

Making Something from Nothing

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Collecting milk samples for bacterial culture from cows with clinical mastitis can help a dairy manager improve milk quality programs. Working with the herd veterinarian, bacterial culture of milk can also help direct mastitis therapy. From a practical point of view, bacterial culture of milk samples, especially from cows with mild to moderate mastitis (not severe mastitis with systemic signs such as shock or loss of appetite) can save time, money, labor, and *reduce unneeded antibiotic use*. Although collecting an aseptic milk sample is relatively simple to do correctly, a recent survey of 628 dairy producers in three states found that less than 20% “always” or “frequently” used milk cultures in their decision making for therapy of clinical mastitis. What are the barriers that keep dairy producers from trying to gain this information more often?

Unless a dairy farm cultures their own milk samples, geographic isolation from laboratories (such as at veterinary clinics or cooperative facilities) can be a barrier and result in untimely therapeutic decisions. Some farms are concerned with the time and labor involved in collecting samples, especially if perceived as interrupting the flow of cows during milking, when most mastitis is first detected. This inconvenience can be increased if small, individually wrapped alcohol pads (as opposed to large wipes) are the means to clean teat ends. But perhaps the biggest frustration with many dairy producers regarding culture of mastitis samples is how to use the results, especially when the laboratory reports “contaminated” or “no organism isolated”. The first problem can be corrected with better sampling techniques. But what about all the effort that goes into collecting a milk sample, storing the sample properly, and plating on media, only to not find any bacteria? Can we get useful information from this result? Can we make something from nothing?

In the summer of 2013, 23 Michigan dairies were asked to collect milk samples from clinical mastitis cases for an average of 10 weeks. The average herd size was 480 cows, with the smallest herd having 93 cows and the largest herd having 1,340 cows. Clinical mastitis cases (as expressed in number of cases per 100 cows milking per month) ranged from 0 to 13.3 with an average of 2.4. This trial occurred over the summer months, so the rate of clinical mastitis could vary at other times of the year. Also, the compliance of sample collection and definition of a clinical mastitis case could vary between farms. However, a reasonable goal for a 200 cow dairy would be to keep the rate of clinical mastitis to less than one per week, even during the times of year when cows are more at risk.

The participating farms collected 479 samples throughout the trial. Table 1 is a summary of the bacteriology results. Although not listed in the table, all samples were also cultured for *Mycoplasma* sp.; none were positive for these bacteria.

Table 1- Summary of Bacteriology Results of Milk Collected from Clinical Mastitis Cases

	No Growth	<i>Staph aureus</i>	<i>Strep agalactiae</i>	Strep sp.	Staph sp.	Coliforms	Other	Contam
Number	274	4	1	52	60	82	4	2
Percent	57	1	0	11	13	17	1	0

The profile in the table shows that the herds in this trial have controlled contagious pathogens; about 1% of all samples yielded *Strep agalactiae* or *Staph aureus*. For those samples that did yield bacteria, coliforms (*E. coli* and *Klebsiella* species), streptococci, and staphylococci were predominant. In fact, 194 of the 205 (95%) samples with bacterial growth had one of these environmental organisms. This is typical for most dairies. If other pathogens, such as contagious organisms or unusual pathogens (e.g., *Pseudomonas*), are found in more than 4-5% of samples, then mastitis management practices should be reviewed. Despite no growth from over half of the samples, further information can be attained from these culture results as well.

- 1) The better than 100:1 ratio of no growth: contaminated (usually defined as three or more different types of colonies on culture) samples reflects very good teat end preparation and sampling technique. More importantly, this might possibly reflect teat end cleaning before intramammary infusions of antibiotic (mastitis) tubes. In these herds, if teats were cleaned with the same care for infusions as was done for milk sample collection, the risk of introducing new infections while treating cows with mastitis tubes would be very low.
- 2) If the proportion of clinical mastitis samples fail to yield bacteria from a herd, care should be taken to account for other bacteria (such as *Mycoplasma bovis*) that are more difficult to isolate under normal culture techniques. However, many milk samples that result in no organisms are likely minor mastitis cases caused by coliform infections or infections that are already being controlled by the cow's immune defenses.
- 3) Research indicates that the type of bacteria that causes clinical mastitis has a large impact on the success of therapy. In particular, streptococci and staphylococci may be treated with a reasonable degree of success (70% or better) if the infections are not chronic. Likewise, research in herds has indicated that clinical cases caused by coliforms, unusual pathogens, and that do not yield any bacteria on culture are best not treated; in many cases there is little benefit of antibiotic therapy compared to no treatment. On an average basis for the 23 farms in this trial, staphylococci and streptococci were isolated in 22% of the samples, with a range from 0 to 66.7% of the samples. Thus, many herds may be able to reduce the proportion of cows with mild clinical mastitis that are treated with antibiotics by as much as 75% or better. As the range in this study showed, the bacteriology of clinical mastitis in herds varies widely. Additionally, SEVERE mastitis cases should receive antibiotic therapy (as well as supportive care) regardless of suspected pathogen, following the advice of the herd veterinarian.

Thus, consider the useful information that culture of clinical mastitis cases can offer, even when a majority of cases don't yield any bacteria. Sometimes, we can learn something from nothing.