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UK UNIVERSITY OF KENTUCKY College of Agriculture

# Kentucky Dairy Notes

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## Are You Using the DHI "Hot Sheet" to Manage your Herd Somatic Cell Count?

**Jeffrey Bewley, Michelle Arnold, and Donna Amaral-Phillips**

The DHI "hot sheet" is often described as the single most useful DHI report provided to dairy producers. An example hot sheet is depicted in Figure 1. The concept of the hot sheet is fairly straightforward. The results printed on this report are based on the collection of milk samples from individual cows in a herd, the recording of the milk production of those cows and the analysis of those milk samples for somatic cell count, butterfat percent, protein percent and if desired milk urea nitrogen (MUN). Each cow in the herd contributes somatic cells to the herd's bulk tank. How many cells an individual cow contributes is a factor of the somatic cell concentration within her milk (measured in cells per mL) and the volume of milk she produces. From DHI testing, we have both SCC concentration and milk volume. So, each cow's contribution of somatic cells to the herd average can be calculated using these two pieces of information. A "weighted average SCC" is calculated for the bulk tank using this information from all cows. Then, using the cells contributed by each cow and her milk production, the percentage of cells in the bulk tank for each cow is calculated. Cows on the hot sheet are ranked with the cow contributing the most cells in the tank on the top of the list and the cow contributing the least cells in the tank on the bottom of the list. The column farthest to the right on the hot sheet shows the percentage of cells in the tank from each cow in the herd. Moving left, the next column lists what the weighted average bulk tank SCC *would be without that cow and all cows above her* in the bulk tank. For most producers, these are the only two columns that need to be examined though the other columns may provide additional useful information such as that cow's somatic cell count (in thousands) and milk yield.

Let us walk through an example using the information provided in Figure 1. For this herd, the weighted average SCC was 492,000 cells/mL. Cow 7 contributed the most somatic cells to the weighted SCC average. Her SCC was 7,352,000 cells/mL. She was responsible for 25.6% of the somatic cells in the bulk tank. Without including her in this average, the weighted average SCC for this milking would have been 373,000 cells/mL. Cow 56 contributed an additional 15.9% of the cells with a SCC of 6,400,000. Without these top two cows (Cows 7 and 56) the weighted average SCC for this milking would have been 297,000 cells/mL. Quickly, we can see the impact that only two cows had on the herd's SCC. Cows with particularly high SCC or high milk production with moderately high SCC can have a huge impact on herd SCC, particularly in small herds. With larger herds, the impact that one cow has on SCC is smaller because this milk is diluted by the milk from other cows. This information can prove very valuable for dealing with a short-term high SCC problem.

It is important to discuss a few limitations of the "hot sheet."

1. First, the numbers reflect the samples collected from and the milk production of the cows on that particular milking on test day. SCC fluctuates considerably among individual cows from milking to milking.
2. Second, the weighted average SCC may not match on-farm bulk tank SCC exactly because of differences in cows tested versus those included in the bulk tank and the fact that cows are sampled one milking of the 2 or 4 milkings included in the bulk tank. For example, if cows sampled on DHI test are treated and their milk withheld from the bulk tank, differences between the two herd SCC measures may occur.
3. Finally, if the highest SCC cows are removed from the herd, other cows will take their place on the top of the list. Part of this is just simple math indicating that some cow has to be the highest SCC cow in the herd.

Nevertheless, it is also important to realize that eliminating high SCC cows is only an emergency treatment of the problem without getting at its root cause. If you only focus on removing high SCC cows from the herd without determining why these cows have high SCC and how to incorporate preventive practices, you will continue to cull or dump milk from high SCC cows test after test. To fully benefit from the DHI hot sheet, you may want to consider collecting milk samples for bacteriological culture for all cows with SCC greater than200,000 for two consecutive months or at least the top 10 or 20 cows on the list. This would provide valuable information for developing prevention strategies and making individual cow treatment or culling decisions. Another caution is to not be too quick in culling high SCC cows. It is best to make decisions based on multiple SCC values and trends instead of a single cell count for a particular cow. The use of three consecutive monthly SCCs improves decision-making, especially when combined with other cow factors such as age, and stage of lactation, and time of year. First, check to see if high cows are chronically high SCC cows ("chronic cows" are defined as those with two consecutive months with a cell count greater than200,000 cells/ml in a single lactation). Those cows are the most likely culls. If the SCC is high on a single test, the cow may recover on her own or with the assistance of treatment.

**Figure 1. An example of a DHI hot sheet.**

# Hot Sheet

Mid-South Dairy Records ******* HOT SHEET ******* Page 1
41 samples collected 4-28-10 tested 5-03-10

| Index | Barn | Milk | Fat | Pro | SNF | MUN | SCC | Count | DIM | Lac | CAR | B# |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Avg | 41 cows | 59.8 | 3.9 | 3.3 | 9.0 | | 3.6 | | 140 | | | |

Highest 20 SCC Cows — Weighted Average SCC: 492

| Index | Barn | Milk | Fat | Pro | SNF | MUN | SCC | Count | DIM | Lac | CAR | 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 |
| 457 | NIKKI | 81.4 | 3.2 | 2.9 | 8.1 | | 5.9 | 746 | 34 | 2 | | 179 | 5.0 |
| 554 | AIDA | 44.8 | 4.3 | 3.4 | 9.2 | | 6.3 | 985 | 150 | 1 | | 161 | 3.7 |
| 289 | WHITCHA | 61.7 | 3.2 | 3.2 | 9.0 | | 5.4 | 528 | 308 | 4 | | 149 | 2.7 |
| 68 | 5639556 | 85.1 | 4.0 | 3.0 | 8.8 | | 4.9 | 373 | 15 | 1 | | 139 | 2.6 |
| 17 | M17 | 47.2 | 2.9 | 3.0 | 8.8 | | 5.6 | 606 | 41 | 1 | | 127 | 2.4 |
| 608 | ELIZABE | 36.1 | 4.1 | 3.2 | 8.9 | | 5.8 | 696 | 107 | 2 | | 116 | 2.1 |
| 47 | PEYTON | 68.2 | 4.8 | 3.3 | 9.0 | | 4.8 | 348 | 117 | 6 | | 106 | 2.0 |
| 35 | SQUIRRE | 58.0 | 3.8 | 3.4 | 9.3 | | 4.7 | 325 | 50 | 1 | | 99 | 1.6 |
| 119 | BGEORGE | 66.2 | 3.0 | 3.1 | 8.7 | | 4.4 | 264 | 162 | 2 | | 92 | 1.4 |
| 113 | BETH | 72.4 | 3.4 | 3.4 | 9.0 | | 4.1 | 214 | 316 | 3 | | 86 | 1.3 |
| 4 | GRACEFU | 56.9 | 6.0 | 3.7 | 9.3 | | 4.4 | 264 | 204 | 4 | | 80 | 1.2 |
| 285 | ANN | 60.5 | 4.2 | 3.7 | 9.2 | | 4.3 | 246 | 210 | 4 | | 72 | 1.2 |
| 42 | 42 | 76.0 | 3.6 | 3.3 | 9.1 | | 3.7 | 162 | 28 | 1 | | 67 | 1.0 |
| 86 | 86 | 65.3 | 2.4 | 3.1 | 8.9 | | 3.9 | 187 | 26 | 1 | | 61 | 1.0 |
| 282 | WITCHIE | 68.1 | 3.9 | 3.1 | 8.6 | | 3.7 | 162 | 137 | 3 | | 55 | 0.9 |

## Calf Diarrhea-New Research into Oral Electrolyte Therapy

**By: Michelle Arnold, DVM**

Diarrhea in neonatal calves remains the leading cause of morbidity (sickness) and mortality (death) in North America and Europe with no change in mortality rates between 1995 and 2001 in dairy heifer calves in the United States. According to the 2007 National Animal Health Monitoring System for U.S. Dairy which can be found at:
http://www.aphis.usda.gov/animal_health/nahms/dairy/downloads/dairy07/Dairy07_ir_CalfHealth.pdf
scours, diarrhea or other digestive problems accounted for the highest percentage of preweaned heifer deaths at 56.5%. There are five major infectious causes of diarrhea in calves less than 21 days of age:

*E. coli* K99, rotavirus, coronavirus, Cryptosporidia, and *Salmonella* species. Noninfectious factors such as insufficient or poor quality colostrum, poor sanitation, stress, and cold weather can cause or contribute to neonatal calf diarrhea as well. Regardless of the cause, diarrhea results in increased loss of electrolytes and water in the feces of calves and decreases milk intake. Ultimately, this process causes dehydration, metabolic acidosis (the blood is more acidic than it should be), electrolyte abnormalities including sodium deficiency, and a negative energy balance from the lost nutrients and lack of milk. Oral electrolyte solutions have typically been used to replace fluid losses, correct acid-base and electrolyte levels in the blood, and provide nutritional support with the added benefit of being relatively inexpensive and easy to administer. Recent research has elicited better methods to assess and treat a calf with diarrhea as well as better guidelines for choosing an oral electrolyte solution. Faster and more accurate diagnostic tests have also been developed to uncover the underlying cause of the diarrhea. Rapid diagnosis is critical to develop the best treatment options and to prevent future outbreaks.

Accurate assessment of a calf with diarrhea is necessary to determine if oral fluid therapy is adequate or if intravenous fluids are indicated. The choice depends on determination of two important factors: 1) if the severity of the dehydration is more or less than 8% and/or 2) the severity of the metabolic acidosis or low pH of the blood. Dehydration is relatively easy to monitor by examination of the position of the eyeball and by skin elasticity or the "skin tent" test. The degree of recession of the eyeball in the orbit (how far the eye is "sunken in") can be estimated by gently pulling the lower eyelid down and measuring the distance between the eye and the socket. If the distance is greater than 0.2 inches, dehydration is more than 8%. Likewise, if the skin is pinched on the side of the neck and rotated 90 degrees then released and the time for the skinfold to disappear is greater than 6 seconds, the calf is considered greater than 8% dehydrated and in need of intravenous fluids. Although these measurements are somewhat subjective and may occasionally be inaccurate, they are by far the most accurate clinical indicators of dehydration that can be easily measured in the field. Conversely, field methods to assess acid-base status are not as good because they are based on a depression or demeanor score to predict the level of acidosis. Calves often have other concurrent metabolic problems that cause depression so these scores may be incorrect in complicated cases. Two parameters are important to assess: 1) the ability to stand (strong, weak or wobbly, down or recumbent) and 2) the ability to suck (strong, weak or slow, or no suckle reflex). In general, a standing calf with a strong to moderate suckle reflex or that demonstrates a "chewing action" should safely tolerate oral fluids. Any calf with a very weak or absent suckle reflex should be given intravenous fluid therapy because if oral fluids are given to a calf with ileus (no gut motility), the fluid is not absorbed but instead pools in the rumen resulting in bloat and rumen acidosis. Calves that are weak and wobbly with a weak or absent suckle reflex will benefit greatly from intravenous fluids that rapidly replace fluid volume and correct acid-base balance at the same time followed by oral fluids. ANY calf that is severely depressed and unable to stand requires intravenous fluids. A table summarizing these assessments and treatment options can be found at: http://www.extension.org/pages/65519/early-identification-of-sick-dairy-calves-important-to-their-survival-and-future-milk-production

In general, when oral fluids are indicated, they should be fed as an extra meal to calves that have diarrhea. For example, if calves are normally being fed morning and evening, then oral electrolytes can be fed in the middle of the day. If this is not possible, then electrolytes can be fed along with milk (particularly the products that contain acetate or very low concentrations of bicarbonate). Some experts used to recommend a "rest the gut" approach to calf diarrhea, suggesting that continued milk feeding worsens diarrhea. However, research has shown that milk feeding does not prolong or worsen diarrhea, nor does it speed healing of the intestines. Calves should be maintained on their full milk diet plus oral electrolytes when possible. If calves are depressed and refuse to suckle, milk can be withheld for one feeding and a hypertonic oral electrolyte product such as Calf-Lyte II HE or Enterolyte HE may be substituted. Milk feeding should always be resumed within 12 hours or blood glucose concentrations will drop too low and the calves get too weak to respond to treatment.

Improved diagnostics are now available to ascertain the cause of neonatal calf diarrhea. The UKVDL has recently developed a Calf Diarrhea Multiplex PCR panel (cost of $50 plus a $10 accession fee)which tests for the major diarrhea pathogens *E.coli* K99, Rotavirus, Coronavirus, *Salmonella* spp., and

Cryptosporidia from one fecal sample submitted early in the course of disease and before any treatment is instituted. It is highly accurate as it detects the DNA or "molecular fingerprint" of the various pathogens and results are available within 1-2 days. A culture of the bacteria is also recommended (an additional $15) in order to identify which antibiotics will work best against bacterial agents. At least 5 grams of feces must be submitted in a labeled, leak-proof container maintained at a cold temperature during transport. Do not submit fecal samples in gloves; screw cap tubes or vials are preferred in the laboratory. Call the UKVDL (859) 257-8283 or check the website http://vdl.uky.edu for more information.

### Why Are My Dairy Cows Not Milking As Well This Year?
**By: Donna Amaral-Phillips**

In most years, cooler fall temperatures result in dairy cows increasing in milk production with cows getting bred back quicker than the summer months. Most of these responses are a result of some herds freshening more cows in the fall, improvements in cow comfort, more time available to maintain facilities, nutrition and reproductive programs, and feeding programs re-formulated to reflect fall/winter stored feeds. Some years, dairy cows may not respond as well as previous years with production being lower than expected. Many different explanations exist for dairy cows, especially early lactation cows, not milking as well. Combinations of factors often contribute to the overall situation of lower milk production and /or reproductive issues. Outlined in this article are some potential factors that might help explain reductions in milk production this fall compared to previous years.

- **Increased average days in milk:** As dairy cows enter mid to later lactation, milk production naturally trails off with milk production peaking during early lactation. As the percentage of cows in mid to later lactation increases (increasing days in milk), milk production will be expected to be lower. This contributing factor to lower milk production might seem very obvious, but can provide a possible explanation or partial explanation which can easily be overlooked.
- **Longer term effects of heat stress:** With the average day time temperatures in the 90's this past July and August for long periods of time and with hot nights, dairy cows were definitely under heat stress. Although fan, sprinklers, and other ways to accomplish heat abatement are important and need to be used to decrease the effects of heat stress, the heat and humidity still had a detrimental effect on feed intake and fertility. Often times, these detrimental effects on fertility and milk production are seen for 6 to 8 weeks after heat and humidity subside.
- **Lower body condition of early lactation cows:** In early lactation, dairy cows cannot consume adequate amounts of energy to meet the energy needs for milk production and maintenance of the cow herself. As a result, early lactation cows are said to be in negative energy balance and rely on body stores of fat or adipose tissue to support the additional amounts of energy needed to support milk production they cannot consume. If these stores are not present or are mobilized too quickly, cows often times will produce the amount of milk equal to the amount of energy they can consume. In other words, they will not milk as well as they could have or peak as high in milk production. Thin early lactation cows often are related to cows calving thinner than normal or metabolic disorders related to the transition back into the milking herd that result in cows going off feed and dropping in body condition quickly.
- **More cows in the milk herd:** Often-times cows are added to the milking string to improve cash flow without making accommodations for increased bunk space (hay, silage, and/or TMR) and/or resting space. Overcrowding at the feed bunk can decrease feed intake especially in fresh and early lactating cows resulting in lower milk production. Sometimes overcrowding with other contributing causes can result in lowered milk production even when it appears that no feeding and management practices have changed.
- **Thinner cows at calving:** Dairy cows are the most efficient and cost effective at putting on body condition or fat stores when they are milking versus when they are dry. Thus, our management programs are geared toward putting condition on cows in mid to later lactation, having them in the proper condition at dry off, and maintaining that condition during the dry period. Summer temperatures can decrease or stop the growth of pasture grasses and legumes, thus decreasing forage availability and sometimes dry cows lose weight or body condition if alternative forages are

not provided.  In addition, with higher grain costs, dry cows may not have been provided adequate amounts of grain to maintain body condition if forage quality was low.  Dry cows that calve too thin will not have the energy reserves to milk well this next lactation, especially during early lactation.

- **Rebalanced rations to reflect quality of forages currently being fed:** The quality and thus nutrient content of forages change between crop year, cuttings, and type of forage.  In addition, yearly differences exist in the digestibility of forages by the rumen bacteria.  These changes in NDF digestibility can greatly affect the amount of energy cows and, more importantly, bacteria receive from the forages and other feeds consumed.  A current forage analysis should be used to balance rations numerous times each year.  Monthly ration balancing or review of rations being fed is recommended for the most economical and efficient use of forage resources.   With the wide swings in commodity prices, this reevaluation becomes even more critical.
- **Limited grain in corn silage:** With this summer's drought and high temperatures during corn pollination, corn silage may contain limited amounts of grain and the amount of corn silage available to be fed may be limiting.  These changes in the quality and quantity of corn silage potentially decrease the amount of energy coming from these forages.  To try and compensate for the decreases seen in grain content, more energy needs to be added to these rations in the form of ground corn grain or other byproducts, increasing the cost to feed the milking herd.   At the same time, these alterations may alter the digestibility of starch and fiber fractions of the diet and the bacteria may not have the identical types and digestibility of energy sources compared to diets containing higher grain, corn silage diets.  Bottom line, when the bacteria do not get adequate amounts of energy at specific times, they produce less end products cows can use to make milk and, as a result, milk production may be reduced.  Sometimes, these diets need to be tweaked over time to get the best combination.  Working with your nutritionist and fine tuning these diets over time is the best way to achieve the desired results.  Blending last year's corn silage with this year's has helped cows adjust to the differences and bridge the gaps.  This may offer one explanation of why some herds have been able to hold milk production similar to previous years.
- **Changes in forages being fed:** With reduced corn silage yields and multiple dry years, some dairy farmers have opted to include silage made from forage sorghum into diets for the milking herd.  Granted these varieties most likely have higher digestibility than older varieties of forage sorghum, but they still contain less energy than higher-yielding, energy dense corn silage.  Can they work well in rations for milking cows?  Yes, but your nutritionist needs to make sure the bacteria have the nutrients they need (carbohydrates and nitrogen or amino acid source) at the correct time.  Thus, old recipes for grain mixes may not always work and they may or may not support 70-80 lb herd averages.
- **Problems when transitioning cows back into the milking herd:** A smooth transition of cows back into the milking herd is critical to getting dairy cows to milk well in early lactation and rebred. Often-times, minimizing stress, caused by limited feed bunk space (recommend 36 inches per cow), cow comfort (provide effective heat abatement) and resting space, 3 weeks before calving through 3 weeks after calving, is the starting point.  Diets need to contain adequate amounts of effective fiber or chew factor for proper rumen fill, minerals and vitamins to prevent subclinical (no visible signs but blood calcium is low) milk fever, and adequate but not excess amounts of energy and protein. Subclinical problems are often not detected and can cause issues in fresh cows that result in decreased feed intake before or after calving, rapid losses in body condition, and decreased milk production and reproductive performance.
- **Other disease issues:** Clinical cases of diseases, such as mastitis or metritis, can decrease milk production and reproductive efficiency.  In addition, mycotoxins in feeds (forages as well as grains) also can decrease feed intake in herds and may affect performance.  However, before dairy farmers blame mycotoxins for decreases seen in milk production and/or reproductive performance, other aspects of their feeding and management program should be examined and eliminated as potential causes first.

**Cooperative Extension Service**

University of Kentucky
*Animal and Food Science Dept.*
400 W. P. Garrigus Building
Lexington KY  40546-0215

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