Consequences of a High Somatic Cell Count (>200,000) at First Test on PRODUCTION, REPRODUCTION AND CULLING

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It is well established that elevated somatic cell counts (SCC) are an indication of intramammary inflammation caused by bacterial intramammary infections (IMI). Cows having Log Linear Somatic Cell Scores greater than 4.0 are indicative of subclinical mastitis, characterized by infection and inflammation (NMC, 2001). Mastitis researchers have determined the relationship between the increasing levels of somatic cells and lost milk production. Beginning at an SCC of 100,000 cells per ml, there is a loss of milk production. The amount of milk production lost is approximately 0.75 lbs./day for first lactation cows and 1.5 lbs./day second plus lactations for each time the SCC doubles. From this, the amount of milk lost for the herd can be estimated from the SCC of individual cows on a given test day. In addition to the effect of elevated SCC on milk production, cows with elevated SCC's have lower conception rates, are at greater risk for developing clinical mastitis and have higher culling rates than cohorts with low SCC's.

SCC's greater than 200,000 SCC/ml (Log Linear Somatic Cell count greater than 4.0) are indicative of subclinical mastitis characterized by infection and inflammation, and are used as an indication that cows have an IMI. Cook, et al., have set a goal of no more than ten percent of the cows in the herd should have SCC's greater than 200,000 cells/ml of milk on the first test day. Not until recently, has the impact of first test day SCC's exceeding 200,000 SCC/ml on subsequent milk production for the lactation been evaluated. Kirkpatrick and Olson evaluated DairyComp 305® herd records from 22 herds in the states of Washington, Oregon and Idaho in the USA. To be eligible for evaluation, the herds had to perform routine monthly milk testing, and record clinical mastitis cases. The evaluation was limited to Holstein cattle for a total of 164,423 cow records. A cow was declared to have subclinical mastitis if somatic cells were greater than 200,000 cells/ml, or a log linear score was greater than 4.0 on first test day (LSC1). Additionally, each individual cow record was examined for the occurrence of clinical mastitis within the first 60 days of lactation. Lactation curves were created at 30-day increments for cows with or without a high LSC1. The same technique was performed for cattle with or without a case of clinical mastitis in the first 60 days of lactation. In the case of clinical mastitis the calculated differences in the curves represented a loss of 1007 lbs. (457 kg). of milk production or $181 lost milk yield ($18.00/45.4 kg) or $129 income over feed costs ($0.29/kg dry matter). Losses extended out to 270 days in milk (DIM). By comparison, the calculated loss attributable to high LSC1 represented 1583 lbs. (718 kg) of milk production amounting to a $285 lost milk yield ($18.00/45.4 kg) or $203 income over feed costs ($0.29/ kg dry matter) that extended through the first 210 days of lactation. Individuals with a high LSC1 demonstrated an increased loss of 576 lbs. (261 kg.) of milk and $74 of income over feed costs when compared to cattle having a clinical case of mastitis in the first 60 days of lactation.

The effect of subclinical mastitis based on LSC1 on the first test day was examined as a risk factor for the subsequent development of clinical mastitis and median time to clinical mastitis. Cows with or without a high LSC1 had a 25.6% vs. a 7.9% incidence rate of clinical mastitis by 60 days-in-milk (DIM), respectively. Of cows that developed clinical mastitis, the median days to clinical mastitis was 35 DIM for cows with a high LSC1 in contrast the low LSC1 population which was 92 DIM. Cows that have an elevated SCC on

first test day have a higher probability of developing clinical mastitis (2.5 times greater risk) and develop clinical mastitis 57 days earlier.

Removal rates (Sold and Died) were evaluated for the two conditions. The rates of removal for cows with high vs. low LSC1 by 60 DIM was 6.5% vs. 2.2% (3 times greater for high LSC1 cows), respectively. The removal rates for cows with and without clinical mastitis by 60 DIM was 13.7% vs. 7.8% (1.89 times greater for cows with mastitis by 60 DIM) respectively. Odds ratio analysis indicated high LSC1 individuals were 3.0 times more likely to be culled within the 1st 60 days of lactation as compared to unaffected cattle. By comparison, individuals affected with clinical mastitis in the 1st 60 days were 1.89 times more likely to be removed as compared to non-affected in the existing lactation.

Cows with high LSC1 or 60-Day clinical mastitis, both experienced reduced conception risk. Using Kaplan-Meier Survival Analysis, the additional median days to pregnancy, for cows with either condition was an additional 18 days.

This evaluation would indicate that the condition of a high LSC1 on first test day may actually be considered to be a more costly condition than a case of clinical mastitis in the 1st 60 days of lactation. While a high LSC1 is a numerically characterized condition it should be considered a more costly health condition than the presence of mastitis clinical mastitis in the first 60 DIM.

The major steps of control of early subclinical and clinical mastitis include dry cow therapy, the use of an internal dry cow teat sealant, vaccination with a core-antigen mastitis vaccine, management of the dry cow environment and monitoring individual 1st test LSC1. Additional control steps include, recording mastitis events (record systems protocols) and routine DHIA testing allowing producers to identify individual cattle that are affected with these conditions, plus tracking herd trends and taking action to mitigate the adverse effects of subclinical mastitis. In this study both DHIA testing and recorded mastitis protocols were essential in demonstrating health and financial ramifications of these conditions.

Take Homes:

1) Cows with subclinical mastitis on first test date sustained a greater loss of production (1583 lbs of milk) than cohorts without subclinical mastitis.
2) Cows with a case of clinical mastitis in the first 60 days of lactation sustained a greater loss of production (1007 lbs) than cohorts without clinical mastitis.
3) Subclinical mastitis on the first test date resulted in a 50% greater lactational loss of milk production than clinical mastitis in the first 60 days of lactation. This observation had not been reported before.
4) Cows that have an elevated SCC on first test day have a 2.5 times greater risk of developing clinical mastitis with the median days to clinical mastitis 57 days earlier.
5) The rates of removal for cows with high vs. low LSC1 by 60 DIM was 6.5% vs. 2.2% (3 times greater for high LSCI cows). The removal rates for cows with and without clinical mastitis by 60 DIM was 13.7% vs. 7.8% (1.89 times greater for cows with mastitis by 60 DIM).

Cook, N. B., et al. (2002). "Monitoring nonlactating cow intramammary infection dynamics using DHI Somatic cell count data." J. Dairy Sci. **85**(5): 1119-1126.

Kirkpatrick, M. A. and J. D. Olson (2015). Somatic Cell Counts at First Test: More than a Number. NMC Meeting. Memphis, TN

National Mastitis Council. Guidelines on Normal and Abnormal Raw Milk Based on Somatic Cell Counts and Signs of Clinical Mastitis. https://nmconline.org/docs/abnmilk.pdf