Convenience survey of bovine tuberculosis prevalence in cattle at the wildlife-livestock interface in the Queen Elizabeth National Park, Uganda

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Introduction

In 2006 the WHO declared bovine tuberculosis a neglected zoonosis, emphasizing the risk of disease in developing countries, where communities interact closely with animals, and adequate public health measures are not usually available.

The Busongora community, north of the Queen Elizabeth National Park (QENP) in Western Uganda, relies on cattle for dairy and meat production with an extensive communal grazing approach. Enclaves within the QENP also keep livestock but fishing is the primary livelihood. In both areas there is reported interaction between domestic animals and wildlife species, by the shared use of grazing and water resources.

Information on the burden of bovine tuberculosis in this region is limited and increasing the available knowledge will assist authorities in decision making, to manage the disease in this complex ecosystem.

Figure 1: Map of Uganda highlighting the Queen Elizabeth National Park in yellow and the enlarged study area of Figure 2.

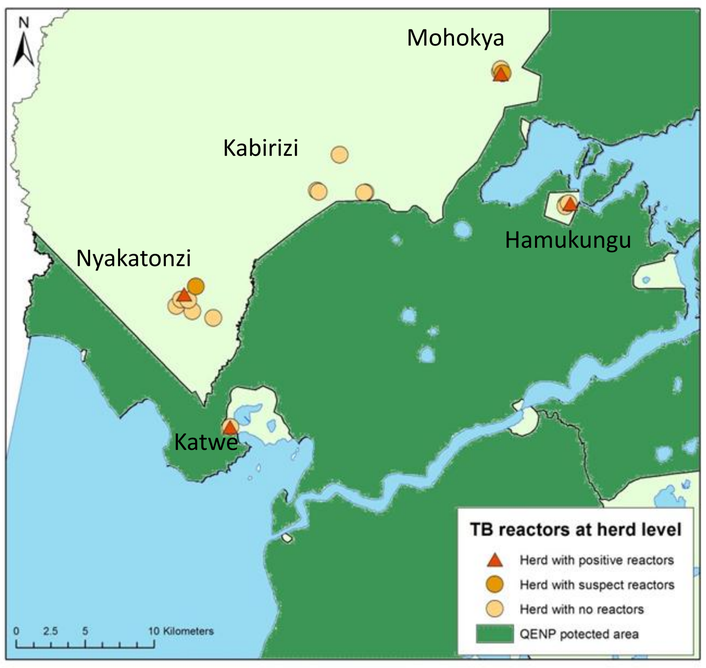


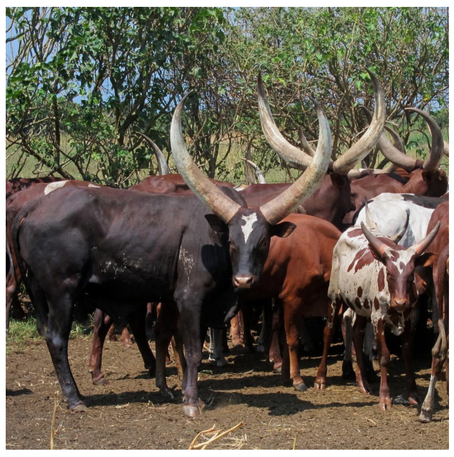
Figure 2: Spatial distribution of the five study sites around QENP, showing herds tested using the comparative skin test.

Materials and Methods

In adult cattle the comparative cervical intradermal skin test was used to test for bovine tuberculosis. Tests were read 72 to 92 hours after the initial injection and measurement of the skinfold thickness. Animals were individually identified using ear tags and were dewormed as an incentive for participation.

Interpretation of results was based on increased difference in skinfold measurement of the bovine versus avian site:
-Positive if more than 4 mm
-Inconclusive/suspect if >1 mm and <4 mm
-Negative if <1 mm and no clinical signs

Villages were selected due to their proximity to the QENP and were cattle owning communities. On consultation with the communities, all owners that were willing to participate from these villages were included in the testing. In small herds (<20 animals), 5 animals were tested on average and in larger herds (>20 animals) 10 animals were sampled on average. Chronically sick animals were specifically selected by two farmers (7 animals) at the Nyakatonzi site. The remaining animals were selected in a non-systematic way, however, there was a tendency to test older animals and 70% of tested animals were over four years of age.



Aims and Objectives

The purpose of this study was to survey bovine tuberculosis in cattle at the interface of QENP using non-random sampling.

Identify methodologies and challenges for large-scale prevalence surveys.

Results

At least one positive reactor was seen in 4 of the 22 herds tested (18%; 95% CI 6.1-38.2%), inconclusive results were seen in 2 (9%) herds and no reactors were seen in the remaining 16 (73%) herds (Table 1).

Individually, of the 188 animals presented for reading, 4% (95% CI 1.6-7.2) of animals had positive reactions, 5% had inconclusive results and 91% of animals tested negative. Positive reactors were seen at 4 of 5 sites, as seen in Figure 2.

A total of 199 cattle from 22 herds were included in the survey. 11 animals from various herds were lost to follow up due to theft, sale, death (non-related causes) or being too far for reading.

Site	Herd level (n=22)		Individual cattle (n=188)	
	Number positive/ number tested (%)	Number inconclusive/ number tested (%)	Number positive/ number tested (%)	Number inconclusive/ number tested (%)
Katwe	1/2 (50%)	0/2 (0%)	2/18 (11%)	0/18 (0%)
Nyakatonzi	1/7 (14%)	1/7 (14%)	2/61 (3%)	8/61 (13%)
Kabirizi	0/5 (0%)	0/5 (0%)	0/45 (0%)	0/45 (0%)
Mohokya	1/4 (25%)	1/4 (25%)	2/40 (5%)	2/40 (5%)
Hamukungu	1/4 (25%)	0/4 (0%)	1/24 (4%)	0/24 (0%)
Total	**4/22 (18%)**	**2/22 (9%)**	**7/188 (4%)**	**10/188 (5%)**

Table 1. Bovine tuberculosis comparative skin test results showing positive reactors and inconclusive results at herd and individual animal level.

Discussion

Few individual animals (4%) were positive reactors and 18% of herds had one or two positive reactors, spread across the majority of sites. The individual prevalence is comparable to previous unpublished work *(Personal comm. G Kalema-Zikusoka).*

Convenience sampling may add bias when extrapolating the prevalence and this may be an overestimate, as testing favoured animals more likely to have disease, namely older and sick animals. This estimate can be used as a basis for sample size calculations in larger-scale prevalence studies.

Community engagement can be challenging due to previous conflicts with wildlife authorities but is necessary for successful sampling. Education to identify and reduce the spread of disease is recommended.

Larger herds were seen outside the QENP and there is increased pressure for grazing land and water sources, forcing herdsmen to move animals far from their homes and occasionally into the protected areas, posing a risk for cross-species disease transmission.

Acknowledgements

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