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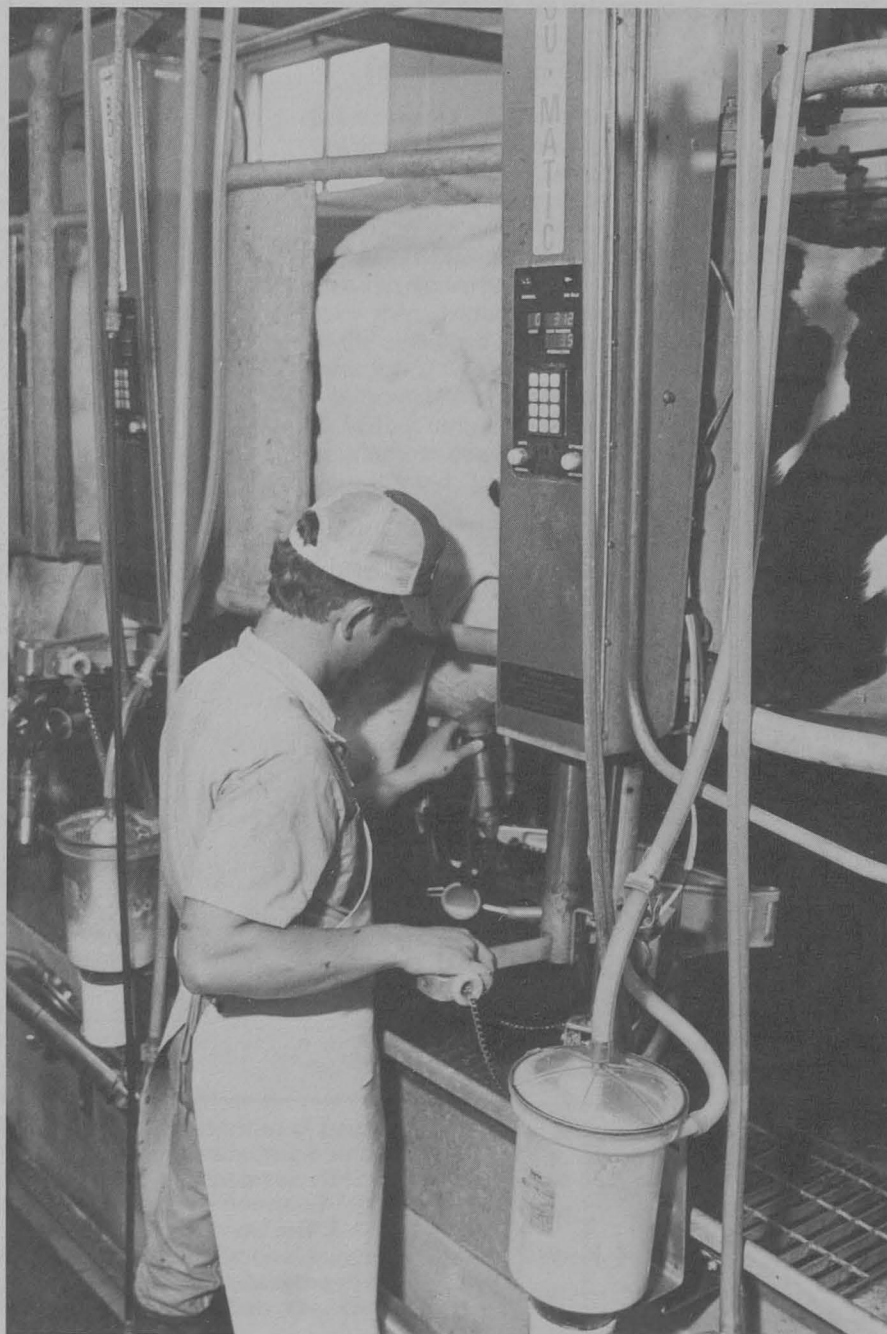
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Somatic Cell Count

An Effective Tool in Controlling Mastitis



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Somatic Cell Count

An Effective Tool in Controlling Mastitis

Mastitis is the most costly disease on the dairy farm today. Nearly 70 percent of this loss is a result of reduced milk production caused by subclinical mastitis.

Mastitis is largely a management disease. To be successful in controlling it, you must be willing to admit that the cause of mastitis probably is due to your own managerial shortcomings.

The Minnesota Dairy Herd Improvement-Somatic Cell Count (DHI-SCC) program is a management tool designed for use as an integral part of a mastitis control program. Successful use of this tool depends on your knowledge and understanding of the SCC report. Proper use of this report not only will create an awareness of the level of mastitis in your herd, but also will give you some idea of what the most likely causes of your mastitis problems are. The Minnesota DHI-SCC program is a herd mastitis prevention program, not an individual cow treatment program. The emphasis is on prevention, not treatment.

Herds Not on the SCC Program

If you do not have your herd on the DHI-SCC program, you can get an idea of your situation by comparing your bulk tank Wisconsin Mastitis Test (WMT) score to the standards shown in table 1. Bulk tank WMT scores less than 6 or bulk tank cell counts less than 200,000 indicate there is not a serious mastitis problem. If your scores are within these ranges, your challenge will be to maintain a clean herd. For you, the SCC program will be a monitoring tool that will enable you to respond to

Table 1. Comparison of bulk tank WMT scores with somatic cell counts.

WMT	SCC	Subclinical mastitis assessment of herd
6 or below	Below 225,000	Excellent: Maintain control measures.
8-12	300,000-465,000	Fair: Check for chronic cows and introduce control measures.
14-16	565,000-675,000	Unsatisfactory: Subclinical mastitis may be widespread in your herd.
18-20	790,000-920,000	Poor: High level of infection present in herd. Large dollar loss due to mastitis.
22 or above	1 million or above	Very poor: Immediate action called for. Obtain individual cow results. Cull or dry off problem cows. DO NOT WAIT. DO IT TODAY.

potential problems before they become a major concern. Bulk tank WMT scores greater than 8 or bulk tank cell counts greater than 300,000 indicate significant subclinical mastitis. If your scores are within these ranges, the SCC program will be an aid in improving mastitis control.

Interpretation of Individual Cell Counts

Before we discuss the interpretation of individual somatic cell counts, let us review some basics. The term somatic cell is a general term referring to the white blood cell. White blood cells are extremely important in combating mastitis. If the udder becomes infected or injured, large numbers of white blood cells migrate to the mammary gland to destroy and remove either the bacteria or the toxin they produce. Therefore, high somatic cell counts in the milk are a strong indication of the presence of an infection.

Although the question of what represents a "normal" cell count remains unanswered, there clearly is a linear relationship between cell count and milk yield (see figures 1 and 2).

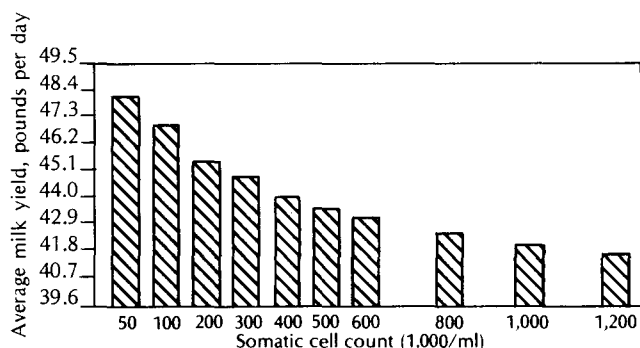


Figure 1. Average milk production of individual cow. (From Shook, G. E. *Approaches to Summarizing Somatic Cell Count Which Improve Interpretability*, National Mastitis Council Proceedings, p. 152, 1982.)

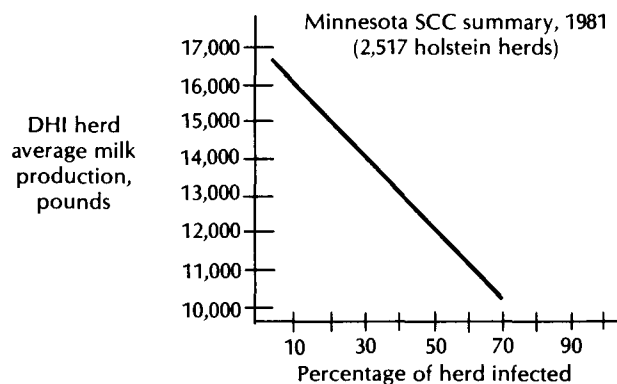


Figure 2. Average milk production of herd.

SOMATIC CELL COUNT SCALE	
NEGATIVE	LESS THAN 250,000
SUSPECT	250,000 - 550,000
POSITIVE	550,000 - 850,000
V STRONG	MORE THAN 850,000
HERD AVG SCC 570,000	

Figure 3. Somatic cell count scale.

Current evidence also indicates that the infiltration of white blood cells through the milk secretion tissue, whatever the cause (infection or other tissue irritation), results in lowered milk yield by that mammary tissue. Each time the cell count doubles, the expected decrease in milk production is approximately 1.4 pounds per day or 400 pounds per lactation. Producers should, therefore, attempt to lower individual cow and herd cell counts as low as is practical to take advantage of more efficient production. Current evidence suggests that an average herd SCC of 150,000 or less is a reasonable and desirable goal.

From the standpoint of mastitis research, approximately 80 percent of those cows with counts of less than 200,000 would be considered negative for mastitis. Of concern would be any cows with counts of 350,000 or greater. Of particular concern would be cows with counts greater than 350,000 cells for 2 or more consecutive months. These cows should be considered infected. Any cow with a single cell count of 500,000 or greater can be considered infected. As cell counts increase, production losses are generally more severe. It is generally thought that large production losses (10-30 percent) are experienced when counts are in the range of 800,000 and above. The DHI-SCC program currently uses the scale shown in figure 3.

Heifers generally have lower counts than older cows. A reasonable explanation would be that since older cows have been in the herd longer and have been milked more times, they are more likely to have been subjected to management induced mastitis. An ideal goal would be that 90 percent or more of the cows in a herd have counts less than 250,000 cells. A reasonable goal would be to have 10 percent or less of the cows positively infected.

Interpreting Herd Summaries

The Minnesota DHI-SCC report has two herd summaries: SCC trends and a yearly SCC summary. Herd summaries can be useful in helping to identify herd management problems. It is usually difficult to decipher herd problems by looking at individual cow data alone.

Both herd summaries consider only positively infected cows in the herd. They characterize the incidence of mastitis with respect to age of the cow and stage of lactation.

Close monitoring of heifers provides a good indication of whether a mastitis control program is being effective. Theoretically, heifers that are managed properly should freshen without mastitis and, if effective mastitis control procedures are being used, they should remain uninfected throughout the lactation.

SCC TRENDS			
LACT NO	PCT POSITIVE OR V STRONG		
	CURRENT	LAST MO	YEAR AGO
1ST	0	0	0
OTHER	9	13	18
ALL	6	10	14

Figure 4. Sample somatic cell count trend summary.

SCC Trends

The trend summary categorizes the infection status of heifers and older cows, comparing the percentage of infected heifers and older cows from a current sample with samples from last month and a year ago. This herd summary is useful for monitoring progress in mastitis control over both the short and long term.

The heifers in the trend summary shown in figure 4 have remained clear of mastitis, indicating that control procedures preventing cow-to-cow spread of mastitis are working well. Progress also may have been made by successful dry cow therapy or the culling of chronically infected old cows.

Drastic increases in the percentage of infected cows from one month to the next (see figure 5) should raise questions and initiate an investigation into what is happening:

1. Is there an equipment problem such as a loose belt on the vacuum pump, a stuck vacuum regulator, a plugged vacuum line, or any other equipment defect that might have a detrimental effect on the milking characteristics of a machine?
2. Is a different person doing the milking?
3. Has there been a sudden and severe change in the weather, with lots becoming muddy and cows becoming wet and dirty and developing frozen teats or other teat problems?
4. Has there been a sudden onset of a disease process such as pseudo cow pox or ulcerative mammillitis that might be causing teat end damage?

SCC TRENDS			
LACT NO	PCT POSITIVE OR V STRONG		
	CURRENT	LAST MO	YEAR AGO
1ST	15	7	3
OTHER	21	7	9
ALL	20	7	7

SCC TRENDS			
LACT NO	PCT POSITIVE OR V STRONG		
	CURRENT	LAST MO	YEAR AGO
1ST	29	0	5
OTHER	50	17	15
ALL	45	12	12

Drastic increase

Figure 5. Examples of drastic increases in percentage of infected cows.

YEARLY SCC SUMMARY			
LACT NO	PCT POSITIVE OR V STRONG*		
	<130 DIM	30-220 DIM	> 220 DIM
1ST	0	0	0
OTHER	10	7	13
ALL	7	6	12

→ First lactation cows clean
→ Some older chronic cows

Figure 6. A herd in which mastitis is being controlled effectively.

Yearly SCC Summary

The yearly summary considers the percentage of infected cows or heifers relative to their stage of lactation. Determination of when the most infections occur during the lactation and in which group (heifers or cows) they are occurring most often will enable you to identify which management factors are the most likely cause of the herd mastitis problem.

Mastitis control in the herd described in figure 6 is good. Heifers are freshening free from mastitis and are remaining free of it throughout the lactation. There are a few older chronic cows in the herd that probably are being milked last. The management techniques being used to control the spread of mastitis in this herd probably include good milking equipment, recommended milking procedures, general sanitation, effective teat dipping, and dry cow therapy.

The herd described in figure 7 is experiencing a high incidence of mastitis in heifers soon after calving. Some possible reasons would include unsanitary heifer maternity facilities, udder edema, and calf sucking problems. In general, the level of mastitis in this herd, except for heifers fresh less than 30 days, is relatively good.

In such a case, searching for deficiencies in milking equipment, milking procedures, teat dipping, or dry cow therapy probably would be unproductive. Emphasizing heifer management should solve the problem.

The herd described in figure 8 demonstrates the typical pattern that develops when there are poor milking

YEARLY SCC SUMMARY			
LACT NO	PCT POSITIVE OR V STRONG*		
	<130 DIM	30-220 DIM	> 220 DIM
1ST	42	1	0
OTHER	14	15	21
ALL	32	9	8

Figure 7. A herd experiencing a high incidence of mastitis in heifers soon after calving.

YEARLY SCC SUMMARY			
LACT NO	PCT POSITIVE OR V STRONG*		
	<130 DIM	30-220 DIM	> 220 DIM
1ST	0	46	60
OTHER	20	34	37
ALL	11	39	42

Figure 8. Typical pattern of mastitis increase when management practices are poor.

practices, marginal milking equipment, or the failure to teat dip or use dry cow therapy consistently. Any one of these circumstances or any combination of them can result in this type of pattern.

Note that the heifers in this herd begin their lactation, as expected, with no infection. As the lactation progresses, however, seemingly small deficiencies (failure to use separate towels to wash and dry, failure to teat dip consistently, allowing too many air slips, etc.) have the cumulative result of increasing the level of mastitis. By the end of the lactation, 60 percent of the heifers in this herd are infected. The owner of a herd with such a pattern needs to analyze milking equipment performance, milking procedures, teat dipping, sanitation, and dry cow therapy.

Herds with mastitis problems due to multiple management or equipment deficiencies throughout the dry period and lactation may not show any of these typical patterns. In such cases, all aspects of mastitis control need serious consideration.

Problem Cow List

The upper right portion of the herd summary lists cows that have contributed a significant portion of the bulk tank somatic cells. The cow's name or number is at the left and the percentage of somatic cells coming from the milk of that cow is at the right.

The two cows listed in figure 9 account for 40 percent of the SCC for a herd. Kelly is contributing more than a fourth of all cells, and Sally is contributing another 14 percent. Keeping Kelly's milk out of the tank would lower the herd average SCC significantly. If, for example, this herd had a herd average SCC of 365,000, removing Kelly's milk would lower it to 279,000.

If you are in the unfortunate situation of having a herd SCC that approaches 1.5 million, withholding the milk from a couple of cows often will reduce the bulk tank count and help ensure your ability to remain on the market.

LIST OF PROBLEM COWS WITH PERCENT HERD SCC		
Kelly, 26		
Sally, 14		

Figure 9. Cows contributing a high percentage of somatic cells.

Individual Cow Data

The column at the left of the summary (see figure 10) identifies individual cows. Age of cow (lactation number), state of lactation (days in milk), and current month sample data (milk weight and SCC score) are listed in the next three columns. Any cow with a score of 3, 4, or 5 should be considered **suspicious** of being infected. **Positive** cows, those likely to be infected but not causing severe economic losses, are those with an SCC of 6, 7, or 8. Cows with a score of 9 or more are in the **very strong** category and are most certainly infected with mastitis.

A *C* in the SCC code column means this cow has had a high somatic cell count for two or more consecutive months since calving. A *P* indicates the cow as a high SCC cow during the previous lactation. An *N* means this cow has a new infection or has been reinfected after having had a count of less than 250,000 for two or more months. The level of infection in any herd depends on the number of cows already infected and the rate of occurrence of new infection, so knowing the rate of new infection each month is helpful in determining whether your mastitis control program is working. If you have just begun some new mastitis control procedures, a decrease in new infections may indicate that they are having an effect. Any significant rise in the new infection rate may indicate a breakdown in mastitis control procedures or may indicate improperly functioning milking equipment.

Individual cow cell count data are useful in identifying problem cows and as an aid in making culling decisions. When possible, changing milking order so that high cell count cows are milked last is a good means of reducing the spread of contagious mastitis.

Monitoring the SCCs of individual cows at the end of lactation may aid in anticipating potential flareups during the early dry off period. Certainly the cow with a consistently high SCC late in lactation needs close observation during this critical period. Discuss appropriate drying off procedures and dry cow treatment with your veterinarian.

What About Treatment?

Obviously, all cases of clinical mastitis should be treated whenever they occur. Generally, however, it is unwise to treat subclinical mastitis (SCC greater than 500,000) during lactation. Treatment of most subclinical infections during lactation cannot be economically justified; the cost of treating cows and discarding the milk far outweighs the benefits. Using good milking procedures as well as teat dipping and dry cow treatment are the most sensible ways of attacking this problem. There is one exception to this general rule. If the subclinical mastitis is caused by the organism *Streptococcus agalactiae*, there is a good chance that treatment during lactation will be effective. If you decide to treat a subclinical case of mastitis, the infected quarter must be identified (California Mastitis Test) and cultured to determine the causative agent as well as its drug sensitivity.

Using SCC for Control

Here is a suggested approach for establishing a control program using the SCC program:

1. Determine the severity of your mastitis problem.
2. If your herd average SCC is greater than 250,000 or the average yearly SCC is greater than 15 percent, review your mastitis control procedures and your milking equipment. Determine the nature of the infection by collecting aseptically and culturing a

composite sample from cows with persistently high SCCs. Another way to characterize a herd mastitis problem is to collect aseptically and culture five consecutive bulk tank samples on special culture media. This procedure should be coordinated with your local veterinary clinic and processed through a veterinary diagnostic lab.

3. Review the control procedures you currently are using and initiate those practices you are not using.
4. Have the adequacy of your milking equipment operation checked twice each year.
5. Be sure you are following proper milking procedures.
6. Improve stall and lot sanitation and other practices, such as clipping the udder, that help keep the udder clean and dry.
7. Use effective teat dips and dry cow treatment routinely.
8. Treat all clinical cases and cull chronic nonresponding cows.
9. Minimize the spread of new infections by establishing a milking order in which infected cows are milked last.
10. Monitor the response of your control program by reviewing your SCC report monthly.

Evaluation of John Dairyman Herd

The John Dairyman herd (see figure 10) has a high herd average SCC (570,000). The high herd average SCC and a yearly average percentage of 33 indicate that this herd has a widespread mastitis problem. The problem is chronic in nature. There are several cows that were infected during the last lactation as well as during this one (*P* in the SCC code column).

Recently the problem seems to have worsened (SCC trends), with 45 percent of the herd infected this month, compared with 17 percent last month. This development may indicate a recent breakdown in equipment or management.

The yearly SCC summary indicates there is a relatively high rate of new infections as cows progress through lactation. Heifers beginning lactation are clean, but by the end of lactation, 38 percent are infected. This pattern may indicate sloppy milking procedures, ineffective and inconsistent teat dipping, or marginal milking equipment. Any one or any combination of the three might explain the pattern.

The problem is a dynamic one and certainly is not under control. There have been three new infections (10 percent of the herd) this month. The number of new infections is a good measure of whether mastitis control is being used or is having an effect.

Further study will yield more information about this herd. This discussion illustrates that proper use of the SCC summary can be an effective aid in controlling mastitis.

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