats d' uneenquête épidémiologique dans les élevages laitiers de la zone périurbaine du district de Bamako;56: 115-120.
39. Smith N H., Gordon S V., de la Rua-Domenech R., Clifton-Hadley RS., Hewinson R G., (2006) *Bottlenecks and broomsticks Nat Rev Microbiol* The molecular evolution of Mycobacterium bovis. 2006 Sep; 4(9):670-81, Review: PubMed PMID: 16912712.
40. Smith NH., Gordon SV., de la Rua-Domenech R., Clifton-Hadley RS., Thoen, C.O., Lobue P.A., Enarson D.A., Kaneene J.B., & De-Kantor I.N., (2009) *journal of tuberculosis Vet Ital*, Tuberculosis A re-emerging Disease in Animals and Humans; 45(1):
41. Timothy C., Rodwell., Nick P. Kriek., Roy G. Bengis., Ian J. Whyte., Petri C Viljoen., Valerius De Vos., and Walter M. Boyce., (2001) *Journal of Wildlife Diseases*, Prevalence of Bovine Tuberculosis in African Buffalo at Kruger National Park Department of Pathology, Microbiology and Immunology; 112: 339-45.
42. Weinhaupt I., Schopf K C., Khaschabi D., Kapaga AM., Msami HM., (2000) *Journal of tropical animal health and production*, Investigations on the prevalence of bovine tuberculosis and brucellosis in dairy cattle in Dares Salaam region and in zebu cattle in Lugoba area, Tanzania: 32: 147-154.
43. Woodford M., (1982) *Journal of tropical animal health production*, Tuberculosis in Wildlife in the Ruwenzori National Park, Uganda. (Part I).
44. World Health Organization., (2004). *Report of the WHO/FAO/OIE Joint consultation on emerging zoonotic diseases*. 3-5 May, Geneva.