On-farm Mastitis Diagnosis

Rapid and accurate diagnosis is helpful for making decisions about cows suspected of being infected with mastitis. Numerous methods are used to identify mastitis infections. Those requiring the submission of milk samples to a laboratory have been criticized as too slow for on-farm decision making. To overcome this hurdle, indirect measures of the somatic cell counts (SCC) such as the California Mastitis Test (CMT) have been used for many years. Recently, several new on-farm tests have been introduced. Here’s a summary of the options currently available.

California Mastitis Test

For 50 years the CMT has been the only reliable cowside screening test for subclinical mastitis. Although it does not identify the type of bacteria that cause mastitis, the CMT is useful in identifying quarters that have high SCC. The degree of reaction between a reagent and the DNA of cell nuclei indicates the number of somatic cells in a milk sample. The relationship between SCC values and CMT is not precise because of the high degree of variability in SCC values within each CMT score (see WDD Summer 2004, p 12).

In a study designed to test the ability of the CMT to detect infected quarters of fresh cows, quarter milk samples were examined each day after calving until 10 days postpartum. When a positive CMT was defined as a reaction of >1, about 57% of infected quarters were accurately identified (43% were missed). Another study used the CMT to test 7,431 composite milk samples obtained from herds in which about 35% of the cows were subclinically infected with Staph aureus and Strept agalactiae. When a CMT value of ‘trace’ or greater was used, 92% of infected cows were correctly identified. When a CMT value of >1 was used only 72% of infected cows were correctly identified. To minimize the number of false negative results, the test should be read as positive when at least a trace reaction is apparent. While the CMT is adequate to detect very high SCC, its ability to precisely identify quarters with SCC that exceed the threshold of 200,000 -250,000 cells/ml is limited by its high rate of false negatives.

PortaSCC

The PortaSCC (www.portacheck.com) is another rapid test that is marketed for cowside SCC testing. This test is adapted from a product used by human cancer patients to monitor white blood counts. The test measures only white blood cells and has an upper limit of detection of 3,500,000 cells/ml.

PortaSCC consists of a small strip that is inoculated with a drop of milk and a reagent. The test strip requires a 45 minute room temperature incubation and is read in a small handheld meter shown here. A Wisconsin study used PortaSCC to evaluate 300 quarter milk samples from cows on 10 dairy farms. There was no significant difference between the SCC determined in the lab and the results of the PortaSCC. When subclinical mastitis was defined based on a threshold of 200,000 cell/ml, there was an 88% agreement between the lab SCC and the PortaSCC. A similar favourable evaluation involving 200 cows in 10 Ontario herds was conducted by researchers from the University of Guelph.

Delaval Direct Cell Counter

The Delaval Direct Cell Counter (DCC) is a new device that is designed to be used on farms for rapid SCC evaluation. Small cassettes are filled with approximately 1 microlitre of fresh milk, stained automatically in the cassette and inserted into a small battery operated optical cell counter. The DCC produces a somatic cell count in less than 1 minute within the range of 10,000 to 4,000,000 cells/ml.
In one recent trial the performance of the DCC was compared with other measures of mastitis. Quarter milk samples were obtained from 200 cows on days 3-9 post-calving. Study personnel performed both the CMT and DCC on the farm and submitted additional duplicate milk samples for lab determination of SCC and for microbiological analysis. Infections with major and minor pathogens were defined based on isolation from both duplicate quarter samples. There was no significant difference between the SCC determined in the lab and the count determined by the DCC. When subclinical mastitis was defined based on a threshold of 200,000 cell/ml, the two methods agreed 95.4% of the time. The DCC reading was higher for milk samples from which pathogens were recovered compared with milk samples that were negative. The DCC appears to be an accurate method to rapidly determine SCC values.

Both the PortaSCC and the Delaval DCC appear to be significant improvements over the CMT because they are able to more accurately count SCC at much lower thresholds than is possible with the CMT test and both remove the subjective aspect of visual observation.

**On-farm culturing**

A Wisconsin study recently compared several on-farm culturing (OFC) systems for ease of use, rapidity of results and agreement with outcomes derived from standard lab procedures. In the first part of our study, 48 quarter milk samples were plated using 3 different OFC systems (Petrifilm Staph Express, Easy Culture, Quad Plates) and assessed at 12, 24 and 36 hours. Compared to the standard NMC method, observed agreement was 63%, 80% and 89% for the 3 systems, respectively.

In a second part of the study, known bacterial isolates were plated using the same 3 OFC systems used previously. Results were compared with the standard laboratory method. An experienced reader properly identified all bacteria using the Quad Plates and the Easy Culture system as well as Staph aureus using Petrifilm. However, an inexperienced reader had difficulty identifying specific bacteria with any of the systems. These results indicate that adequate training must be provide before using OFC systems.

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