The SQMI Quarterly

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

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Role of bedding in milk quality: Lessons from large herds in Wisconsin

Dr. Peter Krawcel—University of Tennessee

As cows spend 10 to 14 hours a day lying down, one of the key management factors evaluated in the Southeast Quality Milk Initiative was their resting space. A study published in the *Journal of Dairy Science* from researchers at the University of Wisconsin focused on the role of bedding in bulk tank milk quality of large farms. To be eligible for the study, farms had to ship at least half a tanker of milk daily (~25,000 lb.), which allowed for larger farms with lower productivity or smaller farms with greater productivity to be enrolled. Along with the evaluation of bedding type: 1) inorganic bedding, i.e., sand; 2) non-manure, organic bedding, i.e., sawdust; and 3) manure-based organic bedding, i.e., manure solids), 2 years of bulk tank data (lb. of milk shipped, SCC, and bacterial counts) were collected.

A total of 325 farms were included. Herd size was 868 cows, daily milk production was 70,700 lb., the rolling herd average was 27,600 lb., daily milk sold per cow was 81.4 lb., prevalence of cows with less than 4 working quarters was 4.7%, prevalence of cows with nonsalable milk was 1.8%, and times bulk tank cultured per year was 20.3%.

Bulk tank SCC was lowest on farms using inorganic bedding (Table 1). There was no difference between the two categories of organic bedding. Approximately 99% of farms used a "complete" milk routine, including predipping, stripping, drying with individual towels, and postdipping. Despite the interaction between bedding type and milk quality, there were some factors that were common across farms. As the percentage of cows with nonfunctional quarters increased, the SCC of the farm increased. SCC was lowest in spring and winter, greatest in summer, and fall fell in between. The likely explanation for this is that the lower SCC in winter carried over into spring and the greater SCC of summer carried over into fall.

For farms using inorganic bedding, the frequency of bedding (intervals of less than 7 days), having a written protocol for milking, and drying of the teat ends before hanging units were key aspects related to milk quality. Interestingly, it did not matter if the sand stalls were groomed mechanically or manually. For organic bedding (non-manure), the key factors for improved milk quality were not having the manager present and replacing the bedding in the back 1/3 of the stalls weekly. For manure bedding, the only factor significant for improved milk quality was the absence of a written protocol.

The main take home message is that results were consistent with the general recommendations for bedding to improve milk quality – the use of sand with regular addition of new bedding and consistent grooming. Collectively, these should all help to ensure a clean, dry environment for lactating cows. The general result for non-manure, organic bedding, grooming the back end of the stalls, should result in the same conditions. Finally, two of the main factors (written protocols and observations from the manager) may be driven by confounding factors. It is likely that a manager will be a greater presence in the parlor when milk quality is an issue. Farms using manure bedding were larger than farms using other bedding types. This might result in larger labor staffs and specialization in tasks on the farm, which might make the need for written protocol less important.

Table 1. Bedding association with productivity and milk quality

Characteristic	Inorganic	Organic	Manure
Herd size, no. of cows	849	706	1502
Daily milk production, lb	24,500	70,700	698,533
Rolling herd average, lb	28,300	26,500	25,900
Daily milk sold per cow, lb	84	77	78
Cows with less than 4 working quarters, %	4.5	4.8	6.3
Cows with nonsalable milk,%	0.6	1.9	2.4
Bulk tank SCC	198	220	248

Milking to Milking Variation in Somatic Cell Counts: Don't Jump to Conclusions Too Quickly

Ashenafi Beyi & Dr. Albert De Vries—University of Florida

Somatic cell counts (SCC) increase when there is an infection of the mammary gland. Elevated SCC are associated with more clinical mastitis, lower milk yields, lower fertility, and reduced shelf life.

Many dairy farmers have their cows tested by DHI for SCC one milking per month. Based on the cows' SCC, and some SCC history, they may decide to cull the highest SCC cows. Another option is to withhold the milk of the cows that are contributing the most cells to the tank.

Highest 20 SCC Cows **Weighted Average SCC: 492**

Index	Barn	Milk	Fat	Pro	SNF	SCC	Count	DIM	Lac	W/O	%
7	7SWISS	42.1	4.7	4.0	8.8	9.2	7352	12	1	373	25.6
56	56	30.2	5.3	4.6	8.3	9.0	6400	180	3	297	15.9
54	TESSY	81.5	3.6	3.2	8.7	6.9	1493	12	2	254	10.1
302	GLITTER	83.1	3.3	3.0	8.2	6.3	985	47	3	226	6.8
14	IZZIE	62.7	3.6	3.3	9.1	6.5	1131	145	5	200	5.9

But when the SCC naturally varies within short amounts of time, say within a few days or even from milking to milking, then one milking a month sampling may not give us a good idea about the average SCC of the cow. We looked into how much SCC varies naturally from milking to milking for individual cows. For example, an uninfected quarter has a mean SCC of approximately 70,000 cells per ml of milk. The day to day variation is about 10% in uninfected cows.

Twelve years ago in the late summer, we measured the SCC in 15 consecutive milkings for approximately 400 cows at the University of Florida Dairy Unit. We used standard DHI test day sampling procedures. Milk quality was a challenge at that time with bulk tank SCC over 500,000. Results were reported in Hoard' Dairyman, February 10, 2007. Only 8% of the cows had all their 15 milkings below 200,000 SCC, and 15% had all their milkings below 400,000. Therefore, if 200,000 per ml was used as a threshold for subclinical mastitis, 92% of the cows would be considered to have subclinical mastitis during at least one milking.

More than half of the 5,751 SCC observations differed more than 140,000 from one milking to the next. Many cows would have a very high SCC at one milking and then typically have a much lower SCC at the next milking. Bacterial results for individual cows were not available. We could not explain these big changes by milking shift, milk yield at the previous milking, duration of the milking, and time since previous milking. Milk yield during the current milking and SCC in the previous milking helped explain only 18% of the milking to milking variation. We believed that infected cows successfully fought and cured these infections.

The ranking of cows that contributed the most cells to the bulk tank changed greatly from milking to milking. On average, only two of the top 20 cows contributing the highest number of somatic cells to the bulk tank at one milking were in the top 20 at the next milking. These findings of large variability in SCC from milking to milking have also been reported in other studies.

While herd average SCC is a good measure of the level of mastitis, individual mastitis control actions should not only be based on a single test day SCC. The sampling frequency is too low. There is a good chance that a high SCC in a subclinical cow disappears quickly again.

Bulk tank SCC at the University of Florida Dairy Unit is now typically below 200,000. Milk quality has been enhanced through good management such as clean and dry bedded stalls and improved milking procedures. Look for SQMI for best practices to control mastitis and improve milk quality.

Stress and Nutrition Affect Milk Quality

Dr. Stephanie Ward—Mississippi State University

This time of year, at the University, students are experiencing tremendous amounts of stress associated with finals, graduation, pursuit of a job…it can be overwhelming. As a result, poor eating habits arise and coupled with lack of sleep, visits to student health centers increase. Stress can negatively affect your immunity and the same is true for cows!

We do not often think about cows being stressed, after all, their lives seem fairly simple and uncomplicated. But, lack of proper feeding programs and heat are both very stressful problems for cows. In the SE region, especially, cows can experience more than 120 days of heat stress per year. It is not just that it's hot, but also that it is humid and because the air is already moist, it is difficult for cows to dissipate heat. So, even when it feels like a nice spring day to us, cows can be experiencing heat stress. When cows experience heat stress, which is typically at a temperature greater than 72 degrees and a humidity of 50% or greater, they tend to decrease their dry matter intake. When cows go off feed, they do not consume a good balance of vitamins and minerals. In particular, Vitamin E and Selenium, which are immune boosters, decrease. As a result, milk yields decrease and somatic cell counts increase (Figure 1).

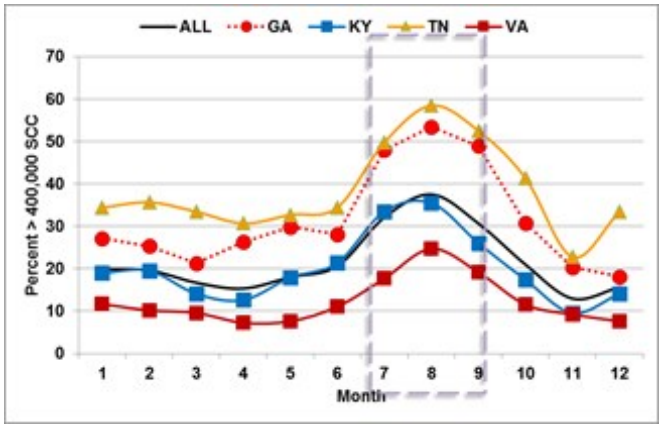
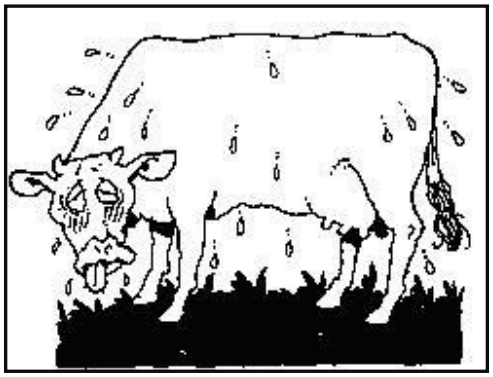


Figure 1. Percentage of farms with SCC greater than 400,000 in the SE by month.

In addition to decreased feed intake, other functions of the immune system can decline when cows experience stress, including concentrations of immunoglobulins which are critical for fighting mastitis pathogens.

As summer approaches, here are a couple of tips for keeping your cows comfortable and healthy.

1. Monitor feed intake closely. As cows begin to decline in feed consumption, consult your nutritionist about balancing your ration and feed additives that can help improve intake and immune response.
   - Consider offering an electrolyte supplement. This can be done in the water trough or added to the ration. Your nutritionist will help you balance minerals and vitamins so that the effects of heat stress are lessened.
   - Use your best quality forages for milk production in the summer. When cows are heat stressed and intake goes down, digestibility of the ration also decreases. Using good quality forages will improve ration palatability and digestibility.
2. Cool cows….ALL cows.
   - Using fans and misters in the barn can help tremendously in cooling cows. Focus on wetting and drying along the topline of the cow- not the udder! Research shows that heat ***does not*** dissipate any faster if the udder is wet.
   - Too often we forget about dry cows and pregnant heifers. Both of these classes of animals can be negatively impacted by heat just as lactating cows are. If you can, bring them in to the barn ~21 days prior to calving so that they can be cooled with the other cows. Cooling during the entire dry period is recommended, but especially in the last month. Calving ease, colostrum quality, and cow and calf health will improve.
   - Grazing cows (dry or lactating) also need cooling. Shade structures or natural shade are recommended. Cooling ponds are not! Cooling ponds can increase the incidence of environmental mastitis. If grazing under a center pivot, consult your technician about the addition of misters to the pivot for cow cooling. It will improve cow comfort and forage intake.



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. Stephanie Ward at srhill@ads.msstate.edu or 662-325-8773
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.

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