

# 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

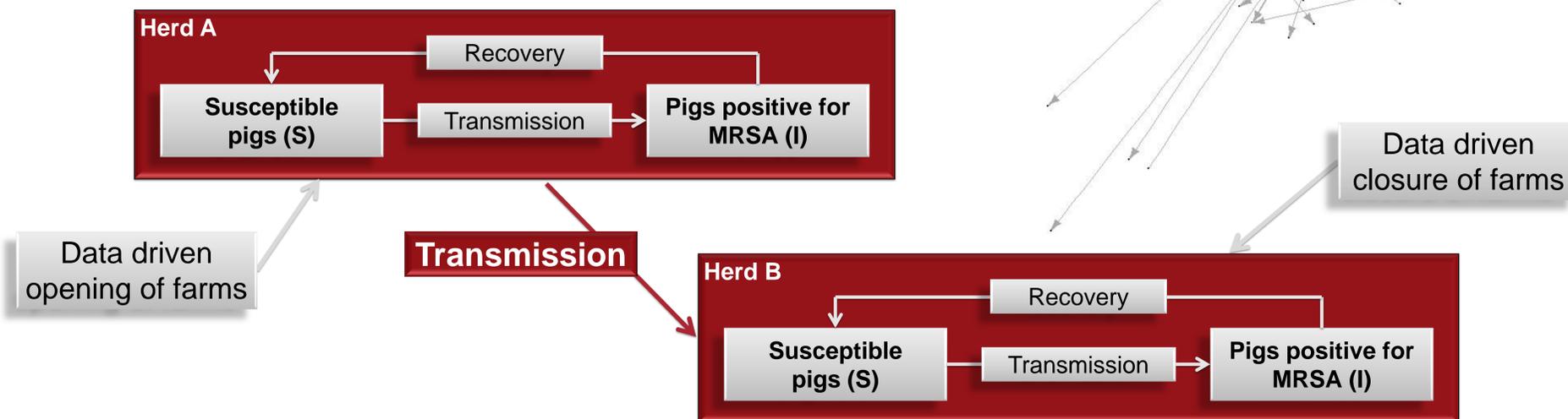
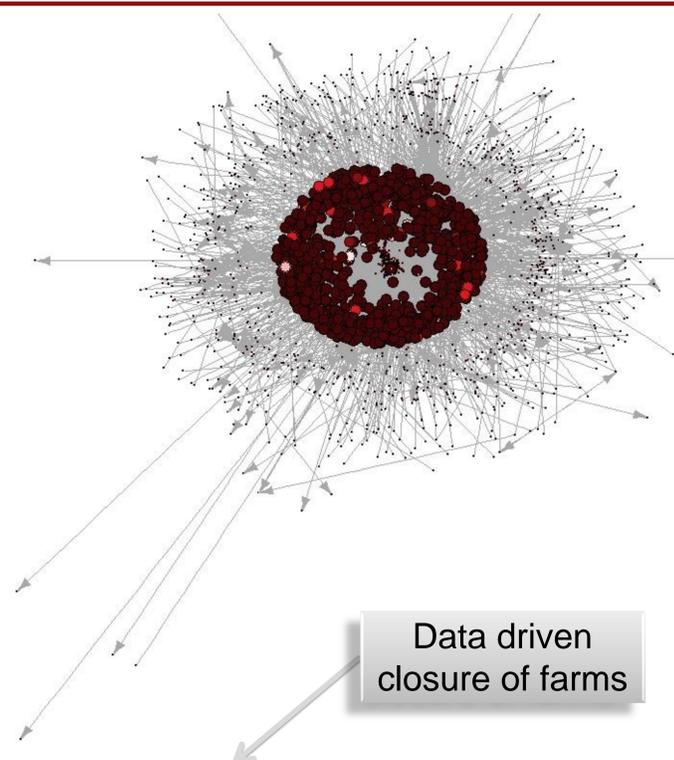
- 18,648 farms holding pigs in Denmark within the time period from 2006 to 2015
- Pig movement data from 2006 to 2015 (n = 10,168,106)

#### 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

1. EFSA (European Food Safety Authority) (2009). Analysis of the baseline- survey on the prevalence of methicillin-resistant *Staphylococcus aureus* (MRSA) in holdings with breeding pigs, in the EU, 2008. Part A. MRSA prevalence estimates; on request from the European Commission, EFSA J. 7, 1376.
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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