# Effect of Dairy Beef Quality Assurance Training on Dairy Worker Knowledge and Welfare-Related Practices

**Abstract**

A study was conducted to determine whether on-farm dairy beef quality assurance (BQA) training affected dairy worker knowledge of BQA and welfare-related practices. Dairy personnel who participated in the BQA training were administered an exam before and after the training to gauge the amount of knowledge gained. The average exam score was 21.0 points higher after the training, increasing from 54.4 to 75.4. Improvement in dairy worker knowledge suggests that BQA training programs have the potential to positively influence the dairy industry through the education of dairy owners and workers on BQA and welfare-related practices.

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## Introduction

Unlike most sectors of animal agriculture, the dairy industry is responsible for providing two valuable food products: dairy and beef. Although the primary purpose of a dairy cow is to produce milk, at the end of its productive life, it will be culled from the herd and enter the beef supply. Over 3 million dairy cows were slaughtered in the United States during 2013, representing 9.8% of all cattle slaughtered that year (U.S. Department of Agriculture, National Agricultural Statistics Service, 2014), illustrating the importance of this class of cattle to the beef supply. Despite this importance, beef quality assurance (BQA) practices are lacking on many dairy operations. Historically, market dairy cows have had more BQA defects than market beef cows, with more injection site lesions (Roeber et al., 2002), greater incidence of lameness (National Cattlemen's Beef Association, 2007), and greater incidence of underweight (Ahola et al., 2011).

The main goal of a dairy BQA program is to ensure that beef from dairy cows meets the quality and safety expectations of consumers (National Dairy Herd Information Association, 2009). In addition, a dairy BQA program emphasizes proper handling and management, promoting dairy cow welfare. The early identification and marketing of cull cows ensures that dairy cattle are culled in a timely manner, prior to compromising their welfare, and maximizes profits for dairy producers by ensuring that animals with fewer defects are sent

to market. Many other practices affect both BQA and dairy cow welfare. For example, administering all injections according to BQA guidelines not only preserves the higher quality, higher value meat in the hindquarters of an animal but also results in injections being given in neck muscle, which has been found to heal faster than rump muscle (Li, Yin, Wang, & Miao, 2012).

Historically, providing on-farm training programs has been an excellent way of educating dairy producers and employees on various components of dairy operations, such as milking and calving management (Dalton & Jensen, 2006; Garry, Roman-Muniz, Lombard, & Van Metre, 2007). For training to be effective, though, it is important that the programs be conducted in the native language of those attending, which for many U.S. dairy employees is Spanish. A milker training program developed by the University of Idaho Extension team was conducted in Spanish and proved to be quite beneficial in improving worker knowledge of milking management (Dalton & Jensen, 2006). Similar training programs focusing on other aspects of dairy operations are likely to be met with success as well.

# Objective

The objective of the preliminary study discussed in this article was to determine whether on-farm dairy BQA training has an effect on dairy worker knowledge of BQA and welfare-related practices.

# Methods

The findings reported here are from a larger collaborative study by Colorado State University and University of Idaho researchers on the effects of on-farm BQA training on health and welfare of dairy cows (Adams, Ahola, Chahine, Ohlheiser, & Roman-Muniz, 2015). In each state (Colorado and Idaho), the operators of six conventional dairies chosen on the basis of size agreed to participate in the study. Of the six dairies in each state, two dairies represented each of the following size categories: small (1 to 199 cows), medium (200 to 1,499 cows), and large (1,500 cows or more). In each state, workers at one dairy from each size category received BQA training while workers at the other dairy in the same size category did not receive training. Results presented here represent the six dairies—three in each state—at which workers received the BQA training.

Training sessions on each dairy were facilitated by university Extension personnel using Spanish-language materials and included a PowerPoint presentation, a video, and printed information. Training sessions lasted approximately 60 min and addressed the following materials and information:

- the Idaho dairy BQA manual, Spanish version (Idaho BQA, 2008);

- *Prevention and Management of Non-ambulatory Dairy Cows* video, Spanish version (Western Dairy Association, 2010);

- *Guidelines for Responsible Antibiotic Use* poster, Spanish version (Minnesota Beef Council, 2013);

- *Beef Quality Assurance for Dairy and Beef Farmers* poster, Spanish version (Minnesota Beef Council, 2013); and

- a dairy BQA PowerPoint presentation in Spanish covering the topics of

- identifying lame cows through use of the 5-point locomotion scoring system (Sprecher, Hostetler, & Kaneene, 1997),

- scoring body condition of dairy cows (Ferguson, Galligan, & Thomsen, 1994),

- handling of dairy cows, and

- proper injection techniques.

A total of 28 dairy personnel participated in the training sessions. All participants were administered an exam immediately prior to and immediately following the training to determine the amount of knowledge gained during the training (Figure 1).

| Figure 1. |
|---|
| Exam Instrument for Dairy Personnel Who Received Training in Beef Quality Assurance (BQA), Administered Both Before and After Training[1] |

| Question | Possible Answers |
|---|---|
| 1. Which of the following can the dairy beef quality assurance (BQA) program affect? | a.  animal health*<br><br>b.  dairy farm profitability*<br><br>c.  animal well-being*<br><br>d.  milk and beef quality* |
| 2. According to BQA guidelines, where should intramuscular (IM) injections be given? | a.  in the rump<br><br>b.  in the neck*<br><br>c.  in the back leg<br><br>d.  in the mammary vein |
| 3. According to BQA guidelines, where should subcutaneous (SQ) injections be given? | a.  in the rump<br><br>b.  in the neck*<br><br>c.  in the back leg<br><br>d.  in the jugular vein |
|  | a.  in the rump |

| | |
|---|---|
| 4. According to BQA guidelines, where should intravenous (IV) injections be given? | b. in the jugular vein*<br><br>c. in the back leg<br><br>d. in the mammary vein |
| 5. According to BQA guidelines, if you have the option of giving an injection subcutaneous (SQ) or intramuscular (IM), which is the preferred method to maximize beef quality? | a. subcutaneous (SQ)*<br><br>b. intramuscular (IM) |
| 6. What is the milk or meat withdrawal period? | a. the time that should pass before you inject the cow again<br><br>b. the time needed before the milk or meat is suitable for human consumption*<br><br>c. the time needed for a drug to cure a disease<br><br>d. a suggestion, not strictly enforced |
| 7. Which of the following can affect beef quality and safety? | a. injection site damage*<br><br>b. shipping to slaughter before completion of drug withdrawal period*<br><br>c. systemic diseases*<br><br>d. body condition score* |
| 8. By itself, which of the following is an acceptable procedure to euthanize mature cows? | a. gunshot to the head*<br><br>b. intravenous injection with disinfectant solution<br><br>c. blunt trauma to the head with a hammer<br><br>d. exsanguination (bleeding out) by cutting the jugular or mammary vein |
| | a. a healthy cow that hasn't gotten pregnant in the last year* |

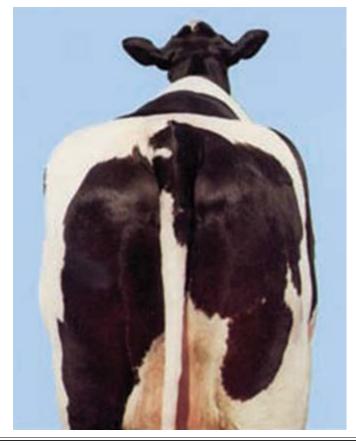| | |
|---|---|
| 9. Which of the following cows should be sent to slaughter? | b. a cow recently diagnosed with cancer<br><br>c. a cow with severe pneumonia and with a lameness score of 4<br><br>d. a very weak cow with body condition score of 1<br><br>e. a cow treated with penicillin and flunixin yesterday |
| 10. What is the locomotion score of a cow that shows pronounced arching of her back and is reluctant to move, with almost no weight bearing on the affected leg? | a. 1<br><br>b. 2<br><br>c. 3<br><br>d. 4<br><br>e. 5* |

11. Which of the following cows has a body condition score of 2?



a.                                                                    *          b.

Zinpro Performance Minerals®, Eden Prairie, MN

[1]Exams were administered in Spanish and translated to English for publication.

* indicates correct response.

Pretraining and posttraining exam results were compared in SAS 9.3 (SAS Institute Inc., Cary, NC) using the Wilcoxon signed rank sum test in PROC UNIVARIATE for comparing individual questions and the paired $t$-test procedure for comparing the difference in participants' overall exam scores, with significance being set at $p \leq$ .05.

# Results

Results comparing responses before and after training are included in Table 1. With the exception of the question regarding what a milk or meat withdrawal is, there was an increase in the percentage of correct responses for all questions ($p < .0001$).

**Table 1.**

Percentages of Correct Responses by Dairy Personnel ($n = 28$) Who Received Training in Beef Quality Assurance (BQA) on Pre- and Posttraining Exams

| Question | % correct response, pretraining exam | % correct response, posttraining exam | Difference (posttraining exam)−(pretraining exam) |
|---|---|---|---|
| 1. What BQA affects | 34.8 | 36.6 | +1.8 |

| | | | |
|---|---|---|---|
| 2. IM injections | 64.3 | 96.4 | +32.1* |
| 3. SQ injections | 83.9 | 96.4 | +12.5 |
| 4. IV injections | 75.0 | 100.0 | +25.0* |
| 5. SQ vs. IM injections | 42.9 | 85.7 | +42.8* |
| 6. Milk and meat withdrawal | 53.6 | 53.6 | 0.0 |
| 7. What affects BQA | 33.0 | 33.9 | +0.9 |
| 8. Euthanasia | 83.9 | 100.0 | +16.1* |
| 9. Suitable for slaughter | 64.3 | 94.6 | +30.3* |
| 10. Locomotion | 16.1 | 57.1 | +41.0* |
| 11. Body condition | 46.4 | 75.0 | +28.6* |

*$p < .05$

The average exam score was 21.0 points higher after the training, increasing from 54.4 for pretraining exams to 75.4 for posttraining exams ($p < .0001$).

# Discussion

Results indicate that on-farm dairy BQA training had an effect on dairy worker knowledge of BQA and welfare-related practices, as indicated by the increase in average exam score from before the training to after the training. Results presented here agree with those presented by Imler, Carr, Hersom, Johnson, and Thrift (2012), who reported that a dairy BQA Extension program was effective at teaching producers how to optimize cow welfare and meat quality and improve value of cull dairy cattle. Although participants in the study reported here showed a marked improvement on most of the exam questions, there were a few questions for which participants either showed minimal improvement (questions 1 and 7) or did not improve at all (question 6). For both question 1 and question 7 to be considered correct, participants had to select all of the answers, which could have been confusing for some and may explain the lack of improvement after receiving training. It is possible that providing further instruction to ensure that all participants understood that some questions required more than one answer would have allowed a difference to be discernible

between pre- and posttraining exam scores for these questions. To prevent confusion, future exams should have an "all of the above" option for this type of question.

An important outcome was the fact that on question 6, which involved selecting the definition of meat and milk withdrawal, participants showed no improvement. As the withdrawal period for a given medication is the amount of time it takes for the medication to clear the animal's system and thereby make the animal's meat safe for human consumption, participants' performance on question 6 could be cause for concern. However, it is possible that the training material did not cover the topics of meat withdrawal and milk withdrawal thoroughly enough to improve knowledge of attendees having little or no previous experience with these terms. Future training programs should focus on covering these topics in more depth, stressing the importance of adhering to strict withdrawal times in order to protect the meat and milk supply from risk of drug residues. In addition, emphasizing the negative consequences of a meat or milk drug residue, on both the dairy industry and human health, may impress on dairy workers the severity of the issue.

## Conclusions and Implications

Improvement in dairy worker knowledge suggests that BQA training programs have the potential to positively influence the dairy industry. Educating dairy owners and employees on proper BQA and welfare-related practices could result in improved handling and management of dairy cows and improved quality of cull cows that are being sent to market. Further research efforts, including those involving a larger sample size and follow-up visits to gauge employee knowledge retention and behavior change, are needed to investigate the long-term effect of on-farm BQA training on dairy worker knowledge and management practices.

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