



SCC DIAGNOSTICS TOOL BOX



F-MC-6: The Use of Bulk Tank Cultures in Problem Solving and Herd Monitoring

The use of bulk tank cultures procedure has become somewhat commonplace in recent years. It is a useful technique for determining the general types of bacteria present in cows within a herd, as well as the amount of exposure to environmental bacteria. Bulk tank culture procedures are certainly not a stand alone type test, and in most instances needs to be supplemented with individual cow somatic cell counts and in some cases with individual cow cultures. However, it is a relatively rapid, inexpensive way to determine some types of information when trying to “troubleshoot” problems in a dairy herd or for monitoring environmental exposure.

Sample Collection and Handling

The number of samples varies but there is strong evidence that in some instances, especially in small herds, that multiple samples collected over several days produce more consistent results. Early in the development of this procedure, it was shown that four days milk is probably needed to overcome the variability in shedding which occurs with some organisms. It also gives coverage over a number of milkings, and also to some extent environmental conditions. Samples need to be carefully taken from the top of the tank since bacterial growth tends to occur around the outlet valve. If a sample must be taken from the bottom of the tank, a fairly large quantity of milk should be allowed to flow through the opening before the sample is taken.

The samples should be frozen immediately and kept frozen until they arrive at the laboratory. A sample that thaws and warms is of virtually no value. If the sample is shipped to a diagnostic laboratory needs to be done in an insulated container containing a sufficient amount of ice type material to allow the sample to arrive at least partially frozen.

Interpretation of Results

It must be remembered that bulk tank cultures are basically estimates and may vary from time to time. As mentioned earlier, they are not a stand alone type of procedure.

An understanding of where the organisms originate and how they affect the mastitis process is helpful in planning mastitis control programs. The organisms *Streptococcus agalactia* (Strep. ag), *Staphylococcus aureus* (Staph. aureus) and Mycoplasma in a bulk milk sample can be assumed to have originated from infected cows if the sample has been handled properly.

The significance of the numbers of these bacteria cannot be over interpreted since there is a tendency for the amount of shedding to vary considerably. In general, there is an 85-90% correlation between the number of infectious pathogens in the bulk tank cultures and the number of cows infected. However, in the 10-15% of cases where there is not a good correlation. Therefore, determining the numbers of infected cows from DHIA SCC counts or individual cultures will be needed to determine the true significance. However, it can be looked at as an indication that further examination is needed.

Perhaps one of the more useful aspects of bulk tank culturing is to determine the degree of environmental exposure. Environmental bacteria such as the environmental strep, coliform and staph species, obtained in a bulk tank culture, can be assumed to have originated on the teats of cows.

Therefore, it is not a direct measure of infection but a measure of potential for infection since we know that the more these bacteria are present on the teat skin, the higher the potential for infection. This is particularly true with environmental streps and coliforms. Monitoring the numbers of these bacteria can be used to determine potentials for infection due to changes in weather changes, management changes, milking practice changes, etc. This tool can be a useful in evaluating the effects of changes on the potential for environmental mastitis possibility.

Long term observations suggest that the levels shown in the tables tend to be reasonably accurate. In addition, observations have shown that when the level of environmental bacteria in bulk tank cultures, especially streps or coliforms are above the "normal" levels, we can expect an increase in sub-clinical and clinical mastitis resulting from infections with these bacteria.

Bulk tank cultures also provide a fairly direct assessment of factors such as milking practices. Though it may appear that the cow preparation procedure is resulting in clean cows, if elevated numbers of environmental bacteria are present, there is likely a failure or lack of consistency in the milking procedure and therefore is still a means for these bacteria to result in increased infection rates.

The number of environmental (coagulase negative) staph also tends to be related to the number of bacteria on the teat skin. This observation has suggested that this relates, to some extent, to the efficacy and particularly coverage of teat dip. In general, if teat dipping is not being practiced or coverage is not good, environmental staph will be present in higher numbers.

The way in which bulk tank results and interpretations are used needs to be carefully considered. Finding large numbers of environmental bacteria suggests that a careful evaluation of stall maintenance and milking preparation procedures is needed to determine the source of these bacteria. High numbers of contagious pathogens suggest that it may be desirable to do individual cultures to find which cows are causing the problems so that they may be dealt with appropriately.

As mentioned, bulk tank culture is not a stand-alone technique, and should be used more for pointing out those areas that need further examination. It also needs to be emphasized that laboratory procedures are not perfect. If laboratory results do not agree with other observations such as herd history and somatic cell count patterns, a careful assessment needs to be made and a possibility considered that laboratory results may not be accurate due to improper sampling, sample thawing or handling, or an overgrowth of environmental organisms. In this case, repeating a bulk tank culture at a different point in time should help eliminate this possibility.

Filter Socks

It has recently been discovered that the management of the in line milk filters (filter socks) can affect the accuracy of differential tank cultures.

When milking times are extended it is possible for bacterial growth to occur in the filter. It is recommended that if bulk tank culturing is being done, the filters should be changed after three hours use.

A filter that is in place during the wash cycle to prevent material from plugging the plate cooler can also be a place where bacterial growth can occur. It is recommended that if this practice is used, a new filter be put into the system before milking any time bulk tank cultures are being collected.

Mastitis Bulk Tank Culture Report Interpretation

Type of Bacteria	Usual Infection Source	Major Means of Spread	Mastitis Control
Strep agalactiae	Infected udders of other cows in herd.	Cow-to-cow by contaminated udder wash rag, teat cups, etc.	Use separate towels to wash / dry: Teat dipping; dry cow treatment; eradication in special cases.
Staph aureus	Infected udders of other cows, contaminated bedding from milk of infected cows.	Cow-to-cow by contaminated udder wash rag, milkers hands, contaminated milking equipment, and improperly functioning equipment.	Use separate towels to wash / dry; teat dipping; dry cow treatment; milk infected cows last, cull chronically infected cows.
Mycoplasma	Infected udder of other cows, often from infected purchased cows/ heifers.	Cow-to-cow by hands of milkers, equipment, and common towels. Aerosol transmission from animals with respiratory signs may also occur. Or the bacteria can move from a respiratory tract infection to the udder or joints.	Careful purchasing of replacement cattle, using bulk tank and cow culturing to monitor herd status and clinical cows. Use separate towels to wash/dry; teat dipping; dry cow treatment; milk infected cows last, cull any positive clinical case.
Non-ag Streps	Environment of cow.	Environment of the cow by: wet, dirty lots, contaminated bedding, milking wet cows, poor cow prep, milking machine air slips.	Improve stall and lot sanitation; milk clean dry cows, avoid air leaks and liner slips, change bedding frequently. Keep cows standing after milking.
Coliforms	Environment of cow.	Environment of the cow by: wet, dirty lots, contaminated bedding, milking wet cows, poor cow prep, milking machine air slips. Hot humid weather.	Improve stall and lot sanitation; milk clean dry cows, avoid air leaks and liner slips, change bedding frequently. Keep cows standing after milking.
Staph species	Environment of cow.	Poor teat dip coverage, poor cow prep, old bedding.	Consistent teat dipping, adequate cow prep, and more frequent bedding change.

