

Identification of subclinical mastitis in dairy herd improvement samples

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The economic impact of mastitis is estimated to be ~\$200 per cow per year, and the loss in productivity is a well recognised issue for both farmers and dairy companies. It is vital for the industry sustainability that herds remain as healthy and productive as possible.

Less well known is the fact that subclinical mastitis is estimated to be present in anywhere from 30-70% of cows in a herd. The National Mastitis Council estimates there are 15-40 cases of subclinical mastitis for every one case of clinical mastitis, and it is a major cause of milk loss.

While the cow appears to be unaffected by illness, and there are no visible changes to the milk produced, in reality there is a significant impact:

- Milk yield is significantly reduced.
- Milk quality is affected.
- The cow is a potential source of infection to the healthy herd mates.

Subclinical mastitis costs the US dairy industry in excess of \$1 billion annually with the overall production loss estimated at \$110/cow.

Therefore, identifying cases of subclinical mastitis could have significant economic benefits for the farmer and result in a positive impact on milk supply and overall herd health.

Identification of mastitis

Somatic cell count (SCC) level is often used as an indicator of sub-clinical mastitis. However, there is no consistent level for SCCs, and country-to-country, farm-to-farm, and animal-to-animal variations exist. Routine screening of standard dairy herd improvement (DHI) samples for the presence of mastitis-causing pathogens could rapidly and reliably identify sub-clinical cows, however classical culturing is not possible with samples that have been preserved for shipment.

Thermo Scientific PathoProof Assays (Thermo Fisher Scientific) can be used with



fresh and preserved samples, and results are available the same day. A study was thus performed on DHI samples using SCC levels together with PathoProof testing for pathogen detection in order to identify cows that should be subsequently tested for causative pathogen identification.

Study outline

- Pathogen positive cows were identified using a PathoProof Major 4.2 assay reading of Cq <32.
- Pathogen positive cows were then analysed for SCC values and % change in SCC values over time-points.
- Analysis showed pathogen positive cows displayed SCC higher values than those not selected by the Cq result.
- This enabled identification of threshold SCC values that correlate with positive pathogen presence and require identification of the causative pathogen to direct treatment.

This would deliver a cost effective method for farmers to identify, segregate and treat previously unidentified cases of subclinical mastitis.

Dutch study

A study was conducted using DHI samples from five Dutch herds over three time points and results were correlated between SCC counts and the results from two PathoProof products – Thermo Scientific PathoProof Complete 16 and Thermo Scientific PathoProof Major 4.2 assay kits.

The PathoProof Complete assay identifies bacteria responsible for >95% of all clinical and subclinical mastitis cases from both environmental and contagious sources, while the PathoProof Major 4.2 assay identifies only major contagious pathogens.

Testing DHI samples with the PathoProof Complete 16 Assay detected a high degree of environmental pathogens in symptomless cows. This is due typically to the general environment, milking and sampling equipment and hygiene procedures. It is thus not recommended that PathoProof

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Complete 16 tests be used to routinely test DHI samples for subclinical mastitis.

Further analysis was thus confined to PathoProof Major 4.2 assay, which identifies the major contagious pathogens most significant to udder health: *Mycoplasma bovis*, *Streptococcus agalactiae*, *Staphylococcus aureus* and *Streptococcus uberis*. Both SCC values and changes in SCC values were analysed alongside the results from the PathoProof Assay. A threshold value for the PathoProof assay result was selected (Cq <32) that indicates the result was due to a real pathogen infection rather than as a result of any potential cross contamination.

| Measurement | Threshold | Affected cows |
|---------------------------------------------------------------------------|------------------|-----------------------------------|
| SCC level | 100,000 cells/ml | 79% of sub-clinical cows detected |
| Change in SCC between two time points (%) (even if SCC <100,000 cells/ml) | >200% | 71% of sub-clinical cows detected |

Table 1. Analysis of SCC levels.

Clear correlations between PathoProof Major 4.2 assay results and SCC levels have been identified. Analysis of the data indicates that the SCC thresholds in Table 1 will identify 71-79% of cows that had a positive PathoProof Major 4.2 assay result.

If the objective is to reduce as many clinical and subclinical cases as possible, screening of all cows with the PathoProof Major 4.2 assay would be the recommendation, with subsequent testing of positive samples with the PathoProof Complete 16 Assay to identify the infective agent and infected quarter.

However, where screening of all animals is not economically feasible, this study identified a subset of cows based on SCC values that would identify up to 79% of cases.

An alternative approach would be to use PathoProof on pooled DHI samples or bulk milk tanks samples, as shown to be effective in other studies.

Conclusions

Use of PathoProof Major assays to screen preserved DHI samples offers a valuable tool in the early identification of subclinical mastitis.

Additionally, as PathoProof kits also test for highly contagious pathogens like *Mycoplasma bovis*, DHI screening also offers proactive early detection thus reducing the spread of mastitis throughout the herd, offering significant benefits to the overall health and productivity of the herd, as well as reducing economic losses. ■

References are available from the author on request

