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A simulation model for the spread of LA-MRSA within a pig herd

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Objectives

• Study the mechanisms of MRSA spread and persistence within a pig herd.
• Examine the short and long term consequences and cost-effectiveness of different control strategies.

Materials and methods

• Mechanistic Monte Carlo simulation in R.
• Parameterization by existing data, data harvested in other part of the OHLAM project and expert opinions.

Background

• Livestock-associated methicillin-resistant Staphylococcus aureus (LA-MRSA) is an opportunistic human pathogen.
• LA-MRSA has main reservoir in pigs, but it has also been isolated from other animals and the environment.
• In 2014, LA-MRSA was found in 68% (N=207) and 63% (N=70) of the Danish production and nucleus/multiplier herds.*

*Source: Danish Food and Veterinary Administration.

Possible influence of …

Transmission of MRSA between stable units?

Emission of MRSA from a pig herd through air?

Emission of MRSA with pigs?

Emission of MRSA with humans leaving the herd?

Transmission of MRSA within a unit?

Transmission of MRSA within a pen?

Perinatal transmission from sow to offspring?

Transmission of MRSA with humans and equipment?

Spread of MRSA with humans and equipment?

Persistently colonized pigs?

Possible interventions…

Hygiene interventions among staff?

Cleaning and disinfection?

Use of probiotics?

Test-and-isolate until slaughter?

Changes in antimicrobial consumption patterns?

Colonized

Susceptible

Different routes of introduction?

Test-and-cull among super-carrier pigs?

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