Determinants of antimicrobial treatments in relation to udder health in Danish dairy cattle farms

Maya Gussmann[1], Kaare Græsbøll[1], Søren S. Nielsen[2], Nils Toft[1], Michael Farre[3],
Carsten Kirkeby[1], Tariq Halasa[1]

[1]Division for Diagnostics & Scientific Advice – Epidemiology, National Veterinary Institute,
Technical University of Denmark
[2]Section of Animal Welfare and Disease Control, Department of Veterinary and Animal Sciences,
Copenhagen University
[3]SEGES

Regular cow level registrations in the Danish Cattle Database include, for instance, cow ID, milk yield, somatic cell count (SCC), calving and dry off dates. The data also include registrations about diseases and treatments for individual cows. In this study, we investigate antimicrobial treatment patterns in relation to udder health management and factors that influence these patterns. Understanding antimicrobial treatment patterns might help in proposing herd-specific udder health management programs considering what farmers already do. This might ease motivating farmers to adopt the proposed management programs to improve udder health, which would improve productivity and animal welfare.

Data from 1312 Danish dairy farms from January 2009 to February 2016, including treatment for various diseases, clinical registrations and PCR results (from milk samples), were used for this analysis. Clinical registrations that were considered relevant for mastitis were those pertaining to the udder or the mammary gland (registered as "udder" or "mammary gland") or given by the California Mastitis Test (indicator of mastitis). Treatments were considered relevant if they were registered as treatments for mastitis pathogens, dry off treatments and treatments pertaining to the udder. To investigate differences between farms, farm-wise analyses were conducted for both lactational and dry off treatments. Cow factors such as milk yield, somatic cell count data (SCC), lactation stage (0-30 DIM, 31-250 DIM, 251-450 DIM, >450 DIM), and parity (1, 2 or ≥3) were also included in the analysis.

SCC, milk yield, PCR testing (yes/no), clinical registrations (yes/no) and information about whether or not a cow was culled together with parity were considered as indicators for treatment in logistic regressions. Additionally, lactation stage was also considered for lactational treatments while information about lactational treatments was considered for dry off treatments. Principal component analysis and clustering were also carried out on all regression coefficients for all farms.

The results suggest that there are various patterns in antimicrobial treatments in relation to udder health in the Danish dairy cattle herds. These patterns are governed by different factors, indicating that farmers have different behaviours and priorities in selecting the cows for treatments. Some farmers rely more on the cow's age as a determinant factor, while others rely more on the cow's production level. A third group of farmers relies on mastitis indicators, such as SCC or PCR. This information can be used, e.g. in simulation models, to investigate and propose cost-effective udder health control programs considering what farmers already do. By considering and expanding current practice, farmers can possibly be more easily motivated to adopt proposed changes in their udder health program.