The SQMI Quarterly

Improving milk quality and farm profitability in the Southeast U.S.

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The impact of parlor equipment function and maintenance on milk quality in the Southeast US

Kellie Enger and Dr. Christina Petersson-Wolfe—Virginia Tech

A specific aim of the Southeast Quality Milk Initiative (SQMI) is to identify specific management factors that most impact milk quality on dairies in the SE. To assess this, we visited 282 dairies representing low (< 220,000 cells/ml), moderate (221,000 to 340,000 cells/ml), and high (≥ 340,000 cells/ml) bulk tank SCC (BTSCC) in Virginia (n = 96), Kentucky (n = 96), Tennessee (n = 84) and Mississippi (n = 7), from July 2014 through June 2015. A 175-question survey, created by SQMI members, was conducted with the farm owner or manager during scheduled farm evaluations.

The survey included questions pertaining to herd demographics, management practices, and equipment maintenance. The farm evaluation included observation of milking practices, teat end scoring, equipment function analysis, and an assessment of housing facilities. Some of the measured parlor indices included claw vacuum at peak milk flow, pulsator testing, and an evaluation of air flow capacity. The BTSCC was converted to bulk tank somatic cell score (BTSCS) for purposes of the analysis. As a reference, a BTSCS of 4 is approximately 200,000 cells/ml and a BTSCS of 5 is approximately 400,000 cells/ml.

Average herd size was 228 ± 20 and ranged from 32 to 2,500 cows; however, the majority of herds (~78%) consisted of less than 250 cows. Average BTSCS was 4.39 ± 0.03 and ranged from 2.78 to 5.75. The mean BTSCS of KY farms (4.27 ± 0.05) was not statistically different than VA farms (4.24 ± 0.05); however, BTSCS of KY and VA farms were significantly less than TN (4.64 ± 0.06) and MS (4.84 ± 0.20). See Figure 1. Additionally, BTSCS decreased as farm size increased. Automatic take-offs, pulsator settings, and how often the parlor received maintenance service did not affect mean BTSCS. No difference was detected between parlor maintenance performed by a qualified technician compared to the farm owner/manager. Milking frequency and age of the parlor also did not significantly influence BTSCS.

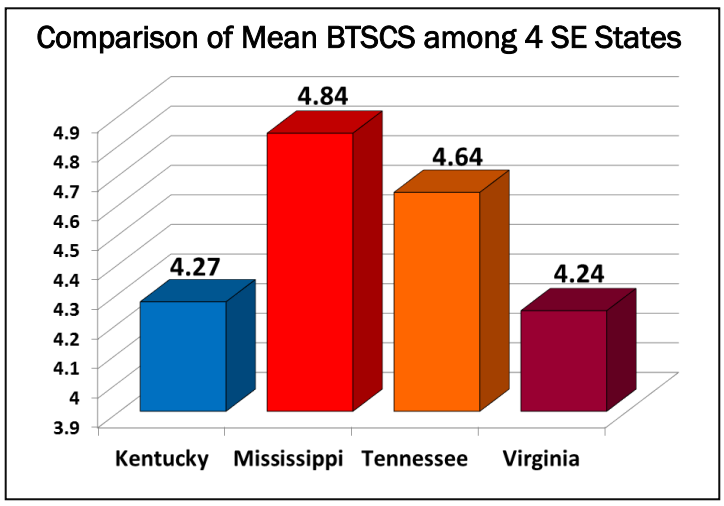

Figure 1. Comparison of mean BTSCS among 4 southeast states.

The mean and median percentages of cows with cracked teat ends were 60.0 ± 1.0 and 65.0 ± 1.0, respectively, with a range of 0 to 100. Cows were considered to have cracked teat ends if at least one teat was cracked. In herds with a majority of cows with cracked teat ends (> 65%), increased claw vacuum led to an increased BTSCS. However, in herds where less than 65% of cows had cracked teat ends, higher levels of claw vacuum did not increase BTSCS.

In conclusion, both state and herd size significantly influenced BTSCS. It is likely that these differences are attributed to variations in environmental factors, management decisions, and differences in producer resources such as veterinary and technician support. An increase in herd size was associated with a lower BTSCS. Farms in TN and MS had greater BTSCS than farms in VA and KY. The interaction between average claw vacuum and percentage of cows with cracked teat ends was also significant. This interaction indicated that higher vacuum levels led to increased the BTSCS when the majority of the herd had poor teat end health. However, high claw vacuum did not result in increased BTSCS in herds with less than 65% of cows with cracked teats. Claw vacuum can be very influential on teat end health. Claw vacuum settings will vary based on liner type and other various specifications on a farm to farm basis.

When it comes to solving SCC crimes, if you don't culture, you don't know

Dr. Jeffrey Bewley—University of Kentucky

Flipping through television channels, it's hard to go very far without running into some type of crime show. The CSI (Crime Scene Investigation) series appeals to a diverse audience by using modern forensic sciences to describe mysterious crimes and murders. While some of the methods and results may seem out-of-touch with reality, these techniques are used by real-life investigators. On a more basic level, investigators have used more simple tools such as good questioning techniques of suspects and witnesses, fingerprints, seeking evidence to support various alternatives, or simply by using the process of elimination to remove implausible alternatives.

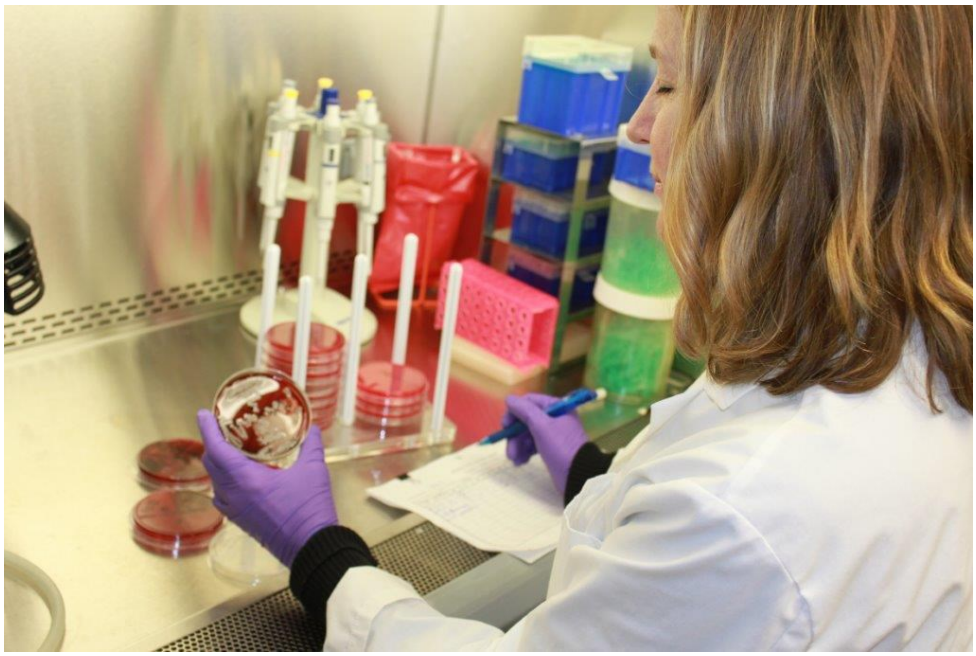

Figure 1. Results of milk cultures help to diagnose specific bacterial infections.

Trying to solve a SCC problem is often like trying to solve a crime. First of all, we are always starting with an imperfect set of information. We don't know exactly what happened or how the situation progressed to the point it did. Secondly, there's generally a high degree of frustration and a strong desire to solve the problem as soon as possible. Finally, the solution is rarely as simple as it seems nor is it the first thought that crosses our mind. Solving a SCC "crime scene" is challenging because there are so many factors that impact mastitis incidence/SCC.

When solving a SCC crime scene, we'll typically start by trying to compare a farm's practices to best recommended practices. So, how can we uncover the weak links? Unlike human crimes, we can't ask affected cows or their herdmates about what has happened. We can communicate with farmers to identify what has changed. And, with DHIA, we can often quantify what changes have occurred over time. However, we can learn a lot more about the situation by culturing the milk to determine what kind of bacteria has caused the mastitis for particular cows. Taking this extra step in solving the SCC crime is similar to taking the extra step of using forensic sciences in human crime solving cases.

To accomplish this goal, a microbiological analysis or milk culture, must be performed on milk samples collected from cows showing clinical or subclinical signs of mastitis. Results of the milk cultures will help identify which bacteria are causing the mastitis. See Figure 1 below. In turn, this information can be used to alter mastitis control, prevention, and treatment options to fit your herd's conditions. During an investigation of a herd dealing with high SCCs or a high incidence of clinical mastitis, milk culture results provide essential evidence for solving the SCC problem. Extra care and precaution are necessary during the collection process using strict, clean, aseptic (without germs and bacteria) procedures to be sure that the bacteria originated from milk from the udder and not the teat end or hair, the sampler's hands, or the barn environment. If the samples are not collected, handled, and transported correctly, the bacteriological results will not be of any diagnostic value.

Culturing selected cows within a herd allows us to focus our prevention and treatment efforts. Without this information, we are merely guessing as to what the causes of the mastitis/high SCC are. As a result, we may make changes (sometimes costly) that don't even address the root cause of the problem. Culturing can provide us with the extra information we need to refine our recommendations, and focus prevention strategies on the most important practices for a specific farm at a specific point in time. This can be the key component in solving a SCC crime and preventing future SCC crimes. It's simply taking advantage of the tool set that is available to us in our crime-solving arsenal, just like those television investigators do in solving human crimes. So, remember when it comes to solving a SCC crime, if you don't culture, you don't know!

What's the best method for drying cows off?

Dr. Steve Nickerson—University of Georgia

Methods of drying off include the following: (1) "Abrupt cessation" of milking in which cows are milked for a 305-day lactation, after which milking is abruptly terminated, all quarters are infused with dry cow therapy and/or a teat sealant, and cows are placed in a far-off pasture and fed a dry cow ration; and (2) "Intermittent milking" in which cows are milked for about 291-298 days (1-2 wk prior to the official dry-off date), and for last 1-2 wk of lactation, concentrate is eliminated and cows are fed hay only. During these last 1-2 wk, cows are milked intermittently, e.g., once a day, then infused with dry cow therapy and/or a teat sealant, and placed in a far-off pasture and fed a dry cow ration. Or instead of milking once a day, there could be a series of single and double-missed milkings. For example, on days 1 and 2: just do the AM milking only; on day 3: the PM milking only; on day 4: no milking; day 5: the AM milking only; then dry off. Intermittent milking will reduce milk production by 22-47%, helping to accelerate mammary gland involution and decrease new infections at calving.

University studies have looked at the new IMI rate based on method of dry-off as well as at the level of milk production at the time of drying off (Figure 1). In a Tennessee study, cows were either dried off by 1) intermittent milking only or by 2) intermittent milking along with feeding hay only; all cows received dry cow therapy (Figure 1a). Cows assigned to intermittent milking along with a ration change exhibited a 50% reduction in new udder infections compared with a 32% reduction in cows assigned to intermittent milking only.

In a Canadian study, cows that were dried off producing greater than 46 lb a day had a higher new IMI rate (26%) than cows dried off producing less than 29 lb (16%) (Figure 1b). The leakage of milk from quarters of cows dried off at the greater production was thought to be the cause for the higher infection rate, as it suggested that the teat canal was open to bacterial invasion. In fact, research has shown that cows leaking milk following dry-off are 4 times more likely to develop clinical mastitis than cows that do not leak.

So, what's better, abrupt cessation or intermittent milking? When used in conjunction with dry cow therapy and reduced energy intake, either method is suitable, as there is no real difference in the new infection rate. However, among cows not receiving dry cow therapy, one study showed that new infections at calving were more numerous using abrupt cessation of milking, probably because of milk leakage. The practice of intermittent milking combined with feeding only free choice hay during the last week of lactation will increase protective factors in milk, such as leukocytes and antibodies, but the effect on new infection rate is questionable.

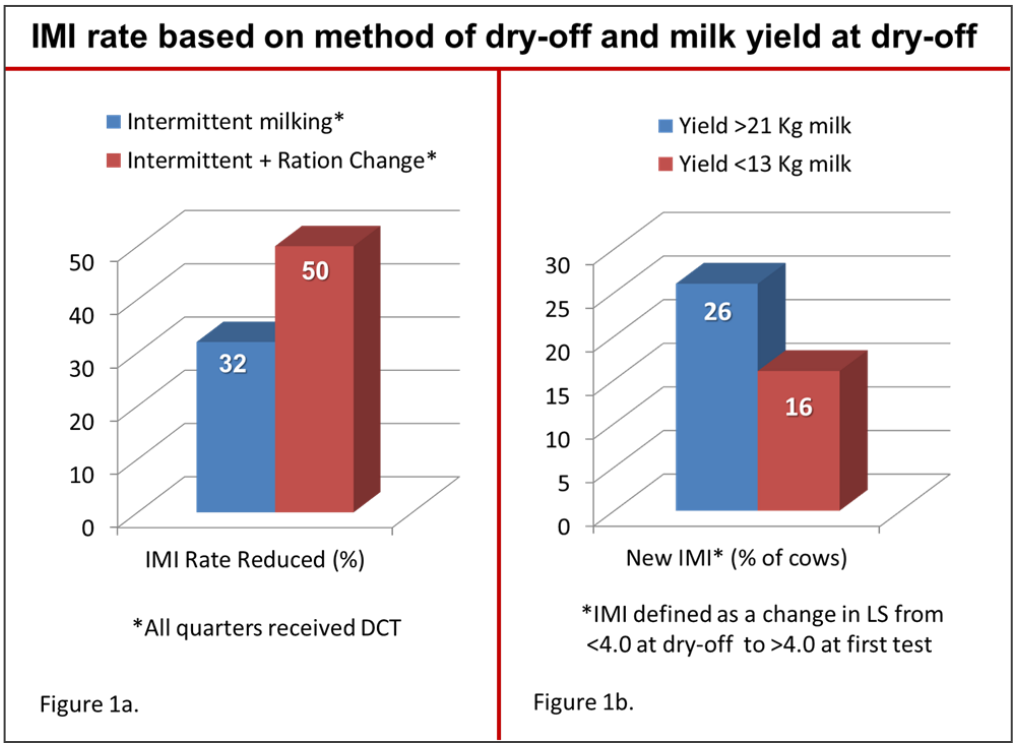

Figure 1. New intramammary infection (IMI) rate based on dry-off method and milk yield.

Irrespective of the method used, the recommendation is to treat all four quarters of all cows with dry cow therapy followed by teat sealant; however, some disadvantages of this practice exist. For example, dry cow antibiotic therapy is not always effective in curing existing infections. Present formulations are not effective against coliforms, and they provide no protection against new infections during the late dry period; however, teat sealants do in fact provide protection during this prepartum period. Development of antibiotic resistance is sometimes considered to be a disadvantage; however, routine use of dry cow therapy does not lead to development of resistant mastitis-causing microorganisms.

Thank you for your interest in the Southeast Quality Milk Initiative (SQMI).

For further information on how to improve your milk quality, visit www.sequalitymilk.com.
If you have specific questions, comments, or suggestions to enhance milk quality in your area, please contact your local SQMI representative listed below.

Florida—Dr. Albert De Vries at devries@ufl.edu or 352-392-5594 ext 227
Georgia—Dr. Stephen Nickerson at scn@uga.edu or 706-542-0658
Mississippi—Dr. Amanda Stone at amanda.stone@msstate.edu or 662-325-8773
North Carolina—Dr. Stephanie Ward at shward@ncsu.edu or 919-515-4015
Kentucky—Dr. Jeffrey Bewley at jbewley@uky.edu or 859-257-7543
Tennessee—Dr. Steve Oliver at soliver@tennessee.edu or 865-974-7172
Virginia—Dr. Christina Petersson-Wolfe at cspw@vt.edu or 540-231-4767

Enclosed is a Spanish version of the newsletter;
feel free to copy and distribute this to the Hispanic dairy community.

United States Department of Agriculture
National Institute of Food and Agriculture

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