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Epidemiology of morbidity and mortality on smallholder dairy farms in Eastern and Southern Africa

A dissertation presented in partial fulfilment
of the requirements for the degree of
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Bernard Joakim Phiri

Institute of Veterinary, Animal and Biomedical Sciences
Massey University
Palmerston North, New Zealand
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Institute of Veterinary, Animal and Biomedical Sciences
Massey University
Palmerston North, New Zealand

Abstract

Morbidity and mortality are important causes of economic losses on dairy farms worldwide. In order to minimize these losses, the causes of morbidity and mortality and the associated risk factors need to be identified and appropriate control measures implemented. With the advent of globalization, more and more countries have sought to belong to regional groupings. One such grouping is the Common Market for Eastern and Southern Africa (COMESA). COMESA not only promotes trade but also encourages regional integration of research in areas such as agriculture. However, little is known is about the causes of morbidity and mortality and their risk factors on smallholder dairy farms in Eastern and Southern Africa (ESA) as a region. This thesis focuses, firstly, on the qualitative analysis of available scientific knowledge in order to identify the causes and associated risk factors for morbidity and mortality in ESA and, secondly, on the analysis of spatial patterns of excess mortality on smallholder dairy farms in Tanzania.

A systematic review was conducted on the causes of morbidity and mortality on smallholder dairy farms in ESA. Mastitis, tick-borne diseases (TBDs), tick infestation and diarrhoea were the major causes of morbidity. TBDs, diarrhoea and trypanosomiasis were the major causes of mortality; however, a substantial number of mortalities with undiagnosed causes were also reported. This review also identified that the strong protective factors for mastitis were residual calf suckling and leaving one quarter un-milked; while teat lesions, tethering, washing teats only prior to milking, use of udder towel and poor body condition score were the main risk factors for mastitis. Zero-grazing was highly protective of TBDs while agro-ecological zone (AEZ), age and district were risk factors.

Survival analysis using a Cox regression model fitted with a gamma-frailty term was employed to explore excess mortality on smallholder dairy farms in Tanga and Iringa regions of Tanzania. First- and second-order spatial patterns of farm frailty were analyzed. First-order patterns were recognizable in both regions, with large clusters

around Tanga town and Iringa town respectively. The analysis did not provide evidence of second-order clustering.

More intervention studies are recommended for the ESA region in order to better identify animal health constraints and their associated risk factors. Targeted research at aggregates of areas with high mortality would be the most cost-efficient way to identify the important risk factors.

Dedications

To Misozi, thank you for all your loving support and encouragement for me enroll into this programme, I will always wish you were here to see this to the end. Joackim and Sam, you remained my source of inspiration and a reason to go on. This one is for you.

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It seems just like yesterday when I first arrived at the EpiCentre wondering what I was getting myself into. Sitting in front of a computer manipulating numbers all day was not my idea of a veterinarian's career. After six months of statistical concepts, journal club, study group and everything else that went along with them, I realized I was in the cohort. Surely, this was not part of the original script. Days of my undergraduate training when we used to anxiously wait for the epidemiology session to end and rush for surgery seemed ancient. It was time to make the best out of the situation; I was now one of them anyway.

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Abbreviations

AEZ	Agro-ecological zone
CI	Confidence interval
COMESA	Common Market for Eastern and Southern Africa
CRD	Center for Reviews and Dissemination
EAC	East African Community
ECF	East Coast Fever
ESA	Eastern and Southern Africa
IQR	Inter-quartile range

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