# Rift Valley Fever interactions with Bovine tuberculosis in a competent reservoir host, African Buffalo

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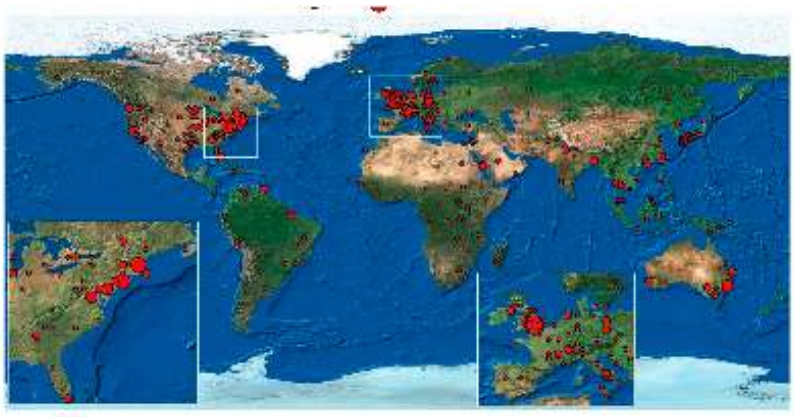
## Emerging Infectious Diseases



From Jones, 2008

# Coinfection

Most free-living animals exposed to multiple parasites simultaneously

- Can one disease interact with another disease within a population?
  - Bovine Tuberculosis and Rift Valley Fever
  - In African Buffalo
  - In Kruger National Park

# Study site

# African Buffalo *(Syncerus caffer)*

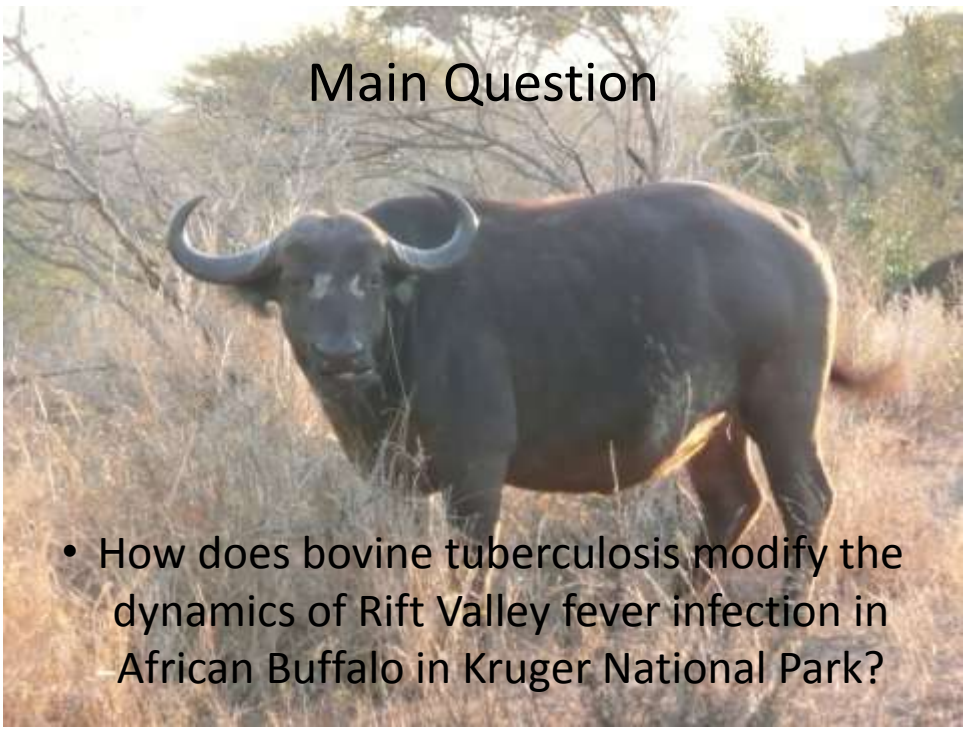
• Gregarious, nonmigratory bovids that live in groups of 50-1500 individuals
• Range across East and South Africa
• KNP population: ~30000
Our herds: ~800-1000 each

## Bovine Tuberculosis in African Buffalo

- Not native
  - Introduced in the 60's
  - Spreading north through the park
- Causes disease in African Buffalo
  - TB granulomas in lungs = PNEUMONIA
  - Once infected, always infected – No Recovery
  - **Most buffalo become infected between 2-5 years of age**
- African Buffalo can spread disease to other susceptible species (cattle, kudu, etc)

# Rift Valley Fever

- Native to South Africa
- Mosquito-transmitted, viral disease
- Causes acute disease (fever)
  - Very low fatality in adult Buffalo
- Can spread to people, cattle and other mammals



## Main Question

- How does bovine tuberculosis modify the dynamics of Rift Valley fever infection in African Buffalo in Kruger National Park?

# Methods - Capture

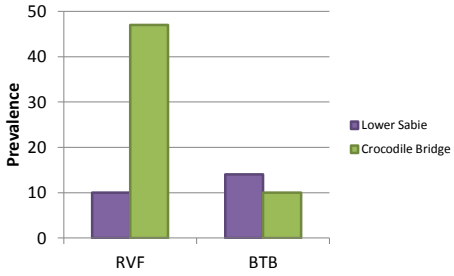
# Data Collected

- Age
- Body Condition
- Pregnancy Status
- Lactation Status
- Season
- Infection Parameters
  - RVF (Antibody ELISA)
  - BTB (IFNy assay)
- Immunity Parameters
  - IFNy responsiveness to pokeweed
  - White Blood cell counts

# Question 1

- What demographic factors predict infection patterns of RVF in our study population
  - Age
  - Herd

# The diseases in our Study Population




GLZ RVF = herd + TB + Age + age*TB
Herd: F=17.34 p=<0.00001

# Question 2

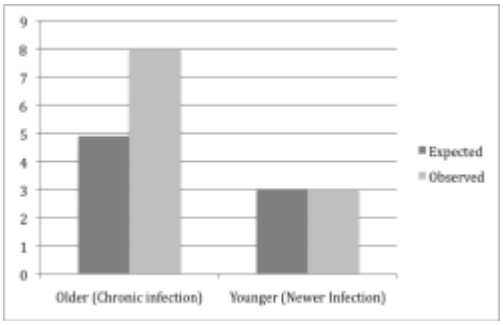
- ***What are the co-infection patterns of tuberculosis and rift valley fever?***
  - ***H1: Coinfections are more common than one would expect at random.***

# Preliminary Data

- Rift Valley fever is more common in animals with BTB infection after accounting for age and herd. (RVF = BTB + herd + age)

# But. . .

- When using AIC to select models from ALL demographic variables the best model was:
  - RVF status = herd + age + BTB + **BTB*Age**
  - *Where coinfection is more common in older animals (>5)*



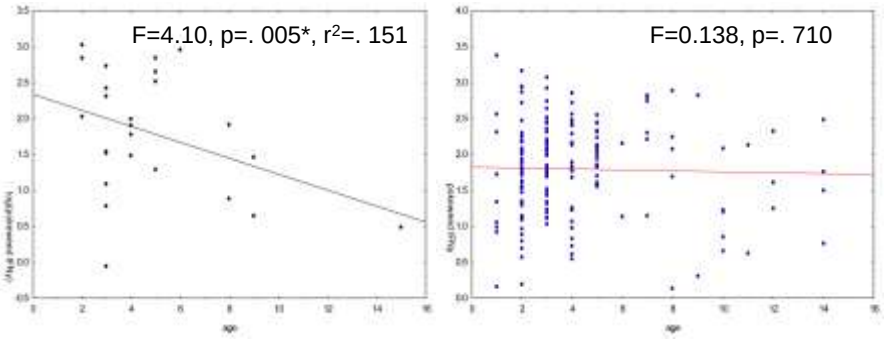

# Why might age of the buffalo matter?

- TB causes chronic disease and has different immunologic effects in chronic vs. acute infection
  - Chronic infection (>5 years of age) = immunosuppressed
  - Acute infection (<5 years of age) = not immunosuppressed

# Evidence of a changing immune profile

Does the animals microparasite immune response change with chronicity of infection?

-IFNy response to a novel antigen (pokeweed)




# Rift Valley Fever & Immune parameters

- Weak correlation between RVF status and IFNy response to pokeweed
  - Animals with BTB and reduced IFNy response are more likely to have RVF
    - RVF = BTB + Age + Herd + IFNy response + BTB*Age + *IFNy response*BTB*
- **Animals with chronic BTB may have suppressed microparasite immune response that may allow them to be more readily infected with RVF.**

# Continuing work

- Preliminary data suggests interactions between BTB and RVF
  - Coinfection more common than one would expect based on age specific prevalence rates in buffalo with “chronic BTB”
  - Incidence data will help clarify interaction
    - Direction of effect?
  - Additional immunological data will describe potential pathways of interaction

# Age & Prevalence of RVF/BTB