



**BUSITEMA
UNIVERSITY**
Pursuing Excellence

**POTENTIAL OF CATTLE MARKETS IN SPREAD OF TICKS, TICKBORNE
DISEASES AND TICK ACARICIDE RESISTANCE: ACASE STUDY OF BUKEDEA,
ARAPAI AND KASILO CATTLE MARKETS IN TESO SUB REGION**

BY

MUYOMBA RONALD GERALD

NO: BU/UG/2013/35

Email muyombaronaldgerald@gmail.com



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

AUGUST 2016

APPROVAL

This dissertation has been submitted for marking with the approval of the subject supervisor;

Dr MAWADRI PATRICK (BVM, MUK)

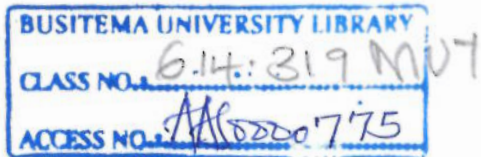
Teaching assistant

Department of animal Production and Management

Faculty of Agriculture and Animal sciences Busitema University

P.O Box 203, Soroti

Signature..... Date.....



Copyright © 2016: MUYOMBA RONALD GERALD

Busitema University, Uganda

All rights reserved

DEDICATION

The dissertation is dedicated to my sister and dearest friend NAMUYOMBA GRACE and KIWANDA ABDULLAH for their moral and spiritual efforts towards my education, may the almighty bless her accordingly. This dissertation is also dedicated to all my friends who have contributed towards my success at school.

TABLE OF CONTENTS

DECLARATION	i
APPROVAL	ii
DEDICATION	iii
TABLE OF CONTENTS	iv
LIST OF FIGURES.....	vii
ABSTRACT	x
CHAPTER ONE	1
1.1 Background to the Study:.....	1
1.2. Statement of the problem	2
1.3 Main objective.....	3
1.4 Specific Objectives	3
1.5 Research questions	3
1.6 Significance of the study	3
1.7 Justification of the study	4
1.7. Scope of the study.....	4
CHAPTER TWO	5
2.0 Introduction.....	5
2.1 Ticks and Tick Borne Diseases of Cattle in Uganda	6
2.2 Ticks	6
2.2.1 Rhipicephalus appendiculatus.....	6
2.2.2 Amblyomma Variegatum	8
2.2.3 Rhipicephalus Decoloratus (Blue Tick).....	9
2.3 Tick Borne Diseases	9
2.3.1 East Coast Fever	10

2.3.2 Anaplasmosis.....	10
2.3.3. Cowdriosis (Heart Water).....	11
2.4 Production Loses Within Livestock Production Due To Tick Borne Diseases in Uganda	13
2.5 Chemical Control of Ticks.....	15
2.6 Acaricide Resistance.....	16
2.6.1 Occurrence of resistance	16
3.1 Area of Study	17
3.2. Study population.....	17
3.3 Study Approach.....	17
3.4 Sampling method.....	17
Data collection for qualitative information.....	18
3.5 Observational Designs	19
3.6. Presentation of data.....	19
CHAPTER FOUR: RESULTS	20
4.1 cattle traders and farmers	20
4.2 Origins (districts) of the cattle to the three cattle markets	20
4.4 Purpose of buying the cattle	22
Table 9 showing the common purposes as to why buyers purchase cattle	22
4.5. Average tick load per cattle market	22
4.7. Tick load in the three cattle markets.....	23
4.10 Environment around the cattle market.....	24
4.11. Risk factors established using information from Key informants	25
Only 40% of the sellers did receive advice from the technical personnel concerning ticks, TBDS and others while 60% of the sellers never received advice.	26
CHAPTER FIVE: DISCUSSION OF RESULTS.....	33

CHAPTER SIX; CONCLUSION AND RECOMMENDATION 40

 6.1. Conclusions 40

 6.2 Recommendations 40

REFERENCES 41

APPENDICES 44

 Appendix 1 questionnaire for the cattle traders and owners 44

 Appendix 2 Map of Uganda indicating Soroti, Serere and Bukedea district 50

LIST OF FIGURES

Figure 1 Graph showing the destinations of cattle from the three cattle market.....	21
Figure 2 A bar graph showing the average abundance of ticks on animals in the three cattle markets.....	23
Figure 3 bar graph showing the distribution of ticks as per each cattle market.....	22
Figure 4 bar graph showing the abundance of ticks	23
Figure 5 Pie chart showing percentage of people who received advice upon arrival of animals at all cattle markets.....	26
Figure 6 Graph showing advice received by the sellers upon animal arrival.....	26
Figure 7 Pie chart showing percentage of sellers who used acaricide.....	27
Figure 8 Pie chart showing the how sellers diluted the acaricides before use.....	29
Figure 9 Sex interested	30
Figure 10 Pie chart showing the consideration of tick infestation when purchasing animals.....	31
Figure 11 Pie chart showing the buyers who used acaricides	

LIST OF TABLES

Table 1 MAJOR TICK BORNE DISEASES IDENTIFIED IN 3 DISTRICTS OF SOROTI, KAYUNGA AND KIRUHURA AND THEIR MEAN OCCURRENCE.....	12
Table 2 THE PERCENTAGE AGE SPECIFIC ANNUAL MORBIDITY RATES OF CATTLE DUE TO COMMON DISEASES IN SOROTI, KAYUNGA, AND KIRUHURA DISTRICTS AS REVEALED BY FARMERS.	12
Table 3 THE PERCENTAGE ANNUAL MORTALITY RATES OF CATTLE DUE TO THE COMMON TICK BORNE DISEASES IN SOROTI KAYUNGA AND KIRUHURA.....	13
Table 4. An average annual cost (Ug shs) of tick borne diseases due to different forms of losses and costs incurred per house hold in Soroti.	14
Table 5 An average annual cost (Ug shs) of tick borne diseases due to different forms of losses and costs incurred per house hold in Kiruhura.....	14
Table 6 An average annual cost (Ug shs) of tick borne diseases due to different forms of losses and costs incurred per house hold in Kayunga.....	15
Table 8: cattle traders and farmer.....	20
Table 9 showing the common purposes as to why buyers purchase cattle.....	22
Table 10 Showing acaricides used by sellers before bringing animals to market.....	27
Table 11 showing last time of tick control by sellers.....	28
Table 12 showing the time at which acaricide application was done.....	29
Table 13 showing the age groups of interest by the buyers.....	30
Table 14 showing percentage of buyers who knew the dangers of ticks.....	31
Table 15 showing the frequency and percentages of acaricides used by the buyers.....	32
Table 16 showing the time of day spraying was done.....	32

LIST OF ABBREVIATIONS

BHC: benzene hexachloride

ECF: east coast fever

DDA: dairy development authority

MAAIF: ministry of agriculture, animal industry and fisheries

spp; specie

ABSTRACT

This study focused on cattle markets with a purpose of finding out the potential in the spread of ticks, tick borne diseases and tick acaricide resistance. They involved Arapai, Kasilo and Bukedea region in Teso region. The study involved 48 respondents who were selected randomly. There were 120 animals sampled whose data was recorded on data collection sheet. Technical personnel were involved with whom questionnaires were administered, and observations were done at the premises.

Analysis was done using both in Microsoft excel and SPSS version 20, Chicago. Tick abundance was calculated by getting the total of ticks on all the animals and divided by the total number of animals in each of the market.

The results revealed the common origins (districts) of animals were (13.5%) Soroti, (6.2%) Ngora and (6.1%) Bukedea. The common destinations of animals were to lira (31.4%), kampala (22.9%), pallisa (20%), south sudan (8.6%), Gulu (2.9%). From the study, most of the respondents were farmers (75%) and the rest (25%) were traders. Most of the animals were moved specifically for breeding (42.8%), slaughter (28.5%), sale (17.1%) and draft power.

The results revealed that *Amblyomma* was most highly loaded tick amongst animals in cattle markets (30 ticks per animal), *Rhipicephalus appendiculatus* (18 ticks per animal) and lastly *Rhipicephalus decoloratus* (12 ticks per animal). It was also noticed that ticks were most highly loaded amongst cattle in Arapai (37%), Bukedea (32%) and lastly Kasilo (31%).

From the study, the risk factors that led to the spread of a high ticks, TBDs and tick acaricide resistance included inadequate advice given to the traders and farmers in the cattle market farmers and traders ignorance about the ticks and their dangers (80%), use of weak class of acaricides (69%), environments around cattle markets, wrong dilution of acaricides (66.7%) .

In conclusion, there is a great potential of Arapai, Kasilo and Bukedea cattle markets to spread of ticks TBDs and acaricide resistant ticks. Recommendations are Tick control measures should be put in place at every cattle market, qualified personnel have to be employed and research regarding relation of tick load and diseases should be carried out in cattle markets.

CHAPTER ONE

1.1 Background to the Study:

The world total cattle population is estimated to be 1467.55 million (world agricultural international, 2013). Livestock contribute 40 % of the global value of agricultural output and support the livelihoods and food security of almost a 1.3 billion people (FAO 2013). Livestock and its inputs are a growing economic sector. The livelihood and income effects of the livestock economy are huge (FAO 2013). More than a billion people keep livestock, 60% of rural households do so (Von Braun *et al.*, 2010). It's a major income source of the poor and especially of women in developing countries. The dairy industry in particular, plays a strong role for the livelihood of poor people (Von Braun *et al.*, 2010).

Ticks and TBDs are of major importance throughout the world but are most prevalent and exert their greatest impact in the tropical and sub-tropical regions (Norval *et al.*, 1992). Ticks are one of the leading vectors of diseases of economic importance to the livestock industry in Africa. In most countries of Africa, over 30 % of calf crop is lost to TBDs (Okello *et al.*, 1994; Otim, 1989). These diseases also account for nearly 90 % of total disease control costs and over 60 % of total farm inputs (Muhanguzi *et al.*, 2014).

In Uganda cattle play a significant role in the socio-economic life of the people of the nation. In addition to the products of meat and milk cattle provide draught power for cultivation of the agricultural lands of many peasants. Skins and hides are also important components of the livestock sector in generating foreign export earnings (Ociba *et al.*, 1990).

Despite of the fact that cattle play a major role to the people of the nation, they are faced with the challenge of ticks (Gebre *et al.*, 2001). There are various species of ticks found on livestock and most of them have importance as vector and disease causing agents and also have damaging effect on skin and hide production. Ticks, besides being important vectors for diseases like Theileriosis, anaplasmosis, babesiosis and heart water in domestic animals, they also cause non specific symptoms like anemia, dermatosis, toxicosis and paralysis (Gebre *et al.*, 2001).

REFERENCES

- Minjauw, B., & McLeod, A. (2003). Tick-borne diseases and poverty: the impact of ticks and tick-borne diseases on the livelihoods of small-scale and marginal livestock owners in India and eastern and southern Africa.
- Jongejan, F., & Uilenberg, G. (2004). The global importance of ticks. *Parasitology*, 129(S1), S3-S14.
- Sajid, M. S., Siddique, R. M., Khan, S. A., Iqbal, Z., & Khan, M. N. (2014). Prevalence and risk factors of anaplasmosis in cattle and buffalo populations of district Khanewal, Punjab, Pakistan. *Global Vet*, 12, 146-153.
- Barre, N., & Garris, G. I. (1990). Biology and ecology of *Amblyomma variegatum* (Acari: Ixodidae) in the Caribbean: Implications for a regional eradication program. *Journal of Agricultural Entomology*, 7(1), 1-9.
- Bryson, N. R., Horak, I. G., Venter, E. H., & Yunker, C. E. (2000). Collection of free-living nymphs and adults of *Amblyomma hebraeum* (Acari: Ixodidae) with pheromone/carbon dioxide traps at 5 different ecological sites in heart water endemic regions of South Africa. *Experimental & applied acarology*, 24(12), 971-982.
- Norval, R. A. I. (1977). Ecology of the tick *Amblyomma hebraeum* Koch in the Eastern Cape Province of South Africa. I. Distribution and seasonal activity. *The Journal of parasitology*, 734-739.
- Norval, R. A. I., Sutherst, R. W., Jorgensen, O. G., Gibson, J. D., & Kerr, J. D. (1989). The effect of the bont tick (*Amblyomma hebraeum*) on the weight gain of Africander steers. *Veterinary Parasitology*, 33(3), 329-341.
- Norval, R. A. I., Donachie, P. L., Meltzer, M. I., Deem, S. L., & Mahan, S. M. (1995). The relationship between tick (*Amblyomma hebraeum*) infestation and immunity to heartwater (*Cowdria ruminantium* infection) in calves in Zimbabwe. *Veterinary Parasitology*, 58(4), 335-352.

- Pegram, R. G., Hoogstraal, H., & Wassef, H. Y. (1981). Ticks (Acari: Ixodoidea) of Ethiopia. I. Distribution, ecology and host relationships of species infesting livestock. *Bulletin of Entomological Research*, 71(02), 339-359.
- Pegram, R. G., Perry, B. D., Musisi, F. L., & Mwanaumo, B. (1986). Ecology and phenology of ticks in Zambia: seasonal dynamics on cattle. *Experimental & applied acarology*, 2(1), 25-45.
- Regassa, A. (2001). Tick infestation of Borana cattle in the Borana Province of Ethiopia. *The Onderstepoort journal of veterinary research*, 68(1), 41.
- Sang, R., Onyango, C., Gachoya, J., Mabinda, E., Konongoi, S., Ofula, V., ... & da Rossa, A. T. (2006). Tickborne arbovirus surveillance in market livestock, Nairobi, Kenya. *Emerg Infect Dis*, 12(7), 1074-1080.
- Walker, A. R. (2003). Ticks of domestic animals in Africa: a guide to identification of species (pp. 3-210). Edinburgh: Bioscience reports.
- Yonow, T. (1995). The life-cycle of *Amblyomma variegatum* (Acari: Ixodidae): a literature synthesis with a view to modelling. *International journal for parasitology*, 25(9), 1023-1060.
- Madder, M., Thys, E., Achi, L., Touré, A., & De Deken, R. (2011). *Rhipicephalus (Boophilus) microplus*: a most successful invasive tick species in West-Africa. *Experimental and Applied Acarology*, 53(2), 139-145.
- Mugambi, J. M., Wesonga, F. D., & Ndungu, S. G. (2012). Ticks and tick-borne disease control in a pastoral and an agro-pastoral farming systems in Kenya. *Livestock Research for Rural Development*, 24, 1-8.
- Vudriko, P., Okwee-Acai, J., Tayebwa, D. S., Byaruhanga, J., Kakooza, S., Wampande, E & Hatta, T. (2016). Emergence of multi-acaricide resistant *Rhipicephalus* ticks and its implication on chemical tick control in Uganda. *Parasites & vectors*, 9(1), 1.

- Ocaido, M., Otim, C. P., & Kakaire, D. (2009). Impact of major diseases and vectors in smallholder cattle production systems in different agro-ecological zones and farming systems in Uganda². *Crops*, 56(51.4), 51-4.
- Wickremasinghe, M. G. V., & Emden, H. V. (1992). Reactions of adult female parasitoids, particularly *Aphidius rhopalosiphii*, to volatile chemical cues from the host plants of their aphid prey. *Physiological Entomology*, 17(3), 297-304.
- Schnitzerling, H. J., Schuntner, C. A., Roulston, W. J., & Wilson, J. T. (1974). Characterization of the Organophosphoms-resistant Mt Alford, Gracemere and Silkwood Strains of the Cattle Tick, *Boophilus microplus*. *Australian journal of biological sciences*, 27(4), 397-408.
- Hilz, H., & Stone, P. R. (1976). Poly (ADP-ribose) and ADP-ribosylation of proteins. In *Reviews of Physiology, Biochemistry and Pharmacology, Volume 76* (pp. 1-58). Springer-Berlin Heidelberg.
- Brown, B. L., Albano, J. D., Ekins, R. P., & Sgherzi, A. M. (1971). A simple and sensitive saturation assay method for the measurement of adenosine 3': 5'-cyclic monophosphate. *Biochemical Journal*, 121(3), 561.
- Chilton, M. D., Drummond, M. H., Merlo, D. J., Sciaky, D., Montoya, A. L., Gordon, M. P., & Nester, E. W. (1977). Stable incorporation of plasmid DNA into higher plant cells: the molecular basis of crown gall tumorigenesis. *Cell*, 11(2), 263-271.
- Whitnall, A. B. M., Thorburn, J. A., McHardy, W. M., Whitehead, G. B., & Meerholz, F. (1952). A BHC-resistant tick. *Bulletin of Entomological Research*, 43(01), 51-65.
- Kettle, C. J. (2010). Ecological considerations for using dipterocarps for restoration of lowland rainforest in Southeast Asia. *Biodiversity and Conservation*, 19(4), 1137-1151.
- Young, A. S., Grocock, C. M., & Kariuki, D. P. (1988). Integrated control of ticks and tick-borne diseases of cattle in Africa. *Parasitology*, 96(02), 403-432.