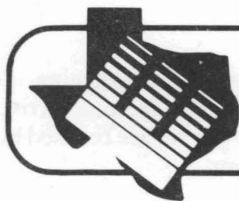


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# Texas Agricultural Extension Service

## Mastitis Control and Somatic Cell Counts

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If you are like most dairymen, you probably feel that you have mastitis under control, at least to a point. Obviously, with all the advances in scientific treatment and prevention programs, how could anyone not have mastitis under control? Unfortunately, a recent survey of dairymen found that at least 40 percent of all cows were infected with some form of mastitis in one or more quarters. It may be hard to believe that almost half of the cows in your herd may have mastitis!

A major reason for such a large number of infected cows is that all too often producers are not seeing their whole mastitis problem. In daily milking routines, dairymen see only a small portion, not more than 30 percent, of the mastitis problem. These are the clinical cases, while the major portion of your mastitis problem is subclinical mastitis. This type is far more costly, harder to detect, and represents more than 70 percent of the herd's mastitis problem. Therefore, an effective mastitis control program should be able to identify both mastitis problems, subclinical and clinical. Fortunately, one proven method of detection available to DHIA members is a regular, cost-effective, individual somatic cell count (SCC) program.

Why individual cow SCC values instead of tank SCC scores? Tank SCC scores can only reflect a composite, or a blended sample of all the cows in the herd. Obviously, a tank SCC score does not fully describe your complete mastitis story. On the other hand, individual SCC scores can identify clinical and subclinical mastitis cases on a single cow basis, which can lead to accurate and timely corrective programs.

### Mastitis: A Costly Disease

Before discussing the advantages of somatic cell counting, it is critical that we examine the potential problems of mastitis. Low levels of mastitis occur even when you follow the 5-point plan recommended by the National Mastitis Council. In this program you:

- use functionally-adequate milking machines in the correct manner;
- dip teats with an effective product after milking;

- administer promptly a full series of recommended treatment to all clinical cases;
- treat each quarter of every cow at drying off with a specially-formulated, commercially-available, antibiotic preparation, and
- cull animals with chronic infections that do not respond to treatment.

The economics of these control programs may vary, but a 1982 study found an average cost to be \$31.70 (Table 1).

Table 1. Estimated Control Costs.

Procedure	Estimated Yearly Cost
Dry treating all quarters	\$4.00
Teat dipping after each milking	7.20
Changing inflation at proper intervals, equipment maintenance	4.90
Use of individual paper towels	5.60
Barn and sanitation costs	10.00
<b>Total Cost per Cow</b>	<b>\$31.70</b>

Note: This does not include the added labor costs.

Table 2. Estimated Annual Loss Resulting from Mastitis.

	Per Cow	Percentage of Total Loss
Decreased yield	\$118.30	65
Discarded milk	23.66	13
Cost of added replacements	16.38	9
Decreased sales value	10.92	6
Drug therapy	7.28	4
Veterinary services	3.64	2
Added labor	1.84	1
	<b>\$182.00</b>	<b>100</b>

Source: Jasper, et al., 1982.

On the other hand, even though you spend a large portion of your profits on disease control, your profits are lower due to lowered production (Table 2). If you notice, the largest factor attributed to this loss was decreased milk yield at \$118.30. As every dairyman

learns to appreciate, a major portion of these losses is directly attributable to clinical and subclinical mastitis.

This probably brings to mind, "My cows don't have that much mastitis; I strip them every day to check!" Stripping, however, will only help detect clinical mastitis. The greatest problem is invisible to the unaided eye—the more costly and prevalent subclinical mastitis. However, a mastitis screening test that quantifies somatic cell counts is a way to detect this silent thief, subclinical mastitis.

### What Are Somatic Cell Counts?

There are many types of cells found in milk, but a vast majority are somatic cells. The somatic cells are essentially white blood cells (leukocytes), a part of the normal disease control mechanism. When somatic cells (white blood cells) sense a bacterial invasion, they respond by migrating from the blood stream into the infected quarter. This results in a rise in the Somatic Cell Count (SCC), an indication there is udder inflammation and possibly a case of mastitis (Table 3).

*Table 3. Average Somatic Cell Counts for Composite Milk Samples and the Number of Infected Quarters.*

Number of Qtrs.	Avg. Number of SCC/ml
0	214,000
1	507,000
2	701,000
3	1,470,000

Source: Natzke et al., 1972.

Important to note, SCC can be affected by more than just udder infection. Age, next to infectious status, has greatest influence on SCC. Consistently, older cows have higher average cell counts than younger cows. A rule of thumb, supported by research, equates an average increase of 100,000 cells per lactation. Stage of lactation is another important effect. Milk SCC in uninfected cows is high at freshenings, lowest from peak to mid-lactation and highest at drying off. This can be explained by the dilution effect. The higher the milk yield, the greater the dilution of SCC in the milk. Finally, season of year has an effect. Highest SCC generally occurs during the summer, while lowest SCC occurs during the winter.

### Why Somatic Cell Count?

You may wonder why use SCC through DHI versus the California Mastitis Test (CMT) or the Wisconsin Mastitis Test (WMT). There are two philosophies behind this answer. First, the SCC test is offered on a routine basis through the DHIA, and the SCC test is conducted on the same composite milk sample collected for determining butterfat and protein. The test is done

on regular, timely intervals, at low cost, and requires no additional labor. Second, the SCC test is an objective test. The number of somatic cells per ml are counted by computerized electronic equipment.

### Interpreting SCC Scores

SCC is reported as actual counts in thousands of cells per ml, and/or log score from 0 to 9. Research indicated a linear relationship between increased log score and milk loss. This means that increased log scores directly correspond to losses in milk production. Table 4 shows the conversion method used to create the log scores. With each increase of one unit of log score there is a doubling of cell count and a loss of 1.5 pounds of milk per day for second and later lactation cows and 0.75 pounds for first lactation cows. These losses over a lactation equal 200 for first and 400 pounds for later lactation in cows.

### How Can SCC Help Me and My Operation?

#### Individual Records

Monthly somatic cell counts from DHIA over a lactation usually show trends which can provide valuable information for your mastitis program. Generally, five different patterns appear when these individual records are examined:

- **Ideal SCC pattern.** Following the normal lactation cycle.
- **Infections after calving.** Low first SCC and an increase to 7 throughout lactation, potentially an indication of a high level of contagious mastitis.
- **Infections during dry period.** A high first SCC and a gradual reduction throughout lactation. This is an indication of a possible infection in dry period or edema and swelling at calving.
- **Infections at freshening.** SCC scores that remain at high levels throughout lactation.
- **Normal fluctuations.** This is where there are up and down changes in SCC. The cow develops an infection, but natural defense mechanisms quickly eliminate the infection and reduce SCC to normal levels. This can also be an indication of an udder injury that quickly healed.

#### Lost Production

How much individual production is really lost with high SCC? The milk loss is calculated by averaging the SCC score, subtracting 2 from the average and multiplying the remainder by 400 pounds. For example, for an SCC average score of 6.14 the milk loss would be:

- 1) average score (6.14) - 2 = 4.14
- 2) 4.14 x 400 pounds = 1,656 pounds.

With a low SCC, her potential milk production would be 1,656 pounds higher than her present production.

**Table 4. Linear Score Information Table.**

WMT	CMT	Linear Score	Somatic Cell Count (1000)		Milk Yield Losses in Lbs.			
			Mid-Point	Range	Per Day 1st Lactation	Per Day 2nd (+) Lactation	Per 305 Lactation 1st	Per 305 Lactation 2nd (+)
		9	6,400	4,526-	5.25	10.5	1400	2800
24.35	2	8	3,200	2,263-4,525	4.5	9.0	1200	2400
		7	1,600	1,131-2,262	3.75	7.5	1000	2100
15-23	1	6	800	566-1,130	3.0	6.0	800	1600
8-14	TRACE	5	400	283-565	2.25	4.5	600	1200
4-7		4	200	141-282	1.5	3.0	400	800
3		3	100	71-140	.75	1.5	200	400
	0	2	50	35-70				
0		1	25	18-34	0	0	0	0
		0	12.5	0-17				

**Monitoring Changes in Management**

A change in the dairy operation affects the cows and may affect udder health. These changes could be in areas such as milking equipment, housing, bedding, hired labor, milking procedures, dry cow management or calf raising. Improvements in any one of these areas should show a gradual reduction in SCC and reinforce the importance of the changes that were made. Conversely, an increase in the SCC should trigger a concern by the dairy producer.

Concern should be focused on subclinical mastitis. For illustration purposes, the effect of subclinical mastitis on milk production is shown in Table 5. Lost

milk totaled 201.8 lb./day for a herd with average SCC scores of 2.93, compared to a loss of 393.9 lb./day in the same herd with average SCC of 4.91. This 192.1 pounds of milk per cow, at \$13.50 per cwt., is \$9,500 per year lost income.

**Culling or Early Dry Off**

Cows with continuously high SCC scores, in spite of appropriate lactation and dry cow antibiotic therapy, should rank high on the cull list or should be dried off early. Those with high SCC and a contagious form of mastitis should be sold because they are a constant source of infection to noninfected cows.

**Buying Cows**

Merchandising mature dairy cattle is an important source of income for many dairymen. If SCC records are available, it is easy for the buyer to evaluate the udder health of the cow before the purchase. The SCC records should be an insurance against purchasing a problem mastitis cow.

**Improving Herd Health**

Veterinarians cannot offer dairy farmers sound udder health advice without good records. Monthly DHI SCC reports can fill that void and provide accurate information on a regular basis. With these valuable records, you and your veterinarian can work together to improve the udder health of the herd and to make intelligent decisions regarding problem cows.

**Table 5. Estimation of Daily Lost Herd Milk Yield from DHI Somatic Cell Scores.**

Age Group	Number Cows	DHI SCC Score				Milk Lost (100 Cows)
		0-3	4-5	6	7-9	
<b>Low SCC herds</b>						
- Number of Cows -						
First calf	30	27	3	0	0	6.0
2nd and later	57	22	25	7	3	195.8
Average SCC Score = 2.93						201.8
<b>High SCC herds</b>						
First calf	36	11	11	9	5	83.3
2nd and later	51	10	13	15	13	310.6
Average SCC Score = 4.91						393.9

Source: G.M. Jones, 1984.



## DHI and SCC Reporting

Within DHI, SCC scores are available for managing your mastitis program in four regular reports. These reports are the Herd Summary Report (DHI-202), the Monthly Cow Sheets (DHI-200/210), the Individual Cow Page (DHI-1303), and the SCC Profile (Management Report Option).

### Interpreting Herd Summaries

The first monthly SCC summary found on the Herd Summary Report shows the percentage of first calf heifers and second and later lactations in four SCC ranges: 0-3, 4-5, 6, and 7-9 (fig. 1). Cows with scores of 4 to 6 should be considered as having subclinical mastitis and these pathogens probably could be identified from their milk samples. However, there is no set SCC

which differentiates between subclinical and clinical mastitis. Certain cows may show clinical symptoms although the SCC score may be 4.

### Indicators

Under a good, sound mastitis control program, 70 percent or more of the first calf heifers should have scores of 0-3, and no more than 5 percent should score above 5. Older cows have been in the herd longer and been subjected to management-induced mastitis. Depending on ages within your herd, a good guideline would be:

- 93 percent or more of the cows should have scores of 5 or below,
- 60 percent should have SCC between 0-3,
- No more than 3 percent in the 7-9 SCC range.

	NUMBER OF COWS	AVERAGE AGE	AVG. PEAK TEST DAY PROD.	PROJECTED ME 305 DAY		% COWS WITH SIRE ID	AVG PD \$\$ OF SIRE OF COWS	SOMATIC CELL COUNT FOR CURRENT MONTH			
				MILK	FAT			% COWS SCC SCORE			
								0, 1, 2, 3	4, 5	6	7, 8, 9
FIRST CALF HEIFERS	26	27	56	16105	612	100	+20	30	30	27	13
2nd AND LATER LACTS.	53	61	68	15740	568	93	-15	20	25	30	25
ALL LACTS	79	50	61	15860	582	96	-5	23	27	29	21

Figure 1. General Management Information on DHI-202 Form.

### Monthly Averages

Monthly herd average SCC scores are also reported on the Herd Summary Report (fig. 2). Attention should be paid to any monthly changes. A decrease suggests that improvements are occurring. For example, changes in milking practices or equipment should first be reflected in the percent first calf heifers with SCC between 0 and 3. On the other hand, an increase in herd average SCC of 0.5 or more from one month to the next indicates that a major breakdown is occurring in the control program. Is there an equipment problem? What changes in the milking routine have occurred? Are there new milkers? Has the weather change been sudden, i.e., muddy pastures, frozen teats?

The Stage of Lactation Profile (DHI-202) is another place where SCC information is available. This profile will help identify when infections are occurring during the year (fig. 3). Knowing when the mastitis problems are occurring can help you identify which management factors are the most likely cause of the problem, and what corrective actions might be tried in successive years.

In addition, the average SCC score for heifers should be 2.5 or less. If the average is high, > 2.5, for heifers in milk less than 100 days, possible reasons include

unsanitary heifer maternity facilities, udder edema, or calf sucking problems. Second, if SCC scores are increasing during mid lactation or late in lactations, small management problems could be the cause; for example, failure to dry teats, inconsistent teat dipping, too many slipping inflations, etc.

SOMATIC CELL COUNT SUMMARY					AVERAGE SCC SCORE
% COWS SCC SCORE					
0, 1, 2, 3	4, 5	6	7, 8, 9		
BELOW 142,000	142,000-595,000	596,000-1,130,000	OVER 1,130,000		
23	21	36	20	5.1	
19	20	36	25	5.3	
20	22	35	23	5.2	
21	22	34	23	5.2	
22	23	33	22	5.1	
22	23	34	21	5.2	
23	25	32	20	5.1	
23	25	32	20	5.0	
23	25	31	21	5.1	
22	23	31	24	5.2	
22	22	32	24	5.2	
22	24	31	23	5.2	
24	25	30	21	5.0	
22	23	32	23	5.2	

Figure 2. Yearly Production and Mastitis Summary.

STAGE OF LACTATION PROFILE					
STAGE OF LACTATION (DAYS)	MILKING COWS & HEIFERS	NUMBER OF COWS	% OF MILKING HERD	AVERAGE DAILY PROD (LBS.)	AVERAGE SCC SCORE
306 AND GREATER	COWS	7	9	29	6.8
	HEIFERS	2	3	23	4.2
200-305	COWS	24	31	42	5.9
	HEIFERS	11	14	36	3.3
100-199	COWS	13	17	59	4.7
	HEIFERS	5	6	48	3.1
FEWER THAN 100	COWS	11	14	74	4.5
	HEIFERS	5	6	56	2.9

Figure 3. Stage of Lactation Profile.

SOMATIC CELL COUNT SCORE AND MILK WEIGHTS BY TEST DAY												
B R E E D	SIRE IDENTITY	TEST MONTH	TEST MONTH	TEST MONTH	TEST MONTH	TEST MONTH	TEST MONTH	TEST MONTH	TEST MONTH	TEST MONTH	TEST MONTH	
		10	11	12	01	02	03	04	05	06	071784	
		REGISTRATION OR EARTAG NO.	SCCS MILK	SCCS MILK	SCCS MILK	SCCS MILK	SCCS MILK	SCCS MILK	SCCS MILK	SCCS MILK	SCCS MILK	SCCS MILK
	7H127	4	3	5	3	3	1	4	1	3		
H	64WAF4203	81	86	74	61	68	53	45	31	27	DRY	
	7H676	5	6	4			5	8	8	3	E	28
H	64WAG6344				DRY	DRY	61	58	49	42	35	35
	29H1892					2	3	2	3			37
H	64WAG2853									DRY	51	40

Figure 4. Monthly Report - DHI-200/210 Form.

### Monthly Cow Sheets and Individual Cow Pages

The SCC are reported for each cow for as many as nine previous test days during the current lactation, and up to four test days from previous lactation (fig. 4). As a word of caution on individual records, SCC scores should not be used as a basis for treatment of individual cows. In fact, treatment of most subclinical infections during lactation cannot be economically justified, since treatment cost and discarded milk outweigh the benefits. Why report individual records? Five good reasons are:

- Identification of undetected or ignored clinical mastitis. Cows with SCC of 8 or 9 usually indicate clinical cases, and should be carefully examined.
- Determining groups and milking order. Consider managing subclinical mastitis as you would clinical mastitis. Milking high SCC cows last will decrease the spread of infection during the milking process.
- Evaluation of dry cow treatment and management program. Comparing SCC from previous lactation and SCC from current lactation indicate the effectiveness of the dry cow treatment program and indicate possible areas for change.

- Culling decisions are facilitated. Problem cows can easily be identified and proper action can be initiated.
- Withholding milk from bulk tank. If you are participating in a quality bonus program, or approaching the regulatory level of SCC, withholding milk from the highest SCC cows can reduce the bulk tank count and help achieve your goals.

### How to Get SCC Profile

These three reports are available by indicating yes for the box labeled 'Special Herd Options to be Added or Deleted' section of the Herd and New Cow Data sheet (DHI-213). The first profile divides the herd into 6 SCC groups, with the first lactation cows printed separately within each group (fig. 5), a helpful listing to identify which cows are possible problems each month. The second profile is a listing of cows ordered by index number with previous and current milk, SCC, days in milk, and freshening date on the report. The third profile is a problem cow report. It reports second and later lactation cows with SCC score 6, and scores 7 to 9, and first lactation cows with SCC scores 6 to 9.

## Summary

An effective mastitis control program minimizes the opportunity to transmit infection from cow to cow, reduces stress upon the teat and teat canal, and encourages maximum milk production. It is strongly recommended that producers sign up for the SCC option. Once SCC results are available to producers and

their veterinarian, the extent of mastitis in the herd is known, problem cows or groups of cows can be identified, and corrective measures can be economically implemented. Last, SCC records are available for a reasonable cost and on regular basis for a minimum of effort. You can do something about the silent thief, subclinical mastitis.

### Somatic Cell Count Profile (counts to nearest 100,000)

Henry Smith  
Rt. #3  
Auburn, Alabama

SCC over 15					SCC 9 to 15					SCC 5 to 8				
Barn Name	Date Due	Days in Milk	Daily Milk	SCC	Barn Name	Date Due	Days in Milk	Daily Milk	SCC	Barn Name	Lot No.	Days in Milk	Daily Milk	SCC
<b>Cows</b>					<b>Cows</b>					<b>Cows</b>				
1580	5-11	236	61	63	1556	5-17	101	94	10	1537	6	248	66	06
1608	2-22	190	61	47	1713	12-10	344	7	10	1626	5	89	59	05
1716	6-15	258	70	17	1719	5-29	89	72	14	1634	4	239	55	06
1777	12-07	268	22	35	1734		90	71	15	1660	4	211	56	08
<b>Heifers</b>					<b>Heifers</b>					<b>Heifers</b>				
1873		65	57	16	1754		51	89	10	1701	3	273	58	08
					1773	11-30	287	45	14	1702	3	287	50	08
					1826	6-12	153	60	12	1774	2	72	80	07
										1798	2	237	44	06
										1804	2	163	66	08
										1831	1	282	42	08
										1852	1	222	29	05
										1862	1	72	39	06
										1872	1	28	51	08

SCC 3 and 4				SCC of 2		SCC < 2			
Barn Name	Lot No.	Days in Milk	Daily Milk	Heifers	Cows	Heifers	Cows	Heifers	Cows
<b>Cows</b>				<b>Cows</b>		<b>Cows</b>			
1595	6	61	79	1840	1527	1820	1546	1854	1779
1705	4	150	74	1846	1587	1821	1664	1856	1781
1728	3	158	79	1850	1647	1823	1667	1858	1783
1737	3	260	57		1659	1824	1695	1863	1785
1766	2	356	48		1669	1825	1710	1864	1786
1769	3	49	67		1671	1830	1726	1866	1789
1772	2	385	38		1679	1837	1727	1870	1796
1782	2	378	47		1694	1841	1732		1800
1797	2	244	40		1725	1842	1739		1802
1801	2	81	81		1733	1843	1743		1810
1805	2	258	72		1744	1847	1758		1817
1818	2	76	63		1748	1848	1760		1819
1834	2	35	71		1749	1851	1776		1835
<b>Heifers</b>					1792	<b>Milking cows not included on profile:</b>			
1839	1	277	47		1812	1490	1495		
1859	1	42	19		1828				

Caution: The Somatic Cell Count Program is an effective monitoring program; however, antibiotic therapy should not be based solely on somatic cell count results.

Figure 5. SCC Profile Sample Report #1.

Educational programs conducted by the Texas Agricultural Extension Service serve people of all ages regardless of socioeconomic level, race, color, sex, religion, handicap or national origin.

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