On-farm Mastitis Culturing: Is it Right for You?

Most farms currently treat clinical mastitis based on clinical signs, but in many mastitis cases treatments with common antibiotic mastitis products are inappropriate. On-farm mastitis culture results can be obtained in a timely manner that help in making treatment decisions. Additionally when the person responsible for culturing is also responsible for treatment, he or she becomes more familiar with the type of mastitis infections, the number of clinical cases and how treatment protocols are working in their herd. Get together with your veterinarian and discuss treatment protocols for your herd.

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Many dairy producers are using, or thinking about using, on-farm milk culturing to identify the cause of mastitis and to develop their treatment protocols. This topic has been discussed in meetings and presented in earlier MDR articles; “Rethinking Clinical Mastitis Therapy” (Hess, 2003) and “On-farm Milk Culturing and Mastitis” (Sterner, 2007). Some Michigan dairies started culturing milk early while others have taken a wait-and-see approach. Other farms have selected local laboratories to culture milk samples for them and utilize the results in various protocols. But none have been more successful than those dairy farms that have decided to make on-farm culture a routine tool to identify mastitis pathogens before starting treatment. I wanted to share some common questions asked and answered when establishing an on-farm culture-treatment protocol. These may be helpful if you are considering starting a similar program for your dairy farm.

Why should we have an on-farm culture program?

There are two major benefits. 1. Culture results are obtained in a timely manner that help in making treatment decisions. 2. When the person responsible for culturing is also responsible for treatment, he or she becomes more familiar with the type of mastitis infections, the number of clinical cases and how treatment protocols are working in their herd. All farms have mastitis, but until someone takes the responsibility for mastitis protocols, few farms will invest enough effort to reduce mastitis.

What mastitis pathogens are identified from on-farm culture?

When milk samples are cultured on the farm, we are first trying to identify those clinical cases where the infection has been eliminated by the cow’s immune system and as observed by no growth on culture. Secondly, we are trying to identify Gram-positive bacteria that can be managed with the help of...
antibiotic therapy and Gram-negative bacteria that are not responsive to antibiotic therapy and often self-limiting. These simple culture protocols can readily identify most bacterial pathogens and are useful in developing treatment protocols. However, this type of culture is not sufficient if *Mycoplasma* is identified in the herd. *Mycoplasma* identification requires special culture media. If *mycoplasma* is suspected or identified on the farm, other diagnostic testing needs to be included in the farm’s mastitis protocol. (see “Dairy Programs” at <http://www.cvm.msu.edu/extension>.)

Why is culturing on-farm more effective than sending samples to laboratory?

Diagnostic laboratories have the advantage of highly trained laboratory personnel who can accurately identify bacteria from milk cultures, but they have disadvantage in the lapsed time it takes to return culture results when making treatment decisions. One of the most useful results for on-farm milk culture is identifying “negative” or “no growth” that indicates the cow has eliminated the bacteria by the time clinical mastitis is detected. This is common in herds where Gram-negative coliform bacteria are the primary cause of clinical mastitis. Using antibiotic therapy is no longer necessary because antibiotic treatment will only help eliminate bacteria. Negative cultures can make up 30-60% of clinical mastitis cases. In these cases, normal milk will return as the gland heals. Identifying negative cultures can reduce antibiotic treatments, while using antibiotics only when they are effective.

In cases where the culture results are negative, why do some of these cows still show clinical mastitis?

Bacteria cause damage to the gland that results in clots and abnormal secretion that is identified as clinical mastitis. The immune system is the cow’s defense against bacteria that clears the infection, however, the gland must heal before milk returns to normal. Some bacteria, especially the Gram-negative *coliforms*, cause serious damage to the gland that can require a longer time for recovery even after the bacteria has been eliminated from the gland. Some glands will continue to have a high SCC through the entire lactation and may not completely heal until the cow has gone through a dry period.

What are the most common errors made by farms that culture their own mastitis samples?

The most common problem is trying to culture milk samples that are not collected aseptically. If the sample is contaminated it will contain bacteria that are not responsible for the mastitis case. If a milk culture has more than one type bacteria growing on the culture plate it is likely a contaminated sample. A new sample should be collected before making a diagnostic or treatment decision. The only exception is if either *Streptococcus agalactiae* or *Staphylococcus aureus* is found in the sample. These bacterial pathogens come from infected cows and should be considered positive until recultured for confirmation. With the exception of *Strept ag* or *Staph aureus*, treatment decisions should only be made from a pure single colony type that is grown in large numbers. With the exception of these two contagious bacteria, one or two colonies on culture plate are not usually important.

Can’t I just treat cows based on clinical signs and get the same results?

Most farms currently treat clinical mastitis based on clinical signs. Because most of the products are selected to treat Gram-positive bacteria, they are effective in many clinical cases. However, on our farm investigations and in clinical mastitis trials, Gram-positive bacteria were not the major cause of clinical mastitis. Therefore, in many mastitis cases treatments with common antibiotic mastitis products are inappropriate. When milk from clinical cases is cultured before treatment, antibiotic treatment can be selected for mastitis cases that are likely to benefit from antibiotic therapy. This can substantially reduce the use of antibiotics in most dairies, get the cows back into the milking string earlier and reduce the cost of mastitis treatment.

How do I know when to use antibiotics and what antibiotic to use?

By culturing clinical mastitis cases, the bacteria can be identified and the best treatment can be chosen to eliminate the infection. In clinical cases where the bacterial infection has been eliminated before treatment, antibiotics are of little use. By culturing clinical cases, farm personnel can identify the major bacteria involved and use antibiotic sensitivity testing to choose the best mastitis treatments. Not all bacteria respond the same and monitoring the herd’s response to treatment is also important. When farm personnel culture their own clinical cases before treating, the most appropriate antibiotic can be selected for the type of infection. Studies on commercial dairies have shown that waiting an additional day before starting antibiotic treatment did not affect the outcome of the infection or jeopardize the health of the animal. (Hess, et al., 2003) In most farms, half of the clinical cases do not need antibiotic therapy. However in severe clinical mastitis, supportive therapy that includes fluids (see page 1 of this issue) and fever reducing drugs should be initiated until culture results are available. These therapy protocols should be designed with the help of the herd veterinarian.

Why do some cows respond to antibiotic treatment and others do not?

Most of the antibiotics used in mastitis preparations (primarily, beta lactams) are effective against Gram-positive bacteria. *Streptococcus agalactiae* are very susceptible to these drugs whereas Gram-negative *coliforms* are not. Treating early in the infection can improve the drug efficacy by getting the drug to the bacteria in a higher concentration to help eliminate...
the bacteria, but as the infection becomes chronic it is difficult to obtain high enough concentrations to be effective. This is a common problem with \textit{Staph aureus} that makes it difficult to eliminate these mastitis infections.

How can a farm get started culturing milk? What culture procedure should be used?

The equipment necessary for on-farm culture can be purchased from several vendors. A list of products and vendors are available on the author’s CVM Dairy website, \(<\text{http://user.cvm.msu.edu/~sears/}>)\. On-farm culturing requires sterile collection vials for aseptic milk sampling, culture plates to grow the bacteria, an incubator to hold a constant temperature while bacteria are growing, and loops or swabs to transfer milk from the vials to the culture plates. Other diagnostic agents including hydrogen peroxide (catalase test) and specific diagnostic tests can be used depending on the skill of the farm personnel. Several culture systems are available but many farms use the Bi-plate (Blood agar/MacConkey agar) culture method as described on our website and published in earlier MDR articles. You also can find a training module presentation at \(<\text{http://user.cvm.msu.edu/~sears/Web-employee-training.htm}>\).

Who should culture the milk and how do they get the right kind of training?

Certainly microbiology training is very useful, but we all had to learn at some point. It needs to be a person interested and willing to take the time to learn the procedures.

The person responsible for culturing milk samples should be the same person treating cows and working with the veterinarian at the regular herd visit. This routine feedback provides good training and engages the employee (or owner/manager) in mastitis control. Fewer treatments and a reduction in antibiotic use can be good motivating factors for the employee. However, someone of authority should monitor progress and evaluate the herd’s mastitis response. This may be someone on the farm (owner, manager) or the veterinarian working with the farm.

How do I get started?

Get together with your veterinarian and discuss treatment protocols for your herd. Your veterinarian also can help identify the equipment and products needed to start your on-farm culture. But more importantly, your veterinarian is trained to identify bacterial pathogens that cause mastitis. As you start culturing milk samples your veterinarian can review culture plates and help with bacteria identification and provide good quality control. Working with your veterinarian also can provide a routine evaluation of the mastitis treatment protocols and monitor the farm’s mastitis prevention programs.

Can we identify \textit{Mycoplasma} with on-farm culturing?

\textit{Mycoplasma} culture requires a special culture media and environment for growing these organisms. Few dairy farms have the media, equipment and personnel that can culture \textit{mycoplasma}. Dairy farms should select an appropriate laboratory for culturing this pathogen. Culturing bulk tanks for the presence of \textit{mycoplasma} is a good way to start and monitor control programs. \textit{Mycoplasma bovis} is a contagious pathogen and when cultured in the bulk tank milk indicates an infected herd. As with other contagious pathogens, management protocols should be developed to deal with cows with \textit{mycoplasma} infections. The National Mastitis Council has a useful brochure on their website www.nmconline.com. Other articles can be found in MDR or on our CVM Dairy Website.

If you are considering an on-farm milk culture program, you should read earlier MDR articles “On-farm Milk Culturing and Mastitis” and “Rethinking Clinical Mastitis Therapy” or go to the CVM Dairy Website before starting. Establishing an on-farm culturing program can help focus your attention on farm deficiencies that are responsible for new mastitis cases affecting milk quality. It is far better to work with professionals in the dairy industry to identify the causes and correct deficiencies than to try to treat cows after they are infected. Diagnosis and treatment is only one tool in eliminating these infections. Our primary objective should be mastitis prevention. Treating mastitis is always an economic loss that should be avoided whenever possible.

References

