

# Employee Management to Improve Milk Quality

Ronald Erskine

Michigan State University, Large Animal Clinical Sciences, 736 Wilson Road, East Lansing, MI 48837, USA  
Email: Erskine@msu.edu

## ■ Take Home Messages

- ▶ Employee training needs to be consistent.
- ▶ Employees need to know how, what and WHY.
- ▶ Let the cows evaluate the protocols..... and training.
- ▶ If the cows like the protocols, you will like your milk cheque.

The North American dairy industry is rapidly intensifying; in the U.S., farms with fewer than 100 cows accounted for 49% of the country's 9.7 million milk cows in 1992, but just 17% of the 9.2 million milk cows in 2012. In contrast, farms with at least 1,000 cows accounted for 49% of all cows in 2012, an increase from just 10% in 1992 (MacDonald and Newton, 2014). Additionally, 63% of the milk supply is produced by herds with more than 500 cows (von Keyserlingk et al., 2013). However, the percentage of herds with less than 100 cows only decreased marginally, from 83% to 77% (USDA:NAHMS, 2007).

Dairy farms are also becoming more diverse in terms of employment practices and organization (Jackson-Smith and Barham, 2001). Increasing numbers of Latino workers are being employed on many farms that had previously hired relatively few foreign-born laborers (Jenkins et al., 2009). Recent reports have estimated that about half of U.S. dairy farms depend on Spanish-speaking foreign labor and 62% of milk is produced from farms employing immigrant labor (Baker and Chappelle, 2012; von Keyserlingk et al., 2013). As the role of immigrant labor increases in the U.S. dairy industry, cultural and communication barriers complicate management–employee relationships as Spanish-speaking workers are increasingly seen in jobs traditionally held by individuals whose first language is English (Cross, 2006; Stack et al., 2006; Jenkins et al., 2009).

To address this potential cultural and language barrier, education, training and translation tools have been developed by land grant universities, consultants and agricultural agencies (Fuhrmann, 2002; Chase et al., 2006, Stack et al., 2006; Jenkins et al., 2009). However, these programs were developed from a management-directed perspective with minimal input from employees and the effectiveness of employee training, or education programs, relative to farm protocols and productivity, has not been evaluated for short or long term success. Additionally, many dairy managers have limited human resource knowledge and experience, this often leads to frustration with protocol drift and a sense that employees are not motivated to engage in the success of the farm beyond prescribed instructions. These and other workplace conditions can contribute to employee turnover, which has been attributed to relationships with management and co-workers (Billikopf and Gonzalez, 2012). Taken together, these gaps in the nation's dairy farms constitute a form of cultural lag. That is, there is a gap between the human resource needs arising within the industry's labor force and the capacity of producers and managers to address them.

Although somatic cell counts (SCC) continue to decrease among U.S. dairy herds (USDA:NAHMS, 2013), poor protocol compliance may contribute to variability in mastitis control among herds (Fuhrmann, 2002; Brasier et al., 2006). We contend that ineffective training of employees and ensuing protocol drift may prevent some herds from attaining their milk quality goals. This is particularly relevant for mastitis control protocols as Latino laborers are heavily concentrated in entry level positions on dairy farms that include milking, maintenance of housing and administration of therapies such as intramammary infusions of antimicrobial drugs (Valentine, 2005; Stack et al., 2006). A recent survey of 628 herd owners and managers from Florida, Michigan, and Pennsylvania revealed that herds that offered quality incentives for employees, or ensured strict compliance of milking protocols had lower bulk tank somatic cell counts (BTSCC) than herds that did incorporate these management practices. Conversely, herds that responded that mastitis was a problem in their herd, or had difficulty with compliance of milking or treatment protocols, were more likely to have higher BTSCC (Schewe et al., 2015). Thus, issues of employee management and training, as well as producer values and attitudes regarding mastitis, are related to BTSCC.

In an attempt to enhance engagement on the part of dairy employees, we are developing an on-farm evaluation, the Quality Milk Alliance (QMA) that incorporates a unique aspect of assessing milk quality opportunities on a dairy farm, the management culture. Beyond identifying traditional opportunities for improving milk quality (e.g., improved bedding quality), the QMA evaluation can also serve as a platform for employee training and teaching.

## ■ What Do Employees Tell Us?

While there is a considerable body of research that links dairy producer beliefs and attitudes with the prevalence of mastitis and antimicrobial drug use (Barkema et al., 1999; Vaarst et al., 2002; Wenz et al., 2007; Sato et al., 2008; Jansen et al., 2009), employee knowledge and attitudes as they relate to quality milk are not well documented (Stup et al., 2006). In a study of 14 farms from four states, employees received a paper copy of a 29 question survey (bi-lingual) and then were instructed to call a bi-lingual interviewer who asked the employees to respond to each question (Durst and Moore, unpublished). The responses were anonymous and a total of 174 employees participated. Owners and managers were also surveyed to determine how they thought their employees would respond. Employees overwhelmingly want to go beyond their current level of knowledge; rating their interest in learning as 4.73 on a scale of 1 to 5 where they were told that “1” corresponded with “I already know enough to do my job” and “5” corresponded to “I am interested in dairy and I want to keep learning”. This is an opportunity to be seized by dairy owners (who ranked employee interest in learning as 3.27), rather than squandered.

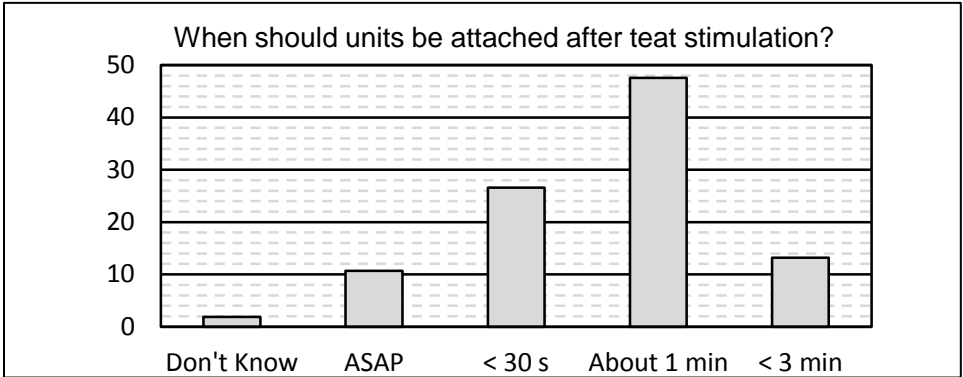
In a pilot study in 12 Michigan dairies, when herd owners or managers were asked, “Who trains new employees how to milk cows?”, 11 of the 12 management teams responded that they perform the training. However, when the employees were asked the same question, only 29% stated they learned how to milk from the managers or owners; 71% said they learned from other employees, or they just “learned on the job”. Employee responses examined by language (Spanish-speaking and English-speaking) showed that only 14% of Latino workers said they learned the milking protocols from managers or owners, which was lower than English-speaking workers (42%; Erskine et al., 2015).

As part of a field trial to develop the QMA evaluation, we have started to gather more extensive information about employee training and communication that will ultimately have over 120 participating herds from Michigan, Pennsylvania, and Florida. Preliminary results suggest that communication and training barriers are similar to those found in our pilot study; on average about half of the employees on farms know the SCC goals for the herd, and a majority rely on training from someone other than a herd manager, or state that team meetings among farm personnel only occur if there is a problem, or not at all (Table 1). Likewise, about half of employees in each herd believe the lag time between teat stimulation and unit attachment should be about a minute, with a variety of responses accounting for the remainder of respondents. Perhaps most intriguingly, when the proportion of employees within each herd was correlated to the percent of employees that were aware of herd SCC goals, there was virtually no association (Figure 2; coefficient of variation = 0.0337). This suggests that herds that offer

incentives for milk quality don't have a greater proportion of employees who are aware of herd goals than herds that do not pay an incentive. Proper preparation of udders and teats before milking improves milk quality by 1) ensuring good hygiene, 2) detecting cows with clinical mastitis, and 3) harvesting milk efficiently. Productivity of a dairy operation increases when milking is done as efficiently as possible, without sacrificing milk quality and harvest. Also, cow health improves when the time standing in holding pens and parlors, or having units attached, decreases.

**Table 1: Mean percent of employees within herds (n=37 herds) that responded to questions regarding training and herd goals. Responses were attained anonymously from 194 employees (mean of 5.3 employees per herd) with remote response technology. Range of responses among herds was 0 to 100% for all questions.**

Do you know the somatic cell count goals for this dairy farm?	Yes	No
	51	49
Who trains you to milk the cows?	Owners/Managers	Other Employees or Self-taught
	23	77
How often do you have team meetings with other employees and managers?	At least once per year	Only when there is a problem or never
	28	72



**Figure 1: Mean percent of employees within herds (n=37 herds) that responded to the question “When should units be attached after teat stimulation”?** Responses were attained anonymously from 194 employees (mean of 5.3 employees per herd) with remote response technology.



**Figure 2: Relationship between the percent of employees that knew herd somatic cell count goals and percent of employees receiving a milk quality incentive within 37 herds.**

## ■ What Do The Cows Tell Us About Employee Training?

Given the effort spent on most dairies to insure proper milking protocols, how do we know if they are being done correctly? Let the cows answer this question, they know best! VaDia® units (Biocontrol NA) digitally record vacuum at the teat end (inside the liner) and cluster, letting the cows tell us if they're ready to milk, or if they're milked too long (overmilked). VaDia units don't measure milk flow directly, but a simple way to interpret VaDia results relative to milk flow is:

**High Milk Flow = Low vacuum in the liner**

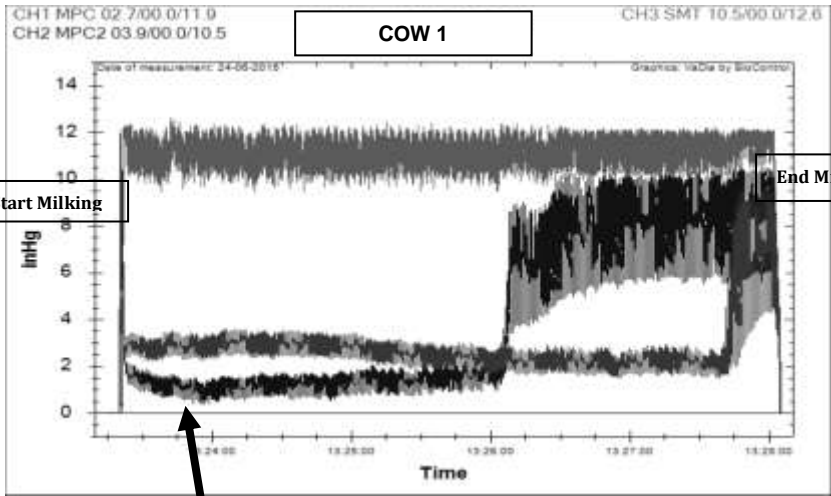
**Low Milk Flow = High vacuum in the liner**

VaDia units can measure vacuum levels at four different places on the cluster simultaneously. Generally, we measure vacuum in the mouthpiece chamber of a front and rear liner (near the teat ends), near the cluster and in a short pulsation tube.

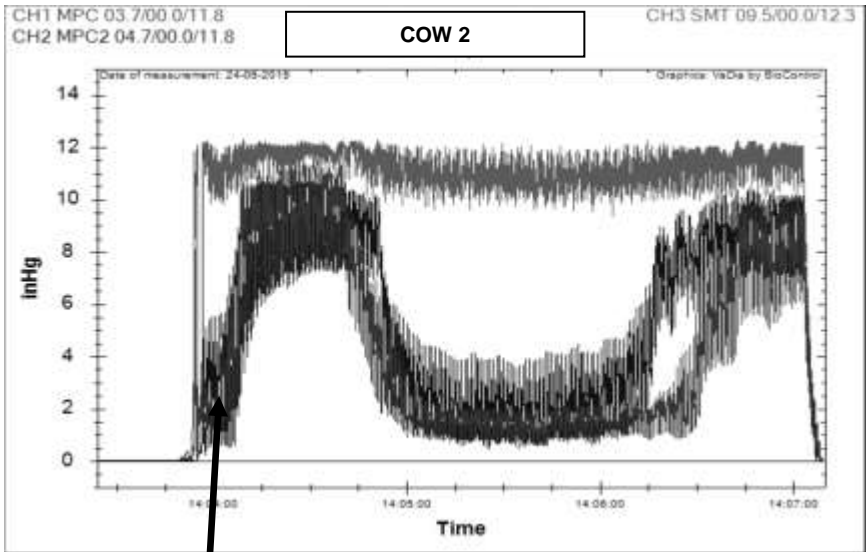
Below are VaDia analyses from two cows during milking.

Cow 1 was ready to milk; the mouthpiece vacuum near the teat ends dropped quickly (less than 15 seconds after the unit was attached) and remained low until each teat was finished milking.

What about Cow 2? Teat end and cluster vacuum (top line) decreased, but then increased to near maximum levels, and finally decreased again. This cow was not ready to milk, milk flow was low for more than a minute after the milking unit was attached, signifying delayed milk letdown. This increases milking time, and may reduce her milk output as well as increase the risk of mastitis.



Mouthpiece vacuum (rear teat ; front teat) near teat ends drops to low level immediately after unit is attached- Cow was ready to milk!!!



Vacuum decreases, increases and then decreases again...  
Bi-modal milking from poor milk letdown

***VaDia analysis “Lets the cows score the milking protocols” and results can be used for employee training and teaching, as well as follow evaluations after training.***

## ■ Discussion

Taken together, there are misperceptions among many herd owners and managers as to the effectiveness of employee training efforts. This may be exacerbated on farms that lack prescribed communication opportunities among personnel, for example, the high proportion of employees that responded that there was a lack of regular team meetings, or only met when there was a problem, could be perceived as a punitive management style among employees. Especially considering that on many farms, employee turnover is considered a problem (Erskine, personal observation), the need for effective and consistent communication, training, and education is critical for the prevention and control of mastitis.

To date, our studies suggest that employees lag behind the understanding of mastitis prevention and control, even though they are performing a greater role in the critical work of milking, cleaning barns, observing the health of cows, etc. From an extension education standpoint, we have possibly lagged behind the cultural changes brought about by the demographic changes in the labor force in the dairy industry. In a separate question from the pilot study, 36/74 (49%) of the employees stated that they receive no education regarding mastitis control and management, and only 12/74 (16%) stated they receive education (videos, consultant or veterinary visits, workshops, etc.) on a regular basis. Thus, a new approach for enhancing the education for dairy employees may be needed to augment extension education models by enlisting and facilitating “education amplifiers”, who spend considerable time on individual dairy farms, develop professional relationships with employees, and apply their expertise in employee training and education.

During the course of our pilot project, we developed learning resources (lessons, learning objectives, metrics of farm goals) for use by veterinarians on each of the 12 farms. The learning resources varied by farm depending on the particular observations and deficiencies that were determined during the course of the milk quality evaluation. Additionally, we provided visual aids in the form of a “Quality Milk Corner” that included a poster board for employees to serve as a focal point for learning about herd goals, metrics, and educational materials. In effect, we tested the ability of veterinarians to serve as “on-farm science teachers” for the employees to help promote better understanding of the protocols on the farm, and ultimately to attain more consistent and sustained practice of mastitis control protocols.

During focus group discussions at the completion of the demonstration project, employees strongly expressed their appreciation for the education program, which helped them better understand why they do their tasks and the importance of those tasks. The education program also instilled a sense of respect, to which one employee added, “Without understanding why we do things, it’s like being told as a kid ‘Not to touch the hot stove’ but never being



told why you shouldn't do it." Dairy producers also noted the positive attitude of employees brought about by veterinarian-initiated education activities and cited several examples of improved interest and team effort on the part of the employees in the work they performed. Additionally, producers expressed interest in continuing this program and believed it held economic value for their operation. One of the critical comments brought forth by veterinarians was the need for support in educating Latino employees, both for interpretation and comprehension of learning materials, and to help navigate cultural differences (e.g., ensuring employees believe that the veterinarian is there to build a relationship with them and not to report back to the owner and get them in trouble).

We believe that engaged employees take the initiative and work to get the desired result for the dairy operation, beyond just "doing the job." Engaged employees understand the goals of the farm, how things must get done to achieve those goals, and why they should follow protocols to attain those goals. We further believe that in order to close the gap between employee knowledge and dairy farm production, extension personnel should build capacity to support "on-farm education" and facilitate "science teachers," be they veterinarians, herd managers, or other professionals who can make a more durable impact on employee engagement and thereby improve productivity on dairy operations in the context of the major changes in the industry. Employees who work long hours may not be fully receptive to learning after travelling to attend structured education programs such as a three-hour-long workshop. Additionally, literacy and education levels can be problematic for some employees, and the application of what has been learned on farm sites generally relies on the herd owners or managers, many of whom are not trained or inclined to serve in the role of educator. Our preliminary results indicate that there are considerable training and communication barriers between herd owners and managers and their employees, especially Spanish-speaking employees. These barriers provide opportunities for further research and implementation.

## **Acknowledgements**

This project was supported by Agriculture and Food Research Initiative Competitive Grant no. 2013-68004-20439 from the USDA National Institute of Food and Agriculture

## **■ References**

- Baker, D., and D. Chappelle. 2012. Health status and needs of Latino dairy farm workers in Vermont. *J. Agromed.*17:277–287.
- Barkema, H. W., J. D. Van Der Ploeg, Y. H. Schukken, T. J. G. M. Lam, G. Benedictus, and A. Brand. 1999. Management style and its association

- with bulk milk somatic cell count and incidence rate of clinical mastitis. *J. Dairy Sci.* 82:1655-1663.
- Billikopf, G., and G. González. 2012. Turnover rates are decreasing in California dairies. *Calif. Agric.* 66:153-157. <http://californiaagriculture.ucanr.org/landingpage.cfm?article=ca.v066n04.p153&fulltext=yes>
- Brasier, K., J. Hyde, R.E. Stup, and L.A. Holden. 2006. Farm-level human resource management: An opportunity for extension. *J. Extension* 44: rb3. <http://www.joe.org/joe/2006june/rb3.php>.
- Chase, L. E., L. O. Ely, and M. F. Hutjens. 2006. Major advances in extension education programs in dairy production. *J. Dairy Sci.* 89:1147–1154.
- Cross, J. 2006. Restructuring America's dairy farms. *Geograph. Rev.* 96:1-23.
- Erskine, R.J., R. O. Martinez, and G. A. Contreras. 2015. Cultural lag: A new challenge for mastitis control on dairy farms in the U.S. *J. Dairy Sci* 98:8240-8244.
- Fuhrmann, T.J. 2002. Quality milk starts with quality management. Pages 131-139 in *Natl. Mastitis Counc. Reg. Mtng. Proc.*, Orlando, FL, *Natl. Mastitis Counc., Inc., Verona, WI*. <http://www.nmconline.org/articles/qualmgt.pdf>.
- Jackson-Smith, D., and B. Barham. 2001. Dynamics of dairy industry restructuring in Wisconsin. *Res. Rural Sociol. Dev.* 8:115-139.
- Jansen, J., B. H. P. van den Borne, R. J. Renes, G. van Schaik, T. J. G. M. Lam, and C. Leeuwis. 2009. Explaining mastitis incidence in Dutch dairy farming: The influence of farmers' attitudes and behaviour. *Prev. Vet. Med.* 92:210-223.
- Jenkins, P. L., S. G. Stack, J. J. May, and G. Earle-Richardson. 2009. Growth of the Spanish-speaking workforce in the Northeast dairy industry. *J. Agromed.* 14:58–65.
- MacDonald, J., and D. Newton. 2014. Milk production continues shifting to large farms. US Department of Agriculture, Economic Report Service, *Amber Waves*, Dec 1, 2014. Accessed April 28, 2015. <http://www.ers.usda.gov/amber-waves/2014-december/milk-production-continues-shifting-to-large-scale-farms.aspx#.VJc6Ff8KQA>
- Sato, K., P. C. Bartlett, L. Alban, J. F. Agger, and H. Houe. 2008. Managerial and environmental determinants of clinical mastitis in Danish dairy herds. *Acta Vet. Scand.* 50:4-12.
- Schewe, R. L., J. Kayitsinga, G. A. Contreras, C. Odom, C. A. Coats, P. Durst, E. P. Hovingh, R. O. Martinez, R. Mobley, S. Moore, and R.J. Erskine. 2015. Herd management and social variables associated with bulk tank somatic cell counts in dairy herds in the Eastern United States. *J. Dairy Sci.* 98:7650-7665.
- Stack, S. G., P. L. Jenkins, G. Earle-Richardson, S. Ackerman, and J. J. May. 2006. Spanish-speaking dairy workers in New York, Pennsylvania, and Vermont. *J. Agromed.* 11:37–44.

- Stup, R. E., J. Hyde, and L. A. Holden. 2006. Relationships between selected human resource management practices and dairy farm performance. *J. Dairy Sci.* 89:1116-1120.
- USDA-NAHMS. 2007. Dairy 2007 Part II: Changes in the U.S. dairy cattle industry, 1991-2007. Accessed January 14, 2015. [http://www.aphis.usda.gov/animal\\_health/nahms/dairy/downloads/dairy07/Dairy07\\_dr\\_PartII.pdf](http://www.aphis.usda.gov/animal_health/nahms/dairy/downloads/dairy07/Dairy07_dr_PartII.pdf)
- USDA-NAHMS. 2013. Determining U.S. milk quality using bulk tank somatic cell counts, 2012. Accessed January 14, 2015. [http://www.aphis.usda.gov/animal\\_health/nahms/dairy/downloads/dairy\\_monitoring/BTSCC\\_2012infosheet.pdf](http://www.aphis.usda.gov/animal_health/nahms/dairy/downloads/dairy_monitoring/BTSCC_2012infosheet.pdf)
- Vaarst, M., B. Paarup-Laursen, H. Houe, C. Fossing, and H. J. Andersen. 2002. Farmers' choice of medical treatment of mastitis in Danish dairy herds based on qualitative research interviews. *J. Dairy Sci.* 85:992-1001.
- Wenz, J. R., S. M. Jensen, J. E. Lombard, B. A. Wagner, and R. P. Dinsmore. 2007. Herd management practices and their association with bulk tank somatic cell count on United States dairy operations. *J. Dairy Sci.* 90:3652-3659.
- von Keyserlingk, M. A. G., N. P. Martin, E. Kebreab, K. F. Knowlton, R. J. Grant, M. Stephenson, C. J. Sniffen, J. P. Harner, A. D. Wright, and S. I. Smith. 2013. Invited industry. University of California, San Diego. Accessed May 2, 2015. <http://ccis.ucsd.edu/PUBLICATIONS/wrkg121Acknowledgements>



