

PREVALENCE OF *ECHINOCOCCUS GRANULOSUS* AND *CYSTICERCUS TENUICOLLIS* INFECTIONS AMONG THE CATTLE, SHEEP AND GOATS SLAUGHTERED AT KUMI MUNICIPAL ABATTOIR KUMI DISTRICT.



By

LUBEGA MICHEAL

BU/UP/2015/212

Email: lubegaligan@gmail.com

SUPERVISOR'S NAME: DR. OMADANG LEONARD

A DISSERTATION SUBMITTED TO THE FACULTY OF AGRICULTURE AND ANIMAL SCIENCES IN PARTIAL FULLFILMENT OF THE REQUIREMENTS FORAWARD OF THE A BACHELORS DEGREE IN ANIMAL PRODUCTION AND MANAGEMENT OF BUSITEMA UNIVERSITY

JULY 2018

DECLARATION

I, Lubega Michael do here by declare that this is my original work and has not been presented for a degree award in any university.

Signature.....*[Handwritten Signature]*.....

Date.....*31st July 2018*.....

This thesis has been submitted for examination with approval of the Academic supervisors

Signature*[Handwritten Signature]*.....

Date.....*02nd August 2018*.....

Name: DR. OMADANG LEONARD



DEDICATION

To my parents and guardians' who were able to witness the whole research process success through the financial support and also to friends. To my wonderful daddy; Iga David, mum; Teopista Nampebwa, Jimmy Muwonge and family. Am greatly indebted to you for always encouraging me to persevere.

ACKNOWLEDGEMENTS

I would like to glorify the Lord Jesus Christ who made all things possible .Am so grateful to acknowledge Kumi Municipal Abattoir Staffs and Administration workers for their kind cooperation during this research work. As well like to extend my gratitude to my academic supervisor for the guidance and consultation.

Table of Contents

DECLARATION	i
DEDICATION	ii
ACKNOWLEDGEMENTS	iii
LIST OF ABBREVIATIONS	vi
LIST OF TABLES AND FIGURES	vii
Abstract	viii
1.0 CHAPTER ONE: INTRODUCTION	1
1.1 BACKGROUND	1
1.3 GENERAL OBJECTIVE	3
1.4 SPECIFIC OBJECTIVES	3
1.6 SIGNIFICANCE	4
1.7 JUSTIFICATION	4
2.0 CHAPTER TWO: LITERATURE REVIEW	5
2.1 BACKGROUND	5
2.2 Hydatid Cysts and <i>c-tenuicollis</i> Prevalence by Age and sex of the livestock	5
2.3 Hydatid Cysts and <i>C-tenuicollis</i> Prevalence by Species and breed	5
2.4 Morphology of <i>Echinococcus granulosus</i> cyst	6
2.5 Classification and transmittion of <i>Cystercercus tenuicollis</i> and hydatid cysts in cattle goats and sheep	7
2.7 Diagnosis	9
3.0 CHAPTER THREE: METHODOLOGY	11
3.2 Study area	11
3.3 Study Design	13
3.4 Sample size determination	13
3.5 Data collection method	13

3.6 Data Analysis:	14
3.7 ethical consideration	14
3.8 Environmental consideration	14
5.0 CHAPTER FIVE	19
5.1 DISCUSSION	19
6.0 CHAPTER SIX	22
6.1 Conclusion	22
6.2 Recommendations	22
References	23
APPENDICES	28
Appendix 1: Data collection sheet	28

LIST OF ABBREVIATIONS

AU/IBAR	African Union-Inter African Bureau for Animal Resources.
FAO	Food and Agriculture Organization
MAAIF	Ministry of Agriculture Animal Industry and Fisheries
UBOS	Uganda Bureau of Statistics
CE	<i>Cyst cercus echinococcus</i>
MPED	Ministry of Finance, Planning and Economic Development
TLU	Total Livestock Unit
OIE	Office International Epizootics
GDP	Growth domestic product
<	Less than
>	Greater than

LIST OF TABLES AND FIGURES

Table 1: showing prevalence summaries according to species	15
Table 2: showing prevalence of cystic echinococcosis in cattle	16
Table 3: showing Echinococcus and Tenuicollis prevalences in goats and sheep.	17
Figure 1: Adult <i>Echinococcus granulosus</i> cyst	7
Figure 2: showing the Life cycle of <i>Echinococcus granulosus</i> . Source: http://www.cdc.gov	8
Figure 3 showing a map of kumi district ("Uganda Districts Information Handbook (Fountain Publishers, 2009.)	12

Abstract

Echinococcosis or hydatidosis (due to the larval stage of *Echinococcus granulosus*) and cysticercosis (due to the larval stage of *Taenia hydatigena*) pose a significant economic losses due to slaughter condemnation and risk to public health in developing countries such as Uganda, Kumi district in particular where sanitation is poor and people live in close proximity with each other and with animals. This study was conducted to determine the prevalence of *Echinococcus granulosus* cysts and *Cysticercus tenuicollis* cysts in cattle, sheep and goats slaughtered at Kumi municipal abattoir, Kumi district, Uganda. A cross-sectional based survey was conducted, from May 2018 to June 2018, where a total of 626 animals comprising of 94 cattle, 396 goats and 163 sheep of both sexes were examined at postmortem for the evidence of larval stages of *Echinococcus granulosus*. (Hydatid cyst) and *T. hydatigena* (*Cysticercus tenuicollis*) through visual inspection, incision and palpation of organs and viscera. The prevalence of *Echinococcus granulosus* was 12.9%, 0.0%, and 1.8% in cattle, goats and sheep, respectively, while that for *Cysticercus tenuicollis* were 0.0% in cattle, 31.4% in goats and 25.2% in sheep. The prevalence of the disease was high in the old animals than the young and so in females than males and there was no correlation between the variables age, sex, breed, area of origin with the prevalence of the diseases. The result of this study revealed that cattle and sheep were more affected by *Echinococcus granulosus* cysts while goats were frequently affected by *Taenia hydatigena* cysts. *T. hydatigena* (*C. tenuicollis*) cysts were more frequently detected in the omentum than other visceral organs among the animals examined while the *Echinococcus granulosus* were more in the liver followed by the lungs and the cysts were mostly calcified. In conclusion, the observed high prevalence of the two metacestodes larval stages leads to high condemnation rates of edible organs and raises significant public health concerns. This call for the need to undertake more extensive epidemiological investigations to determine the causal factors and importance of the diseases in this livestock.

1.0 CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND

The livestock sector in Uganda is significant in importance to the agricultural sector and to the wider economy (Agriterria, 2012). It contributes 5 percent to the National growth domestic product and 18 percent to agricultural GDP. The sector has also continued to deliver steady growth about 3 percent per annum - even as the total agricultural sector growth has slowed. (Agriterria, 2012).

Over one million goats and sheep are slaughtered and consumed annually for meat (ILRI, 1996). Animal diseases are one of the key problems facing livestock keepers (ILRI, 1996). *Echinococcus granulosus* and *Cysticercus tenuicollis* have been reported to affect livestock and man, they are therefore considered emerging and re-emerging diseases (Craig *et al.*, 2015) especially among the pastoral communities and their livestock. They cause reduction in productivity in terms of weight loss and milk reduction and considerable losses in carcass quality during slaughter and more so, organ condemnations (Belina *et al.*, 2015). *Cystic echinococcosis* sometimes called hydatidosis or hydatid cyst and *cysticercus tenuicollis* (*taenia hydatigena*) are larval stages (metacestodes) of the dog tapeworms *Echinococcus granulosus* and *taenia hydatigena* respectively (Miran *et al.*, 2017). *Echinococcus granulosus* is worldwide in distribution, zoonotic and yet a neglected disease of economic and public health significance (Bizuwork *et al.*, 2012).

Domestic, feral or roaming dogs and wild canids such as wolves, jackals and red foxes are the primary definitive hosts for these parasites harboring those (adults) in their gastro-intestinal tracts (GIT). They get infected by ingesting infected organs of herbivores which are the intermediate hosts (Guzel *et al.*, 2008). Livestock and the humans acquire the infection indirectly from grass and water contaminated by the eggs of *E. granulosus* from dog faeces (Craig *et al.*, 2007). The absence of proper meat inspection procedures and the presence of large numbers of stray dog populations contribute significantly to the prevalence of the disease (Otero-Abad & Torgerson, 2013). *Echinococcus granulosus* metacestodes develop majorly in the liver, lungs, heart, and spleen but sometimes in the brain, bone marrow etc (Craig *et al.*, 2007).

References

- Abdulhameed, M. F., & Habib, I. (2018). Cystic echinococcosis in marketed offal of sheep in Basrah , Iraq : Abattoir-based survey and a probabilistic model estimation of the direct economic losses due to hydatid cyst. *Parasite Epidemiology and Control*, (February), 0–1. <https://doi.org/10.1016/j.parepi.2018.02.002>
- Abebe, A., Beyene, D., & Kumsa, B. (2014). Cystic echinococcosis in cattle slaughtered at Gondar Elfora export Abattoir , northwest Ethiopia, 38(4), 404–409. <https://doi.org/10.1007/s12639-013-0255-z>
- Adane, M., & Guadu, T. (2014). Bovine Hydatidosis : Occurrence , Economic and Public Health Importance in Gondar ELFORA Abattoir, 6(2), 11–19. <https://doi.org/10.5829/idosi.ejas.2014.6.2.8585>
- Agriterra. (2012). Identification of livestock investment opportunities in Uganda Identification of livestock investment opportunities in Uganda.
- Ahmed, M. E., Fros, F., Abdelrahim, M. I., & Ahmed, F. M. (2011). Review Article Hydatid disease , a morbid drop needs awareness. *Sudan Med J*, 47(1), 4–8.
- Arbabi, M., & Hooshyar, H. (2006). Survey of echinococcosis and hydatidosis in Kashan region, central Iran. *Iranian Journal of Public Health*, 35(1), 75–81.
- Assefa, H., Mulate, B., Nazir, S., Alemayehu, A., Nazir, S., Amhara, D., & Attribution, C. (2011). Cystic echinococcosis amongst small ruminants and humans in central Ethiopia, 1–7. <https://doi.org/10.4102/ojvr.v82i1.949>
- Azlaf, R. (2006).
- Banda, F. (2013). Prevalence and risk factors of cystic\echinococcosis in cattle and humans in\western province of zambia. *thesis*.
- Belina, D., Fekadu, G., Zegaye, E., & Belina, S. (2015). Bovine hydatidosis: Prevalence , public health and its economic significance in and around Harar , Ethiopia, 7(January), 18–26. <https://doi.org/10.5897/JVMAH2014.0337>

- Chamai, M., Omadang, L., Erume, J., Ocaido, M., Oba, P., Othieno, E., ... Kitibwa, A. (2015). Identification of *Echinococcus granulosus* strains using polymerase chain reaction – restriction fragment length polymorphism amongst livestock in Moroto district , Uganda, 1–7.
- Craig, P., Mastin, A., van Kesteren, F., & Boufana, B. (2015). *Echinococcus granulosus*: Epidemiology and state-of-the-art of diagnostics in animals. *Veterinary Parasitology*, 213(3–4), 132–148. <https://doi.org/10.1016/j.vetpar.2015.07.028>
- Craig, P. S., Hegglin, D., Lightowers, M. W., Torgerson, P. R., & Wang, Q. (2017). *Echinococcosis: Control and Prevention. Advances in Parasitology* (Vol. 96). Elsevier Ltd. <https://doi.org/10.1016/bs.apar.2016.09.002>.
- Desta, Y., Tefera, M., & Bekēle, M. (2012). Prevalence of hydatidosis of sheep slaughtered at Abergelle export Abattoir, Mekelle, Northern Ethiopia. *Global Veterinaria*, 9(4), 490–496. <https://doi.org/10.5829/idosi.gv.2012.9.4.65119>
- Edo, T. (2015). Prevalence of Small Ruminants Hydatidosis and Its Economic Impact at Asella Municipal Abattoir, 45, 100–108.
- Fato, M. A., & Zone, B. (2002). Study on Prevalence of Small Ruminants Hydatidosis and Its Economic Importance at Gindhir Municipal Abattoir, 27–34. <https://doi.org/10.5829/idosi.ejbs.2017.27.34>
- Fato, M. A., & Zone, B. (2017). Study on Prevalence of Small Ruminants Hydatidosis and Its Economic Importance at Gindhir Municipal Abattoir, 9(1), 27–34. <https://doi.org/10.5829/idosi.ejbs.2017.27.34>
- Ghandour, A. M., & Shalaby, M. O. T. M. (1989). A Comparative Study of the Prevalence of Some Parasites in Animals Slaughtered in Jeddah Abattoir, 1, 87–94.
- Grosso, G., Gruttadauria, S., Biondi, A., Marventano, S., & Mistretta, A. (2012). Worldwide epidemiology of liver hydatidosis including the Mediterranean area. *World Journal of Gastroenterology*, 18(13), 1425–1437. <https://doi.org/10.3748/wjg.v18.i13.1425>
- Guzel, M., Yaman, M., Koltas, I. S., Demirkazik, M., & Aktas, H. (2008). Detection of

- Echinococcus granulosus coproantigens in dogs from Antakya Province, Turkey, 150–153. <https://doi.org/10.2478/s11687-008-0030-3>
- Harandi, M. F., Budke, C. M., & Rostami, S. (2015). The Monetary Burden of Cystic Echinococcosis in Iran, 6(11). <https://doi.org/10.1371/journal.pntd.0001915>
- Kebede, S., Menkir, S., & Desta, M. (2014). Original Research Article On farm and Abattoir study of Lungworm infection of small ruminants in selected areas of Dale District, Southern Ethiopia, 3(4), 1139–1152.
- Komba, E. V. G., Komba, E. V., Mkupasi, E. M., & Mbyuzi, A. O. (2012). Sanitary practices and occurrence of zoonotic conditions in cattle at slaughter in Morogoro Municipality, Tanzania : implications for public health, 14(2), 1–12.
- Kouidri, M., Khoudja, F. B., Boulkaboul, A., & Selles, M. (2012). Prevalence, fertility and viability of cystic echinococcosis in sheep and cattle of Algeria, 191–197.
- Macpherson, C. N. L., Spoerry, A., Zeyhle, E., Romig, T., & Gorfe, M. (1989). Pastoralists and hydatid disease: An ultrasound scanning prevalence survey in east Africa. *Transactions of the Royal Society of Tropical Medicine and Hygiene*. [https://doi.org/10.1016/0035-9203\(89\)90664-0](https://doi.org/10.1016/0035-9203(89)90664-0)
- Manyuele, C. T. (2014). Prevalence of cystic echinococcosis and diversity of Echinococcus granulosus infection in sheep in a thesis submitted in partial fulfillment of the requirement for the degree of master of science (applied parasitology).
- Mekuria, E., Shimelis, S., Bekele, J., & Sheferaw, D. (2013). Sheep and goats Cysticercus tenuicollis prevalence and associated risk factors, 8(24), 3121–3125. <https://doi.org/10.5897/AJAR2012.7361>
- Miran, M. B., Kasuku, A. A., & Swai, E. S. (2017). Prevalence of echinococcosis and Taenia hydatigena cysticercosis in slaughtered small ruminants at the livestock-wildlife interface areas of Ngorongoro, Tanzania. *Veterinary World*, 10(4), 411–417. <https://doi.org/10.14202/vetworld.2017.411-417>
- Mogoye, B. K. (2013). Human cystic echinococcosis in South Africa, (May).

- Nyero, D., Zirintunda, G., Omadang, L., & Ekou, J. (2015). Prevalence of hydatid cysts in goats and sheep slaughtered in Soroti Municipal Abattoir, Eastern Uganda, 2(9), 148–151.
- Ochi, E. B., Akol, D. A., & Augustino, S. M. (2015). Prevalence and Economic Loss due to Hydatidosis in Slaughtered Animals in Juba South Sudan, 3(3), 177–182.
- OIE. (2013). Manual of Diagnostic Tests and Vaccines for Terrestrial Animals. *World Organisation for Animal Health*, (May), 1185–1191. <https://doi.org/10.1007/s13398-014-0173-7.2>
- Omadang, L., Chamai, M., Othieno, E., Okwi, A., Inangolet, F. O., Ejobi, F., ... Ocaido, M. (2018). Knowledge, attitudes and practices towards cystic echinococcosis in livestock among selected pastoral and agro-pastoral communities in Uganda, 50(1), 11–17. <https://doi.org/10.1007/s11250-017-1394-5>
- Otero-Abad, B., & Torgerson, P. R. (2013). A systematic review of the epidemiology of echinococcosis in domestic and wild animals. *PLoS Negl. Trop Dis*, 7(2), 51–56. <https://doi.org/10.1371/journal.pntd.0002249>
- Othieno, E., Okwi, A. L., Mupere, E., Zeyhle, E., Oba, P., & Chamai, M. (2017). Risk factors associated with cystic echinococcosis in humans in selected pastoral and agro-pastoral areas of Uganda, 3, 1–6. <https://doi.org/10.14202/IJOH.2017.1-6>
- Othieno, E., Okwi, A., Mupere, E., Zeyhle, E., Oba, P., Chamai, M., ... Ocaido, M. (2016). Prevalence of Cystic Echinococcosis in Selected Pastoral and Agro-Pastoral Districts of Uganda, 2, 2–7.
- Radfar, M. H., Tajalli, S., & Jalalzadeh, M. (2005). Prevalence and morphological characterization of *Cysticercus tenuicollis* (*Taenia hydatigena cysticerci*) from sheep and goats in, 75(6), 469–476.
- Rummant, S. (1996). *and Development in Africa I*, .
- Sadeghi, H., Bakht, M., Saghafi, H., & Shahsavari, T. (2015). Prevalence of intestinal parasites in a population in Eghbalieli city from Qazvin Province, Iran. *Journal of Parasitic Diseases*. <https://doi.org/10.1007/s12639-013-0366-6>

Thrusfield. (2005). *Veterinary epidemiology*.

Tsegay, A. K., Abdulatif, A., & Mammo, B. (2015). Prevalence, Cyst Distribution in Visceral Organs and Economic Loss of *Cysticercus tenuicollis* in Small Ruminants Slaughtered at Bishoftu, Elfora Export Abattoir. *American-Eurasian Journal of Scientific Research*, 10(4), 210–220. <https://doi.org/10.5829/idosi.aejsr.2015.10.4.95179>

Uganda Districts Information Handbook (Fountain Publishers, 1992, 158 p. (n.d.).

UIA. (2014). Livestock Sector Profile. *Uganda Investment Authority*, 2002(Chart 2), 1–8.