Evaluation of intervention strategies for subclinical and clinical mastitis

Maya K. Gussmann[1,3], Wilma Steeneveld[2], Carsten Kirkeby[3], Henk Hogeveen[4], Michael Farre[5], Tariq Halasa[1,3]

[1]National Veterinary Institute, Technical University of Denmark,
[2]Department of Farm Animal Health, Faculty of Veterinary Medicine, Utrecht University,
[3]Section for Animal Welfare and Disease Control,
Department of Veterinary and Animal Sciences (IVH), University of Copenhagen,
[4]Business Economics Group, Department of Social Sciences, Wageningen University,
[5]SEGES Livestock Innovation

Background. Mastitis is one of the most frequent diseases in dairy cows worldwide. Because of the high costs, it is important to advise farmers on optimal levels of prevention. Simulation models can help in assessing and proposing management strategies regarding mastitis: different strategies can be simulated and compared for cost-effectiveness.

In this study, we used a stochastic simulation model of a Danish dairy herd with an added transmission framework for intramammary infections (IMI). Furthermore, we simulated and compared long-term economic and epidemiological effects of different intervention strategies for clinical and subclinical IMI for two Danish dairy herds with different mastitis situations. In one herd, most IMI were caused by *Staphylococcus aureus*. In the second herd, *Streptococcus agalactiae* was the main causative pathogen.

The default treatment strategy consisted of a 3-day antibiotic intramammary treatment of all clinical cases. Further intervention strategies considered different measures, including increased use of antibiotics or reactive culling of certain cows (e.g., cows with a low probability for cure). Several combinations of intervention strategies for clinical and for subclinical mastitis were then evaluated for their cost-effectiveness.

Results. The results include the net income, the number of clinical and subclinical cases, the number of treatment days, and the number of culled cows in the simulated herd. They show that IMI incidence can be reduced cost-effectively by various strategies at the cost of an increased use of antibiotics or an increased number of cows culled in relation to IMI. However, there were differences between the two simulated herds. In the *S. agalactiae* herd, interventions aimed at clinical mastitis cases did not seem to have a high impact on income and the number of IMI cases. However, interventions aimed at subclinical cases were highly cost-effective. In the *S. aureus* herd, on the other hand, cow-specific clinical interventions led to a higher net income and a lower number of cases.

Conclusions. The results highlight that intervention strategies should be pathogen-, cow- and herd-specific. Furthermore, they might want to take the nonmonetary costs (antibiotics, culling) into account, as farmers may have different management goals for their herds.