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Towards control of LA-MRSA

Simulation modeling of LA-MRSA spread between pig farms

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Background

Livestock-associated methicillin-resistant *Staphylococcus aureus* of type CC398 (LA-MRSA) was found in 2005 in pigs and humans in the Netherlands (Voss et al., 2005). Since then, several other countries have detected LA-MRSA in pig herds (EFSA, 2009). There is a lack of knowledge regarding potential interventions.

Objective: Model the spread of LA-MRSA between herds and the impact of potential control strategies on the spread.

Material and methods

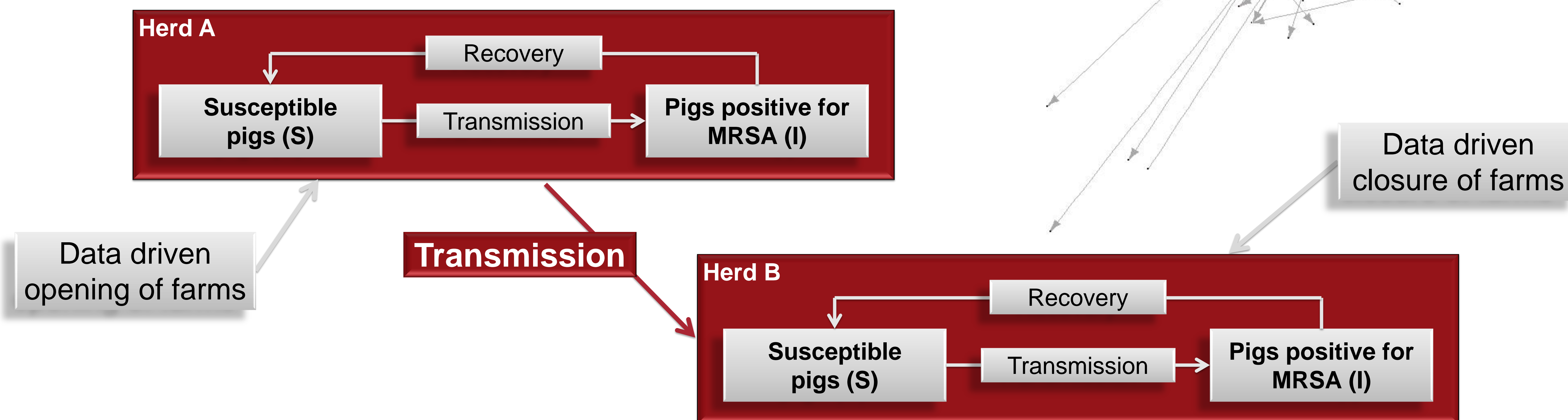
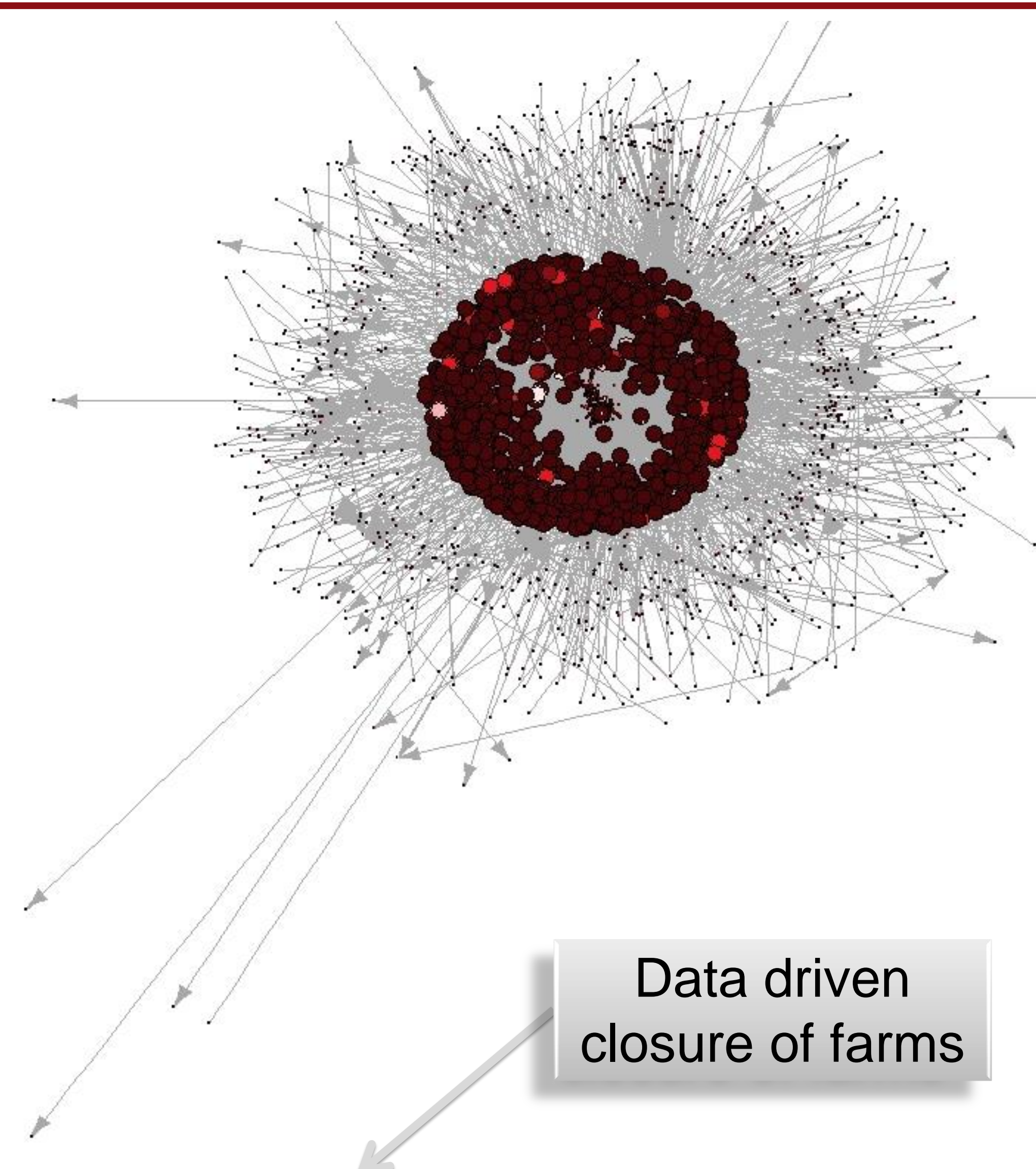
- 18,648 farms holding pigs in Denmark within the time period from 2006 to 2015
- Pig movement data from 2006 to 2015 (n = 10,168,106)

1) Dynamic network analysis

- Characterization of the network, quantification of changes
- Revealing of current movement patterns and hubs for disease spread

2) Simulation model of LA-MRSA spread between Danish pig herds

- SIS model for between herd spread based on movement data
- Within-farm dynamics: SIS model



3) Assessment of the impact of strategies to control/eradicate LA-MRSA

- How do control strategies within a herd affect the spread of LA-MRSA between herds?
- How do general control strategies affect the spread of LA-MRSA between herds like
 - Trade restrictions or purchase from herds with no or reduced levels of LA-MRSA
- Is eradication possible? Risk of re-infection!

References

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2. Voss, A., Loeffen, F., Bakker, J., Klaassen, C., & Wulf, M. (2005). Methicillin-resistant *Staphylococcus aureus* in Pig Farming. *Emerging Infectious Diseases*, 11(12), 1965–1966.

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