



## SCC DIAGNOSTICS TOOL BOX



### F-MC-2: Dealing with *Streptococcus agalactiae* Mastitis

R. Farnsworth, S. Stewart, and D. Reid  
College of Veterinary Medicine, University of Minnesota, St. Paul

*Streptococcus agalactiae* was first recognized as a leading cause of mastitis infections in dairy herds in the early 1930s. Mastitis caused by *Strep ag* was the primary target of most mastitis control programs and a major focus of mastitis research from the time of identification until the late 1970s.

During these years, eradication based on test and treatment was the major method of control. The introduction and widespread adoption of teat dipping and dry treatment greatly reduced the number of infected cows and herds. As a consequence, many researchers, mastitis consultants, and dairymen have begun to consider *Strep ag* merely a historical curiosity. However, in many herds (including low bulk tank SCC herds) *Strep ag* is still present and detectable on routine bulk tank milk cultures.

With the rapid changes and major expansions that are occurring in the late 90s in the dairy industry, a resurgence in *Strep ag* infections is being seen. This increase is apparently due to co-mingling large numbers of animals from multiple sources to populate these expansion dairies, with no prior screening of incoming animals for *Strep ag*. Quite often also, there is breakdown of simple management practices for *Strep ag* control during the extremely busy time of initial startup in expansion dairies.

These factors are compounded by the relative lack of experience of today's veterinarians and producers with *Strep ag*, due to its low prevalence in the last 20 years. This situation makes both early recognition as well as the quick control of *Strep ag* a dilemma.

Experience from the 50s and 60s offers some basic principles in *Strep ag* control that need to be observed to avoid confusing and/or poor results. Even though the large number of animals in some of today's herds make both control more difficult and the economics more critical. The basic principles involved in control are the same. Overwhelming, past experience has shown that the practices for *Strep ag* eradication cannot be ignored or shortcuts taken without a large risk of being ineffective.

#### **Eradicate by Test and Treat?**

There are basically two systems for controlling *Strep ag*. The first system is to gain and maintain control over time with a stringently adhered to program of proper teat dipping and universal whole herd dry cow treatment. This system is usually quite successful, but can fail in herds that are bringing in large numbers of new animals, as has been common in recent upper Midwest expansion herds. The second is to attempt eradication via an aggressive test and treat program.

Obviously, the teat dip/dry cow treatment system is the easiest and most economic method. There have been occasions where this system appears to have failed, but in most cases, there have been deficiencies in the actual techniques employed. Most commonly, these deficits have involved inconsistently applied teat dipping post milking or poor coverage of teats with post-dip. In other cases, selective dry cow treatment may have lead to infected cows not being treated during the dry period, allowing infections to persist.

The main disadvantage to the teat dip/dry cow approach to eradication is that a lengthy period of time may be required to eliminate all infections from the herd. It may take up to 1 to 2 years of consistently applied teat dipping and universal dry cow treatment. Because results often take a long period of time to be seen, discouragement may occur. In addition, milk losses occur to some extent during the whole time. An

additional disadvantage shared with other control methods is that new animals introduced into the milking herd must be screened carefully for presence of the organism to avoid reintroducing the pathogen in the herd.

Eradication by test and treatment has the advantages of removing the infections more rapidly therefore minimizing milk loss and more quickly removing the potential for spread if other control practices fail. However, eradication requires accurate and extensive laboratory capabilities, more initial cost in the form of treatment and treated milk discarded, and more potential for antibiotic residue problems. Nonetheless, if properly done, culture and treatment can solve the problem quickly and effectively and be more economically beneficial in the long run.

The choice of the best method for a given herd will vary. The number of cows infected may play a major role in this decision. If only a few cows are infected, eradication helps eliminate the future threat fairly easily. If a high percentage of the herd is infected, it may be necessary to choose eradication to maintain acceptable milk quality, continue to shipments of milk, obtain premiums, and prevent deductions.

Determining the number of cows infected cannot be done without individual cow culturing. Bulk tank cultures will indicate the presence of the organism but will not accurately indicate the number of infected cows due to variation in shedding. The only work relating to the sensitivity of the TKT media commonly used for bulk tank cultures has shown it to be capable of finding one infected *Strep ag* quarter in a 40 cow herd.

*Strep ag* cows will tend to have increased somatic cell counts over time; however, if other types of infections, particularly *Staph aureus*, are present these infections will tend to produce the same pattern of increasing somatic cell counts. Culturing of cows with high cell counts will give a general idea of the extent of infection but has a sufficiently high potential for missing infected cows that it should not be used for eradication. Serious eradication efforts must involve an initial whole herd culture, post-treatment cultures of cows positive on the first cultures, additional whole herd cultures after eliminating all cows positive on culture and routine monitoring via bulk tank cultures thereafter. In addition, culturing of all fresh animals and all new animals may be necessary.

The rapidity of spread of infection may also be a factor influencing the choice of system. Although the immunology of *Strep ag* is not well documented, field observations have shown that when the organism (or perhaps a different strain from the one currently in the herd) is introduced in a previously negative herd, spread may be much faster than in a herd containing a few infected cows over a long time. Expansion herds co-mingling cattle are at risk from this phenomenon.

The rapidity of spread can be assessed to some extent if the cows showing up as new infections (below 4.0 LS last month. above 4.0 LS this month) on the DHIA SCC report are cultured individually. In most herds culture of these "new" infections will likely be necessary. It cannot be assumed all new infections are *Strep ag*, especially if environmental mastitis is a problem to any extent in the herd.

The extent of environmental mastitis and general management level of the herd is also a factor in choice of system. In a herd with stall sanitation problems or milking procedure problems, failure to resolve these deficits may simply result with eradication efforts that trade *Strep ag* infections for environmental infections. If these happen to be coliform infections, more clinical mastitis and even increased cow deaths may occur. Obviously, the producer will be unhappy with these results. In this type of herd, ensuring post milking teat dipping and dry cow procedures are being done properly along with improving environmental sanitation and *E. coli* vaccination will help avoid trading *Strep ag* problems for environmental mastitis problems.

Another necessity for eradication programs is a laboratory capable of properly handling the necessary samples. The lab must use proper culture techniques and have adequate quality control checking (such as running regular control samples) to assure accurate results. The use of blood agar plates for initial isolation rather than differential and selective media usually produces better results more economically for individual cow cultures.

If composite samples (four quarters in one tube) are used it is advisable to plate more than the standard 0.01 ml. Work on staphylococci has shown that plating 0.05 ml resulted in about 90+ % correlation with quarter samples compared to 60% with 0.01 ml. This amount of milk needs to be plated on at least half of a plate and preferably a whole plate.

### **Eradication Procedures**

Once the decision has been made to attempt eradication the main factors determining success are proper, complete execution and stringent follow-up. Experience has shown that if execution and follow-up is not properly done, often within a year the problem will have the same magnitude as at the start.

The first step is to culture the entire herd or string. Culturing only the high cell count cows risks missing carrier animals with low cell counts; therefore, in most cases culturing of all animals should be performed. Composite samples of all four quarters can be used if collected properly.

Techniques to assure sterile, uncontaminated samples need to be used. Samples must be taken directly from the teats into the sterile containers and not from milk meter samples used by DHIA for SCC. There is too much contamination from one cow to the next using milk meters. This will lead to false positives when samples are cultured.

Producers can obtain very good samples but do need to be trained in proper technique. It is also preferable if the same person does not attempt to sample and milk at the same time. Time of sampling is best done at milking time (before milking the cow), primarily from a logistics standpoint. If samples are taken in the middle of the day, it should be at least 4 hours after the last milking.

It should be obvious that sample tubes need to be handled properly to ensure sterility at all times, including holding tubes at an angle, not putting caps into pockets, not touching tops or insides of tubes, avoiding putting particles of manure and dirt into the sample, etc.

The most important factor, however, is that teats need to be clean and dry. To accomplish this, a cow can be prepped as usual but the teats may need to be dried more completely by the person sampling. Scrub the teat ends thoroughly with an alcohol prep or sterile cotton ball saturated with alcohol. Simply dipping the teat in teat dip or alcohol will not be sufficient. Discarding a squirt of milk before collection is recommended.

Situations with open doors or tunnel ventilation can cause massive air movement, resulting in major contamination problems from bedding and dust. In these cases, air movement may need to be minimized during the time of sampling.

After the infected cows are identified, the next step is to treat the infected cows. There are numerous approaches to treatment, each with advantages and disadvantages. The intent here is to outline procedures offering the best combination of efficacy and economy while avoiding some common problems.

For *Strep ag* infections, intramammary treatment is the preferable approach. The addition of systemic antibiotics in combination with intra-mammary treatment has never to proven to increase efficacy appreciably. Using systemic antibiotics alone has a very low efficacy.

The antibiotic of choice is penicillin. Other drugs can be used but are not more effective since *Strep ag* has never been shown to become antibiotic resistant. All four quarters should always be treated to avoid missing an infected quarter.

Only commercial mastitis tubes should be used. These tubes are "strong" enough to get a 90% cure rate. Label directions should be followed, but in most cases, treating all four quarters for 2 to 3 treatments at 12 to 24 hour intervals will provide sufficiently high antibiotic levels for a sufficiently long enough time. As increasing the number of treated animals at the same time increases the risk of residues, monitoring for residues should be done at least at the tank level, if not the individual cow level before milk should be considered marketable.

While extra-label therapies have been used, it is unlikely that these treatments have had any greater efficacy than commercial tubes. In today's residue conscious and litigious society, extra-label drug usage needs to be approached with utmost caution and avoided except in the most extreme circumstances. The small potential difference in drug costs is not worth the risk. Any veterinarian recommending extra-label usage should recognize he is risking his own livelihood as well as the dairyman's ability to sell milk. Routine extra-label treatment for *Strep ag* eradication cannot be defended on scientific or legal grounds.

Therefore, extra-label therapies for *Strep ag* should be considered only in extreme cases and only for animals that have been treated three or more times with approved drugs without a bacteriological cure. In fact, a better option for these animals would be to cull them. In no circumstances should multiple dose or non-sterile products be used.

After the initial round of treatment, the next step is reculturing the entire herd. While classic directions say 10 to 14 days, in some cows the infection is reduced but still present at this time. These cows may be culture negative for *Strep ag* at day 10 to 14. In the senior author's experience 14 days and perhaps 21 days should be considered the minimum interval after treatment before reculturing, is performed. While there may be some concern about the exposure from unresponsive cows, it is probably less of a risk than missing cows by reculturing too soon.

When culture results are available, treat all cows positive for *Strep ag* on culture including those identified as positive on first test as well as any newly positive animal. Use the same treatment approach system as before.

Twenty-one days after the second treatment do another (third) complete herd culture. At this point there should be very few new infections if control procedures (proper teat dipping mainly) have been properly implemented. Any cow treated twice and still culture positive is unlikely to respond to treatment and needs to be considered a chronically infected animal. Any cow treated once before and not culture negative (as well as newly identified positive animals) needs to be treated again.

Twenty-one days later, reculture only those cows treated on the previous round. Any cows not responding should be considered chronics and managed (preferably culled) as such.

### **Management of Chronic *Strep ag* cows**

There should be at most 5 to 10% of the treated cows in this category. The best solution is to cull them as soon as possible. This reduces the likelihood of reintroduction. Cautiously approached extra label long-term antibiotic treatment may cure a small percentage, but should not be routinely used.

If chronically infected *Strep ag* cows are retained in the herd, they must be milked last. This allows the milking units to be thoroughly washed in the equipment wash cycle before use on the next cows. Attempts to keep separate units for these animals or dipping teat cups between cows have typically failed

### **Future Monitoring**

Once *Strep ag* has been eliminated, it is necessary to monitor to prevent reintroduction. Any new cows added to the herd either by freshening (including heifers and cows dry during the time of initial culture) or purchase should be sampled. In some herds, every cow that freshens is sampled at the third or fourth milking. Culturing new DFHA SCC positive cows each month is also a good idea.

Finally, at about 3 months after the last round of treatment, the entire herd should be recultured and any positive cows culled or retreated and recultured to ensure cures. Then culture every 3 months until all cows are negative. Bulk tank cultures can be used at this point for the presence of *Strep ag*, but bulk tank cultures may not be sensitive enough to pick up a small number of infected cows in a large herd. In some cases in large herds, sequential samples may be used if collected properly.

## Flow Chart for *Strep ag* Eradication

*Strep ag* detected on bulk tank culture or individual culture



Implement proper post-milking teat dipping and universal dry cow therapy



Evaluate milking equipment and unit on-time (NMC protocol)  
**Goal:** Minimize unit on-time



### **Culture Entire Herd**

Treat positive cows with commercial tubes 2-3 times, 12-24 hours apart



### **Wait 14-21 Days – Reculture Entire Herd**

Treat positive cows with commercial tubes 2-3 times, 12-24 hours apart



### **Wait 14-21 Days – Reculture Entire Herd**

Cull cows treated twice and still positive for *Strep ag*  
 (if not culled, milk last/perhaps extra label treatment)  
 Treat positive cows with commercial tubes 2-3 times, 12-24 hours apart



### **Wait 14-21 Days – Reculture Cows Positive on Most Recent Culture**

Cull cows treated twice and still positive for *Strep ag*  
 (if not culled, milk last/perhaps extra label treatment)  
 Treat positive cows with commercial tubes 2-3 times, 12-24 hours apart



### **Repeat Culture and Treat/Cull Cycle on Positive Cows until 100% Negative**

After last culture is 100% negative:  
 Culture any newly purchased cows or fresh cows not previously negative



### **Three Months Later – Reculture Entire Herd**

If positive, repeat cycle of culture and treatment



### **Long-Term Monitoring**

Monitor with monthly or more frequent bulk tank cultures  
 Culture any newly purchased cows or fresh cows not previously negative  
 Consider culturing all fresh animals at third or fourth milking

