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College of Veterinary Medicine

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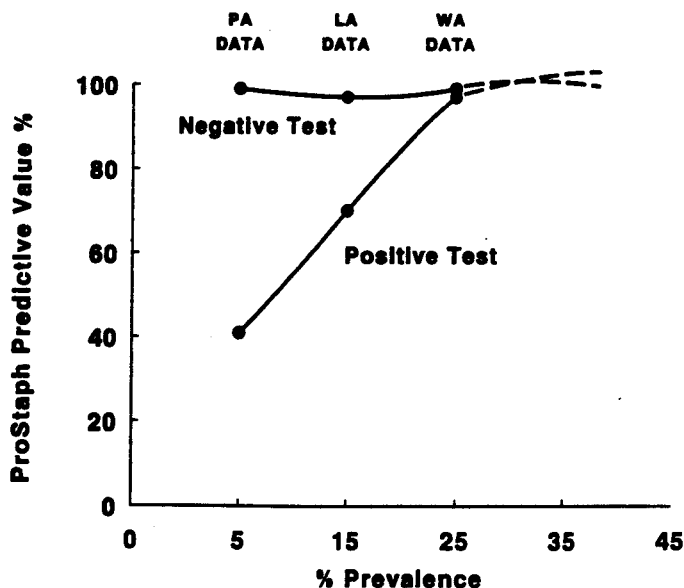
## MINNESOTA DHIA PROSTAPH TESTING

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ProStaph is an enzyme-linked immunosorbent assay (ELISA) for detecting Staph aureus antibody in milk. The ProStaph test is conducted on the routine milk sample collected by DHI field staff for determination of % fat, % protein, and SCC. The ProStaph test reduces the need and expense of whole herd culturing to identify Staph aureus infected cows. However, it should not be construed from this that bulk tank or individual cow culturing are unnecessary. For example, it is advisable to verify the presence of Staph aureus in the herd by bulk tank culture before individual cow testing is done. It is also recommended that ProStaph positive cows are cultured to verify the presence of Staph aureus prior to culling.

Although introduced amidst a flurry of controversy in 1989, further evaluation of the test has indicated that where applied properly and interpreted correctly, the ProStaph test is a useful and accurate tool in the identification and control of Staph aureus. As is the case with most biological tests, prevalence of the disease being tested in the population will effect the ability of the test to correctly identify diseased individuals. As the prevalence of Staph aureus infected cows increases, the predictive value of a ProStaph positive will also increase. Much of the controversy surrounding earlier discussions about the accuracy of the ProStaph test resulted because of a lack in the understanding of this principle. It will be noted that a single positive ProStaph test in a herd where herd Staph aureus prevalence is low (5% or less) predictive value positive is poor (see Figure 1). The predictive value of a negative test, on the other hand, remains high regardless of prevalence. Thus, the negative ProStaph test is very reliable regardless of the number of Staph aureus infections present in the herd. Multiple testing increases predictive value regardless of prevalence rates. Therefore, it is recommended that more than a single ProStaph test be used to determine the Staph aureus infection status of an individual cow.

Figure 1.



Minnesota DHI has been cautious about introducing ProStaph testing. Prior to implementation of this test option two field studies were conducted to gain experience in the application of this new DHI test. The following recommendations are based on these and other studies.

### WHEN SHOULD THE PROSTAPH TEST BE USED?

Obviously, before implementation of the DHI ProStaph test the bacterial source of the herd's mastitis problem should be determined. The best means would be through the use of a bulk tank culture. The advantage of using a bulk tank culture is that other mastitis pathogens will also be identified. The presence of Staph aureus pathogens in the bulk tank milk sample is absolute proof that there are infected cows in the herd. The number of colonies cultured is not a reliable indicator of the number of cows affected.

The DHI Bulk Tank ProStaph test can also be used to identify problem Staph aureus herds. The Bulk Tank ProStaph test is specific for the presence of Staph aureus antibody and therefore will not aid in the identification of other mastitis pathogens. It does have the advantage of estimating the relative number of cows infected by Staph aureus in the herd. New York studies in 163 dairy herds demonstrated there was a direct correlation between the ProStaph bulk tank test score and the level of Staph aureus infection in the herd. Studies done in Virginia, Wisconsin, and Minnesota have verified these findings. A compilation of those findings and a guide to interpretation of DHI Bulk Tank ProStaph test results is given in Table 1. If the bulk tank ProStaph test result (O.D. Index)<sup>1</sup> is greater than 50 and the goal is to reduce or eliminate Staph aureus from the herd, then whole herd ProStaph testing should be implemented. Herds with Bulk Tank ProStaph scores that are suspect (O.D. Index = 20 to 50) do not have a serious Staph aureus problem and should be monitored monthly either by bulk tank culture or Bulk Tank ProStaph testing.

It is recommended that both a bulk tank culture and a Bulk Tank ProStaph test be conducted before individual cow ProStaph testing be implemented. Monthly whole herd ProStaph testing is of questioned value in herds with less than 5% Staph aureus infection. However, routine bulk tank monitoring of these herds is advised.

### MINIMUM STAPH AUREUS MASTITIS CONTROL PRACTICES

After identification of a problem Staph aureus herd by bulk tank culture and Bulk Tank ProStaph testing and before enrolling in the Minnesota DHI ProStaph option, it is recommended that the herd have a complete milking equipment and milking routine analysis. Successful reduction and/or elimination of Staph aureus will require that: all milking equipment is operating correctly and that it is maintained properly; milking routine is excellent; and mastitis control procedures such as teat dipping and dry cow therapy are consistently done. Chronically infected cows should be culled from the herd as it becomes economically feasible and replaced with Staph aureus free cows.

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<sup>1</sup> O.D. Index = (O.D. of sample ÷ O.D. Index of positive control) x 100

Table 1.

## MINNESOTA DHIA PROSTAPH BULK TANK TEST

HERD CODE: \_\_\_\_\_

TEST DATE: \_\_\_\_\_

NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

BULK TANK RESULTS: \_\_\_\_\_

## INTERPRETATION OF RESULTS

Bulk Tank O.D. Index	Interpretation	Recommended Action
Less than 20	Less than 1% Staph aureus not a problem	Continue excellent mastitis control; recheck bulk tank periodically
20 to 50	0 to 5% Staph aureus a minor problem	Implement Staph aureus control procedures; run Bulk Tank ProStaph monthly
Greater than 50	Over 10% Staph aureus is a problem	Begin whole herd ProStaph testing; segregate positive cows and milk last; implement Staph aureus control procedures

Until it is economically reasonable to cull Staph aureus infected cows from the herd, there needs to be a willingness by the owner to segregate those cows and milk them last. In parlor herds where grouping Staph aureus infected cows is impossible, an automatic backflush system is recommended. Although not as dependable as an automatic backflush system, the following manual backflush protocol was shown to be effective by Virginia researchers.

VPI Manual Backflush Protocol

1. Identify all Staph aureus infected cows with some visible ID (i.e. leg bands).
2. Using 25 ppm iodine or 100 ppm chlorine solutions, spray each individual teat cup until all evidence of milk is removed from the liner surface.
3. Allow to drain 10 to 20 seconds before application to the next cow.

Experience has shown that unless the herd owner is willing to commit these minimum Staph aureus mastitis control procedures there will be little success in eliminating the spread of Staph aureus infection. Therefore, prior to enrollment in the Minnesota DHI ProStaph Option these concepts should be thoroughly discussed and agreed upon. It should also be made clear that significant reduction in Staph aureus will take at least one year. Herd SCC will drop as new

infection rate is lowered but will not decline rapidly until chronic Staph aureus cows are culled or dried off.

Attention should be focused on the DHI SCC Report new infection rate. Success or failure of mastitis control procedures will most quickly be reflected by the new infection rate. When the new infection rate is held to 5% or less, good progress in lowering the herd SCC can be expected.

## INTERPRETATION OF INDIVIDUAL COW PROSTAPH TEST

### General Interpretation Guide

- Negative = O.D. Index of 0 to less than 85
- Suspect = O.D. Index of 85 to 100
- Suspect = O.D. Index > 100 but cow less than 30 DIM
- Suspect = O.D. Index > 100 but cow less than 30 lb milk
- Suspect = Any cow negative this test that was positive last test
- Positive = O.D. Index greater than 100

As has been pointed out previously, the reliability of ProStaph negative test results is very good regardless of herd Staph aureus prevalence. However, the value of a ProStaph positive test is greatly influenced by the overall prevalence of Staph aureus infection in the herd. For example, in herds where the prevalence of Staph aureus infection is 5% or less the predictive value of a single positive ProStaph test is less than 50%. Even under ideal circumstances of acceptable culture sample collection techniques, etc. there are sometimes conflicts between ProStaph and culture results. Likely explanations of these conflicts are listed below.

### Positive ProStaph Test with a Negative Culture

1. Culture failure because an inadequate amount of milk sample was used. It is recommended that the minimum amount of milk that should be plated for Staph aureus culturing is .05 ml.
2. Transient Staph aureus infection with a residual milk antibody still present.
3. Intermittent shedding of the Staph aureus organism from infected quarters.
4. "Blind" Staph aureus infected quarter with resulting milk antibody in adjacent quarters.
5. False positive ProStaph test.

### Culture Positive with ProStaph Test Negative

1. Teat canal infection.
2. Early Staph aureus infection where the antibody response is not yet evident. There is thought to be a lag between initiation of a new infection and significant appearance of antibody in milk.
3. False negative ProStaph test.

## DHI PROSTAPH REPORTS

An example of the Minnesota DHI ProStaph report is included in Appendix 1. This Report is being generated by Dairy Comp 305 and at present represents the most recent month's test day information. ProStaph results are conveniently arranged in a descending O.D. Index order so that positive and suspect cows are located at the top of the list. Pertinent information such as milk weight, days in milk, and SCC data are also listed to facilitate easy interpretation. Also included in Appendix 2 is a suggested summary worksheet on which the monthly ProStaph results on positive and suspect cows can be copied. The worksheet will make easier the task of tracking the status of the problem cows. Eventually a computerized version of a ProStaph summary report is anticipated.

## MONTHLY PROSTAPH TESTING VS PERIODIC OR PARTIAL PROSTAPH TESTING

Both monthly and periodic or partial ProStaph testing schemes (Figures 2 and 3) were tried in the two Minnesota DHI ProStaph pilot projects. Monthly ProStaph testing in which every cow is tested each month of the lactation is the superior of the two methods and is the only one being recommended by Minnesota DHIA. Accumulation of several months of individual cow ProStaph tests accurately establishes herd and individual cow Staph aureus infection status. Monthly ProStaph testing combined with SCC and culture data gives a more dependable basis from which diagnosis can be made and mastitis management strategy prescribed.

Running one or two tests on individual cows followed by repeat tests as deemed necessary (periodic or partial ProStaph testing scheme) not only is very difficult to manage but often gives confusing results leading to ambiguous conclusions. The problem of identifying which cows should be tested each month as well as the difficulty in consistently obtaining a bulk tank sample from the "clean" cows (those negative cows that are milked first) becomes nearly an impossible task for the farmer, the DHI field staff, and the veterinarian. Yet to be sure that new Staph aureus infections are not spreading to the negative cows, it is important that the "negative" cows be monitored. Thus, large gaps in the data collected under this scheme often compromise diagnosis.

The obvious driving force for selecting the partial ProStaph testing scheme is the cost of the test. Minnesota DHIA has tried to overcome this obstacle by charging less for the individual ProStaph test where whole herd testing is being done.

### Minnesota DHIA ProStaph Pricing

- |                           |                              |
|---------------------------|------------------------------|
| 1. Whole herd testing     | \$1.60/cow                   |
| 2. Individual cow testing | \$2.25/cow (\$10.00 minimum) |
| 3. Bulk tank testing      | \$5.00/sample                |

Figure 2.

**MONTHLY WHOLE HERD PROSTAPH TESTING SCHEME**

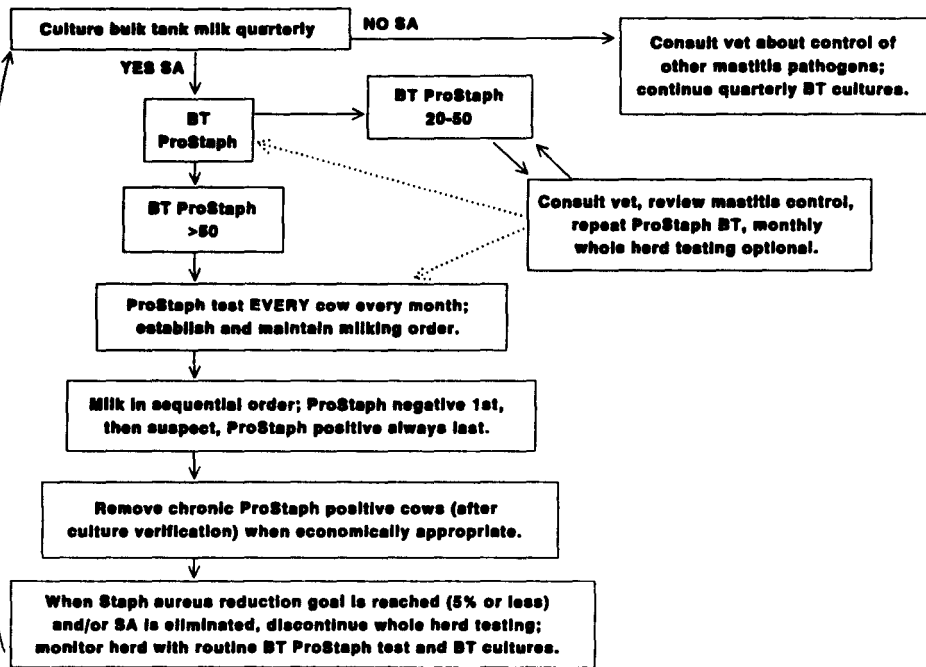
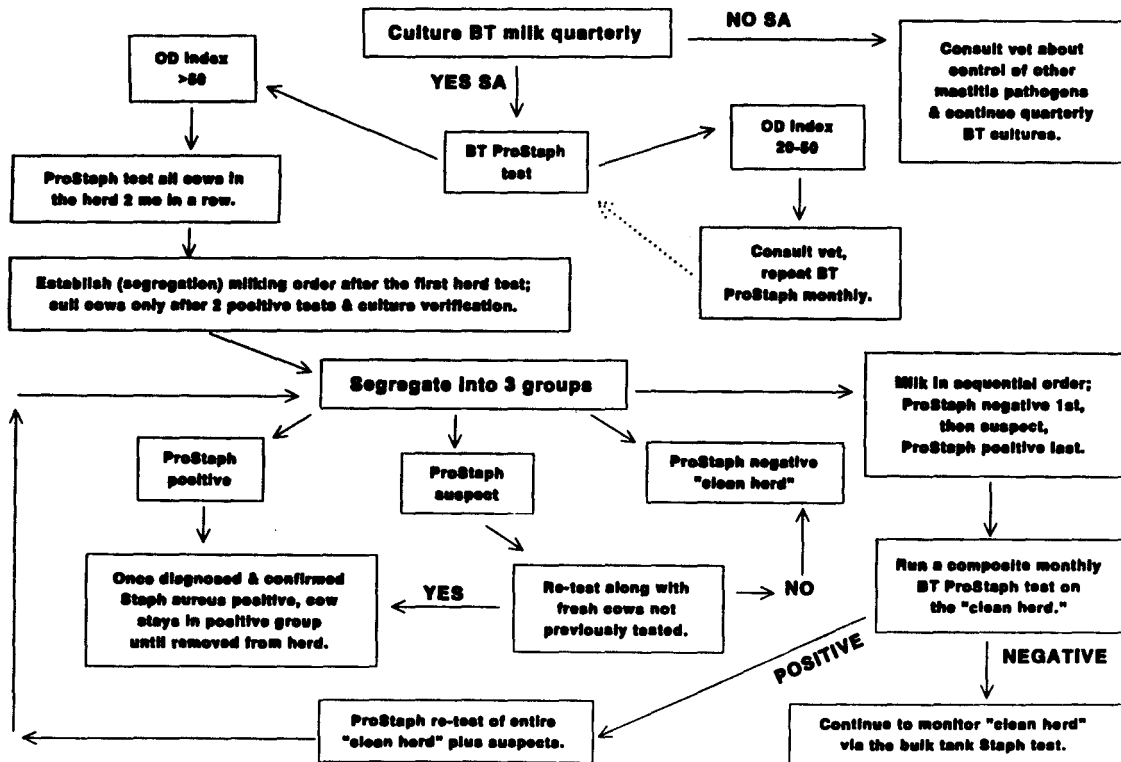


Figure 3.

**PERIODIC PROSTAPH TESTING SCHEME**



## PROSTAPH MORE THAN A TEST FOR STAPH AUREUS

All 20 of the herds studied in the two Minnesota DHIA ProStaph projects had mastitis caused by both Staph aureus and environmental pathogens. In all but two of the herds the environmental pathogens were of greater concern than Staph aureus. In the development of monthly reports it became clear that through combining bulk tank culture, DHI SCC, and ProStaph test results with deductive reasoning that there was much more diagnostic power in these tests than mere identification of Staph aureus infected cows. In fact, in most cases the information provided regarding environmental pathogens had more relative economic importance than the reporting of the Staph aureus findings.

In most herds there exists a mix of contagious and environmental pathogen problems. Yet this may not be fully appreciated by the herd manager. Enrollment in the ProStaph test option tends to focus attention on the Staph aureus problem. It is often discouraging to work hard reducing the level of Staph aureus infections with an expectation of lowering herd SCC and failing to succeed because the problem with environmental mastitis pathogens is not being simultaneously addressed. This situation occurred several times during the course of the Minnesota DHI ProStaph pilot studies. Application of the ProStaph test in combination with bulk tank culturing, and DHI individual cow SCC data provided a balance of information regarding both the Staph aureus and environmental mastitis concerns.

## PROSTAPH CASE STUDY

Appendix 3, 4, 5 represent an example of a herd in which monthly ProStaph testing combined with SCC and culture data provided the basis of accurate diagnosis and management of a difficult herd mastitis problem.

This farm at the beginning of the study had a serious Staph aureus problem. Nearly 50% of the herd was infected with Staph aureus. Nearly all of the high herd SCC problem could be accounted for by chronic Staph aureus infected cows shedding large numbers of somatic cells into the bulk tank milk. The herd SCC routinely was between 600,000 to 800,000.

This farmer had taken seriously the implementation of the Staph aureus control procedures and had faithfully milked all identified Staph infected cows last. He had succeeded in holding the new infection rate to 5% or less for several months. After a few of the chronic Staph aureus cows were culled the herd SCC had dropped to 200,000 to 300,000. The farmer was quite satisfied with the progress and pleased to be getting quality premiums for the first time. In December, however, the herd SCC increased drastically as did the new infection rate. This was very disturbing to the farmer. He was sure that there was a "break" in the Staph aureus control. Yet closer examination of the data revealed quite a different conclusion.

The bulk tank culture revealed that there was no Strep ag infection in the herd but that Staph aureus infection was present (see Appendix 4). It also indicated that teat exposure to environmental pathogens was moderate.



Listing ProStaph and SCC test results together on the DHI SCC Report problem cow list and the new infections indicated that those cows responsible for the increased herd SCC had high SCC's but they had negative ProStaph tests. Thus, the recent upsurge in new infections was not a result of Staph aureus infection but rather was most likely caused by environmental pathogens. Proper identification of the cause of the problem helped to relieve the farmer's confusion and frustration while enabling the veterinarian to prescribe appropriate control procedures to remedy the situation.

#### DEC DHI SCC REPORT PROBLEM COW LIST

Cow ID	O.D. Index	Linear Score	% BTSCC
913	9	9	29
708	447	8	14
916	18	8	13
612	448	8	10

#### DEC DHI NEW INFECTIONS

Cow ID	O.D. Index	Linear Score	DIM
61	71	4	10
809	38	4	224
814	39	6	7
816	8	7	328
831	53	5	389
904	8	7	211
912	18	5	46
913	9	9	48
916	18	8	20

#### CONCLUSIONS

ProStaph testing is another effective mastitis control tool. Individual cow ProStaph testing should not be done in all herds. It is appropriate that routine bulk tank culturing and/or Bulk Tank ProStaph testing be done in all herds. In herds with Staph aureus prevalence of greater than 10% and where there is a determined commitment to lowering the level of Staph aureus infection, application of monthly whole herd ProStaph testing is recommended. Combining monthly DHI ProStaph tests with DHI SCC data and culture results not only will accurately identify Staph aureus infection but also will help to characterize the environmental mastitis component of the herd mastitis problem as well.

Minnesota  
**DHIA**

**ProStaph I**™  
by ProScience

BNAME	PSRES	STAPH	LGSCC	SCC	DIM	MILK	RELV	RPRO	DUE	PROSD
65	P	203	0	0	2	0	0	FRESH	-	2/26/93
23	P	186	5.1	430	26	89	112	FRESH	-	2/26/93
66	P	175	7.1	1680	404	79	91	FRESH	-	2/26/93
68A	P	137	6.7	1300	208	97	133	PREG	8/23/93	2/26/93
25	P	131	5.4	550	33	91	85	FRESH	-	2/26/93
7	S	96	2.4	70	33	77	99	FRESH	-	2/26/93
2006	S	94	5.7	660	4	0	0	FRESH	-	2/26/93
46	N	82	4.8	340	331	51	105	PREG	5/13/93	2/26/93
11A	N	78	4.5	290	382	28	129	PREG	5/20/93	2/26/93
24	N	72	6.8	1350	448	63	97	FRESH	-	2/26/93
3	N	65	4.1	210	55	67	88	FRESH	-	2/26/93
57	N	60	5.4	540	16	101	96	FRESH	-	2/26/93
35	N	57	2.8	90	124	79	105	BRED	-	2/26/93
54A	N	54	2.7	80	272	40	89	PREG	4/ 9/93	2/26/93
9	N	51	6.9	1480	108	105	111	BRED	-	2/26/93
21	N	48	4.7	330	240	51	100	PREG	5/31/93	2/26/93
63	N	48	3.8	170	154	79	111	PREG	10/ 7/93	2/26/93
34A	N	47	6.0	770	323	65	114	FRESH	-	2/26/93
13	N	45	3.4	140	291	42	92	PREG	7/11/93	2/26/93
51	N	44	4.3	240	303	65	109	PREG	4/15/93	2/26/93
61	N	44	3.9	190	143	83	112	PREG	10/ 7/93	2/26/93
4	N	44	1.7	40	103	85	108	FRESH	-	2/26/93
30	N	34	4.7	330	206	44	96	PREG	7/18/93	2/26/93
19	N	29	2.7	80	157	79	110	BRED	-	2/26/93
64	N	27	4.1	210	186	89	125	PREG	8/ 5/93	2/26/93
2	N	27	3.1	110	138	93	106	BRED	-	2/26/93
53	N	27	6.2	920	349	61	108	PREG	5/22/93	2/26/93
16A	N	26	5.7	650	111	107	116	FRESH	-	2/26/93
15	N	25	2.4	70	276	40	94	PREG	5/27/93	2/26/93
45	N	23	1.3	30	92	103	108	FRESH	-	2/26/93
62	N	22	3.0	100	250	65	87	PREG	6/24/93	2/26/93
22	N	22	6.4	1050	43	77	92	FRESH	-	2/26/93
49	N	21	.7	20	54	103	98	BRED	-	2/26/93
56	N	21	1.7	40	67	77	101	FRESH	-	2/26/93
59	N	20	4.3	250	54	131	114	FRESH	-	2/26/93
18	N	19	0	10	32	105	88	FRESH	-	2/26/93
5	N	19	5.0	410	428	87	105	PREG	2/25/93	2/26/93
29	N	18	3.4	130	452	57	112	PREG	6/25/93	2/26/93
50	N	16	2.0	50	140	75	100	BRED	-	2/26/93
36	N	15	7.6	2540	78	117	110	BRED	-	2/26/93
52	N	14	5.0	390	254	36	102	BRED	-	2/26/93
32	N	14	0	10	151	69	101	BRED	-	2/26/93
26	N	11	4.7	320	477	46	128	BRED	-	2/26/93
20	N	11	2.0	50	115	87	102	BRED	-	2/26/93
12	N	11	4.3	240	37	91	122	FRESH	-	2/26/93
55	N	10	0	10	138	89	113	PREG	10/ 4/93	2/26/93

N = NEGATIVE

S = SUSPECT

P = POSITIVE

# Minnesota DHIA ProStaph Summary Worksheet

Cow ID		ProStaph Test Date										Overall Status	
	PSRES												
	LGSCC												
	MILK												
	DIM												
	PSRES												
	LGSCC												
	MILK												
	DIM												
	PSRES												
	LGSCC												
	MILK												
	DIM												
	PSRES												
	LGSCC												
	MILK												
	DIM												
	PSRES												
	LGSCC												
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	DIM												
	PSRES												
	LGSCC												
	MILK												
	DIM												
	PSRES												
	LGSCC												
	MILK												
	DIM												
	PSRES												
	LGSCC												
	MILK												
	DIM												

**ProStaph Report Interpretation Guide:**

**PSRES: ProStaph Results:**  
**N** = OD Index of 0 to less than 85  
**S** = OD Index of 85 to 100  
**S** = Any cow less than 30 DIM and Staph > 100  
**S** = Any cow less than 30 lb milk Staph > 100  
**S** = Any cow N this test and P last test  
**P** = OD Index greater than 100

**LGSCC:** Linear Somatic Cell Score  
**MILK:** Test Day Milk  
**DIM:** Days in Milk

# SCC SUMMARY

SOMATIC CELL COUNT  
AN EFFECTIVE TOOL  
IN MASTITIS CONTROL

SAMPLE DATE 12-09-91 PAGE 1

CURRENT SCC SUMMARY											
LACT NO	NUMBER COWS	NUMBER OF COWS ON SAMPLE DAY									
		0	1	2	3	4	5	6	7	8	9
1ST	19		1	3	2	3	2		2	1	1
OTHER	19			2	8	4		2		3	
ALL	34		1	5	10	7	2	2	2	4	1

HERD AVG SCC
CELLS
731,000
LINEAR
4.3

SCC TRENDS			
LACT NO	PCT POSITIVE		
	CURRENT	LAST MO	YR ABO
1ST	53	7	28
OTHER	32	36	25
ALL	41	25	43

YEARLY SCC SUMMARY			
LACT NO	PCT POSITIVE		
	CU	SEP	1ST
1ST	43	22	32
OTHER	62	46	54
ALL	54	38	43

LIST OF PROBLEM COWS WITH PERCENT HERD SCC		
913...	29	
708...	14	
916...	13	
612...	10	

BARRY HERD IMPROVEMENT  
ON 222 000

ESTIMATED DAILY MILK YIELD LOST = 64 LBS

YEARLY AVERAGE PERCENT SCC POSITIVE = 41

COMPUTER NUMBER	LACT NO	DAYS IN MILK	CURRENT SAMPLE 12-09-91 MILK SCC	SCC CODE	BARN NAME	NOV 13 26 DAYS ABO		OCT 11 59 DAYS ABO		SEP 11 89 DAYS ABO		AUG 9 122 DAYS ABO		JUL 2 160 DAYS ABO		JUN 3 189 DAYS ABO		MAY 2 221 DAYS ABO		APR 1 252 DAYS ABO		MAR 1 283 DAYS ABO		JAN 31 312 DAYS ABO		JAN 3 340 DAYS ABO	
						MILK	SCC	MILK	SCC	MILK	SCC	MILK	SCC	MILK	SCC	MILK	SCC	MILK	SCC	MILK	SCC	MILK	SCC	MILK	SCC	MILK	SCC
0376	3	137	55 3		14	76 2	89 0	86 0	81 2																		
0322	5	139	91 3		25	96 3	95 3	97 3	95 4*																		
0419	1		52 2		36	52 2	63 1	60 4*																			
0273	6	169	80 3		50	70 2	96 2	88 0	89 1	77 2																	
0418	2		55 2		58	55 4	63 2	58 2																			
0422	1	10	20 4*	N	61																						
0323	5	113	65 2		88	52 3	76 0	89 0																			
0230	3	345	47 4	P	106	75 4	75 3	76 3	82 3	71 2	93 2	90 2	95 2	88 3	96 3												
0203	5	121	70 3		140	73 3	80 0	91 0																			
0270	3	295	41 8*	CP	112	62 8*	63 7*	68 6*	41 5*	83 6*	87 6*	91 6*	89 6*	79 4*													
0290	3	288	43 4		120	45 5*	66 2	60 0	74 2	74 0	80 1	86 0	102 1	4*													
0315	3	34	67 8*	CP	708	69 5*																					
0325	2	405	38 6*	C	712	37 6*	47 5*	49 5*	56 6*	53 6*	69 6*	61 5*	63 4*	71 5*	75 4*	75 4											
0331	2	283	22 4		716	30 4*	40 3	49 2	57 4	53 2	72 2	69 2	72 3														
0334	2	131	60 3	P	801	78 2	100 1	88 1	73 5*																		
0337	2	222	63 3		804	61 3	68 2	71 0	71 2	85 0	92 1																
0340	2	265	19 8*	CP	806	22 8*	52 7*	58 6*	49 9*	60 8*	67 6*	65 6*	71 6*														
0347	2	224	41 4*	N	809	51 3	59 2	63 1	62 3	76 0	84 1																
0346	2	196	65 3	C	810	69 3	73 3	65 2	83 4*	79 4*	50 6*																
0353	1	377	58 3	C	813	52 3	56 3	48 5*	56 5*	66 7*	73 3	59 3	76 5*	67 4	73 3	64 3											
0392	2	7	44 6*	NP	814																						
0358	1	328	23 7*	N	816	42 4	58 3	55 1	58 2	60 2	68 2	60 2	63 3	65 3	63 2												
0396	1	336	35 2		817	40 2	40 1	42 0	48 3	48 1	48 1	40 0	39 1	41 3	39 2												
0409	2	82	83 3		830	80 2	80 0																				
0404	1	389	34 5*	N	831	41 3	52 2	56 2	60 3	55 2	65 3	61 1	56 3	71 4	70 2	65 1											
0365	1	236	39 4		802	39 4	45 2	46 0	46 3	54 1	61 1	67 1															
0369	1	247	51 3	C	803	51 3	51 5*	55 6*	56 4	64 4	68 3	65 5*															
0371	1	211	44 7*	N	804	40 2	53 0	60 0	57 2	44 2	66 1																
0372	1	235	36 1		807	38 2	48 1	41 0	44 3	44 3	49 2	40 2															
0420	1	71	69 4*	C	809	61 7*	48 8*																				
0374	1	57	75 2		810	65 4																					
0378	1	46	60 5*	N	812	60 3																					
0379	1	48	69 9*	N	813	69 2																					
0385	1	28	49 8*	N	816																						

NUMBER OF NEW INFECTIONS = 9 COWS ( 26 PCT OF COWS IN MILK)  
SHORT TERM INFECTIONS = 6 PCT OF COWS IN MILK  
\* = ANIMAL INFECTED

## BULK TANK MASTITIS SCREENING TEST REPORT

Name

Address

JON WILHELM

## Bacteria Counts

Type of Bacteria	Herd results	Low levels	Moderate levels	High levels	Very high levels
Strep. Ag.	<u>0</u>	0-50	50-200	200-400	> 400
Staph aureus (coag. pos.)	<u>785</u>	< 50	50-150	150-250	> 250
Non-Ag Strep	<u>760</u>	500-700	700-1200	1200-2000	> 2000
Coliforms	<u>40</u>	< 100	100-400	400-700	> 700
Staph. epi. species (coag. neg.)	<u>75</u>	< 300	300-500	500-750	> 750

Table 1 is meant to help interpret your bulk tank sample results. If your results fall within the normal levels you are probably doing a good job controlling mastitis. However, if you find your results to be above normal levels you should reconsider the effectiveness of your mastitis control procedures.

In Table 2 are listed each bacterial type with its corresponding usual source of infection, mode of spread, and measures necessary for its control. If your counts exceed the normal levels in any bacterial category, consider improving the mastitis control measures implicated.

Table 2.

Type of Bacteria	Usual source of infection	Major means of spread	Mastitis control measures to be improved
Strep. Ag.	infected udders of other cows in herd.	cow-to-cow by contaminated udder wash rag, teat cups, etc.	use separate towels to wash & dry, teat dipping, dry cow treatment, eradication in special cases.
Staph. aureus (coag. pos.)	infected udder and contaminated bedding, etc.	cow-to-cow by contaminated udder wash rag, milking equipment or inadequate milking equipment.	use separate towels to wash and dry, teat dipping, dry cow treatment, culling of chronically infected cows. Establish milking order.
Non-Ag Strep.	environment of cow	environment-to-cow by; wet, dirty lots, milking wet cows, poor cow preparation, machine problems resulting in reversing flows at teat end.	improve barn and lot sanitation, milk clean, dry cows; avoid air leaks and liner slips. Change bedding frequently.
Coliforms	environment of cow	environment-to-cow by; wet, dirty lots, milking wet cows, poor cow preparation, machine problems resulting in reversing flows at teat end, teat injuries and hot humid weather.	improve barn and lot sanitation, milk clean, dry cows; keep cows standing 1-2 hours after milking; avoid air leaks and liner slips. Change bedding frequently.
Staph epi species (coag. neg.)	normal inhabitants of skin, some bedding	poor teat dip coverage, poor cow preparation, occasionally associated with old bedding	teat dipping, adequate cow preparation, more frequent bedding changes

COMMENTS:

## APPENDIX # 5: CASE STUDY HERD

DATE: DECEMBER 20, 1991

RE: DECEMBER PROSTAPH REPORT

THE HERD PROSTAPH CLASSIFICATION FOR MILKING ORDER PURPOSES IS:

POSITIVE: 612, 708, 712, 806, 813

SUSPECT: 816 AND ANY NEWLY FRESH OR PURCHASED COWS

NEGATIVE: ALL THOSE NOT LISTED ABOVE

	DEC	NOV	OCT	SEP	AUG	JUL	JUN	MAY	APR
HERD AVG. SCC(X1000)	736	320	312	225	392	709	530	812	617
HERD AVG. LN.SCORE	4.3	3.6	2.9	2.5	3.9	3.6	3.6	3.8	3.8
NEW INFECTION RATE	26%	8%	6%	5%	11%	5%	5%	5%	5%

I CAN FEEL YOUR FRUSTRATION !!! THE JUMP IN HERD SCC, LINEAR SCORE AND ESPECIALLY IN THE NEW INFECTION RATE IS A KICK IN THE SHINS TO BE SURE.

I'VE TRIED TO ANALYZE CAREFULLY WHAT HAS HAPPENED AND LOCATE WHERE THE INCREASE HAS COME FROM.

LETS LOOK AT THE STAPH AUREUS COMPONENT OF THIS HERD MASTITIS FIRST. HAS THERE BEEN AN INCREASE IN THE STAPH AUREUS ? COWS 712 AND 813 HAVE BEEN NEGATIVE FOR MANY MONTHS AND ARE VERY LATE IN LACTATION. THESE COULD BE NEW INFECTIONS BUT WE WILL NEED TO CONFIRM THEIR STATUS NEXT MONTH. THE OVERALL HERD AVERAGE PROSTAPH VALUE HAS ACTUALLY DECREASED. LAST MONTH IT WAS 88.94. LAST YEAR IN JAN. IT WAS 269.86. THIS MONTH IT WAS 78.32. IT APPEARS THAT THERE HAS BEEN STEADY PROGRESS IN LOWERING THE STAPH AUREUS INFECTION IN THE HERD. LOOKING AT THE DHI SCC REPORT PROBLEM COW LIST STAPH AUREUS INFECTED COWS 708 AND 612 ACCOUNT FOR 24% OF THE BULK TANK SCC. COWS 913 AND 916 (RECENTLY FRESH HEIFERS) WHICH ARE NEGATIVE FOR STAPH AUREUS AND THUS ARE INFECTED WITH ENVIRONMENTAL PATHOGENS ACCOUNT FOR 42% OF THE HERD SCC. FOUR COWS ACCOUNT FOR 66% OF ALL THE HERD SCC. THEORETICALLY WITHOUT THESE THREE COWS MILK IN THE TANK ON TEST DAY THE HERD SCC WOULD HAVE BEEN 249,000.

THERE ARE TWO POINTS TO BE MADE: 1) THAT A FEW COWS THAT ARE SHEDDING HIGH NUMBERS OF SCC'S AND IN GOOD MILK PRODUCTION CAN HAVE A HUGE EFFECT ON THE HERD SCC IN SMALL HERDS. 2) THERE HAS BEEN A CHANGE IN THE CHARACTER OF THE MASTITIS IN YOUR HERD. FOR THE FIRST TIME ENVIRONMENTAL INFECTIONS ARE PLAYING THE MOST IMPORTANT ROLE IN THE HERD SCC.

THE FOLLOWING MAY HELP EXPLAIN WHY ENVIRONMENTAL INFECTIONS HAVE BECOME THE MOST SIGNIFICANT CONTRIBUTORS TO YOUR HERD MASTITIS PROBLEM. LETS CONSIDER THE COWS DESIGNATED AS NEW INFECTIONS THIS MONTH. THREE OF THEM (916,814,61) WERE FRESH COWS ALL OF WHICH WERE NEGATIVE PROSTAPH COWS BUT HAD HIGH SCC'S. FOUR WERE MID TO LATE LACTATION COWS OF WHICH ONLY 816 WAS "SUSPECT". THE OTHER 2 (912,913) HAVE BEEN FRESH ONLY TWO MONTHS AND ARE ALSO APPARENTLY ENVIRONMENTAL INFECTIONS. WITH THIS UPSURGE IN NEW INFECTIONS NEARLY ALL OF WHICH ARE APPARENTLY OF ENVIRONMENTAL ORIGIN WE CAN EASILY MAKE THE CONCLUSION THAT THE RECENT INCREASE IN THE HERDS SCC (MASTITIS) IS DUE TO AN INCREASE EXPOSURE TO ENVIRONMENTAL PATHOGENS.

A LARGE AMOUNT OF THIS ENVIRONMENTAL PATHOGEN PROBLEM APPEARS TO BE OCCURRING DURING THE DRY PERIOD AND PERSISTING INTO LACTATION. FOR EXAMPLE, 100% OF THE COWS AND/OR HEIFERS THAT CALVED DURING THE PAST HERD TEST PERIOD CALVED WITH HIGH SCC'S. OVER THE PAST FEW MONTHS THIS TREND HAS ESCALATED. TO A LARGE DEGREE I THINK YOU MAY NOW BE HARVESTING THE RESULTS OF HIGH TEAT EXPOSURE TO ENVIRONMENTAL PATHOGENS DURING THE DRY PERIOD THIS PAST FALL AND LATE SUMMER. YOU WILL REMEMBER WHAT A WET SUMMER AND FALL WE HAD WHICH MADE US VERY VULNERABLE TO THIS SORT OF PROBLEM.

TO OVERCOME THIS ENVIRONMENTAL PROBLEM YOU WILL NEED TO EMPHASIZE:

- 1) KEEPING THE DRY COW AND SPRINGING HEIFERS CLEAN AND DRY. THIS MAY REQUIRE CHANGING OR IMPROVING THE DRY COW LOT AND LOAFING AREA.
- 2) IMPROVE STALL BARN BEDDING MANAGEMENT. CHANGE THE BEDDING DAILY BEING SURE TO PUT ONLY DRY, FRESH BEDDING UNDER THE COWS UDDERS.
- 3) YOU MAY WANT TO IMPLEMENT THE NEW PRE-DIP WASH ROUTINE THAT DR. FARNSWORTH AND I DEVELOPED TO HELP SOLVE ENVIRONMENTAL MASTITIS PROBLEMS.
- 4) CLIP ALL THE COWS UDDERS.

THESE ARE A FEW IDEAS THAT YOU CAN TRY. IF YOU HAVE QUESTIONS PLEASE CALL. DON'T LET YOURSELF GET TO DISCOURAGED. COMPARED TO STAPH AUREUS, ENVIRONMENTAL PATHOGENS ARE QUITE EASY TO CONTROL.

HAVE A NICE CHRISTMAS !!!!