Somatic Cell Counts - Do's and Don'ts

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Introduction

Somatic cell counts are the primary tool to monitor and assess the level of non-clinical mastitis. They can be effectively used on individual cows or herds of cows. In this way they help to increase the awareness of non-clinical mastitis and the potential loss of milk production caused by this type of mastitis.

In all cases when using somatic cell counts to solve problems try to get a *series of counts* to base the decision on rather than a single isolated count. *Use the trend* instead of one count. This points out the need for continued routine individual cell counts rather than sporadic counts when there is cause for concern.

Cow Selection for Culture

Herd Problem - Survey for Cause

In this case the objective is to determine what organisms are the probable causative agents within a problem herd (high somatic cell counts). Keep in mind that this type of problem herd will usually be the high cell count herd due to contagious organisms (*Strep ag* or *Staph aureus*). Most of these infections are chronic in character with continually elevated cell counts in the infected cows. In contrast, with acute clinical cases as a herd problem, it is best to determine the causative organisms by sampling clinically apparent cows before they are treated. Most of these cows will have low or normal cell counts until they become infected and show actual clinical signs.

Selection of cows to culture can be based on a *series* of elevated counts over several months. This can be determined by DHIA records or repeated CMT testing by the owner. Realize that some infected cows will be missed as the sample is usually a composite of all four quarters. Cows with single quarter infections may have the composite cell count diluted by the other 3 non-infected quarters. This should not be a serious problem as there are usually enough cows with elevated counts in a problem herd to find the causative agents. Select about 10 cows with several elevated counts. Avoid treated cows unless that is part of the problem history.

As a suggestion, it may be advantageous to do an initial screening based on composite cell counts. When collecting the milk samples from these cows, use the CMT to determine the infected quarters for sampling.

Be aware that in some states laboratories do not routinely test for mycoplasma and other non bacterial agents. In these cases, cows may have elevated somatic cell counts but may show up negative on culture.

Finding All Infected Individual Cows

This is a more difficult problem (perhaps impossible) which in many cases may not be 100% possible. The problem is that usually composite samples are taken for cell counts. Due to dilution by non-infected quarters, some cows may not evidence elevated counts. The best approach is to set your breakpoint between infected and non-infected very low, *ie* 200,000 cells/ml or less. This will cause some non-infected cows to be cultured. If this is not an economic burden, it may be an option. Another option is to CMT the cows on a quarter basis and culture every cow with any reaction "Trace" or greater. The "Trace" being around 300,000 cells/ml.

Repeated cultures and duplicate samples will be necessary to determine all the infected cows within a herd. And the results will only be accurate for the day when the samples were taken as the level of infection is dynamic and constantly changing.

Lowering Bulk Tank Cell Count

The somatic cells are measured in cells per milliliter of milk. Each cow contributes to the bulk tank in proportion to their individual cell counts and the amount of milk they produce. This is usually referred to as a weighted cell count. Cows with high cell counts and high milk production usually have a more significant contribution to the bulk tank cell count than do cows with either low production or low cell counts. Some DHIA record processing centers figure the percentage of contribution to the bulk tank made by each cow.

This information on contributions by individual cows can be used to quickly lower the bulk tank cell count. By removing several high count cows from the tank milk supply, the tank count can be reduced. This may allow the tank milk to meet regulatory or milk quality bonus limits. This may provide the dairyman with time to determine the cause of the high cell count

problem while still being able to ship legal or bonus quality milk.

Culling

A decision should be based on a *series* of somatic cell counts rather than a single isolated count. It has been suggested that cows with persistently high counts for 3 or more consecutive tests should be evaluated for their economic merit. Several other factors probably should be considered such as milk production, stage of lactation, reproductive status, milk culture results, and response to previous therapy.

Removing these cows with persistently high cell counts will decrease the probable reservoir of potential infections to non-infected cows. Keep in mind that this will have a major effect on the contagious pathogen and very little effect on new infections from environmental sources. Under some circumstances, cows with chronically high cell counts may be producing at a very profitable level and in the absence of other detrimental conditions they may be kept within the herd. Care should be taken to identify these infected cows and provide steps to prevent spread of infection to other cows, particularly during milking.

Milking Order

As with attempts to locate all non-clinically infected cows in a herd, the problem in defining the milking order is that some cows with low composite somatic cell counts that are assumed to be free of infections may in fact be infected. However, in an attempt to milk the infected cows last, the cows with continually high counts could be milked at the end of the milking order.

With Other Tests

There are also other tests now available to dairymen which aid in the diagnosis of mastitis. The results of these tests along with somatic cell counts and traditional culture reports can be used in concert to increase the reliability of the decisions to be made. Indeed, in some reported cases in low cell count herds which experience outbreaks of clinical mastitis, the causative agent generally suspected is from environmental sources. Culturing in some of these herds may find that contagious organisms are involved.

Buying and Selling

Buying herd additions on an informed basis will increase the chances of introducing disease free animals into a herd. In DHIA herds, it would be appropriate to look at the individual cow records to determine the mastitis status from the previous cell counts. This would be particularly important in herds with a history of elevated bulk tank cell counts. When possible, individual cows could be CMT tested to determine their mastitis status. Buying animals with CMT reactions of "Trace" or greater will certainly increase the chances of bringing contagious mastitis into a herd.

As in other situations, the somatic cell counts can be used along with other mastitis tests to provide more confidence if time and money permits.

Treatment

As a general rule of thumb, treatment, particularly treatment of lactating cows, should not be undertaken based solely on elevated somatic cell counts. The reason for not treating based on cell counts is primarily economic. Most of the bacteria causing elevated counts are resistent to treatment. Due to this resistance to therapy, the cost of treatment, discarded milk and labor is usually lost as the treated cows are not cured.

Cow Selection

Lactating Cows

The exception would be in herds known to be highly infected with *Strep ag*. The cost effectiveness of treating on the basis of total herd culture results verses treating on the basis of elevated somatic cell counts alone is similar and both are usually cost effective. Either of these methods is economically superior to total herd "blitz" treatment. The key is knowing that the herd is predominately infected with only *Strep ag*. Using either of these techniques will result in a lowered bulk tank cell counts.

Some have suggested that cows calving for the first time, first calf heifers, could be treated early in lactation if they show high cell count and where relatively few infections exist within the herd. Knowing what causative agents were involved might give merit to this suggestion.

Early Dryoff

It has been suggested that in cows that are known to be pregnant which develop high somatic counts late in lactation, that early dryoff and treatment may appropriate. If for no other reason, this would remove known infected cows from the milking herd and thus reduce that chances of infecting other cows. At this point, no milk will have to be discarded and the potential for milk residue will be minimized. To do this, be certain that the cow is pregnant and not more than 100 days from calving. With longer dry periods (over 100 days), it will be difficult to prevent over-conditioning and this may

lead to other disease conditions at calving (fatty liver, displaced abomasum, retained placenta, metritis).

Cow which receive early dryoff therapy should be monitored after freshening to determine their status with regard to mastitis. If they freshen with mastitis (high somatic cell counts) after going dry with non-clinical mastitis (high somatic cell counts) and being dry treated, they should be closely evaluated as in all likelihood they will remain chronically infected.

Evaluating Treatment Efficacy

After an infected cow is treated with an antibiotic by intramammary infusion or other routes of treatment, the somatic cell count will remain elevated for a period of time. If the infection is not resolved the counts will remain persistently high. If the infection is only clinically cured as opposed to bacteriologically cured, the count may be reduced, however, at some point in the future it will probably increase as the infection becomes active. When a bacteriologic cure occurs and the causative agent is destroyed, the cell count can be anticipated to decrease. Note that the count may not decrease for a period of several weeks to a month or so.

If the CMT is used to monitor the effectiveness of therapy, wait at least 3 weeks after treatment before testing the cows. If tests are done very soon after intramammary treatment, the CMT reaction may in fact appear to have increased. Often dairymen get very depressed by testing their cows too soon. If the DHIA somatic cell option is used to monitor the situation, the period of about 30 days between tests should be sufficient to note a change especially if several cows were treated. Individual cows may go longer before changes are seen.

New Infection Rate

The level of infection within a herd is based on the number of infections and how long they last (duration), along with the number of new infections entering the infected group (new infection rate). By preventing infections, the new infection rate can be kept low. The pool of infected cows will slowly be decreased by spontaneous cure, treatment and culling.

While changes in individual cell counts may not precisely reflect changes in true infections, it does give some indication or feeling for the dynamics of infections within the herd. When prevention or control breaks down, the new infection rate will increase. When effective control measures are instituted, the new infection rate will decrease. By monitoring the new infection rate, the effectiveness of the mastitis control program can be observed.

To monitor the new infection rate, a break point between infected and non-infected status must be established. Cows below the break point are non-infected and eligible for a new infection. The new infection rate is the number of cows moving from below the break point to above the break point divided by the total below the break point.

$$NIR = \frac{\text{\# new infections}}{\text{\# at risk of new infection}} \times 100$$

Summary

When used based on trends or a series of tests, somatic cell counts can be very useful to dairy producers and their veterinarians in decision making with regard to non-clinical mastitis. In this manner, cows can be selected for milk culturing, culling and early dry off and treatment. They may also be used to help decide milking orders and aid in buying and selling decisions. With certain restrictions, cell counts may be used to determine efficacy of treatment. As a routine, they should not be used to select cows for lactational therapy. The exception would be in herds known to be highly infected with only *Strep ag*.

Somatic cell counts are only one of several diagnostic aids which may be used to detect non-clinical mastitis. Whenever possible, they should be used with other diagnostic tests such as milk cultures or ELISA type tests to increase the confidence of the decisions. All dairymen should routinely employ some method of somatic cell counting within their herd.