10 Smart Things Dairy Farms Do To Achieve Milking Excellence

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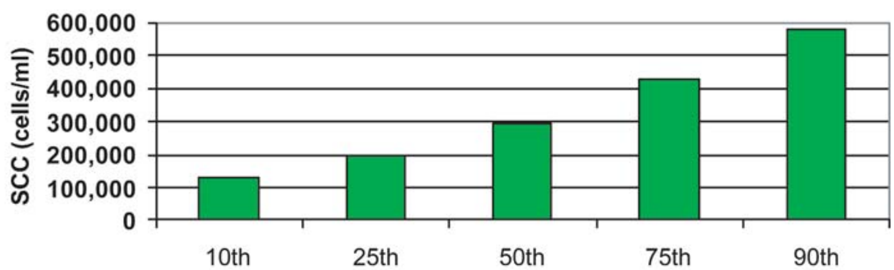
1. SMART FARMS SET PERFORMANCE GOALS

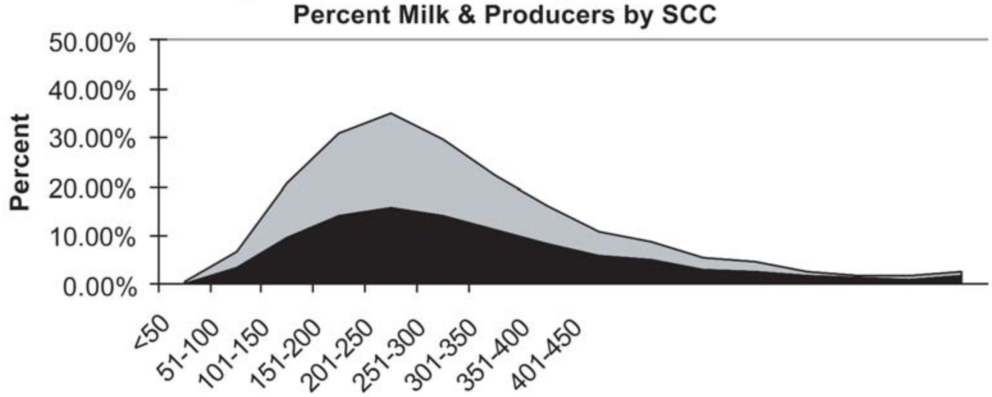
There is an old saying that you can't get to your destination unless you know where you are going. Many farms that start on the path to milking excellence don't make it because they don't have clear quality goals for their farms. Many dairy farms consistently produce high quality milk. In 1998, over 1,800 Wisconsin dairy farms had average bulk tank somatic cell counts (BTSCC) of <120,000 cells/ml and over 4,500 dairy farms obtained average BTSCC of <200,000. In fact, Wisconsin grade A dairy farmers with BTSCC >400,000 cells/ml were ranked in the bottom 25% of herds (Fig. 1).[1]

Figure 1. 1998 BTSCC Percentiles all WI Grade A Herds



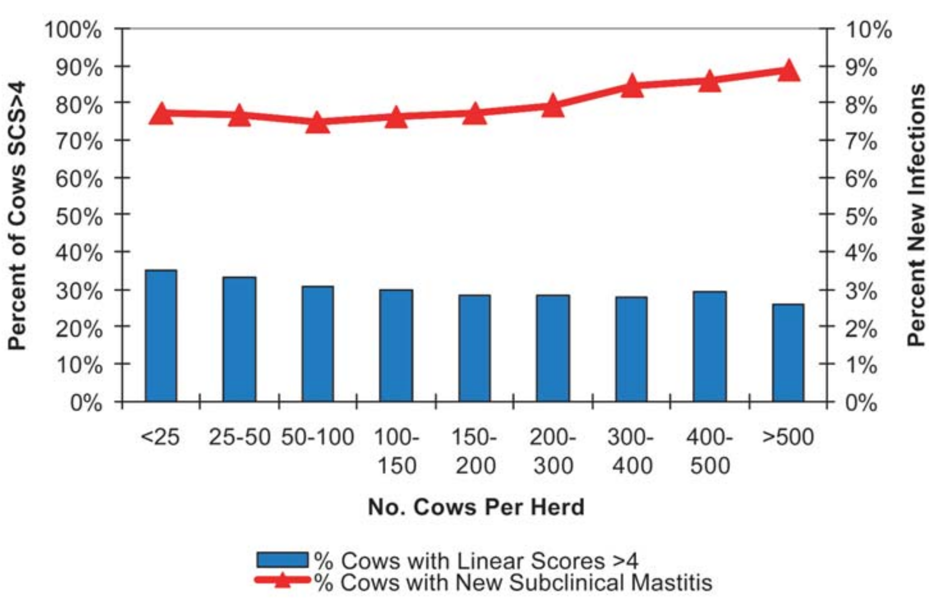
Herd size does influence somatic cell count but not in the manner that many expect. As a group, larger more specialized dairy producers tend to be more focused on quality than more diversified dairy operations. In the December 1998 Chicago regional market order data, 16% of producers and 50% of milk had SCC <250,000 cells/ml; 84% of the milk was produced with a BTSCC of <400,000 (Fig. 2) cells/ml.

Figure 2. 1998 Chicago Regional Market Data
Percent Milk & Producers by SCC



Achievable product quality goals should be set for milk leaving the dairy. The most obvious goal should be to achieve ZERO antibiotic residues. Standard plate counts should average <10,000 cfu. Goals for BTSCC should be set for each farm based upon current farm status but the ultimate objective should be to consistently ship milk with a BTSCC <250,000 cells/ml. BTSCC generally reflects the prevalence of subclinical mastitis that a dairy herd is experiencing. All cows with SCC >250,000 are considered to have subclinical mastitis. The prevalence of subclinical mastitis (the percentage of cows with SCC >250,000) can only be determined by obtaining individual cow SCC values or by performing the CMT on each cow. The prevalence of subclinical mastitis is dependent upon just 2 factors: the new infection rate (percentage of cows developing new subclinical infections) and the duration of each subclinical infection. Mastitis caused by environmental pathogens (coliforms, and environmental streptococci) is generally of shorter duration than mastitis caused by contagious pathogens (*Staph. aureus*, *Strep. ag* and *Mycoplasma bovis*). Herds experiencing problems with environmental mastitis can often rapidly influence the BTSCC by reducing the rate of new infections. Culling is a common strategy for reducing the duration of infection. Many mastitis control programs for contagious mastitis are focused too heavily on culling rather than controlling new infections. Common industry goals for subclinical mastitis are: 85% cows with linear somatic cell scores <5 and new subclinical infection rate <5% per month. [2] These goals are probably aggressive as evidenced by the performance of Wisconsin DHIA herds in June 2000 (Fig. 3). There were >7000 herds included in the data and no size category had <40 herds contributing. The prevalence of subclinical mastitis in the top 10% (based on milk quality) of these herds was <5%.

Figure 3. AgSource Herd Summary Data by Herd Size
June 2000



2. SMART FARMS RAPIDLY IDENTIFY PROBLEMS

Farms that consistently produce high quality milk have methods to monitor herd performance. As farms grow, the farm owner usually becomes the manager of the milking process rather than the actual person milking the cows. Many farms have multiple people milking cows and in the absence of a clearly defined monitoring system, it is easy for milking system managers to lose control of the milking process. The rate of clinical mastitis is often unknown to milking process managers. Specialized milking personnel on larger dairies may have an incentive not to detect or report all cases. Milking technique may influence the perception of clinical mastitis on a farm. Only severe cases of clinical mastitis are detected with milking routines that do not include forestripping. In this instance the only clue that abnormal milk is going into the bulk tank may be highly variable BTSCC values. Unless SCC records are routinely reviewed, even this indicator can be missed. Only 65% of dairy farmers that participated in a WI pilot program emphasizing milk quality teams reported that they routinely reviewed SCC records on a monthly basis.[3] Only 58% of these WI farmers reported recording clinical cases of mastitis. In another survey, less than half of Wisconsin dairy farmers reported that all cows that received antibiotic treatments had a written treatment record.[4]

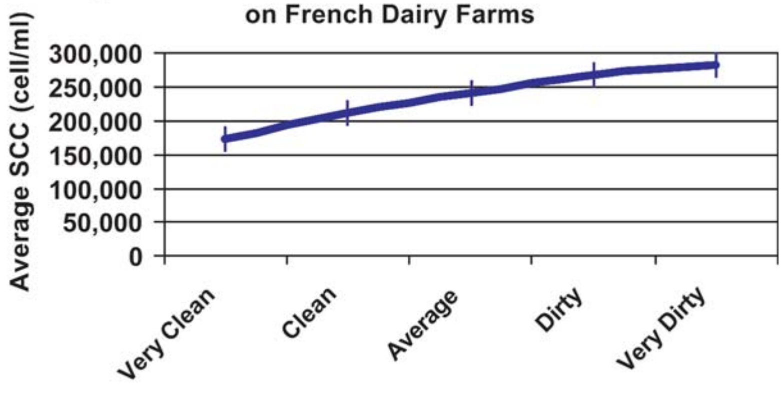
Variability due to differences in detection and definition of clinical mastitis contributes to large differences reported in clinical mastitis rates among studies. One summary reported that 7 to 64% of all lactations experienced clinical mastitis.[5] A summary of 11 studies reported a monthly weighted average incidence of 3.2% and an annual weighted incidence of 38%.[6] A recent study of dairy herds in the UK with BTSCC averages<100,000 cells/ml reported that the average proportion of the herd affected was 23.1%.[7] Goals for clinical mastitis should be based upon individual farm conditions but a reasonable goal for the incidence of clinical mastitis on commercial dairy farms is 2% new cases per month (24% per year). Unrecognized culling can mask mastitis problems and allow serious herd problems to develop prior to detection. According to the NAHMS Dairy '96 study, the top 2 culling reasons reported by dairy farmers in 1995 were reproduction (26.7% of culls) and mastitis (26.5%).[8] This survey also reported that mastitis was the 3rd leading cause of adult cow mortality, accounting for 16.3% of all adult cow deaths.

3. SMART FARMS MILK CLEAN COWS

Many progressive dairy farms have controlled contagious mastitis. On these farms, the major source of mastitis is often environmental pathogens such as E.coli and the environmental streptococci.[9] Cows are exposed to environmental mastitis infections between milkings in their stalls or housing areas. Organic bedding sources, wet or muddy fresh pens, and infrequently or inadequately bedded mattresses are often the environmental niches for these pathogens.

Sand is an excellent inorganic bedding source and has some characteristics (such as getting kicked out of the stall) that help to reduce exposure of the udder to environmental bacteria. Even sand can be mishandled and sand stalls should be groomed on a daily basis. Cow walkways are also a source of exposure to manure and should be frequently scraped. Cows that enter parlors dirty take longer to milk and reduce parlor throughput. A French study demonstrated that teat cleanliness is a good predictor of herd average somatic cell count (Fig. 4).[10] Sending dirty cows to the milking parlor unfairly penalizes milking personnel by requiring them to spend more time prepping cows prior to unit attachment. Predipping is an effective way to reduce exposure to environmental bacteria. Effective predipping consists of adequate coverage of the teat by use of non-recycling teat dipper. Milking routines must be designed to allow for a minimum predip contact time of 20-30 seconds. Iodine based teat dips (0.5%) continue to be effective on most farms. Teat foamers are showing promise as an effective method of premilking teat sanitation. Individual paper or cloth towels should be used to thoroughly dry teats prior to unit attachment.

Figure 4. Teat Cleanliness and Somatic Cell Count on French Dairy Farms



4. SMART FARMS STANDARDIZE THEIR MILKING ROUTINES

Achieving a consistent milking routine is the key to quality milk and is a goal of most farmers. However, many farms have not explicitly described the milking process for their personnel. Less than 20% of WI farms participating in milk quality teams had written milking routines prior to beginning the project.[3] There is tremendous variability in milking routine reported by farmers. In a non-random survey of 338 WI dairy producers conducted in 1998, four routines accounted for 63% of all routines used (Table 1) but the remaining 117 herds reported using an additional 23 milking routines.

Table 1. Reported Pre-Milking Procedures of selected WI Dairy Farmers in 1998

Pre-Milking Steps	Number of Farms Reporting	Percent of Total[a]
Predip, Dry, Attach	69	21.9%
Forestrip, Predip, Dry, Attach	60	19.0%
Predip, Forestrip, Dry, Attach	40	12.7%
Predip, Dry, Forestrip, Attach	29	9.2%

[a]315 farms reported enough data to characterize their milking routine

It is not unusual for consultants that are observing parlor performance to discover that milkers on the same farm are using different milking routines. The key to optimizing milking performance is to milk clean and dry udders, coordinate unit attachment with milk letdown, remove milk rapidly and remove the unit when milking is completed. Milking units should be attached within 40-90 seconds from the beginning of teat stimulation and cows should not be surprised by unexpected procedures occurring during the preparation process. Milking routines should be written down, posted in the milking area and translated for non-english speaking personnel. Parlor processes should be designed to accommodate the working routine of the personnel. The choice of a territorial (each milker manages all steps of the milking process for part of the parlor) versus sequential (milkers work as a team, each milker performing part of the milking process) should be made based in part upon the compatibility and communication abilities of parlor personnel. Sequential work routines are rarely effective when milking personnel work at different rates, speak different languages, or are unclear about farm standards of performance.

5. SMART FARMS TRAIN THEIR STAFF

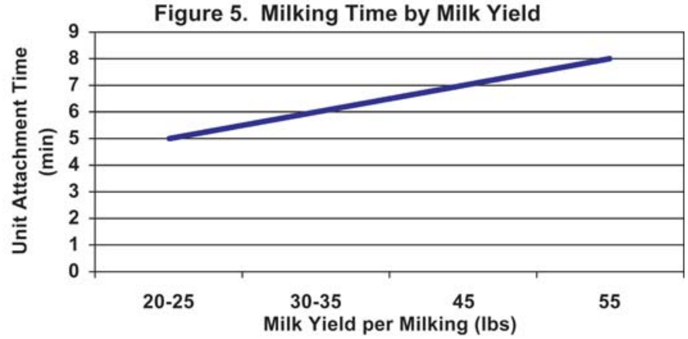
Today's dairy managers increasingly rely upon others to milk their cows. In 1998, there were an average of 6 different people milking cows per month per farm on Wisconsin dairy farms that responded to the milking procedures survey. At the beginning of the WI milk quality team pilot project, more than 40% of respondents indicated that they NEVER trained milkers and an additional 38% responded that they trained milkers only when hired. Only 15% of Spanish speaking milking personnel, attending a worker training session in Wisconsin in April 2000, indicated that they had worked on their current farm for >1 year and 16% had received NO training regarding milking procedures. The most common training mentioned was "on the job experience with a supervisor" (50%). The image and concern about quality that a farm projects to employees will either motivate or demotivate employees in their daily milking practices. Motivation and job satisfaction of employees is generally based more upon the perceived value of their effort rather than pay schedules. On an increasing number of farms, the production of quality milk depends upon continuous effort by non-family employees. Investing and improving employees is a smart management strategy that will return rewards in both better job performance and enhanced employee retention.

6. SMART FARMS MAINTAIN & UPDATE THEIR MILKING SYSTEMS

A properly functioning milking system is essential for the production of high quality milk. Milking equipment represents a substantial portion of farm capital investment and the system needs to be regularly evaluated and updated. Thirty-five percent of quality team participants had never had their milking systems analyzed during milking prior to beginning the project. Milking systems should be adjusted to provide claw vacuum of 10.5-12.5" Hg during peak milk flow.

The use of a flow simulator set at 1.5 gal/minute flow rate is an excellent method to determine vacuum level at peak flow. Low claw vacuums result in longer milking times, overmilking and teat end damage. Milk yield is directly related to unit attachment time (Fig. 5).[12]

Figure 5. Milking Time by Milk Yield



7. SMART FARMS HAVE TREATMENT PROTOCOLS

Treatment protocols are used to define standard treatments for common diseases on dairy farms. Treatment protocols are advocated when multiple people have responsibility for administering antibiotic treatments to dairy cattle or when extralabel drug use is prescribed. Extralabel drug use is any use of drugs that is not specifically mentioned on the product label. Examples of extralabel drug use include: 3 tubes of an intramammary tube when the product label prescribes 2 tubes; use of intramammary tubes at 8 hour intervals when the product label prescribes 24 hour intervals; use of Excenel® IM for any indication besides bovine respiratory disease or footrot; or dosage of 40 cc penicillin SQ when the label dosage is 13 cc SQ. A requirement for legal extralabel drug use in food animals is the existence of a valid veterinarian/client/patient relationship (VCPR). A key requirement of the VCPR is that "the veterinarian has assumed the responsibility of making medical judgments regarding the health of the animals and the need for medical treatment and the client (owner or caretaker) has agreed to follow the instructions of the veterinarian." Documentation (such as clinical mastitis records) of extralabel drug usage is required. Treatment protocols provide a mechanism for increased communication about treatment plans between the veterinarian and client and allow the farm to partially fulfill requirements for legal extralabel drug use. The use of treatment protocols is highly associated with adoption of clinical mastitis records and longer milk discard times.

Table 2. Example of Treatment Protocol for Clinical Mastitis

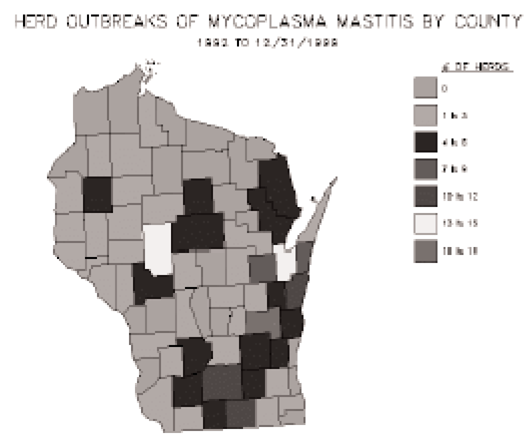
Clinical Signs			
Abnormal milk only	Give oxytocin, put leg band on	Use ¼milker for 2 milkings	Recheck, remove band if normal, take sterile culture if not normal
Abnormal milk PLUS swollen udder	Give oxytocin, put leg band on	Freeze sterile milk sample; give 1 intramammary tube after each milking for 2 RX, Put in Sick Pen	
Abnormal milk PLUS swollen udder or PLUS temp>103, off feed, down in milk	Give oxytocin, put leg band on	Freeze sterile milk sample; give 1 intramammary tube after each milking for 2 RX, 2 aspirin, Put in Sick Pen	Recheck 2 hours later, give 3 l hypertonic saline if temp >103.5, CALL VET if not improved 2 hours after saline
Down & Dehydrated	→	→	CALL VET

Farms participating in the WI quality teams that had treatment protocols were 6.5 times more likely to maintain clinical mastitis records and discarded milk for one-half day longer. Treatment protocols can be simple (Table 2) but should be defined by consultation between the local veterinarian, farm owner and key animal caretakers.

8. SMART FARMS HAVE MASTITIS BIOSECURITY PLANS

Biosecurity is a very trendy topic of discussion in dairy magazines. Mastitis biosecurity refers to keeping cattle safe from contagious mastitis pathogens such as *Staphylococcus aureus*, *Streptococcus agalactia* and *Mycoplasma bovis*. While *Staph aureus* and *Strep ag* are well known threats to milk quality, mastitis caused by *Mycoplasma bovis* has more recently been recognized in Midwestern and Eastern states. Prior to 1992, there were only 2 confirmed herd outbreaks within Wisconsin, between 1992 and 1998 at least 140 herd outbreaks of that organism were reported.[13] Herd outbreaks of Mycoplasma mastitis have been isolated from most Wisconsin counties that have substantial dairy cow populations (Fig 6).

Figure 6. Herd Outbreaks Diagnosed at the WI Animal Health Lab



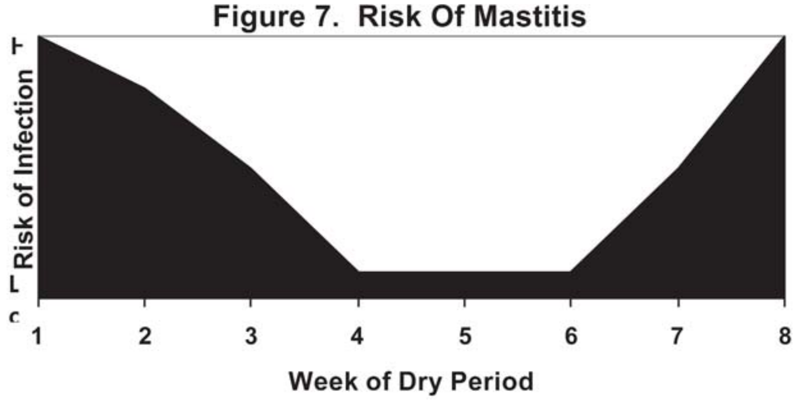
Mycoplasma mastitis is a contagious mastitis pathogen that is not easily treated in dairy cattle. It can cause both clinical and subclinical mastitis and must be diagnosed by culture of bulk tank or cow samples on specially requested media. Once diagnosed in a herd, the most common recommendation is to identify infected cattle and cull them. The recent purchase of cattle is a common risk factor for Mycoplasma mastitis infections. In spite of media interest in biosecurity, relatively few farmers have adopted biosecurity practices. In the NAHMS Dairy '96 study, 18% of milking cows were purchased, 45% of herds introduced at least 1 cow, 20% of dairy operations bought lactating cows and 9% bought bulls. In spite of all this cow movement, only 6% of herds isolated introduced cattle, 67% of herds required no testing, 70% of herds did not ask about cow SCC and >90% of herds did not require a milk culture. Biosecurity programs are simply risk reduction programs and consist of appropriate testing, purchase of lower risk animals and controlling access to animals and equipment. A sound mastitis biosecurity program consists of the following steps:

Four Steps

- Buy healthy cattle – younger, non-lactating animals have likely had less exposure to mastitis pathogens and are usually lower risk. Mature, comingled lactating cattle are maximum risk.
- Buy from a healthy herd – The herd SCC should be <250,000 cells/ml; the cow SCC should be <200,000 cells/ml If SCC are not available cows should be CMT negative. Pooled 5 day bulk tank cultures should be free of contagious mastitis pathogens.
- Keep purchased cattle healthy – house purchased cows separately until proven non-infectious to existing herd. Purchased cattle that calve for the first time should be screened with CMT on day 5 post-freshening and all positive quarters cultured.
- Culture bulk tanks twice monthly during periods when cattle are entering the herd and be sure to request Mycoplasma cultures.

9. SMART FARMS TAKE CARE OF THEIR DRY COWS

Figure 7. Risk Of Mastitis



The dry period is a critical time for the development of mastitis (Fig. 7). Dry cows are at risk for mastitis for a number of reasons. During the dry period important preventive practices such as forestripping, predipping and postdipping are discontinued. The teat canal gets shorter, decreasing the physical barrier that external pathogens must travel to infect the gland. As calving approaches the cows immune system becomes depressed, reducing the ability of the gland to fight off new infections. While the importance of dry cow therapy for the control of contagious mastitis is well documented, recent research has demonstrated that infections with environmental pathogens are often acquired during this period. One study demonstrated that 65% of clinical cases of environmental mastitis had previous isolations of the same pathogen during the dry period that preceded the lactation when the mastitis occurred. Cows that had environmental pathogens isolated at dry off were 4.5 times more likely to have a new clinical case of mastitis during the next lactation.[14] Housing of dry cows is often neglected, especially during an expansion phase when the emphasis is on filling the barn with income-generating lactating cows. As a result, grouping strategies for dry, close-up and fresh cows often put vulnerable, recently fresh animals in close proximity to sick animals. Sick cows were occasionally (39%) or frequently (16%) housed with fresh cows in the majority of farms that responded to the NAHMS Dairy '96 study.[8] Producers that are focused on milking excellence provide a spacious, clean and dry environment for non-lactating cows. They isolate sick cows from fresh cows and ensure that nutritional programs supply adequate vitamin E (1000 IU/day) and selenium levels. Additional practices, such as treatment of all quarters with approved intramammary dry cow therapy, the use of teat sealants (must be applied properly to ensure adequate adhesion days), the use of J-5 vaccines, and fresh cow protocols to screen for contagious mastitis (CMT followed by culture of positive quarters) can be used to achieve the production of high quality milk.

10. SMART FARMS USE APPROPRIATE CONSULTANTS

Dairy farming is a complex process that involves interactions between animals, nature and people. Like other research-based businesses, the growth in knowledge about dairy management practices is extraordinary. Dairy farmers acquire information about animal health from a variety of sources including veterinarians, nutritionists, other producers, dairy magazines and consultants.[8] The use of consultants can help farmers sort through complex issues and make informed decisions. Consultants visit multiple farms, see results from wide variety of management decisions and bring an outside perspective to farm decisions. An increasing use of consultants is the formation of on-farm management teams. On-farm management teams can be formed to troubleshoot specific farm issues or to meet periodically and review farm performance. A properly formed management team can aid the farmer by bringing expertise on narrow issues. Management teams also allow for dialogue between consultants (such as veterinarians and dairy plant personnel) that have shared interest in specific outcomes. The management team format appears to show promise for milk quality issues. Farms that were successful in forming management teams in a Wisconsin milk quality pilot project decreased their BTSCC by 44,972 cells/ml (in a 4 month period) as compared to an increase of 41,063 cells/ml in herds where farms met separately with their consultants.

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