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Beef Quality Assurance from Farm to Fork: Development of a Pilot Program in Farm to Table Food Safety

Gregory P. Lardy
North Dakota State University, glardy@ndsuext.nodak.edu

Julie Garden-Robinson
North Dakota State University

Charlie Stoltenow
North Dakota State University

Martin J. Marchello
North Dakota State University

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Beef Quality Assurance from Farm to Fork: Development of a Pilot Program in Farm to Table Food Safety

Abstract
The goal of the project described here was to develop an interdisciplinary 3-day food safety training program. Course material for this program included content focused on food safety issues at the pre-harvest (farm, ranch, feedlot), post-harvest (slaughter and fabrication), and consumer (foodservice, retail, home) level. A pre-and post-test were given to each participant to assess the impact of this training program. Pre-test scores averaged 62%, while post-test scores averaged 87%. The 3-day interdisciplinary food safety course was effective at increasing constituent knowledge of food safety issues related to beef production and consumption from farm to fork.

Gregory P. Lardy
Assistant Professor and Beef Cattle Specialist
Department of Animal and Range Sciences
North Dakota State University
Fargo, North Dakota
Internet Address: glardy@ndsuext.nodak.edu

Julie Garden-Robinson
Extension Specialist, Food and Nutrition
Department of Food and Nutrition
North Dakota State University
Fargo, North Dakota

Charlie Stoltenow
Assistant Professor and Extension Veterinarian
Department of Veterinary and Microbiological Sciences
North Dakota State University
Fargo, North Dakota

Martin J. Marchello
Professor, Meat Science
Department of Animal and Range Sciences
North Dakota State University
Fargo, North Dakota

Lisa Lee
Director, Beef Quality Assurance
NDSU Extension Service
Department of Animal and Range Sciences
Bismarck, North Dakota

Introduction

In 1999, the Centers for Disease Control and Prevention estimated that 76 million people become ill, 325,000 people are hospitalized, and 5,000 people die annually from foodborne illnesses in the United States (Mead, Slutsker, Dietz, McCaig, Bresee, Shapiro, Griffin, & Tauxe, 1999). The USDA's Economic Research Service in conjunction with the USDA's Food Safety and Inspection Service estimated that foodborne illnesses caused by seven major microbial pathogens cost the United States $5.6 to $9.4 billion annually (Buzby & Crutchfield, 1997).

Food safety risks in the beef industry are large, as evidenced by the number of *E. coli* O157:H7 outbreaks that have occurred in the last 5 to 7 years. The CDC estimates that 73,000 illnesses and 61 deaths occur annually in the U.S. due to E. coli O157:H7. Undercooked contaminated ground beef is implicated in a majority of the illnesses (CDC, 2000). Other areas of food safety concern in beef production include the proper use of antibiotics and other animal health products, proper use of implants, and proper route and location of administration of animal health products.

In the past, the majority of Beef Quality Assurance (BQA) programs have focused on the feedlot rather than the cow-calf producer (Cowman, 2000, personal communication). This is logical because there are smaller numbers of feedlots compared to cow-calf producers, the feedlots tend to be geographically concentrated, and feedlots (especially large feedlots) tend to have routine training programs for employees (USDA, 2000).

Beef cattle production is the number one livestock industry in North Dakota. In 1998, the beef cattle industry generated over 350 million dollars in gross receipts in North Dakota (North Dakota Agricultural Statistics Service, 1999). North Dakota's beef industry is centered around cow-calf production units. There are approximately 12,700 cow-calf operations in the state (North Dakota Agricultural Statistics Service, 1999).

Although the feedlot industry in North Dakota is small by national standards, it is growing. Recently, the North Dakota Legislature passed legislation to provide funding and a mechanism to start a state meat inspection program. This program will allow producers access to additional market opportunities and should heighten awareness of other aspects of the beef industry.

Federally inspected packing and processing plants are required to implement Hazard Analysis Critical Control Point (HACCP) programs as a method to ensure food safety (Food Safety and Inspection Service, 1996). These HACCP programs are not foolproof and require regular updating to remain effective at reducing risk of foodborne illness.

Foodservice establishments are linked to a majority of foodborne illness cases. Manager and employee education programs have proven successful in changing food handling behavior (Cottercio, Gunn, Coffill, Tormey, & Barry, 1998). Despite consumer education campaigns and media reports of foodborne illness outbreaks, consumers continue to practice risky food safety behaviors.

For instance, the International Food Safety Council (1999) reported that only 6% of consumers "often" or "sometimes" check hamburger temperature with a thermometer prior to eating. Surveys conducted by the National Cattleman's Beef Association (1999) indicated that 2% of consumers routinely use a meat thermometer to gauge meat doneness. According to a multi-state survey, 20% of respondents reported eating pink hamburgers and 19% failed to wash hands and cutting boards adequately after contact with raw meat (Altekruse, Yang, Timbo, & Angulo, 1999).

Methodology

The overall goal of the project described here was to develop and pilot an interdisciplinary, 3-day food safety training program for Extension agents, state health and agriculture department personnel, state meat inspection personnel, and rural veterinarians to alert them to beef safety issues from production to consumption and to enable them to deliver face-to-face food safety programs/advice to their constituents.

The North Dakota State University Extension Service divides North Dakota into 10 Multi-County Programming Units (MPU) based on location. Representatives from three MPUs were selected to participate in the pilot training session based on their location in the major beef cattle production areas in the state. One agricultural agent and one food and nutrition agent from each MPU were invited to participate. County Extension participants were selected based on their ability to attend the training session, their willingness to recruit local participants, and their willingness to complete a follow-up training session in their local community following the training session.

Each Extension agent was asked to recruit participants from their local community, basing their selections on involvement or interest in the beef industry. Participants included ranchers, small slaughter plant operators, state and federal meat inspectors, representatives from beef industry groups, officials from the state department of agriculture, state health inspectors, food service workers, representatives from regional meat wholesalers, and consumers.

Course Content

Beef Quality Assurance

Approximately 8 hours of the training session was devoted to Beef Quality Assurance (BQA) related topics. A number of activities and a wide variety of topics were covered in the BQA section of the course. A brief history of BQA on a state and national scale was covered. North Dakota's producer certification procedure was outlined.

Detailed information on the national beef quality audits (both fed and non-fed) conducted by the National Cattleman's Beef Association (NCBA) were presented. Considerable time was spent on the non-fed (cull) quality audit because the majority of North Dakota's beef industry consists of cow-

calf producers. Management practices that influenced the quality and safety of beef and beef products were discussed in relation to the beef quality audits.

Information on disease conditions in cattle and their relation to food safety was also discussed. In particular, bovine spongiform encephalopathy (BSE) and its possible link to variant Creutzfeldt-Jakob Disease were covered. Methods that the U.S beef industry and government took to keep BSE out of the U.S. were also covered.

Injection site location and damage were covered as well. The hidden damage caused by improper injection technique was covered by using slide sets developed by the NCBA BQA task force. In addition, a pharmaceutical company was recruited to provide an injection site demonstration. This demonstration illustrated the damage that can occur with improper injection location, amount, and route of administration. This portion of the course was conducted at a local veterinary clinic. Detailed information on the correct method to administer injections was also included.

Other topics, including instruction on how to read a drug label, the differences between prescription and non-prescription pharmaceuticals, and biological versus pharmaceutical products were also covered. Handout material included the North Dakota BQA producer manual that contained detailed information on withdrawal times of commonly used animal health products.

HACCP in the Meat Processing Industry

Approximately 6 hours of training was devoted to an overview of Hazard Analysis Critical Control Point (HACCP) in the meat processing industry. Lecture topics included the history of meat processing, utilization of good manufacturing practices, standard sanitation operating procedures, and the seven principles of HACCP.

Flowcharts of common meat products were distributed and discussed. Videotapes were used to reinforce concepts presented in lecture. For example, a videotape, *Excel Beef Plant: Slaughter*, was used to illustrate how the meat industry attempts to reduce hazards at the slaughter level. This portion of the course concluded with a tour of a meat processing facility with HACCP fully implemented.

Food Handling in the Foodservice and Consumer Sectors:

About 4 hours of the workshop was devoted to food safety issues for foodservice and consumers. Lecture topics included summaries of food handling errors reported in foodservice and consumer research studies, the leading microbial causes of foodborne illness, common foods associated with foodborne illnesses, and implementation of HACCP principles in foodservice establishments and homes. A demonstration using a fluorescing lotion and black light was used to illustrate proper handwashing.

Consumer products (cleaning/sanitizing agents, antibacterial cleansers, various types of thermometers) were discussed for their role in food safety. A food safety game based on the principles (clean, separate, cook, chill) of the national Fight BAC campaign was introduced to the participants for use with food handlers and consumers. Available resources including Web sites, curricular materials, CD-ROMS, posters, and other information were displayed.

Outreach Planning Group Session

The three groups met and discussed plans for outreach as a result of this programming and submitted a plan at the end of the workshop. A laptop computer was provided for each group to use during their discussion time, and all reports were submitted on disk.

Assessment of Learning

Evaluation consisted of pre- and post-testing at the training session. Results of the pre- and post-tests are given in Figures 1-4. The exam scores are broken out by course content emphasis areas (BQA, Slaughter and Fabrication, Foodservice/consumer Food Safety, and Overall Score; Figures 1-4, respectively). The overall score increased from 62% to 87% from the pre-test to the post-test. Each course area showed similar improvements in pre- and post-test scores. Knowledge of BQA and Slaughter and Fabrication topics was slightly lower (56%) on the pre-test compared to the Consumer Food Safety section of the test (68%). This should not be unexpected, however, considering that all of our participants were consumers but only a portion were involved in the beef production, slaughter, or fabrication industries.

Figure 1.
Pre- and Post-Test Results for the Beef Quality Assurance Portion of the Assessment

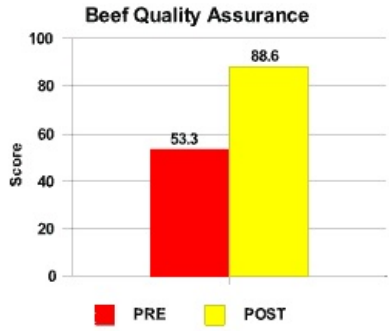


Figure 2.
Pre- and Post-Test Results for the Slaughter and Fabrication Portion of the Assessment

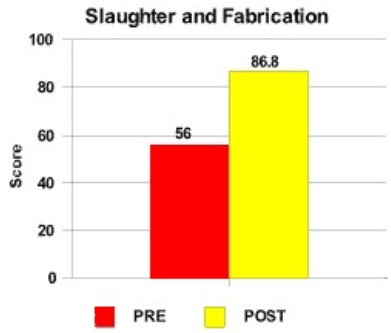
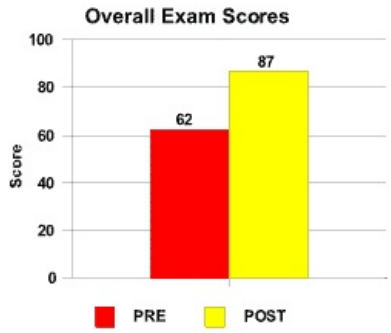


Figure 3.
Pre- and Post-Test Results for the Consumer Food Safety Portion of the Assessment

Figure 4.
Pre- and Post-Test Results for the Entire Assessment in Farm to Table Food Safety



Outreach as a Result of the Program

Results of this program were presented at an international conference of agricultural professionals in Winnipeg, Manitoba, in July 2000. Several participants in the training program have requested additional material and assistance in their outreach, including a federal meat inspector who requested additional research-based HACCP materials and Web sites to assist meat processing companies. Several Extension agent participants in the program have requested follow-up information to assist consumers and professionals.

Lectures on "Farm to Table Food Safety Issues" were presented to 75 foodservice managers at food shows in Grand Forks and Bismarck. One of the attendees at the farm-to-table training workshop served as the facilitator. All participants received written materials and posters to display at their facility.

A lecture, "Fight BAC: Keep Food Safe," facilitated by a workshop participant who works at a

foodservice brokerage company in Fargo was presented to 250 school cooks. All participants received written materials and posters to display at their schools.

One of the Extension agent participants from the farm-to-table workshop helped facilitate an educational program on food thermometer use on a reservation. Materials developed for this project included a food safety poster and two handouts based on the Fight BAC campaign targeting people receiving commodity foods. Each participant in the program received a food thermometer and a refrigerator thermometer.

Large laminated "Thermy" posters, a video, USDA Thermy and National Food Safety Month materials, along with background research and handouts, were provided to all North Dakota county Extension offices. The materials will be used for general Extension food safety programs as well as in the Family Nutrition Program and the Expanded Food and Nutrition Education Program, which serve limited resource audiences.

Training workshops were held in five North Dakota sites for about 60 Family Nutrition Program (FNP) and Expanded Food and Nutrition Education Program (EFNEP) staff who serve limited resource audiences. The topics included food safety issues at the ranch, meat processing, and consumer levels. Preliminary evaluation results showed pretest scores of 46% and post-test scores of 94%. Each county Extension office received a large laminated "Thermy" poster, a video, USDA Thermy™ and National Food Safety Month℠ materials, lesson plans, pre/post evaluations for consumer audiences and background research-based resources for outreach in every county in North Dakota.

Conclusions and Recommendations

A 3-day, multidisciplinary training session was effective at increasing knowledge about all facets of food safety in the beef industry. Participants left the training session with a greater awareness and appreciation for on-ranch food safety, aspects of food safety related to meat processing, a greater awareness of consumer attitudes, and knowledge of food safety in the home.

If others were to conduct similar programs, we suggest the following.

- Select a diverse group of participants representing all aspects of the beef industry, including ranchers, meat processors, inspectors and consumers.
- Involve Extension agents in the selection of representatives from their areas.
- Use a variety of educational techniques (lecture, videos, case studies, hands-on activities) and allow time for discussion.
- Provide educational materials and follow-up support to participants.

This program has application to other food producing industries. The entire food chain consists of a continuum of producers, food manufacturers, and consumers. While in-depth educational efforts should be aimed at specific segments along the continuum in order to solve specific food safety problems, bringing together participants from all facets of a production/consumption chain allows each segment to gain a better understanding of the role of the other segments in the production chain. Participants gain knowledge about food safety issues that may occur at various segments in each production unit.

Livestock production industries may find this approach easily adaptable to other species. Vegetable, fruit, and grain production industries may also find this approach applicable with minor modifications in delivery method.

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