Optimising infection detection in dairy herds conducting selective dry cow therapy

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Summary

- Somatic cell count (SCC) at the last milk recording is the most useful recording to predict if a cow is infected in late lactation. It is advised to conduct at least one milk recording in late lactation (within 30 days of dry-off) to guide dry cow therapy decisions. Teagasc recommends conducting several milk recordings throughout lactation.
- The quarter SCC threshold that optimises correct classification of infected and uninfected cows in late lactation is 61,000 cells/mL and 101,000 cells/mL for first lactation and second and greater lactation cows, respectively.
- Almost 30% of first lactation cows had infections in late lactation. Measures should be implemented on farms to address this issue.

Introduction

Blanket dry cow therapy (DCT, treating all cows in a herd with an intramammary antibiotic at dry-off) to treat existing intra-mammary infections (IMI) and to prevent new IMI over the dry period has been a key pillar in mastitis control for many decades. New EU regulations state that antimicrobials should not be used as a preventive measure. An alternative strategy to blanket DCT is to treat cows that have an IMI with antibiotics, while the remaining cows are treated with an internal teat seal (ITS) alone (selective DCT). Implementing selective DCT involves correctly categorising quarters or cows as having IMI, and infusing them with antibiotics, or being uninfected and infusing them with an ITS alone.

Somatic cell counts (SCC) are a commonly used measure to detect intra-mammary infection. These reflect immune cells that are secreted in milk to try to eliminate IMIs. An IMI usually results in an increased SCC. The most common SCC threshold used to identify IMI is > 200,000 cells/mL, however, this threshold needs to be evaluated depending on the production system and bacteria most commonly causing the IMIs. Therefore, the objectives of this study were to: 1) explore cow-level factors to predict infection in late lactation; 2) describe the level of IMI in late lactation in commercial herds; and 3) determine the most effective SCC threshold to identify IMI.

Prediction of infection and SCC threshold for infection detection

A total of 21 herds (2,074 cows) located in the south of Ireland were enrolled for this study. All herds had an average bulk tank SCC of < 200,000 cells/mL in 2020. Cow data from the herds' milk recordings (parity, milk yields, SCC) were obtained from ICBF. Additionally, all cows were quarter milk sampled in late lactation (approximately 30 days prior to dry-off) and samples were cultured to detect the presence of bacteria and to determine quarter-level SCC. If samples had bacterial growth, the cow was classified as "infected", and the bacterium was identified.

Results

The average cow-level infection rate in late lactation was 19% for the 21 herds. Staphylococcus aureus was the predominant pathogen causing IMI in all herds. Of the cows with IMI (n = 393/2,074), 84% (n = 330/393) were infected with S. aureus, followed by

4.1% (n = 16/393) with Streptococcus uberis. Twenty-nine percent of first lactation cows had an infection in late lactation, compared to 14% of second to fourth lactation cows and 19.7% of five and greater lactation cows.

The last milk recording SCC provided the most important information to predict infection in late lactation. Using the average or the maximum SCC of the lactation did not improve prediction of IMI in late lactation. Also, including milk yield or the number of times that the cows had a high SCC (>200,000 cells/mL) in the lactation did not improve the prediction compared to using the last milk recording SCC alone. This highlights the importance of milk recording in late lactation to guide dry cow therapy decisions.

We found that the quarter SCC threshold that maximised the combination of correctly identifying the infected cows and correctly identifying the uninfected cows was 61,000 cells/mL for first lactation cows and 101,000 cells/mL for second and greater lactation cows. However, for older cows the accuracy of the SCC threshold was lower than that of first lactation cows. This means that using 101,000 cells/mL to classify cows as "infected" or "uninfected" will result in more cows wrongly classified in both categories, compared to using 61,000 cells/mL in first lactation cows. Table 1 shows the average SCC for infected and uninfected cows and the level of infection in different lactation categories.

Table 1. *Average SCC (cells/mL) in the last milk recording of uninfected and infected cows and percentage of infected cows by lactation category*

Lactation	Uninfected cows	Infected cows	% of infected cows (no. of infected)
1	59,700	157,400	29.3 (136)
2	55,000	98,200	14.2 (57)
3	57,800	115,700	13.3 (53)
4	59,400	158,900	15.1 (41)
≥5	90,500	198,200	19.7 (106)

Conclusion

We found that S. aureus caused the majority of IMI in the 21 studied herds. First lactation cows had a higher level of IMI compared to second and greater lactation cows. The SCC at the last milk recording of the lactation was the best predictor of IMI in late lactation. Therefore, it is very important to do a milk recording in late lactation to inform dry cow therapy decisions. Using SCC to detect infection is more accurate in first lactation cows than in second and greater lactation cows. We found that SCC thresholds of 61,000 cells/mL and 101,000 cells/mL are best to detect infection in heifers and older cows, respectively. These findings suggest that the SCC threshold for guiding antibiotic therapy at dry-off should be different for first lactation and older cows.

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