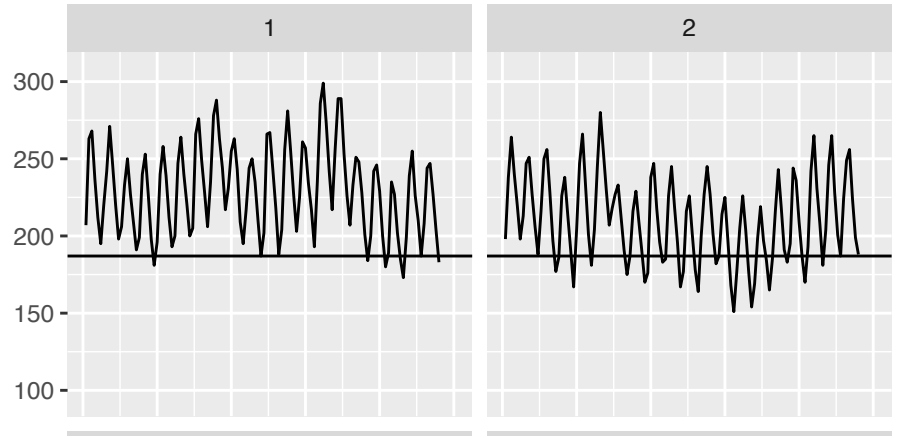
Using the Turretfield rabbit population to assess the impact of myxomatosis and rabbit haemorrhagic disease



Louise K. Barnett, Thomas A. A. Prowse, David E. Peacock, Gregory J. Mutze, Ron Sinclair, John Kovaliski , Brian Cooke & Corey J. A. Bradshaw

Project goals

1. Find out how survival of individual rabbits changes during outbreaks of rabbit haemorrhagic disease and myxomatosis
   - Do myxomatosis and rabbit haemorrhagic disease interact to affect survival?
2. Use survival rates to model the population at Turretfield under current conditions
3. Simulate the introduction of a new biocontrol

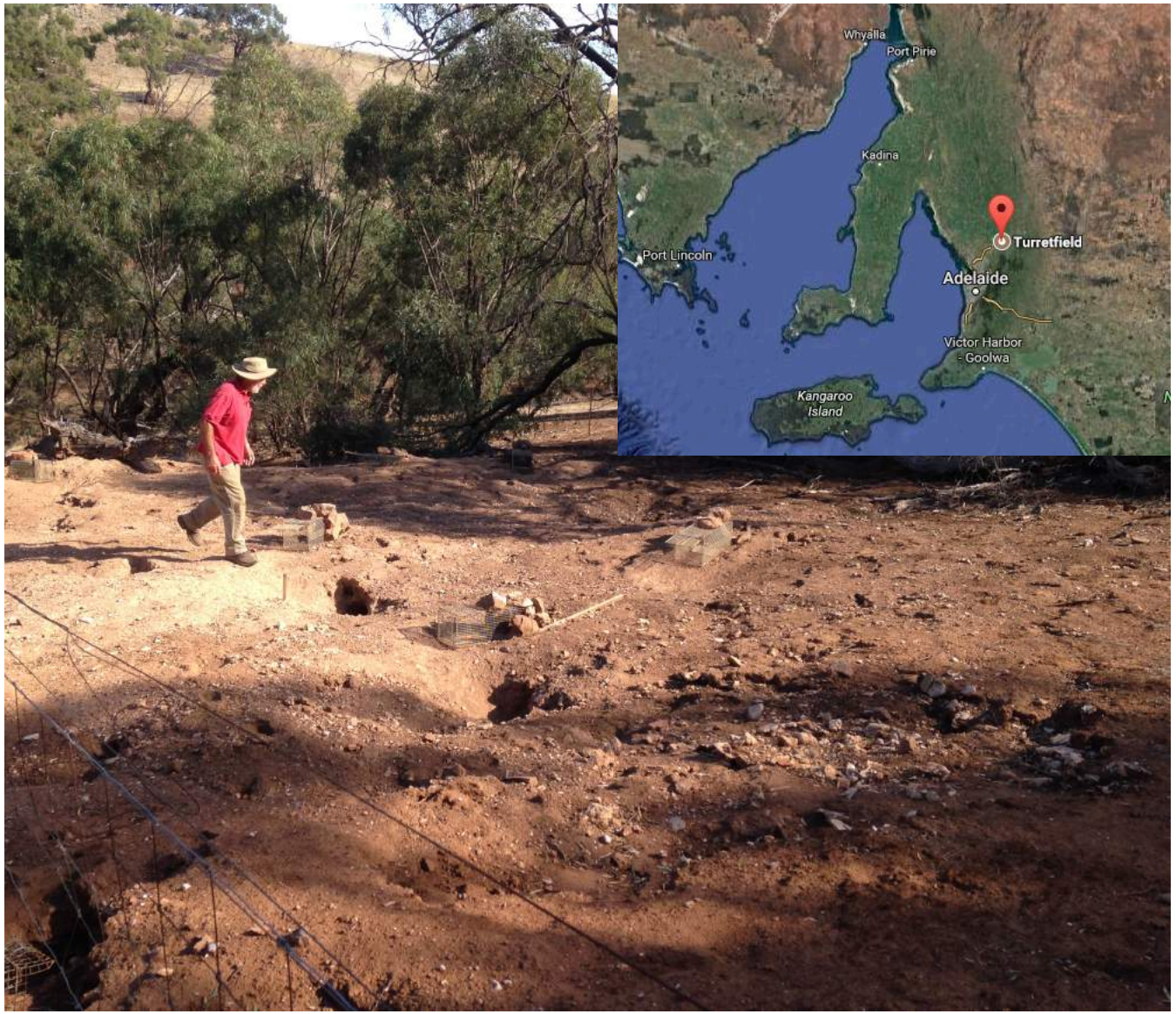
Project goals

1. Find out how survival of individual rabbits changes during outbreaks of rabbit haemorrhagic disease and myxomatosis
   - Do myxomatosis and rabbit haemorrhagic disease interact to affect survival?
2. Use survival rates to model the population at Turretfield under current conditions
3. Simulate the introduction of a new biocontrol

Need to know the effect of current biological controls before we can start predicting the impact of new ones

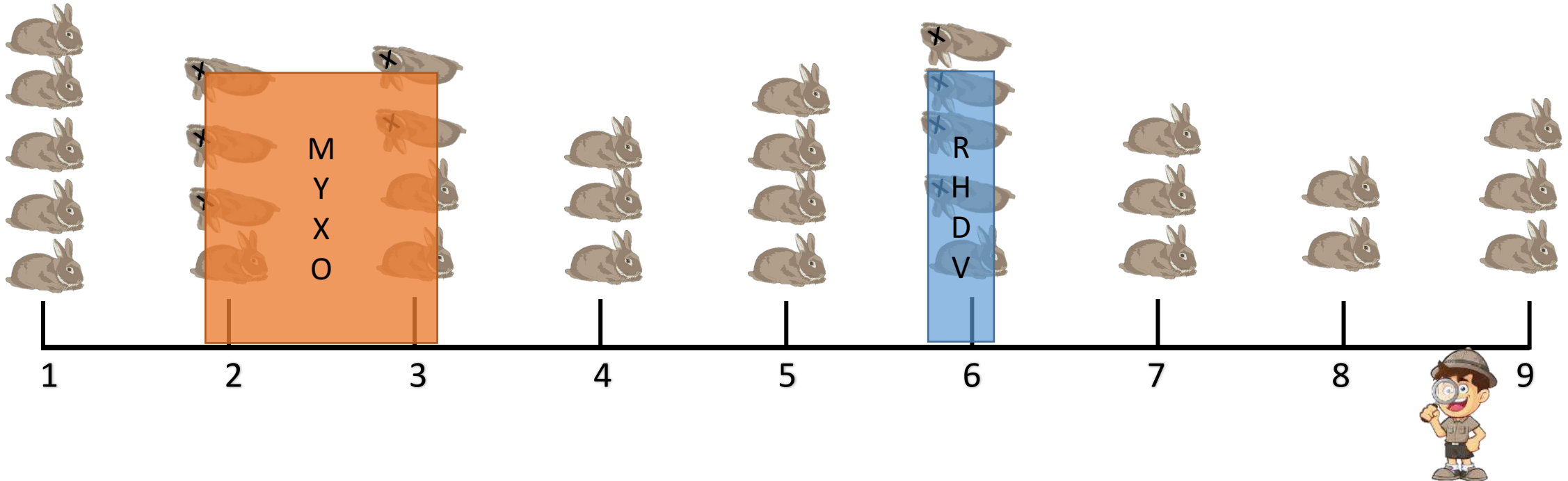
The data

- Turretfield
  - Biosecurity SA long term monitoring site
- Cage trapping
  - Rabbits tagged upon first capture
- 107 trapping trips
  - 1998 and 2015
  - 18 years
  - ~58 days between trips



Each trapping trip:

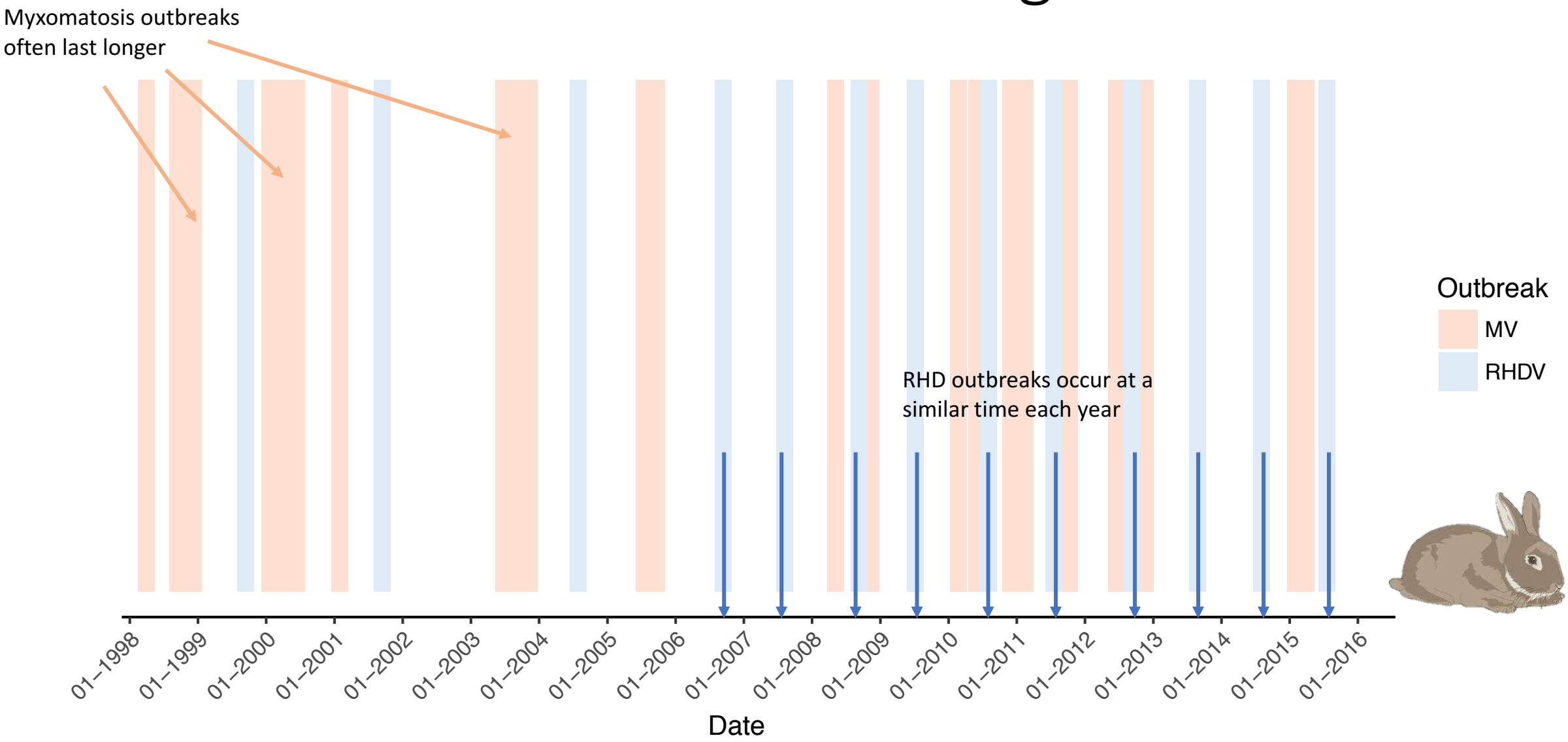
- Rabbits trapped & identified
- Carcasses collected
  - Identified
  - cause of death determined
- Identify outbreaks



What information does this dataset provide?

- Timing of rabbit haemorrhagic disease and myxomatosis outbreaks

Outbreak timing



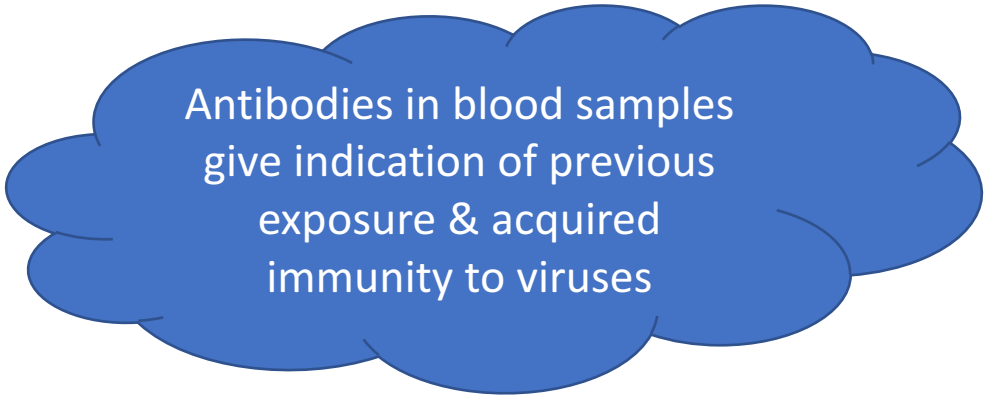
What information does this dataset provide?

- Timing of rabbit haemorrhagic disease and myxomatosis outbreaks

- Individual histories of virus exposure

Each time a rabbit is captured:

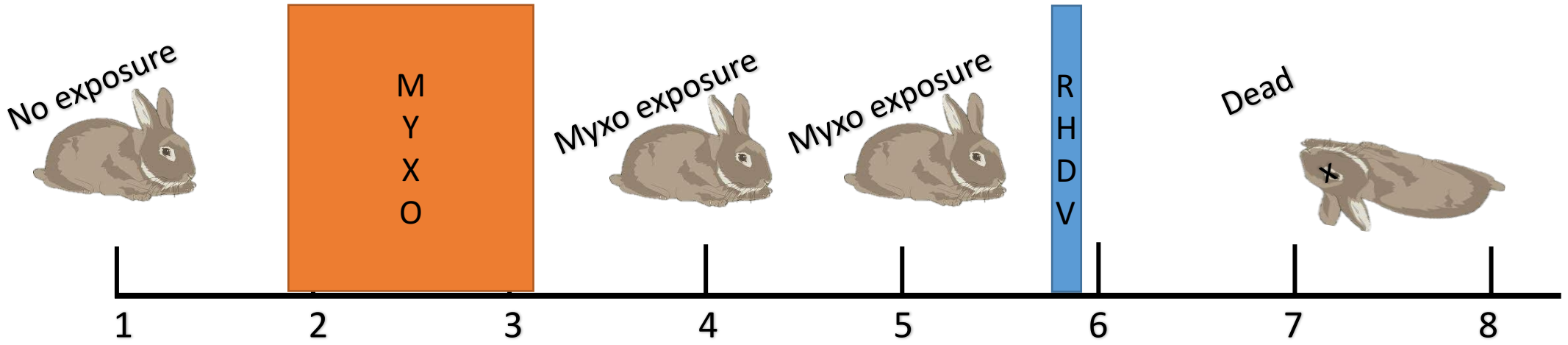
- Blood sample taken
- Immunity state/previous exposure recorded
  - No exposure
  - Myxo exposure
  - RHD exposure
  - Exposure to both viruses



Each time a rabbit is captured:

- Blood sample taken
- Immunity state/previous exposure recorded
  - No exposure
  - Myxo exposure
  - RHD exposure
  - Exposure to both viruses

We have similar histories for over 4200 rabbits



Rabbit number 400

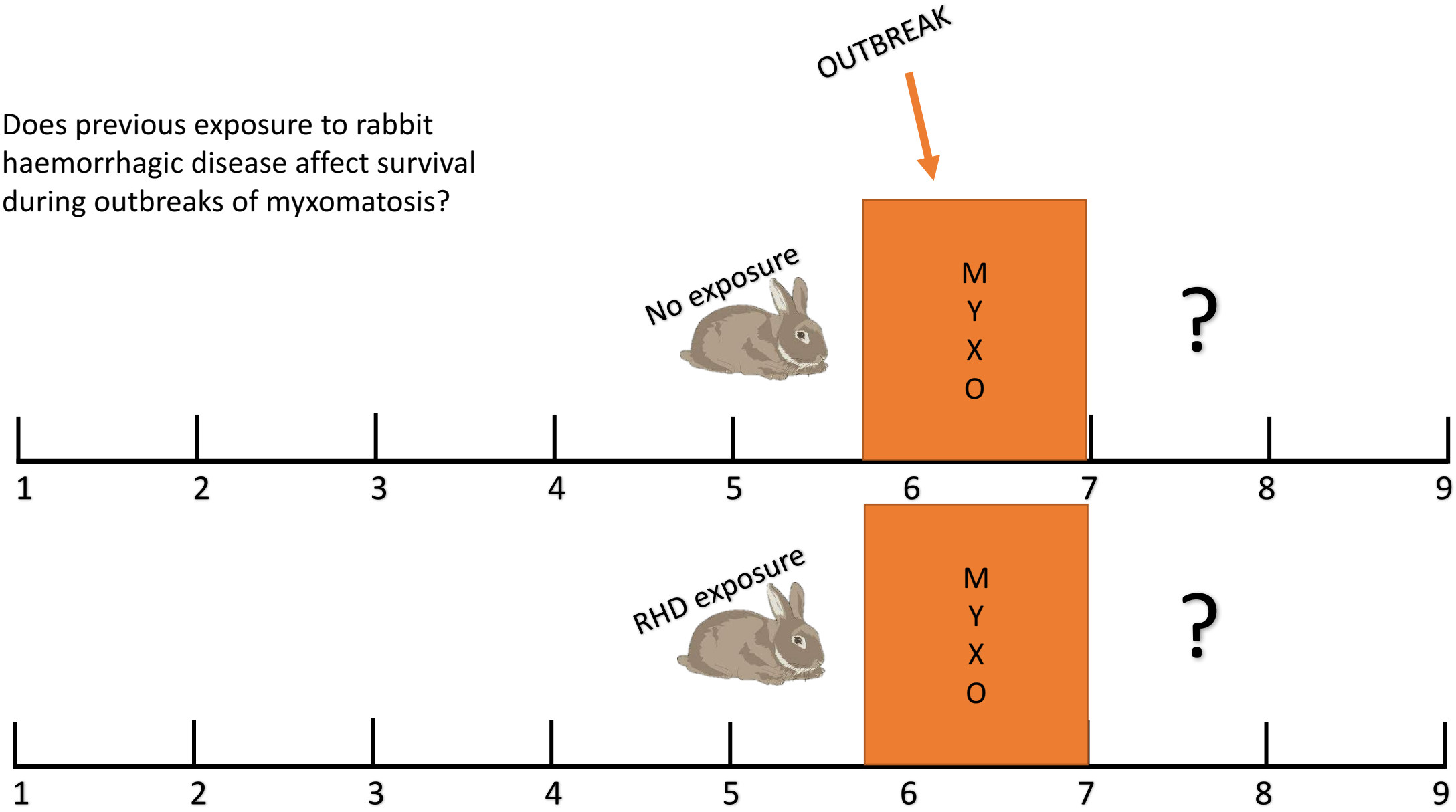
What information does this dataset provide?

- Timing of rabbit haemorrhagic disease and myxomatosis outbreaks
- Individual histories of virus exposure

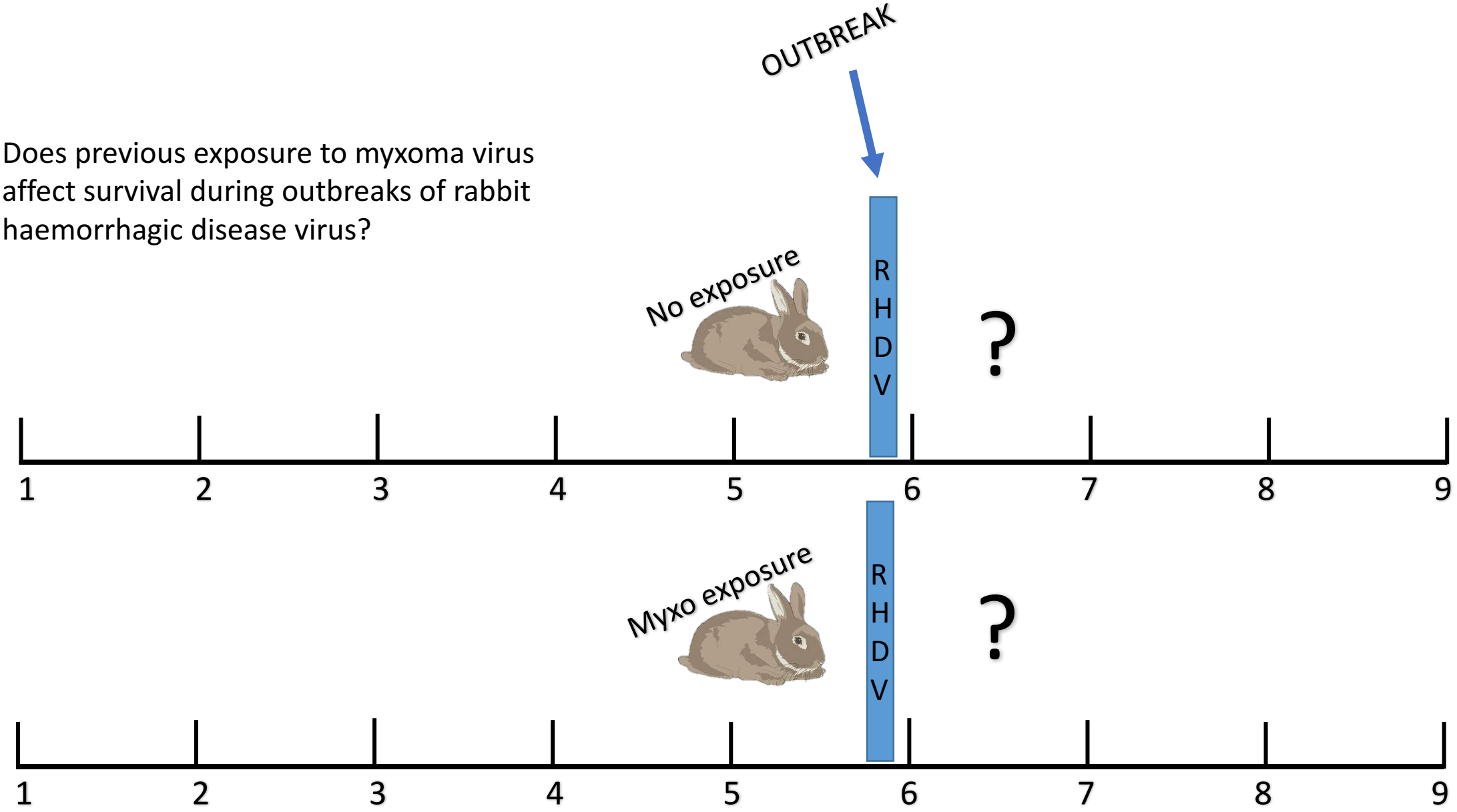
Does exposure to one virus affect survival of rabbits during outbreaks of the other virus?

Do these diseases interact to affect survival?

Does previous exposure to rabbit haemorrhagic disease affect survival during outbreaks of myxomatosis?



Does previous exposure to myxoma virus affect survival during outbreaks of rabbit haemorrhagic disease virus?



Compared four survival models

Different combinations:

Previous exposure to RHD affects survival during myxo outbreaks

AND / OR

Previous exposure to myxo affects survival during RHD outbreaks

OR

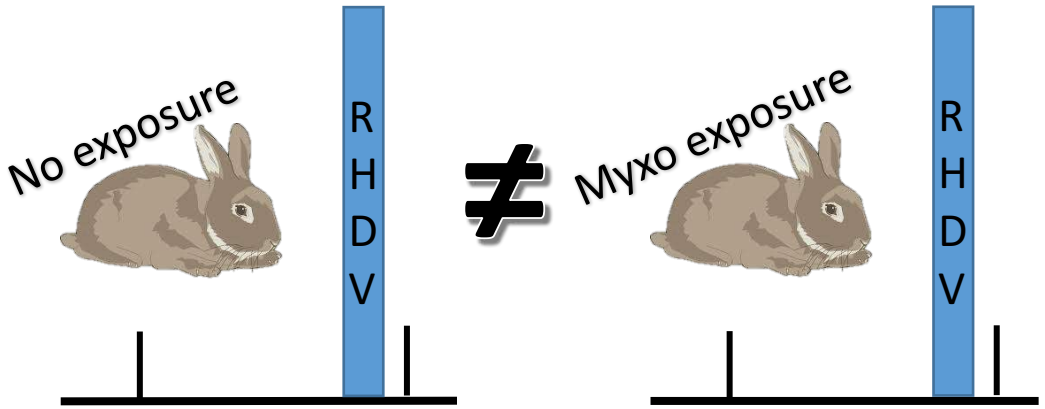
Previous virus exposure never affects survival during outbreaks of the other virus

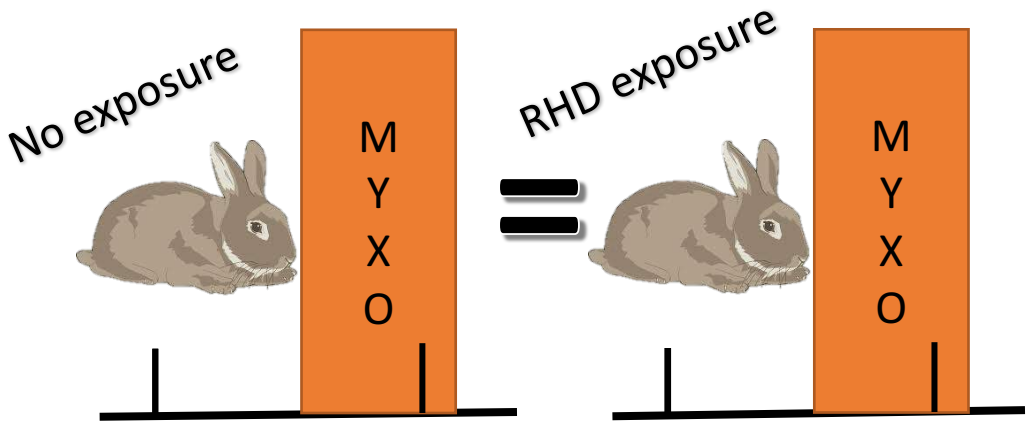
Results

Previous exposure to myxo affects survival during RHD outbreaks

BUT

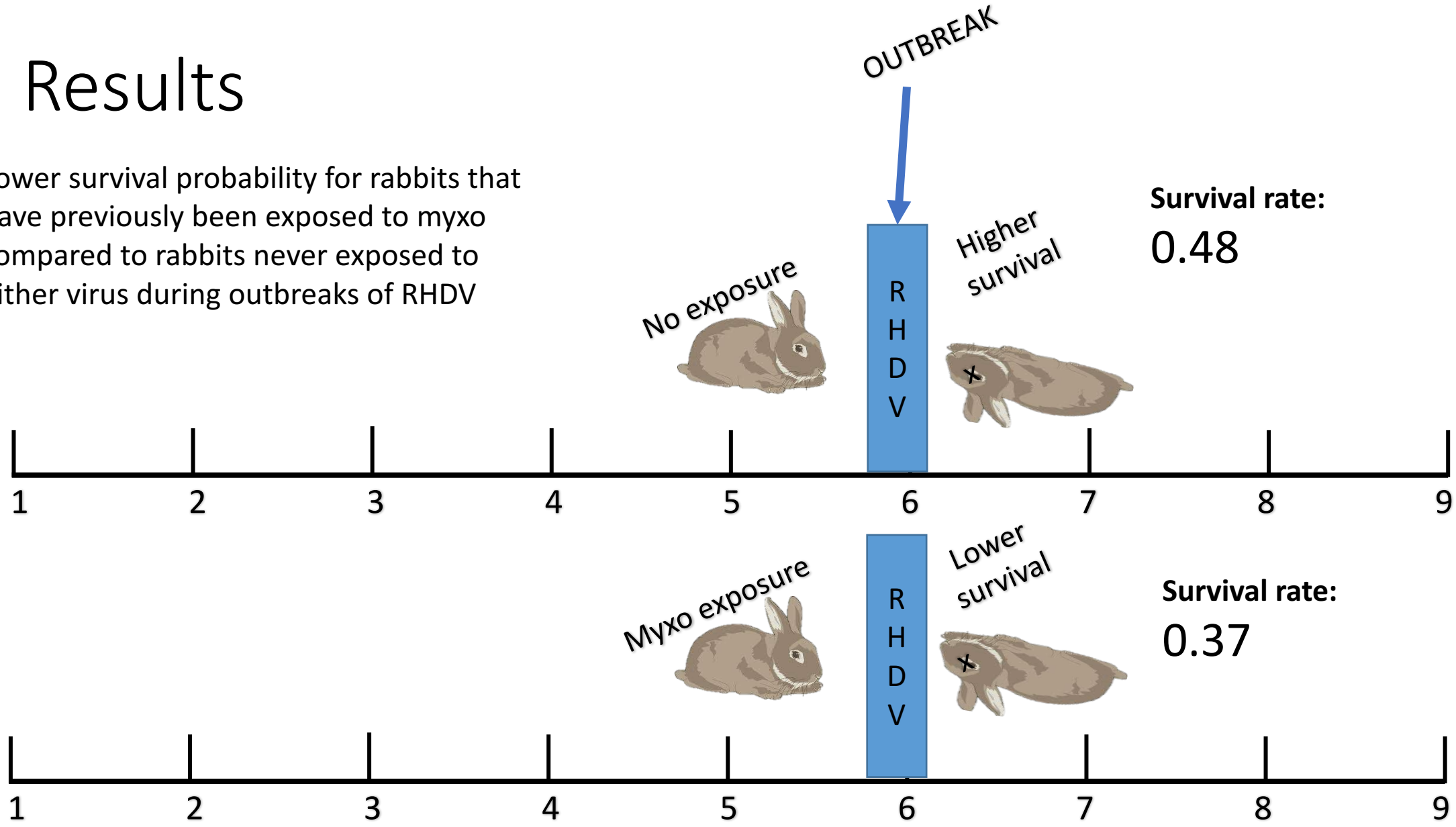
Previous exposure to RHD does NOT affect survival during myxo outbreaks





Results

Lower survival probability for rabbits that have previously been exposed to myxo compared to rabbits never exposed to either virus during outbreaks of RHDV

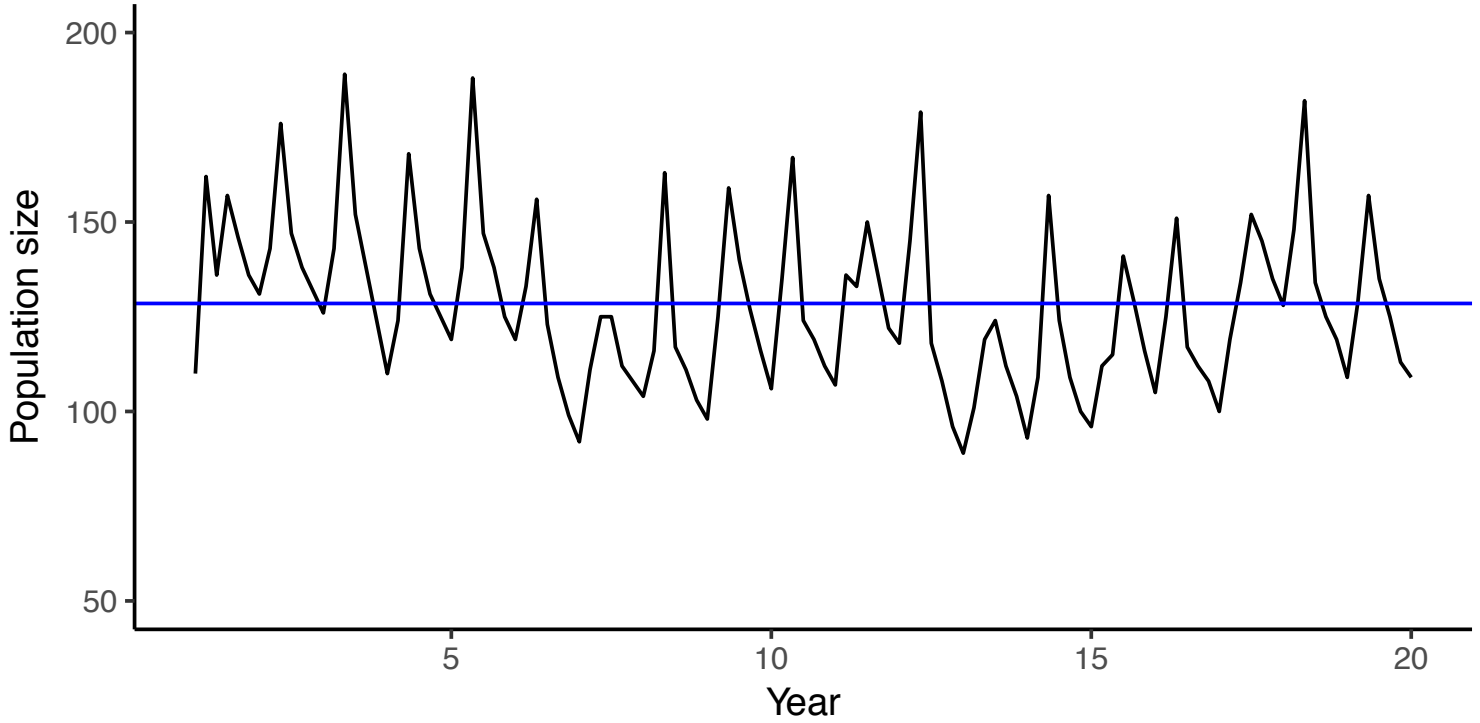


Project goals

1. Find out how survival of individual rabbits changes during outbreaks of rabbit haemorrhagic disease and myxomatosis ✅
   - Do myxomatosis and rabbit haemorrhagic disease interact to affect survival? **Yes**
2. **Use survival rates to model the population at Turretfield under current conditions**
3. Simulate the introduction of a new biocontrol

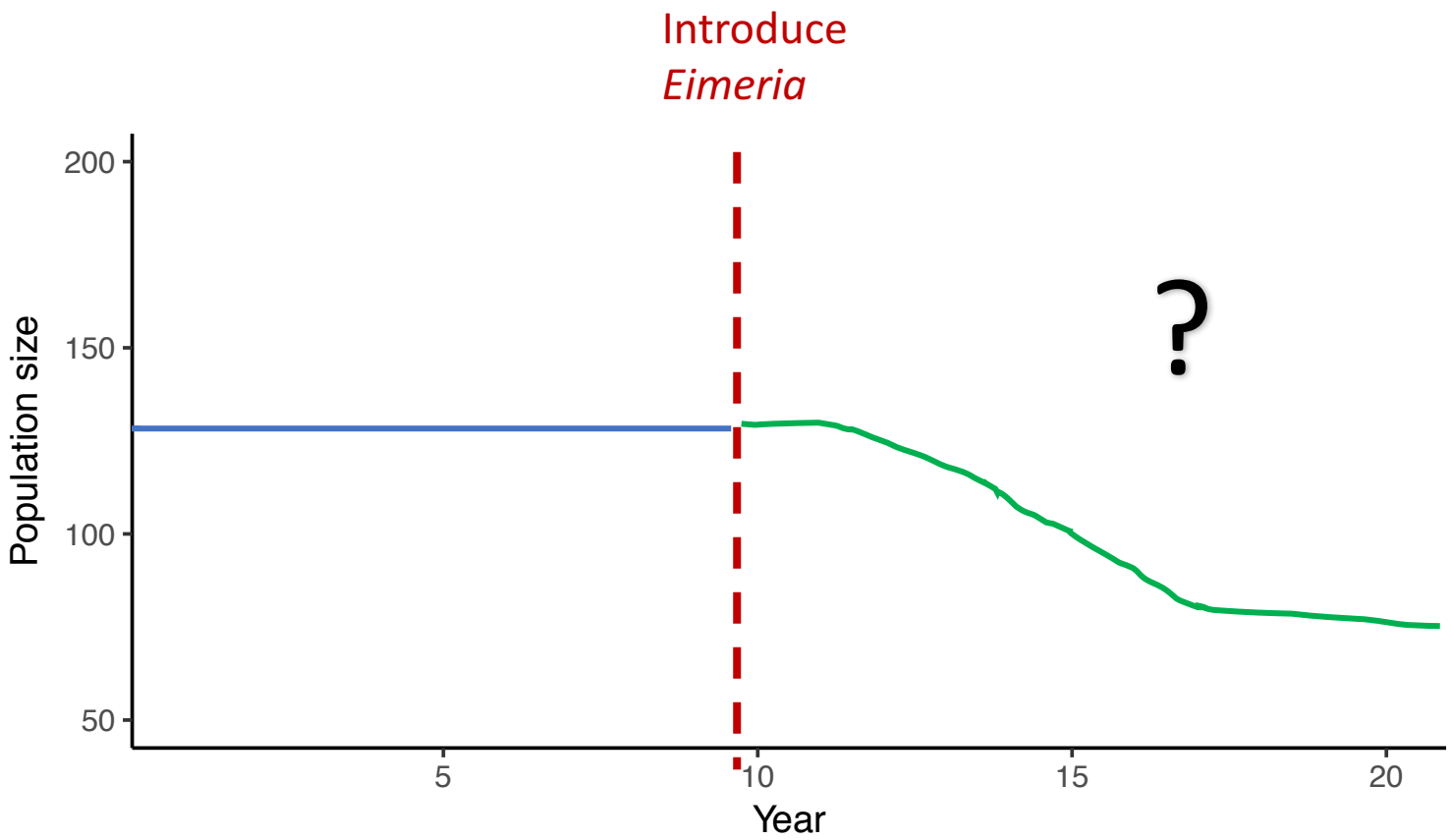
Modelling the Turretfield population

- Use estimates of survival and immunity state transitions to model Turretfield population
- With regular outbreaks of rabbit haemorrhagic disease and myxomatosis



What's next?

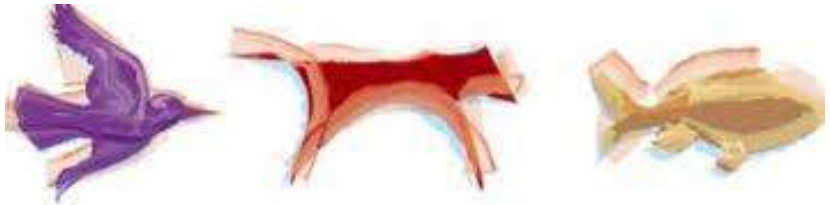
- Model population trajectories under a range of future disease scenarios
- E.g. the introduction of parasites, such as *Eimeria* spp.



To be continued…

Thank you!

RFA
Foundation for Rabbit-Free Australia Inc.



Invasive Animals CRC

Government of South Australia
Biosecurity SA

Lorenzo Capucci
Peter Kerr
John Evans
Brad Page
Amy Ianella

Co-authors:
Corey Bradshaw
Thomas Prowse
David Peacock
Greg Mutze
Ron Sinclair
John Kovaliski
Brian Cooke