



## Worksheet 16: Feeding and Milk Quality Variation

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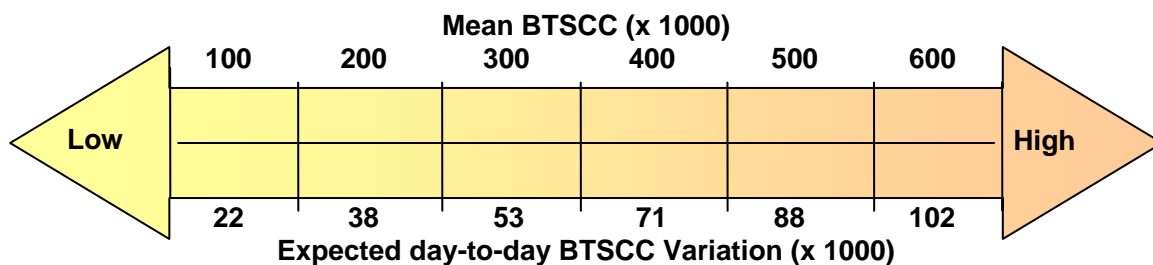
How consistent are you at managing your dairy? How consistent and compliant are your employees in carrying out the management protocols on your farm? Successful farms are consistent in how work is done. Cows love to be bored. They love it when everything is always the same. Cows love it when they don't even know there is a different milker milking them. They milk best when milking routines are the same time after time. They perform best when fed palatable diets that consistently provide all nutrient requirements day after day. These are just two of many examples of how cows do better when consistent, high quality management is used on the farm.

A recent University of Minnesota study of over 1500 Upper Midwest dairies indicates that day-to-day variation is a reliable way to measure the quality of herd management processes. The study shows the benefits of doing the work in a consistent and routine manner on your farm. In this study, day-to-day variation of bulk tank butterfat %, protein % and BTSCC were measured for an entire year.

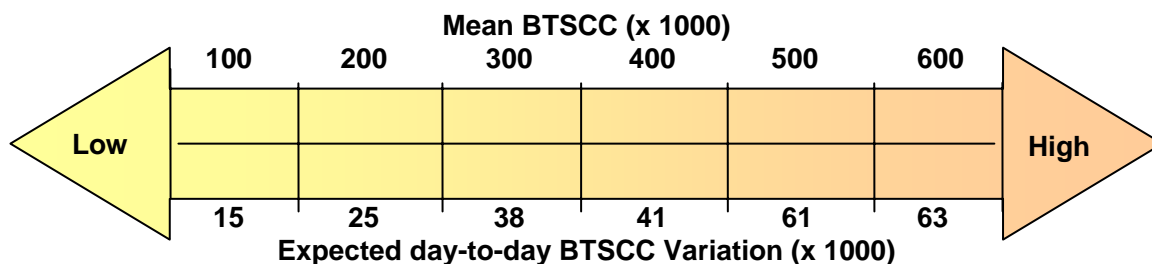
Variation is a measure of process quality, compliance and consistency. For a bulk tank somatic cell count (BTSCC), the magnitude of the variation can be a good indicator of the level of those on-farm management processes (or procedures) that result in milk quality. **Figure 1** indicates the relationship between day-to-day BTSCC variation and BTSCC level. Since herd size will have an effect on the degree of variation, the data in this study was categorized for herds less than 100 cows and herds with greater than 100 cows.

**Figure 1. BULK TANK SCC**

*ARROW A (Herds less than 100 cows)*



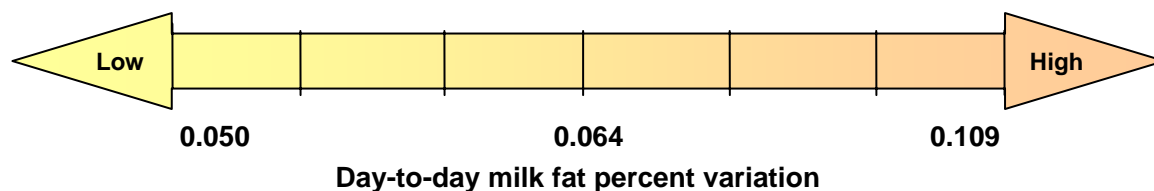
*ARROW B (Herds 100 cows or more)*



Therefore, if you know your average BTSCC and the day-to-day variation you will be able to determine the quality of the processes or the consistency with which the processes are applied. For example, if a farm has a higher than desired BTSCC but the day-to-day variation in BTSCC is low, this is an indication that compliance and consistency to the current procedures is good. But in order to improve BTSCC you should focus on improving the overall processes. On the other hand, if both BTSCC and day-to-day BTSCC variation are high then you need to focus first on becoming more consistent and then think about improving the processes.

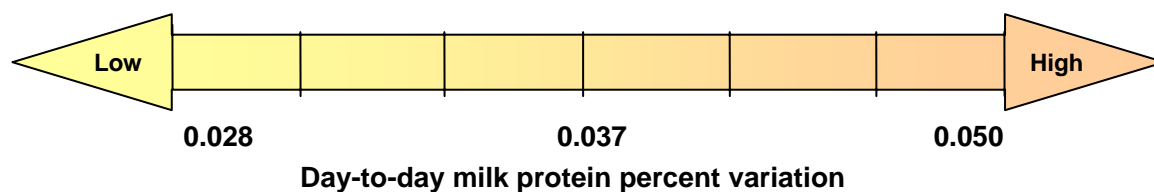
Do you have concerns about the nutrition of the dairy herd? Day-to-day variation of milk fat and protein tell something about the consistency of the herd's nutrition. However, when assessing herd nutritional management it is only necessary to study day-to-day milk fat and protein variation. There is no correlation between milk fat or protein level and day-to-day variation. **Figures 2 and 3** show the day-to-day variation of butterfat % and protein % for over 1500 Upper Midwest dairies.

**Figure 2. BULK TANK MILK FAT**



Low day-to-day variation in milk protein and fat implies that a very consistent feeding program is being implemented on the farm. High variation would then imply the opposite is true.

**Figure 3. BULK TANK MILK PROTEIN**



**How Dairy Producers Can Utilize Variation Data for Managing Their Herd**

For herds subscribing to MILKLAB now being offered to farms in the Upper Midwest, this calculation is automatically done. This Internet service uses bulk tank test results to make a daily control chart plot in which the herd mean and sigma value (a measure of variation) is calculated. Any herd selling milk to processors offering this service or any of those dairies whose milk is being tested at the Dairy Quality Control Inc. milk testing laboratory can get this service. If you have not heard of this service, ask your milk plant field representative for further details or log on to [www.dairyperformance.com](http://www.dairyperformance.com) for more information. Otherwise you can calculate and evaluate your herd variation in three easy steps described below.

**Step 1. Calculate the mean and standard deviation.**

Take the last twenty bulk tank SCC (fat or protein) results and calculate their mean and standard deviation. You may want to use a scientific calculator, computer software or **Table 1**. To use the table, write the last twenty bulk tank SCC (fat or protein) results in Column A (starting from the first result) and Column B (starting from the second result). Calculate the difference between Columns A and B and record the results in Column C. For SCC evaluation calculate the average of the numbers from Column A and record the result in the square at the bottom of Column A. For SCC, fat and protein calculate the average of the numbers from Column C divide it by 1.13 and record the result in the square at the bottom of Column C. The numbers in the squares represent the mean and the variation of your process.

	Column A		Column B	Column C
1		2		
2		3		
3		4		
4		5		
5		6		
6		7		
7		8		
8		9		
9		10		
10		11		
11		12		
12		13		
13		14		
14		15		
15		16		
16		17		
17		18		
18		19		
19		20		
20				
<b>AVERAGE</b>	<div style="border: 1px solid black; width: 100px; height: 40px; margin: 0 auto;"></div>			<div style="border: 1px solid black; width: 100px; height: 40px; margin: 0 auto; position: relative;"> <div style="position: absolute; top: -10px; left: 50%; transform: translate(-50%, -100%);">÷ 1.13</div> </div>
	<b>MEAN</b>			<b>VARIATION</b>

**Step 2. Rank your farm.**

Use the numbers you obtained in Step 1 to rank your farm processes by placing an **X** at the appropriate location on the arrows.

### ***SCC Interpretation***

When looking at SCC you should first find the arrow appropriate for your herd size and then mark an **X** at BTSCC mean closest to your farm's mean BTSCC in the upper row of the arrow (**Figure 1, Arrows A and B**). Mark the variation (sigma) on the lower row of the arrow. It is expected that the **X** for your variation should be in the same column as the **X** you marked for the mean. If you marked an **X** for variation above (to the right) of the indicated value for the particular mean, that means that the variation in SCC is large; a value below the expected value identifies a small variation.

### ***Fat and Protein Interpretation***

When looking at milk fat or milk protein you only need to consider variation. Use **Figures 3 and 4** to mark the farm's variation in the appropriate location on the arrow. An **X** closer to the left end of the arrow represents a low variation; in the middle, an average variation; and at the right end, a high variation.

### **Step 3. Draw your conclusions.**

#### **What if your variation is high?**

If the variation is higher than expected, this suggests a need to improve process compliance and consistency. Evaluation of employee compliance to protocols and/or the consistency with which protocols are followed is needed. On farms where SOP's (standard operating procedures) are not in place, encouragement should be given to write them. Routine employee training should be implemented to be sure that each employee understands their duties and is committed to following all SOPs. Training is effective in reducing variation. Recent University of Wisconsin studies indicated that herds with more frequent training for milkers had lower BTSCC.

#### **What if variation is low?**

When the variation is low the good news is that the employees are being consistent in their work. The bad news is that, if the dairy is still not producing milk of desired quality, some things are being done consistently wrong. Take a closer look at how all tasks are performed, take measurements and make observations. When concentrating on problems with milk components, the things to evaluate could include: bunk space per cow, feed dry matter change, TMR mixing time, manure score, particle size of feed that is fed to the cows and the refusals, etc. Some examples of the measurements to take when attempting to lower the SCC are: cow density, bedding cultures, cow hygiene score, bulk tank cultures and a number of other indicators that might help identify the root cause of the problem.

#### **What if variation is average?**

If the variation for BTSCC, fat or protein lays somewhere in the middle of the indicated range there is room for improvement in both consistency in people performance and the processes themselves. Experience has shown that it is best to start by improving consistency and protocol compliance. This makes it easier to identify true improvement in performance. By first reducing the variation in performance, when changes are made to the procedures used, it will be easier to determine if the implemented changes actually resulted in any improvement in milk quality.

Monitoring variation is not the panacea remedy that will automatically solve all problems on the farm. However, experience in nonagricultural industry has shown that taking a closer look at variation can be very helpful in spotting emerging problems early as well as aid in the discovery of the root causes. This approach can result in both an improved herd and employee performance.