

Somatic Cell Counts and the Milk Check

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Dairy producers strive to maintain high quality milk, which contributes to a safe, sustainable food supply. Mastitis also impacts cow health and well being and ultimately the economic well being of the dairy. Many cooperatives offer incentives linked to quality milk standards such as somatic cell counts (SCC), bacteria counts, preliminary incubation counts, and the absence of any drug residue violations. Thus, a bonus is added to the milk check which is a palpable reward for a job well done. Ironically, this isn't the biggest financial reward for reducing mastitis. Mastitis, the inflammatory response to infection in the mammary gland, decreases the capacity of epithelial cells to produce milk, or destroys epithelial cells altogether. Unresolved infections, even those that seemingly cause minor (subclinical) increases in somatic cell counts, will result in lost milk production in an affected cow, every milking, every day of her lactation. This economic loss is a lost opportunity, and unlike the incentive programs, doesn't seemingly put "real" money in a producer's milk check. However, a cow with subclinical mastitis has the same feed, housing, labor, and husbandry expenses whether she is achieving her optimal production, or losing milk to mastitis. Thus, subclinical mastitis is a "silent" money sink.

Pioneering work by Raubertas and Shook (1982) found that there was direct linear relationship between milk yield loss and the log 2 transformation of SCC. More simply stated, it was estimated that 1.5 lbs of milk was lost per day in older cows (0.75 lbs in first lactation cows) for each doubling of SCC, or unit increase in linear score. For example, a cow with a SCC of 200,000 cells/mL (linear score of 4) would lose 1.5 lbs per day as compared to a cow with a SCC of 100,000 cells/mL (linear score of 3). Likewise, a cow with a SCC of 400,000 cells/mL (linear score of 5) would lose 3 lbs of milk per day compared to the cow with a linear score of 3. Thus, as SCC increase (an indicator of more pronounced inflammation) milk yield losses increase. This concept has been used by DHI programs to estimate milk yield losses for dairy herds based on individual cow linear SCC scores. But are there other factors involved in milk yield loss related to SCC? More recent studies have re-examined this relationship and may better reflect the current production, management, and genetics of dairy operation than 30 years ago. One of the more intriguing studies was published by Hand et al (2012).

In this study, DHI records from over 2,800 dairy herds in Ontario were reviewed to determine the relationship between SCC and milk production. Although similar to the Raubertas and Shook report, the Canadian study suggested that the amount of milk lost per day to increasing SCC may be greater than previously suggested, especially in first lactation animals. Additionally, *the impact of mastitis on milk yield loss, both in terms of pounds of milk per day and percent of daily milk yield increases in higher producing cows.* Table 1 is a synopsis of the Canadian study.

Table 1- Estimated daily milk loss (pounds and percent) by a cow with selected SCC ($\times 10^3$ cells/mL), relative to a cow with a SCC of 100,000 cells/mL . (Hand et al, 2012)

Lactation (Rank of cows in herd- by milk production)	Daily Milk Loss					
	Pounds			Percent		
	SCC - 200	SCC - 500	SCC - 800	SCC - 200	SCC - 500	SCC - 800
1 (Lowest 25% milk production)	.75	1.75	2.3	1.4	3.3	4.3
1 (Highest 25% milk production)	1.75	4.1	5.3	2.2	5	6.5
2 (Lowest 25% milk production)	1.3	3.1	4.2	2.5	5.7	7.4
2 (Highest 25% milk production)	2.4	5.5	7.2	2.7	6.2	8.0
3 (Lowest 25% milk production)	1.4	3.2	4.2	2.4	5.6	7.3
3 (Highest 25% milk production)	2.4	5.5	7.2	2.7	6.2	8.0

Additionally, total lactation milk yield loss increased for each test day that a cow had a SCC of greater than 100,000 cells/mL, (linear score 3), especially for cows with at least 5 test days above 100,000 cells/mL.

Mastitis causes a destructive inflammation in the mammary gland, even when the inflammation is a mild subclinical infection. Beyond the lost incentives for quality milk, treatment costs of clinical cases, decreased reproductive fertility, and decreased longevity and well-being of affected cows, mastitis also causes a pernicious day to day milk yield loss.

Some important points to consider from the Canadian study:

- 1) Milk yield loss begins at any SCC over 100,000 cells/mL
- 2) The greater number of days that a cow has subclinical mastitis in a lactation (the earlier she becomes infected in a lactation) the greater the milk yield loss. This implies that reducing new infection rates during the dry and transition period is a critical part of a herd quality milk program.
- 3) Milk yield losses are proportional to the milk yield potential of a cow. Higher producing cows lose the same percent of milk each day from mastitis as a lower producing cow, thus higher producing cows lose more milk.

References

Raubertas, R. F., and G. E. Shook. 1982. Relationship between lactation measures of somatic cell concentration and milk yield. *J. Dairy Sci.* 65:419–425.

Hand, K.J., A. Godkin, and D.F. Kelton. 2012. Milk production and somatic cell counts: A cow-level analysis. *J. Dairy Sci.* 95:1358-1362.