



Bovine Mastitis: Bulk Tank Milk Culturing

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Establishing a surveillance system to detect a mastitis problem, as early in its development as possible, is a key component to an effective herd health-monitoring program. Although the value of bulk tank milk (BTM) culturing as a means of monitoring the prevalence of mastitis in a herd is based upon limited scientific data, BTM culturing can supply two important types of information: 1) presence or absence of a bacterial group, and 2) identification of predominate bacterial groups in BTM. Knowing this information can provide clues to what management can do to reduce or prevent mastitis problems.

Sampling

The more often BTM is sampled, the more useful the information. Ideally each tank of milk should be sampled, but such a sampling schedule is impractical. Samples taken over consecutive days or weeks are most useful. One practice that works for many is to incorporate BTM sampling into the weekly, bi-weekly, or monthly herd health examinations. Samples can be frozen and saved until the veterinarian arrives for the herd health check, allowing the service to be offered as part of a total herd health program.

Extreme caution should be taken when interpreting results from a single BTM sample. If a dairy is facing being downgraded, try to obtain samples from the bulk tank over a period of time. Samples taken over consecutive days or weeks are most helpful and provide a better picture of the problem. Additional information including individual cow somatic cell counts and milking systems and procedures analysis should also be used in correcting deficiencies that decrease milk quality.

To get the most out of bulk tank sampling, follow these suggestions:

1. Take samples on a routine basis.
2. Agitate the milk in the bulk tank for 10 to 15 minutes before sampling.
3. Take samples from the top of the tank with a sterile syringe and needle or vial to avoid contamination from the outlet valve. If sampling from the top is not possible, allow a gallon or two of milk to flow through the outlet valve before taking a sample in this manner.
4. Freeze the sample immediately and pack for shipment to ensure the sample will stay frozen until it reaches the

laboratory. It is best to ship samples to the laboratory before Thursday in order to avoid long storage times. Samples for bacterial culture analysis may be sent to the Oklahoma Animal Disease Diagnostic Laboratory in Stillwater, OK. For sample submission instructions and fee schedule contact the OADDL at www.cvm.okstate.edu/Depts/ADL/oaddl/oaddl.htm or call (405) 744-6623.

5. If results are inconclusive or are inconsistent with current management practices, retake samples or identify and sample individual cows with high somatic cell counts to provide further information.

Predominate Bacterial Isolates

Bacterial isolates from BTM are typically a mixture of various groups. Theoretically, any bacterial isolate from BTM could arise from an intramammary infection. The probability of an isolate originating from a mammary infection is dependant on the bacteria. For example, presence of the contagious mastitis-causing bacteria *Streptococcus agalactiae*, *Staphylococcus aureus*, or *Mycoplasma* spp. usually indicates mammary infection. However, presence of coliform (*Escherichia coli*, *Klebsiella* spp., *Enterobacter* spp., *Serratia* spp., *Pseudomonas* spp.), non-agalactiae streptococci (*Streptococcus dysgalactiae*, *Streptococcus uberis*, *Streptococcus bovis*), coagulase negative staphylococcus (*Staphylococcus epidermis*, *Staphylococcus hyicus*, *Staphylococcus chromogenes*), and *Enterococcus* spp. may originate from intramammary infections. Other common sources of elevated counts caused by these bacteria may involve milking wet udders, organic soil in milk lines, cracked inflations, inadequately heated wash water, and inadequate cooling of milk.

Interpreting Results

The first question to ask when interpreting BTM cultures is whether or not the samples are positive for *Streptococcus agalactiae*, *Staphylococcus aureus*, or *Mycoplasma* spp. Presence of these pathogens in BTM almost always indicates the presence of infected quarters in the herd. However, negative culture results do not necessarily mean the herd is negative for infection caused by the pathogens. Further, it is important to remember that BTM cultures are not useful as indicators of mastitis prevalence in the herd, nor should they be used as a substitute for determining infection incidence and prevalence based on quarter milk samples. Use Figure 1 to aid in

determining the action to take in response to BTM culture results. Attainable goals for BTM counts of non-agalactiae streptococci and coliforms are <1,000 colony forming units (CFU)/milliliter and <500 CFU/milliliter, respectively. A reasonable goal for coagulase-negative staphylococci in BTM

counts is <1,000 CFU/milliliter. For the contagious mastitis pathogen *Streptococcus agalactiae* eradication is attainable; however, for *Staphylococcus aureus* a goal of <50 CFU/milliliter in the BTM is reasonable.

Figure 1. Suggested control procedures for selected bacterial isolates from bulk tank milk.

Bacteria Type	Source	Suggested Control Procedures/Goals
<i>Streptococcus agalactiae</i>	<ul style="list-style-type: none"> • Infected udders 	<ul style="list-style-type: none"> • Use separate towels to wash and dry udders • Use postmilking teat dip • Dry treat all cows at dry-off
<i>Staphylococcus aureus</i>	<ul style="list-style-type: none"> • Infected udders 	<ul style="list-style-type: none"> • Use separate towels to wash and dry udders • Use postmilking teat dip • Dry treat all cows at dry-off • Cull chronically infected cows • Milk infected cows last
<i>Mycoplasma</i> spp.	<ul style="list-style-type: none"> • Infected udders • Respiratory tract • Urogenital tract 	<ul style="list-style-type: none"> • Follow proper milking procedures • Use premilking teat disinfection • Use postmilking teat dip • Milk infected cows last • Culture all replacement animals • Culture all cows and heifers at calving • Cull infected cattle when possible • Maintain a closed herd
Non-agalactiae Streptococci	<ul style="list-style-type: none"> • Environment 	<ul style="list-style-type: none"> • Milk only clean, dry udders • Improve cleanliness of housing environment • Use premilking teat disinfection • Use postmilking teat dip • Dry treat all cows at dry-off
Coliforms	<ul style="list-style-type: none"> • Environment 	<ul style="list-style-type: none"> • Milk only clean, dry udders • Improve cleanliness of housing environment • Use premilking teat disinfection
Coagulase-negative staphylococci	<ul style="list-style-type: none"> • Environment • Skin 	<ul style="list-style-type: none"> • Milk only clean, dry udders • Improve cleanliness of housing environment • Use postmilking teat dip • Dry treat all cows at dry-off
<i>Pseudomonas</i> spp.	<ul style="list-style-type: none"> • Environment 	<ul style="list-style-type: none"> • Follow proper milking procedures
<i>Bacillus</i> spp.	<ul style="list-style-type: none"> • Milking equipment 	<ul style="list-style-type: none"> • Milk only clean, dry udders
<i>Corynebacterium</i> spp.		<ul style="list-style-type: none"> • Improve cleanliness of housing environment • Follow proper equipment sanitizing procedures

Source: National Mastitis Council. 1999. Laboratory Handbook on Bovine Mastitis

Adapted from: Laboratory Handbook on Bovine Mastitis. 1999. National Mastitis Council. Madison, WI

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