

## Herd Somatic Cell Counts: The Complete Story?

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Somatic cell counts (SCC) are excellent indicators of subclinical mastitis. Somatic cells are mostly leukocytes (white blood cells), and they increase in milk almost entirely because of microbial infections. Thus, SCC are used widely by dairy producers and processors as a measure of milk quality. Higher SCC in milk decreases shelf life in the grocery store and decreases yields of cultured dairy foods such as cheese.

Dairy producers routinely appraise bulk tank (or DHIA average) SCC to track mastitis in their herd. It has long been recognized that there is a strong, positive correlation between the proportion of infected cows (mastitis) and herd SCC, and an increase in herd SCC equates to lost production of milk and other health problems in cows.



Herds with SCC that are consistently below 150,000 cells/mL will have less than 15% of their cows infected with subclinical mastitis, while herds with SCC consistently near 500,000 cells/mL will have nearly half of their cows with mastitis. Herds with SCC under 100,000 cells/mL may have only 5% of their cows infected. But interpreting the level of mastitis in a herd using herd SCC from bulk tanks or DHIA records requires a little insight. The key words for this interpretation are consistent and average.

Herd SCC can vary from day to day and week to week. Additionally, bulk tank SCC are not indicative of the entire mastitis picture, because treated cows with clinical mastitis are very likely to have their milk withheld from market due to drug residue concerns, and thus they do not contribute to the herd bulk tank SCC.

Both bulk tank and DHIA herd average SCC rely on two factors, both the number of cells and the pounds of milk that each cow yields into the milk supply. Therefore, cows that are higher milk producers than their herdmates will contribute more to the measures of herd SCC. High-producing cows with low SCC are beneficial for herd milk quality, but high producing cows with mastitis will have a negative impact on herd milk quality.

Table 1 lists the percent of the total herd SCC (weighted DHIA average) that is contributed by (1) the three highest SCC cows in each herd, or (2) the top 2% (highest SCC) of cows in each herd for 50 dairy farms from Michigan, Ohio, Indiana, and Pennsylvania. The data is further divided into herds with less than 200 cows (18 herds), 200 to 499 cows (20 herds), and 500 or more cows (12 herds). As would be expected in smaller herds, just three cows with high SCC can impact the herd SCC dramatically, averaging 32% of the SCC contribution from all cows in the herd.

As herds get larger, the impact from three individual cows is much smaller. However, what does not change with herd size is the impact that just a small percent of the herd (2% of the milking cows) has on the total herd SCC. For example, even in herds with more than 500 milking cows, the highest 2% SCC cows contributed an average of 35% of the total herd SCC. *So whether you are milking 70 or 3,000 cows, herd milk quality is affected by a small proportion of animals.* It should be noted that none of the herds in this table had SCC more than 400,000 cells/mL.

**Table 1- Contribution to total herd SCC (weighted DHIA average) by small populations of cows within herds (n=40 herds)**

Herd Size (number of milking cows)	Percent of total herd SCC	
	Highest 3 SCC cows in herd	Highest 2% SCC cows in herd
< 200	32	30
201– 499	22	32
≥500	13	35

Consistency must also be considered when using herd-level SCC to help determine milk quality. SCC can vary considerably and be affected by daily changes in the herd relative to proportions of fresh cows to cows that are culled or dried off and younger to older animals, cows with infections of long duration, cases of clinical mastitis, and to some extent sampling and laboratory variation.

Care should be used to assess meaningful changes in herd average SCC based solely on one or two months of records. As described above (Table 1), all herds can see deviations in SCC from the infection dynamics of just a small percentage of cows.

When considered over longer periods of time, herd average SCC correlate well with the number of infected cows within the herd. However, a better indicator of trends in subclinical mastitis is the distribution of individual cow SCC rather than the average herd SCC only. In general, cows with linear SCC scores of 4 or greater are likely to be infected. Thus, a key indicator for milk quality might be to follow the proportion of cows with linear SCC scores of 3 or less, or non-infected cows.

Table 2 is a six-month history of a herd with a DHIA herd average SCC that exceeded 400,000 cells/mL. Overall, the herd average SCC trended downwards over the period. However, the overall increase in the percentage of non-infected cows (linear score < 4) was very modest, only 65 to 67%. Additionally, the apparent decline in subclinical mastitis that occurred from month 2 to 3 (as measured by herd SCC decreasing from 334,000 to 281,000 cells/mL), actually resulted in an increase of infected cows by 5%. Thus, dairy managers and veterinarians should track the distribution of SCC scores as well as average SCC to monitor quality milk.

**Table 2 Herd average SCC and individual cow linear SCC score over an 8-month period**

Month	Herd SCC (cells/mL)	Linear SCC score			
		0-3* (< 142,000)	4 (142-283,000)	5 (284-565,000)	6-9 (>565,000)
—	439,000	65	12	7	16
1	272,000	69	10	9	12
2	334,000	69	11	7	13
3	281,000	64	14	11	11
4	169,000	72	15	8	5
5	243,000	74	11	8	7
6	280,000	67	12	9	12

\*Uninfected by DHIA SCC standards

SCC are an important tool for helping to monitor quality milk on a dairy farm and are a good indicator of subclinical infection both at the individual cow and at a herd level. However, interpretation should consider three key points:

1. Considerable variation can occur both on at the individual cow and herd level.
2. A small proportion of cows within a herd usually account for a disproportionate amount of SCC in bulk tank milk, regardless of herd size. This disproportionate contribution can especially lead to larger variability in smaller herds.
3. While herd average or bulk tank SCC are useful for monitoring quality milk over the long term, the distribution of individual cow SCC offers a better insight to trends in subclinical mastitis.

One final reminder, SCC cannot reveal the true nature of clinical mastitis or hospital pen cases within a herd. This information needs to be obtained from treatment records.