Modelling Bluetongue Outbreaks and Control Using a Deterministic Model

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WHAT IS BLUETONGUE?
- Bluetongue is a virus spread from Culicoides biting midges to livestock
- Direct economic losses from deaths and decreased production
- Indirect economic losses from trade restrictions
- Control measures include vaccination, quarantine and movement restrictions

Global cost of Bluetongue is $3 billion annually
Present on all continents apart from Antarctica
WOAH ‘Listed Disease’ due to huge global impact

WHY MODEL BLUETONGUE?
- For prediction, in preparation for future outbreaks
- To understand optimal control measures
- To estimate economic impact of an ongoing outbreak
- To learn more about the drivers of the disease
- To experimentally explore differences in serotypes and host/vector species

THE SIMULATION
A hypothetical simulation for 100 cattle and 100 sheep, housed on the same farm, with the outbreak initiating in the middle of summer:

- Outbreak length = 171 days
- Number sheep affected = 42
- Number cattle affected = 56

- Outbreak length = 148 days
- Number sheep affected = 12
- Number cattle affected = 17

- Outbreak length = 152 days
- Number sheep affected = 23
- Number cattle affected = 32

FUTURE WORK
- Develop a “meta-population” model where midges can fly to neighbouring farms and livestock can travel to other locations
- Undertake an economic analysis to understand the cost of control versus the cost of losses
- Explore Bluetongue prediction under future climatic conditions

Thank you