# Implementing Milk Quality Programs on Farms
# Lessons Learned from "Milk Money"

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## Introduction

The production of high quality milk from healthy cows is the primary objective of most dairy farmers. Despite this objective, mastitis remains a significant problem because cow's teats are often exposed to overwhelming numbers of mastitis pathogens. It is well known that mastitis can be controlled by prevention of new infections and elimination of existing infections. The 5-point plan (consisting of post-milking teat disinfection, universal dry cow therapy, appropriate treatment of clinical cases, culling of chronically infected cows, regular milking machine maintenance) has been demonstrated to successfully control contagious pathogens but it is often difficult to fully implement these simple practices (Giger et al., 1994; Payne et al., 1999). When environments mastitis is a concern, implementation of effective mastitis control programs also requires the ability to provide the cow with a clean and dry environment and to harvest the milk efficiently without damaging the teat.

Successful implementation of mastitis control programs often results in additional benefits such as increased milk production and improved profitability (Payne et al., 1999). Various approaches to mastitis control have been reported (Morin et al., 1993; Peters et al., 1994; Sischo et al., 1997; Sargeant et al., 1998). In general, these programs focused on enhancing adoption of research-based practices and management principles that reduce the level of exposure to mastitis pathogens. In Wisconsin, dairy farms have the opportunity to enroll in a mastitis control program ("Milk Money") that is designed to help the individual dairy producers create a targeted milk quality program that meets the needs of the individual farm. (Rodrigues et al., 2005, Rodrigues and Ruegg, 2005). The program is a voluntary program designed to encourage the production of high quality milk and is based on formation of a self-selected team of advisors. During the program, farmers meet with their team 4 times (usually at 4 consecutive monthly meetings) to focus specifically on issues that affect milk quality. Farms use the team and program materials to help prioritize management changes that will help them to reach their self-defined goals. At each of 4 monthly meetings, a simple list of actions to be completed before the next meeting is developed, people responsible for completing the actions are assigned and a method of evaluating the outcome of the action is agreed upon. At the beginning of each subsequent meeting, the action list is reviewed and people are held accountable for completion of their tasks. This simple process has been amazingly successful in improving milk quality and the purpose of this paper is to describe actions important for the implementation of milk quality programs.

## Barriers to Improvement in Milk Quality

Surveys of veterinarians and other professionals working with dairy producers indicate that barriers to improvement milk quality are primarily related to motivation and implementation

rather than lack of technical knowledge or skills (Rodrigues and Ruegg, 2004, Rodrigues and Ruegg, 2005). In a survey of 165 Wisconsin dairy professionals the existence of too many other problems (55%) and few incentives for production of high quality milk (48%) were the predominant reasons cited for failure of farms to improve milk quality. Only a few responders indicated that they felt the need for additional on farm training programs (24%). In a separate survey of farmers that had completed the Milk Money program (n = 140 responders), farmers were asked an open ended question that stated: "What is your greatest challenge in maintaining production of high quality milk?" The most common responses were related to employee management (mentioned by 26% of responders) followed by management of the environment of the cow (mentioned by 14% of responders) and maintaining consistency in the milking process (mentioned by 11% of responders) (Hohmann and Ruegg, 2006, unpublished). It is no mystery why employee management is mentioned so often because 51% of farms responding to a post Milk Money survey, indicated that they employed Spanish speaking employees, yet only 15% indicated that they had any ability to speak or understand Spanish and 40% had never employed an interpreter.

Dairy farms that enroll in the Milk Money program are asked to prioritize management factors that need to be addressed on their farms. In an evaluation of enrolled herds, control of environment mastitis was the most frequently cited priority followed by improvements in milking routine (Table 1). Control of environmental mastitis is based on reducing exposure of teats to moisture, mud, and manure present in the housing area of the cows. These types of changes in management require commitment and training of farm personnel and require that farm managers clearly understand the tasks that they are asking of farm laborers. Communication between the cow handlers and the farm decision makers needs to be frequent, based on mutual trust and allow for dissenting opinions.

**Table 1.** Frequency of critical management factors for the milk quality program reported by WI dairies (N = 113).

| Factor | Percentage (%) [1] |
|---|---|
| Control of environmental mastitis | 70.8 |
| Improvement of the milking routine | 60.2 |
| Reduced rate of clinical mastitis | 49.5 |
| Assessment of milking system function | 47.8 |
| Development of treatment protocols | 44.2 |
| Improvement of cow and parlor hygiene | 39.8 |
| Improved teat end quality | 37.2 |
| Modified the dry cow program | 36.3 |
| Better milker training | 32.7 |
| More use of farm records | 32.7 |
| Control of contagious mastitis | 29.2 |
| Development of standard operating procedures | 29.2 |

[1]Percentage calculated for each factor.

## Oversight of the Milking Process

The quality of milk is directly dependent upon the ability of the farm manager to motivate employees to use management practices that reduce exposure to environmental pathogens and eliminate transmission of contagious pathogens during milking. An emphasis on parlor

throughput rather than quality cow preparation sends the message that speed of milking is more important than cow care. Clear communication of expectations of employees needs to be supported with training and resources to help the employees meet those expectations. Efforts to standardize the milking routine and train employees to consistently meet farm expectations can result in improved milk quality, better job performance and enhanced employee retention.

Statistics from Wisconsin farms that use freestalls indicate that management of the milking parlor is often neglected (Rodrigues et al., 2005). The herds included in this dataset had an average SCC of 328,000 cells per ml, milked 377 cows and had rolling herd average production of about 10,500 kg (23,100 lbs) per cow per year. In this dataset, the reported use of recommended milking practices was generally high. Of the farms, 89% reported that milkers always wore gloves when milking, 97% applied postmilking teat dips, 98% used predips, and 89% reported that milkers forestripped cows before attaching milking units. On participating farms, there were approximately 6 different people milking cows each month, with a range of 2 to 16 separate individuals working in the parlor throughout the month. Training of milking technicians occurred relatively infrequently. Only 22% of the farms indicated that they held frequent training sessions for their milkers, 49 % indicated that they trained milkers only at hiring and 29% indicated that milkers were never trained. It is difficult to understand how employees are expected to perform adequately because less than half (41%) of the farms reported that they had a written milking routine.

Many milking parlors on large dairy farms are used continuously and farmers often focus on increasing parlor throughput. Our data from Wisconsin freestall operations indicate that the largest influences on cows milked per hour per operator (cows/hr/operator) are training frequency and the presence of a written milking routine (Table 2; Rodrigues et.al.,, 2005). **Frequent training of milking technicians resulted in the fastest milking speeds and the lowest monthly rate of clinical mastitis (Table 2)**.

Table 2. Influence of Milking Routine on Performance for Wisconsin Freestall Farms (n = 101)

| Variable | | Cows per Hour per Operator | P value | Monthly Rate of Clinical Mastitis | P Value |
|---|---|---|---|---|---|
| Written Milking Routine | Yes | 46.9 | <0.001 | 5.0% | 0.25 |
| | No | 35.6 | | 7.1% | |
| Training Frequency | Never | 33.6 | 0.006 | 9.6% | 0.04 |
| | At Hiring | 41.6 | | 4.8% | |
| | Frequently | 49.4 | | 5.8% | |
| Complete milking routine[a] | Yes | 40.8 | 0.15 | 5.5% | 0.01 |
| | No | 35.3 | | 10.3% | |
| Forestrip | Yes | 40.9 | 0.09 | 5.8% | 0.08 |
| | No | 32.9 | | 9.4% | |

[a]routine includes forestripping, predipping, drying before unit attachment

The use of a complete milking routine (includes forestripping, predipping and drying before unit attachment, and application of postmilking teat dips) also resulted in faster parlor performance.

**The combination of a complete milking routine and frequent training resulted in the most efficient parlor throughput.** Cows were milked at a rate of 52 cows per hour per operator when a complete milking routine and frequent training was used in contrast to 38 and 35 cows per hour per operator for herds that used an incomplete milking routine and frequent training or incomplete routine without training, respectively. This data strongly suggests that frequent training of milking technicians is an excellent investment and will result in improved milking performance.

Adoption of Best Management Practices

There are no shortcuts or secrets regarding production of high quality milk. The adoption of recommended mastitis control practices will result in improvements in milk quality and the use of a farm based management team has been demonstrated to stimulate adoption of many practices (Rodrigues and Ruegg, 2005). Our data demonstrated that adoption of virtually all best management practices can be enhanced when a clearly defined milk quality plan is collaboratively developed and clearly communicated to people that are held accountable for implementation (Table 3). Implementation of milk quality improvement programs must include input from milking technicians and must be oriented to reconcile their needs with farm management goals. The successful adoption of these practices will result in improvements in milk quality (Table 4).

Table 3. Differences in management practices of WI dairy farms completing milk quality program (n = 113). (from Rodrigues et. al., 2005)

| Management practice | Before program | After program | Adoption rate [3] | P |
|---|---|---|---|---|
| Analyze the milking system during milking at least annually (%) | 39.4 | 61.5 | 38.1 | < 0.001 |
| Forestrip (%) | 86.5 | 92.3 | 50.0 | 0.030 |
| Pre-dip (%) | 87.5 | 97.1 | 84.6 | 0.004 |
| Have a complete milking routine [1] (%) | 76.9 | 85.6 | 54.2 | 0.030 |
| Dry udder using 1 towel per cow (%) | 86.0 | 91.6 | 46.7 | 0.030 |
| Always wear gloves during milking (%) | 70.1 | 82.2 | 50.0 | 0.003 |
| Have a written milking routine (%) | 25.5 | 51.9 | 36.7 | < 0.001 |
| Have a frequent training program for milkers (%) | 14.0 | 31.1 | 22.5 | < 0.001 |
| Record clinical mastitis (%) | 52.6 | 91.8 | 84.8 | < 0.001 |
| Culture all clinical mastitis cases (%) | 13.3 | 31.4 | 29.7 | < 0.001 |
| Culture bulk milk several times per year (%) | 59.2 | 87.4 | 76.2 | < 0.001 |
| Have requested *Mycoplasma* culture (%) | 53.3 | 70.1 | 48.0 | 0.001 |
| Have a written treatment protocol for clinical mastitis (%) | 16.4 | 54.8 | 47.1 | < 0.001 |
| Treat all quarters of all cows at dry-off (%) | 91.5 | 95.3 | 44.5 | 0.100 |
| Use CMT [2] (%) | 67.6 | 80.0 | 47.1 | 0.003 |
| Review individual cow SCC records each month (%) | 77.6 | 90.7 | 58.3 | < 0.001 |
| Plan milk quality program with farm veterinarian (%) | 19.8 | 84.0 | 81.2 | < 0.001 |
| Discuss milk quality issues with dairy plant field representative (%) | 42.1 | 78.0 | 69.4 | < 0.001 |
| Have regular meetings between dairy plant field representative and veterinarian to talk about milk quality improvement (%) | 7.6 | 62.9 | 61.9 | < 0.001 |

[1]Defined as use of a milking routine that includes forestrip, pre-dip, dry and post-dip; [2]California Mastitis Test.
[3]Percentage of adoption by herds not performing each practice at meeting

Table 4. Monthly outcomes of WI dairy farms completing milk quality program (n = 113) (From Rodrigues et al., 2005)

| Outcome | Before program | After program | Difference | P |
|---|---|---|---|---|
| Yield per cow per day (kg) | 29.8 | 30.6 | 0.82 | 0.223 |
| BMSCC (cell/mL) | 385,838 | 307,951 | -77,887 | < 0.001 [a] |
| Standard plate count (cfu/mL) | 14,564 | 10,433 | -4131 | 0.014 [a] |
| Cows milked per hour per person (n) | 31.6 | 30.6 | -0.95 | 0.606 |
| Milk discarded for clinical mastitis (days) | 6.1 | 6.1 | 0.00 | 0.963 |
| Monthly clinical mastitis [1] (%) | 6.8 | 4.9 | -1.9 | 0.016 |
| Monthly incidence of subclinical mastitis [2, 4] (%) | 10.9 | 9.2 | -1.8 | 0.033 |
| Monthly prevalence of subclinical mastitis [3, 4] (%) | 35.8 | 30.8 | -5.0 | 0.008 |
| Monthly cows culled for mastitis [5] (%) | 1.4 | 0.8 | -0.7 | 0.023 |
| Monthly total cows culled [6] (%) | 4.1 | 2.5 | -1.5 | 0.004 |
| Standard milk production loss per cow [7] ($) | 3.88 | 2.75 | -1.12 | < 0.001 |
| BMSCC current quality premium ($/45kg) | 0.07 | 0.27 | 0.20 | < 0.001 |
| Milk quality premium loss per cow ($) | 9.21 | 5.97 | -3.24 | < 0.001 |
| Standard loss from clinical mastitis per cow [8] ($) | 7.71 | 5.47 | -2.24 | 0.010 |
| Yield per cow per day (kg) | 29.8 | 30.6 | 0.82 | 0.223 |

[a]Analyzed as $\log_{10}$; [1]Reported monthly number of clinicals divided by the number of actual cows;[2]Percent of cows with SCS > 4 for first time in current lactation;[3]Percent of cows with SCS > 4 at current test;[4]Calculated average for herds with DHI; n for overall = 86; n for freestall facility = 49; n for stallbarn facility = 37;[5]Percent of cows culled due to mastitis reason in previous month;[6]Percent of total cows culled in previous month;[7]Total average milk production loss due to cows with SCS greater than the goal standard multiplied by the milk price. Calculated with fixed milk price of $0.24 per kg;[8]Sum of the total drug cost, discard milk cost and veterinary labor cost due to clinical mastitis per month. Calculated with fixed prices (drug cost $15.00, milk price $0.24 per kg and veterinary labor cost $50.00)

## Reasons Why Some Milk Quality Programs Fail

In some herds milk quality programs always fail. In most instances, failure can be attributed to a lack of commitment to change. One reason that the Milk Money program is so successful is that it is entirely voluntary and has a system that reinforces personal accountability for implementation of defined actions. In our study, herds that did not achieve their milk quality goals reported that a lack of time and other farm problems were the major constraints to implementation of suggested changes. Time, money and facility restrictions have been previously reported to account for a majority of the barriers to improvements in milk quality (Wienland and Conlin, 2003). In herds enrolled in Milk Money, it is clear that farmers that enrolled in the program had a desire to improve milk quality because enrollment was voluntary and more than 80% of herds complete all 4 meetings of the program. However, the implementation of actions depends on the ability to apply changes to the current farm situation and changing farm priorities. At the completion of the Milk Money program, of herds responding to the question regarding achievement of goals (n = 96), 60 herds (63%) reported that they had achieved their milk quality goals. Herds reported that lack of time (49%), other farm problems (16%), lack of focus (16%), seasonal influences (14%) and poor choice of goals (5%) were possible reasons for failure to meet goals. Of herds surveyed a year after completing the program (n = 121 responders), 83% indicated that they believed that participation in the Milk Money program had a long-term positive benefit on the quality of milk produced on their herds.

## Conclusion

Many dairy farms produce high quality milk and there are no secrets regarding how they achieve it. The ability to implement recommended management practices is an essential aspect of quality milk production. Implementation is dependent on the ability to clearly communicate the value of these practices and to motivate farm personnel to consistently apply them. The use of a farmer selected milk quality management team that meets for a defined time period to work toward predefined goals is a strategy that has clear benefits for the farm. Enrolling farms in such a program requires a prospective, focused marketing program that utilizes a variety of recruitment techniques. Herds enrolling in the Milk Money program report that they became aware of the program by personal contact from an extension agent (54%), a veterinarian (15%) or dairy plant representative (14%) or they read about the program in the news media (21%) or received a mailed brochure offering to help them form a Milk Money team (14%). Maintaining awareness of the importance of producing high quality milk and providing a mechanism to allocate management time and resources toward that goal allow farmers to produce the high quality milk that the industry desires.

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