A Cow- and Herd-specific Bio-Economic Model of Intramammary Infections in Dairy Cows

Kirkeby, Carsten Thure; Gussmann, Maya Katrin; Græsbøll, Kaare; Nielsen, Søren Saxmose; Toft, Nils; Hisham Beshara Halasa, Tariq

Publication date:
2017

Document Version
Publisher's PDF, also known as Version of record

Link back to DTU Orbit

Citation (APA):
A Cow- and Herd-specific Bio-Economic Model of Intramammary Infections in Dairy Cows

Carsten Kirkeby¹, Maya Gussmann¹, Kaare Græsbøll¹, Søren Saxmose Nielsen², Nils Toft¹, Tariq Halasa¹
¹DTU National Veterinary Institute, Denmark, ²University of Copenhagen, Denmark

Background
Intra-mammary infections (IMI) are often caused by more than one pathogen circulating on a farm, each with different prevalence, transmission and required management approach. Farm-specific simulation models can be useful for choosing the optimal management strategy, e.g. prevention measures, antimicrobial treatment or culling specific cows.

We created a bioeconomic model for IMI infection with multiple pathogens within dairy cattle herds. The model is versatile enough to simulate specific herds with management decisions on cow level.

Objectives
• Simulate infection with multiple pathogens within a herd
• Take economically sound management decisions such as prevention, treatment and culling for individual farms and cows.

Methods
We developed a mechanistic, stochastic simulation model for a 200 cow herd with individual properties such as curves for milk and somatic cell count. Infection is on quarter level based on two transmission modes: environmental and contagious pathogens. Subclinically infected cows have increased somatic cell counts and a reduced milk yield.

First results:
A model output example (above) shows co-existence of three contagious pathogens: *S. aureus*, *S. agalactiae* and *S. uberis* (contagious strain); and two environmental pathogens: *S. uberis* (environmental strain) and *E. coli*. Adjusting the transmission parameters enables simulation of specific herds with different sets of pathogens and strains. The model provides the economic result of different management strategies, and can thus be a tool to pinpoint the optimal strategy for the specific herd and cow.