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Introduction:

- Host-associated microbial communities are being recognized as important players in human and animal health
- The role of microbiomes in wildlife health is very difficult to study because of lack of longitudinal data

Using a unique study system, we aim to (1) evaluate the relationship between microbiome composition and host health in wild African buffalo (*Syncerus caffer*), and (2) assess the effects of age, sex, and season on microbiome composition.



Materials and Methods

- A semi-wild herd of \sim 65 buffalo from a 900 hectare enclosure in the central portion of KNP was studied over the course of 3 years.
- Age, sex, nutrition, and disease status were followed closely, and nasal samples were taken every 2-3 months for microbiome sequencing.
- Statistical comparisons were made using generalized linear models (GLMs), mantel tests, and Adonis tests to study association of between season, age, sex, and health with microbiome diversity/composition.



Figure 1: The boma (enclosure) for the buffalo herd used in this study is located in the central portion of Kruger National park. Total size of the enclosure is 900 hectares, and a double fence was constructed to exclude predators.

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Nasal Microbiome Composition and Bovine Tuberculosis

 Preliminary data suggests an association between nasal microbiome composition and Bovine tuberculosis. More data is needed to confirm this result.



Figure 2: Relative abundances of (A) phyla and (B) genera of bacteria in buffalo nasal microbiomes. The TB positive animal is indicated with an arrow.

Effects of Season on Microbiome Diversity and Composition

- GLMs were used to assess seasonality in richness
- Large seasonal differences were observed in richness and composition
- Differences could be from seasonal fluctuations in nutrition, water availability, or disease exposure



Figure 3: Differences in bacterial richness (top) and composition (bottom) in buffalo nasal microbiomes across time

Variation in Microbiome Diversity

- Significant inter- and intra-individual variation in nasal microbiome diversity was observed
- Intra-individual variation in richness stabilizes with age







Figure 5: Some animals maintain relatively constant bacterial richness, while others fluctuate considerably.



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