Differential cell counts – promising results from the EMCo-MAST project

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Introduction: Intra-mammary infections (IMIs) cause problems in dairy herds worldwide, including reduced animal welfare and production losses for farmers. Currently, Bacterial culture (BC) and PCR are used to detect IMI pathogens in composite or quarter samples. However, these tests are costly and time consuming, and therefore the somatic cell count (SCC) from DHI samples is often used as an indicator of IMI in dairy cows. SCC varies largely and represents all cells related to immune reactions within the udder. IMI activates the immune system and therefore SCC increases following an infection. The differential somatic cell count (DSCC), was recently introduced as an additional indicator for IMI for routine DHI samples. DSCC represents the proportion of polymorphonuclear neutrophils (PMNs) and lymphocytes relative to the macrophages in milk, measuring the acute response and therefore it has the potential to avail more precise indication of IMI. We here present the first results from a field experiment to evaluate the additional value of combining DSCC with the widely used SCC for detection of IMI.

Materials and methods: Two Danish dairy herds were included in a repeated cross-sectional study. Herd 1 comprised 180 milking cows and had a high prevalence of IMI, including *Staph. aureus*. Herd 2 comprised 360 milking cows and had few problems with IMI pathogens. All cows were sampled monthly during all of 2017. All DHI samples were analyzed with BC, and SCC and DSCC were obtained using the Fossomatic 7 DC. All positive results were grouped into the following pathogen groups: Major, Minor, or Other pathogens. We used general linear mixed models for each pathogen group including SCC, DIM, their interaction and a random effect of cow as explanatory variables, to determine the performance of SCC to detect IMI. We then constructed the same models also including DSCC. We then compared the models including DSCC with those without DSCC using an ANOVA test.

Results and Discussion: In Herd 1, we found a high frequency of major pathogens (*Staph. aureus*) and less Minor pathogens, whereas in Herd 2 we found few *Staph. aureus* and relatively more Minor pathogens (*Corynebacterium spp.* and NAS (non-aureus staphylococci)). Overall, the DSCC decreased slightly over the lactation. We found a general positive correlation between DSCC and SCC. From the comparisons of the linear mixed models we found that DSCC contributed significantly to detect minor pathogens in both herds, and major pathogens in Herd 1.

Conclusion: DSCC contributed significantly to the detection of IMI in DHI samples even when SCC was already known, especially in IMI cases caused by minor pathogens. This indicates that DSCC potentially can be a useful tool for controlling mastitis in dairy herds.