

# UT PARLOR

A publication for Tennessee's dairy producers and supporting industries



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## Factors for Controlling Somatic Cell Counts and Reducing Mastitis

### Why are somatic cell count (SCC) limits becoming stricter?

Recently, the U.S. Department of Agriculture's Agricultural Marketing Service (AMS) announced updates to the European Health Certification Program, which has stricter milk quality standards and immediate implications for dairy producers. This note is to help address questions producers might have regarding why, when and how these stricter guidelines will impact them.

### Why are SCC limits getting stricter?

Any processor who sends dairy products to European countries must apply for a European Health Certificate that proves milk from an individual farm meets European Union (EU) standards. The EU maximum SCC is 400,000 cells/ml. Therefore, if a processor wants to export products, the processor must comply with the certification program administered by the U.S. Department of Agriculture's Agricultural Marketing Service (AMS).

### How will individual farm SCC be determined?

A rolling, three-month average will be calculated based on at least one bulk tank SCC test each month. For example, the initial rolling average will be based on bulk tank SCC samples from January, February and March (Table 1). This average will be updated each month, dropping the oldest month and including the most recent. Either an arithmetic or geometric mean (see example below) can be used and may differ by milk buyer. The geometric mean will always be equal to or lower than the arithmetic mean. Each processor and co-op also may differ in how many SCC tests they use each month to determine the monthly bulk tank SCC.

### When will these new guidelines start?

On Jan. 1, 2012, the clock will start ticking towards generating the initial three-month average. This average will include SCC from January, February and March. If the initial three-month rolling average is greater than 400,000 cells/ml., the first consequences would occur April 2012.

### Will the co-op or processor accept my milk if my three-month average SCC is greater than 400,000 cells/ml.?

The answer will depend on who you sell your milk to. If you sell to a co-op, is there another outlet for the milk which does not require an EU health certificate? If you sell to a processor, are they willing and able to separate this milk into a separate silo or handling facility so that it does not mix with milk being used to generate dairy products for export?

### If my three-month SCC average is greater than 400,000 cells/ml., can I ask for more time to make changes on my farm to lower SCC?

Maybe. A farmer can ask their milk buyer to file a request with the USDA AMS Dairy Programs for a "derogation" that will allow their milk to be accepted into the EU export

	Jan	Feb	Mar	Rolling 3 month arithmetic average	Rolling 3 month geometric mean
Farm A	600,000	500,000	400,000	500,000	493,242
Farm B	500,000	350,000	300,000	383,333	374,443
Farm C	250,000	300,000	275,000	275,000	274,240

Farm A arithmetic mean =  $600,000 + 500,000 + 400,000 = 1,500,000 / 3 = 500,000$

Farm A geometric mean = = 493,242

program for one year. For this scenario to happen, the milk must be pasteurized or go into raw milk cheese that will be aged at least 60 days. Corrective actions to lower SCC also must be taken. USDA AMS will charge a fee.

### SCC tend to rise during the summer months; what if we go over?

The farm may request the milk supplier contact USDA AMS Dairy Program for a “derogation” to allow this milk to be accepted into the EU export program. To do so, the farm must show that for the majority of the year (at least nine months) they do not exceed 400,000 cells/ml. Additionally, the milk must be pasteurized or go into raw milk cheese that will be aged at least 60 days. If approved, this derogation would be valid for three years. USDA will charge a fee for this request.

### Do all co-ops and processors need to meet these regulations?

No. Only if they produce dairy products that will be exported to the European Union OR sell to those who do.

### Will all co-ops and processors handle this change the same?

It is not likely. Each processor and co-op has different facilities and markets, which will influence their decisions on if they will be able to accept milk not meeting the EU certificate standard. Processors will have the greatest influence as they set the SCC limits on the milk they are willing to purchase.

### Guidelines for controlling environmental mastitis

*Material summarized from National Mastitis Council fact sheet on Environmental Mastitis, available at [www.nmcoline.org/factsheets.html](http://www.nmcoline.org/factsheets.html).*

Environmental mastitis results from bacteria (environmental streptococci [Strep. uberis] coagulase negative staph [CNS] and coliform bacteria [E. coli]) living in the cow’s environment and contained within bedding materials, manure, feed, water and dirt.

### Risk factors

- Cows within confinement housing (freestalls, bedded packs, tie-stalls, etc.) are at a greater risk than those housed on pasture.
- Organic bedding materials (sawdust, shavings, chopped straw, etc.) contain higher amounts of bacteria than nonorganic bedding (sand or crushed limestone). Even sand or limestone can be a problem if it has manure in it!
- Housing factors (overcrowding, poor ventilation, excessive manure) contribute to environmental mastitis.

- Dirty and/or poorly maintained stalls, calving pens, maternity stalls or exercise areas increase the risk.

### Control strategies

(Intended to decrease contact between teat end and bacteria or increase the cow’s ability to fight infection.)

- Milk clean, dry udders.
- Pre-dip with germicidal teat tip.
- Use a post-milking teat dip.
  - Appropriate teat dip depends on cause of environmental mastitis.
- Environmental Strep. – Germicidal dip is better.
- Coliforms – Barrier dip better for reducing new infections.
- Follow the routine: Dip with pre-dipping solutions; Strip first squirts of milk; Dry with individual towels; Apply milking machine.
- Have fresh feed available to cows after milking to keep them standing for about one hour. Keeping them standing gives the teat end time to recover and close the teat canal.
- Keep bedding material clean and dry. Add fresh bedding frequently to maintain cow and stall cleanliness.
- Treat all quarters with a dry cow therapy at dry-off.
  - Practice will offer protection during early dry period, but not as calving is approaching.
  - Reinfusion during dry period is not beneficial.
- Use a persistent barrier teat dip during dry period.
- Use antibiotic therapy during lactation when appropriate.
  - Treatment of environmental strep. is 50-60 percent effective.
  - Treatment of coliforms with approved antibiotics is largely ineffective.
- Check and maintain milking equipment.
- Vaccinate with an E. coli J-5 bacterin during the dry period.
  - Effective at reducing the number of infections and the severity of the ones that do occur during the early lactation period.
- Ensure adequate amounts of Vitamin A, Vitamin E, selenium, copper and zinc are provided in the diet.
- Provide a clean, dry housing environment for all cows within the herd.

### Assessment

- Environmental strep. – Requires culturing of individual milk sample for detection.
- Coliforms – Requires accurate records of new infection and culturing of individual milk samples.
- Bulk tank microbiology: Coliforms, Staph, and Strep counts – These tests are indicators of a cow’s preparation before milking and the cow’s environment. High numbers

are an indicator of bad milking hygiene and bedding management.

- Check how clean the cows are at milking. Dirty cows indicate a poor bedding management.

### Guidelines for controlling contagious mastitis

Material summarized from NMC factsheet on Contagious Mastitis, available at [www.nmcoline.org/factsheets.html](http://www.nmcoline.org/factsheets.html).

Contagious mastitis results primarily from infection with pathogens (*Strep. agalactiae*, *Staph. aureus*, and *Mycoplasma*) that enter the udder through the teat in one cow, where they can survive for weeks, months or years and become the source for new infections throughout the herd.

### Risk factors

- Milking represents the time that cows are most at-risk for a new infection.
- The major reservoir for these pathogens is the infected udder. Infections are spread among cows or between quarters during the milking process by contaminated milking equipment, a milker's hands, or cloths or sponges used to wash or dry more than one cow. It is also spread when infected cows are milked ahead of healthy cows.
- Injured and chapped teats as they allow easier entry of the pathogen into the udder tissue.
- Diets lacking adequate amounts of vitamin A, vitamin E, selenium or copper increase the risk of new mastitis infection.
- Mixing of infected and noninfected cows.
- Liner slips during milking and over-milking.
- Poor maintenance of milking equipment – including liner changes, automatic take-off units, and vacuum levels.

### General strategies for controlling contagious mastitis

- Completely clean and dry the teats with a clean, dry towel for each cow (single-use paper towel or washed and dried cloth towel).
- Follow the squirt, dip, dry, apply or the dip, squirt, dry and apply routines.
- Make sure that all milking equipment is adequately sized and maintained for proper function during milking.
- Use an effective teat dip after every milking; **this factor is the most important in reducing the rate of new contagious infections.**
- Have fresh feed available after milking to keep cows standing for approximately one hour. Doing so gives the teat end time to recover and close the teat canal.
- Work with your veterinarian to establish a standard operating procedure for mild, moderate and severe

clinical mastitis. Other than *Strep. agalactiae*, antibiotics have little effect on most bacteria causing contagious mastitis.

- Treat each dry cow with a single dose of a Food and Drug Administration approved dry cow therapy.
- Chronically infected cows represent a risk to all healthy cows; it may be time to cull these cows from the herd.
  - Cull old cows with chronic mastitis.
  - Use dry-cow treatment to give a chance to young cows with chronic mastitis.
  - Cull if the cow shows mastitis during the next early lactation.
- Culture milk samples from purchased cows before they enter the herd or maintain a closed herd to prevent introduction of contagious pathogens.
- Work with herd veterinarian, the UT Extension dairy specialist and the UT Quality Milk Laboratory to develop an active milk quality program. Targets to aim for are 0 percent infection with *Strep. agalactiae* and *Mycoplasma* and 5 percent with *Staph. aureus*.
- Maintain milking equipment as recommended, including regular inflation changes and vacuum checks.

### Control strategies for specific causes of contagious mastitis

*Strep. agalactiae*

- *Strep. agalactiae* can be eradicated from a herd with the following steps:

1. Identify infected cows by culturing individual milk samples.
2. Treat infected cows with beta-lactam intramammary infusion (*i.e.*, penicillin, ceftiofur, cloxacillin, cephalosporin, amoxicillin and ampicillin).
  - a. The treatment approach is effective in both lactating and dry cows.
  - b. Infection should be cured within two infusions. If infection remains after two treatments, cow may be chronic and not curable. Remove from herd.

- Following elimination, the following steps can prevent its return:

1. Culture bulk tank samples each month for at least six months to make sure bacteria is eliminated from the herd.
2. Include dry cows and heifers in program as they represent a source for re-introduction of bacteria into lactating herd.



3. Maintaining a closed herd is ideal; culturing of samples from purchased cows before they are introduced to herd is key to keep pathogen out.
4. Separate and test any cow that was taken to a fair or livestock show. Use of contaminated equipment there can be a source for bringing the pathogen back to farm.
5. Do not feed milk containing *Strep. agalactiae* to heifers as the bacteria can remain in the udder for months before calving.

*Staph. aureus*

- Control of this bacteria relies on limiting its movement from cow to cow and reducing the total number of infected cows in the herd using the following steps:

1. Identify infected cows by culturing milk samples.
2. Prevent infected milk from contacting uninfected cows by milk infected cows last.
3. Dry cow therapies are generally more effective than those used during lactation.
4. Generally, a single treatment will cure those infections that will respond to treatment.
5. Use infection status as a factor when making decisions on removing a cow from the herd.

*Mycoplasma*

- There is no effective cure for mastitis caused by this pathogen. Its spread can be controlled with the following:

1. Identify infected cows by culturing milk samples.
2. Segregate, or remove, infected cows.
3. If they remain, milk these cows last and only use single-use commercial products. Multidose products were previously responsible for herd outbreaks of this form of mastitis.
4. Test the milk of any purchased cows before they are introduced to the herd. Also, consider culturing the milk of all cows with clinical mastitis as well as the bulk tank following the purchase of cows.
5. Mycoplasma can live within the lungs of healthy cows can then be transferred to the udder. This transfer is most common when calves, heifers or cows are housed with poor ventilation.
6. In addition to mastitis, Mycoplasmas can cause abortion, vulvovaginitis and be present in vaginal exudates.

**The eight steps for proper milking technique**

*Summarized from the NMC fact sheet on Recommended Milking Procedures, [www.nmconline.org/factsheets.html](http://www.nmconline.org/factsheets.html).*

The following list details the steps that the National Mastitis Council has established to promote the products of quality milk and reduce mastitis. It is important to note that consistency and the attitude of the milker are critical in this process.

1. Milk cows in a clean, low-stress environment.
2. Visually and physically inspect the udder and foremilk to look for signs of mastitis at the start of milking. A hot, hard udder is a sign of inflammation. Foremilk that is clotty, stringy or watery is a sign of mastitis.
3. Wash teat ends with a wash solution or pre-dip to remove all debris. The wash solution may be the best approach for heavily soiled teats. Pre-dipping is sufficient when teats are mostly clean.
4. Completely dry the teats using a clean towel for each individual cow.
5. Attach milking units no more than two minutes after the start of stimulation, which occurs by prepping the teats and checking for mastitis. Maximum milk letdown begins one minute after the initial stimulation and will last for roughly 10 minutes. Cows producing 75 pounds of milk per day should milk out in six to eight minutes, so beginning milking with two minutes will allow milking to occur within the maximum milk letdown window.
6. Prevent liner slips or teat end damage by properly aligning the milking unit. Slips can force milk into the teat end, and placing the unit too high on the teats may result in irritation. Both can cause an increase in mastitis.
7. Prevent overmilking with proper vacuum adjustment. Similar to inappropriate alignment, overmilking can lead to liner slip and increased mastitis.
8. Cover at least the lower third of each teat with an effective post-milking dip. This step may be the most important for reducing somatic cell count (SCC) and mastitis.

Additionally, avoid feeding cows during milking. Instead, have fresh feed available to keep cows on their feet and feeding for approximately one hour instead of lying down immediately. This method lets the teat end close.

## What is the relationship between the milking equipment and mastitis/milk quality?

The information contained on this sheet was originally prepared by G. M. Jones for publication at [www.extension.org](http://www.extension.org). Additional information and the complete articles can be found at <http://www.extension.org/pages/15600/dairy-cattle-mastitis-and-milking-management>.

Along with management plans for controlling or eliminating the pathogens responsible for environmental and contagious mastitis, properly functioning milking equipment is critical for lowering somatic cell count (SCC) and reducing mastitis.

In general, poorly functioning milking equipment leads to increased mastitis rates or reduced milk quality by moving infected milk between infected and healthy quarters or infected and healthy cows, damaging teats and udder tissue allowing for greater likelihood of infection, and forcing bacteria into the teat end during fluctuations in vacuum. Additionally, injury of the teats and udder resulting from milking equipment indirectly increases disease as the associated pain can cause a stress response, which reduces immune function and milk letdown.

## What should you expect from your milking equipment?

That it milks cows out completely, that it functions properly to prevent cross contamination, and the pulsation of the units should be sufficient to maintain blood flow in the teats and milk flow out of the teat. Finally, milking equipment should be easily cleaned, handled and maintained.

## What are the main reasons for vacuum fluctuation?

Fluctuations in vacuum mainly occur in two ways: steady leakage and sporadic leakage. The causes of steady leakage from unintended air admission are generally connected to worn out or damaged milking equipment (cracks or holes in hoses, lines or claws). Sporadic leakage from unintended air admission more likely results from issues occurring during the milking of a cow (liner slips, milking unit falling off or being kicked off, etc.).

## What are the main reasons for liner slips?

The cause often depends on the stage of the milking process that the slip occurs. Slips at the start of milking can, typically, be explained by too little vacuum, obstructed air vents, or blocking of the short milk tube. Slips that occur toward the end of milking are more likely due to misalignment of the milking unit, worn out liners or the weight of the milking unit being unequally distributed.

## What should you have checked at scheduled intervals by trained service personnel?

1. Performance and function of the vacuum pump.
2. The entire system for air leakage.
3. Performance and function of the regulator.
4. Vacuum level (should range from 11 to 13 inches at each teat with less than 2 to 3 inches of fluctuation).
5. Performance and function of pulsators.
6. Air vents.
7. Condition of all rubber and plastic pieces (major source for air leakage).
8. Cleanliness of the milking system.
9. Performance and function of clean-in-place (CIP) system.
10. Check for stray voltage.

## What is the appropriate schedule for preventative maintenance?

### Daily

1. Wash the milking system (milk line, receiver jar/trap, claws and hoses) and empty the trap.
2. Examine all rubber parts and replace any liner or short air tube with holes or cracks.
3. Check vacuum level and its recovery time (level should come back within 2 to 3 seconds after a milking unit is opened).
4. Evaluate function of pulsators.
5. Check for air leaks.

### Weekly

1. Clean vacuum regulator and moisture drain valves.
2. Examine the filters of the pulsator and vacuum regulator. Clean or replace as needed.
3. Evaluate short vacuum tubes to confirm that each pulsator opens and closes completely.
4. Examine stall cocks for leaks.
5. Check the tightness of all electrical connections.

6. Clean and check the fittings and gaskets of the receiver and weigh jars.

### Monthly

1. Breakdown pulsators. Clean air ports and screens. Replace worn parts as needed.
2. Use vacuum gauge to test each pulsator's function.
3. Breakdown vacuum regulators. Clean. Replace the air filter.
4. Flush the vacuum lines of the pulsator.
5. Examine the air tubes, vacuum hoses and milk hoses for holes, cracks or other signs of wear.
6. Clean the inside of trap and examine the float.

### Every 6 months

1. Examine the full milking system.
2. Replace all rubber parts, hoses and air tubes of the pulsator.
3. Replace all milk hoses.
4. Replace the gasket of the receiver jar.
5. Replace the hoses and nozzles used to wash udders (if used).
6. Examine the belts and oiler on each vacuum pump.

### Keys for proper post-milking teat dipping

Material summarized from National Mastitis Council fact sheet on Post-milking Teat Disinfection, available at [www.nmcoline.org/factsheets.html](http://www.nmcoline.org/factsheets.html).

As previously discussed in the guidelines for controlling both contagious and environmental mastitis, proper use of a post-milking teat dip is a key factor for reducing mastitis. The following is a summary of the appropriate way to use a post-dip to maximize control of mastitis.

### How should a post-milking teat dip be applied?

The use of dipping or spraying is appropriate as long as the all teat ends are completely covered and the product is applied immediately after the milking attachment is removed.

### How should a teat dip be stored?

Store products in a cool, dry place that will prevent freezing from occurring. Always make sure the container is closed to prevent contamination. Throw the product away if the expiration date has passed.

### How should the product be used?

Carefully follow all instructions on the label and make sure that the specified concentration is applied. If dilution is required, use water that meets the products requirements. These requirements may include pH and mineral content, and they may specify the water be bacteria free.

### What is the proper method for using dip cups?

Dump remaining product from the cup at the end of each milking (or if the cup becomes dirty during milking) and then clean. Make sure there is enough of the product for the entire milking. Do not contaminate the main container of dip by returning unused portion following milking. Throw away the damaged cup.

### What is the proper method for using a spray?

Make sure that the product you intend to use was formulated to spray. Also, make sure there is enough of the product for the entire milking. Ensure coverage of all teats by using a lance/wand to extend the sprayer.

### What are the products to use?

The best teat dips to use are those that are proven to be effective against the main pathogens that cause mastitis, easily achieve full coverage of all teats, and help maintain/promote healthy teat skin. The product should be registered with the FDA. Additionally, look for a product that is approved by the EMEA (European Medicines Evaluation Agency) or VDD (Veterinary Drugs Directorate). The EMEA requires that all approved products have

demonstrated the effectiveness in controlled research studies and the VDD requires that the product has undergone an evaluation of its effectiveness and safety (along with other considerations).

### **What considerations should be made during different seasons?**

In winter, consider using a product with more than 50 percent moisturizers to help maintain healthy teat ends. Also, dry teats before releasing cows into cold weather; warming dips will reduce drying time. Finally, carefully monitor fresh cows as they are more at risk for chapped teat ends.

In summer, moisturizers are less important, but products containing fly repellents or sunscreen may be helpful for maintaining healthy teat ends.



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