

BSP abstract for research talk

How does the composition of mixed wildlife-livestock communities impact ungulate parasite burden and diversity in Botswana?

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For centuries large populations of livestock and wildlife have coexisted across the African savannah rangelands, with unrestricted seasonal movement up until the latter half of the 20th century. However, in recent decades harmonious coexistence has become increasingly unstable, in part due to concern for the spread of direct and indirect infectious diseases between livestock and wildlife. Wild ungulates are implicated in the spread of prevalent livestock diseases, but transmission is also bi-directional with diseases likewise capable of spreading from livestock into vulnerable wildlife populations. It is now evermore important to study the burden, distribution and movement of parasites from the perspective of multi-host parasite systems, rather than solely one-host (and one-parasite) systems.

To determine the impact of host ecological communities on parasite communities, we characterised gastrointestinal nematode diversity and abundance in three ecosystems in Botswana with differing levels of livestock-wildlife interaction. We hypothesised that parasite prevalence and diversity varies locally and regionally in Botswana due to host community dynamics, with specific host species contributing disproportionately to onwards transmission.

Study sites were characterised by villages bordering national parks with varying levels of boundary permeability, which in turn were further subset according to the level of wildlife occupation, i.e. wildlife-only, livestock-only, and sympatric. Faecal samples from 16 wildlife and livestock species were collected from the ground with a total of 1500 individual faecal egg counts processed. Counts of strongyle eggs ranged widely between species from low mean counts of 31 eggs per gram (epg) in kudu, and 36epg (giraffe) to high mean counts of 695epg (donkey), 586epg (elephant), and 1339epg (zebra). Samples were collected from several infrequently encountered antelope species, potentially representing the first description of gastrointestinal parasites in these host species in Botswana. Spatial analyses of ungulate observations were used to quantify the degree of shared land use by livestock and wildlife at each site. Generalised linear mixed models incorporating these analyses were used to relate the parasitic gastrointestinal nematode (GIN) burden to host and site characteristics. Parasitic L3 larvae samples have been submitted for ITS-2 sequencing, enabling GIN species presence and abundance. We will use these findings to evaluate how host community structure impacts GIN diversity and prevalence using multi host network modelling. The overarching aims of this project are to better understand the specific roles of different ungulate species in parasite transmission, to inform on parasite control strategies and support human-wildlife conflict mitigation actions.