Mastitis Herd Investigation Report

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Introduction

On Wednesday, June 22, 1988, a farm visit was made to case 1191 at the request of the herd veterinarian to investigate a herd mastitis problem. The primary concern was sporadic occurrences of "hot" cases of clinical mastitis over the past year, along with a continual rise in SCC over the past 5-6 months. A concern of slow and incomplete milk-out was also expressed.

The herd consists of 34 holstein cows. Rolling herd average is 19,395 lbs. of milk and 798 lbs. of fat.

Milking Machine System:

The milking system is a DeLaval 2 inch stainless steel pipeline system which was installed in 1980. The milk line was a looped three slope system with two inlet lines into the receiver jar. The milkhouse was on the southeast corner of the barn, and the highpoint of the pipeline in the northwest corner. The middle slope formed a T on to the north side of the loop, and the east slope formed a T on the south side of the loop. Slopes on the milk lines varied from 1 to 1.8 inches per ten feet. The pulsation line was 2 inch PVC pipe in a complete loop and parallel to the pipeline.

Three units were used to milk. The claws were DeLaval large transplarent claws with a bottom vacuum shut-off button. The inflations were narrow bore liners which looked relatively new. Inflations are changed every 60 days, which is adequate for this size herd. The rubber parts on the milkers appeared to be in good condition, except on the floor bucket which had roughened and worn hoses and inflations.

The pulsators were three year old DeLaval alternating vacuum pulsators, reportedly set at a 60:40 ratio. The units alternate pulsation from side to side, while the floor bucket alternates pulsation from front to rear.

During the afternoon on our farm visit a pulsation check was done. The maximum vacuum level of the pulsators was 14-15 inches of Hg. They cycled from 65 to 56 times per minute, with an open:closed ratio of approximately 60:40.

The DeLaval model 76 vacuum pump had a three horsepower motor, with the reverse tank below the motor and pump. A DeLaval diaphragm type regulator was located on the milk line between the sanitary trap and the vacuum pump. The sensor for the regulator was on the pulsator line. The pump vacuum capacity was measured as 88 cfm (NZ). The effective vacuum reserve capacity of the system was 71 cfm (NZ), indicating a system leak of 17 cfm. With the units in place, the effective pump capacity was 49 cfm (NZ). Vacuum system recovery time was four seconds. The system vacuum gauge was compared to our vacuum gauge, and registered correctly.

Teat end vacuum levels were checked while milking with the floor bucket and while milking a high producing cow. On the high producing cow, vacuum varied from 9 to 12 inches of Hg during peak milk flow. Using the floor bucket, the vacuum fluctuation was measured at 11 to 14 inches of Hg during peak flow.

Stray Voltage Analysis:

In 1986, the electric company installed an isolator between the primary and secondary neutrals due to a stray voltage problem prior to that time. After the isolator was installed, the SCC dropped from 500,000 to 250,000, and milk-out improved.

Upon arrival on the farm (4:30 p.m.), a continuous recording voltmeter was attached to the secondary neutral at the barn electrical box. During the time recording, there was no significant voltage level recorded (<.2 volts). A hand held voltmeter was used to check several locations in the barn and milk house for stray voltage at 4:45 p.m. without equipment running, and at 7:30 p.m. (during milking). All readings were under .1 volt. Stray voltage was not considered a problem at this time.

Environment:

During the summer the cows are in the barn only during milking. After milking they're turned out in the lot, given time to eat (haylage provided in bunk, hay in feeder), and then locked in the pasture until the next milking. The cemented cow lot is built on a slope for drainage, and is relatively dry. The cows are put in one of two pastures, both of which are well drained and dry. The lane out to these pastures is covered with crushed rock. No source of mud from the outside environment could be found.

In the barn, the stalls are of adequate size. About one-third of the stalls were lined with rubber mats with a dimpled pattern. There was moisture and manure under the back half of the mats. All of the stalls had some long straw

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in the front and were spread with lime in the back. Some had a hard build-up on the floor in the back. This build-up was sampled and cultured. The results showed heavy growth of Strept, Coliform, some Staph and Bacillus. While the cows were in for the evening milking, a few cows had manured on the stall platform and laid on it. Some cows had manure and stains on their flanks and udder. After the cows were turned out, it was observed that most of the stalls were wet with urine or milk. No trainers were being used during the summer. Grates were present over the gutter behind some cows.

Milking Technique:

Two times a day milking is done by the herd owner. His brother and father help. A concern was expressed about slow and incomplete milk-out. Milking time for 34 cows was reported to be one and one half hours, using three units.

Teats were washed with individual paper towels using an iodine wash solution. They were dried with an individual paper towel. Preparation lasted 15 to 30 seconds. The units were attached on the cows, frequently leaking vacuum from the teat cup being placed. Before removal the unit was held down and the cow's udder massaged. This procedure often caused liner squawks. On several cows, teat cups were removed separately.

Vacuum was turned off before the entire unit was removed. Removal was within 6 to 8 minutes after attachment, udder massage took place 2 to 3 of those minutes. Udder balm was applied to the teats, and all cows were hand stripped for 1 to 2 minutes after unit removal. Teats were then dipped with a bottle containing a non-flow-back cup, using 3-M Teat Shield (Lauricidin, glyceryl monolaurate, as active ingredient in a latex base). Four or five cows were given oxytocin prior to milking to aid in let-down.

Each cow is treated with a commercial dry cow treatment as she is dried-off.

Mammary Gland Health:

The herd owner described his herd problem as sporadic outbreaks of mastitis. The affected cows had watery milk with clumps, some of them went off-feed and were febrile. These outbreaks followed no seasonal pattern, nor did the affected cows follow patterns for age, stage of lactation or production levels. The last outbreak occurred in April and May, in which 12 new cases of clinical mastitis were treated, 36% of the milking herd. Fifteen percent of these needed re-treating within the two month period. These outbreaks occur every 3-6 months.

According to the herd owner, the SCC in 1987 averaged 150,000, but even when the bulk SCC was as low as 80,000, the mastitis flare-ups still occurred. The herd owner reported that the SCC first began rising in February. (Jan. reports were not available, but the Dec. average SCC was 230,000, Feb. average was 490,000, and March average was 573,000). This rise was reportedly due to one infected cow which was sold in March, after which the SCC dropped (86,000 for the last week in March). The SCC has been steadily rising since then. (June SCC average is 500,000).

During the evening milking on the day of our farm visit, we ran the California Mastitis Test (CMT) and collected a milk sample from all quarters of lactating cows in the herd. The distribution of the number of quarters and the percentage for each score were as follows:

Score	SCC	# Quarters	% Quarters
Negative	(1-200,000)	89	68
Trace	(150,000-500,000)	15	11
1	(400,000-1,500,000)	17	13
2	(800,000-5,000,000)	7	5
3	(>5,000,000)	3	2
Total		131	

The quarter milk samples were refrigerated and cultured the following morning, 6-23-88. Quarters were classified as infected if isolation of a significant pathogen occurred along with elevated cell count. A summary of the infected quarters and cows in the herd is as follows:

	Quarters
Strept spp.	5
Strept ag.	0
Staph spp.	6
Staph aureus	0
Coliforms	1
Clean	75
Equivocal (CMT -, Culture +)	29
Equivocal (CMT +, Culture -)	15
Blind	1
	132

No *Staph aureus* or *Strept agalactiae* was grown from the samples. The majority of organisms grown were environmental Staph and Strept. Those cows infected with *Strept spp.* and *Staph spp.* were further identified on the 6-8-88 DHI test sheet to compare lactation number and stage of lactation.

Strept spp.	ID	Lactation	Fresh	Days in milk
	40	2	4-5-88	64
	3	3	1-4-88	156
	17	4	4-1-88	68
	39	4	4-7-88	62

Staph spp.	ID	Lactation	Fresh	Days in milk
	16	1	11-11-88	210
	3	3	1-04-88	156
	39	4	4-07-88	62
	35	6	4-27-88	42

Four of the six cows infected with *Strept spp* or *Staph spp.* were just recently fresh. The correlation between infected cows and their recent parturition would indicate that the cows are being exposed to environmental pathogens in early lactation.

Summary

This dairy herd is experiencing a high rate of acute clinical mastitis, while overall the herd is relatively "clean" of subclinical mastitis. This herd situation usually occurs when clean quarters with low cell counts are exposed to a high level of environmental pathogens. The pathogens cross the teat end barrier resulting in acute cases of mastitis. The cows lying on dirty or wet platforms before and after milking is the most likely source of this contamination.

From the data collected it cannot be determined whether this herd has an environmental *Staph spp.* and *Strept spp.* problem, or whether the mastitis flare-ups are caused by Coliform pathogens. *Staph spp.* and *Strept spp.* were the main organisms cultured from the herd, but these organisms are difficult to eliminate from the udder and often continue to thrive in the mammary gland long after the clinical mastitis is eliminated. Coliform, on the other hand, are present in the udder only for the first few days of the infection. They are then eliminated and the endotoxins remain causing the clinical signs. If this herd is having outbreaks of Coliform mastitis, it could not be cultured from the previously infected quarters.

A suggested method to determine the causative agent of the outbreaks in this herd would be to culture every mastitis as soon as it is discovered. *Staph spp.* and *Strep spp.* as well as Coliform may be recovered from the milk samples at that time.

The milking machine system appears to be satisfactory. There was adequate slope on the pipeline, and vacuum levels were adequate. The milking procedure appears to be following good mastitis preventive techniques. The cows were washed and dried with individual paper towels, teats were being dipped, and cows are being dry treated. Cows infected with mastitis are receiving prompt medical treatment.

The cows are in a dry, clean environment when outside. Practices such as keeping the lane dry, fencing off the creek, and not allowing the cows to lie in the cow lot are all good ways to keep environmental contamination to a minimum.

Recommendations:

Stall platform cleaning and care

a. Current platform buildup should be removed down to a clean platform surface.

b. Periodic pressure hose wash of the platform and under the rear portion of the mats may decrease the number of pathogens.

c. Mats installed in the future should be placed with the dimpled side down and the grooved side up for ease of cleaning.

d. The platforms should be scraped and swept after the cows leave the barn.

e. Allow the platforms to dry during the day. Before bringing the cows into the barn, cover the floor of the platform with lime. Kiln dried shavings may be used in addition to the lime to help keep the cows clean while they are in the barn.

f. Use trainers to prevent defecation and urination on the platforms.

Milking techniques

a. Attach the milking unit carefully to the cow, crimping the vacuum off during teat cup placement. Air leakage during teat cup placement may cause impacts of milk and environmental contaminants against the teat ends and up into the quarter.

b. When holding down the milker and massaging the udder, try to avoid liner squawks and air leakage. This too may lead to impacts of contaminants up the teat ends.

c. Do not remove teat cups from quarters individually. This is another cause of air leaks leading to impacts.

d. Hand strip cows only when necessary, and do not use udder balm on the teats. The petroleum base of the balm prevents the germicidal action of the teat dip at the teat end.

e. Continue the fine mastitis control measure that are already being practiced.

f. Replace rubber hoses and inflations on the floor bucket more frequently.

Infected cows

a. Culture all new clinical mastitis cases to determine which type of organism is causing the majority of the clinical mastitis problems. This will provide a basis for choosing an effective treatment plan. Teat dips should also be based upon the culture trends. Environmental Strept and Staph are most effectively controlled using an iodine or chlorhexisine teat dip, while a barrier dip (such as what is being used presently) is effective in controlling Coliform.

b. Re-establish the DHI SCC program. From the SCC information, establish a milking order such that cows with a high SCC are milked last or all milked with one unit. Culling decisions may also be easier on those high SCC cows.

References

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