Food Safety Issues Affecting the Dairy Beef Industry

GARY STEFAN
United States Department of Agriculture,
Food Safety and Inspection Service,
Animal Production Food Safety Staff,
Washington, DC 20250

ABSTRACT

The ability of dairy farmers to market cull cows and veal calves may be affected by the final rule on Pathogen Reduction and HACCP (Hazard Analysis Critical Control Points) Systems, a sweeping reform of USDA food safety regulations that was published on July 25, 1996. Although the regulations apply only to slaughter and processing plants handling meat and poultry, the rule will have an impact on food animal producers, including dairy farmers. Under this regulation, plant operators are required to evaluate potential hazards and to devise and implement controls that are appropriate for each product and plant to prevent or reduce those hazards. Processing plants may need to consider the potential hazards associated with incoming animals, such as illegal drug residues, which may result in marked changes in the relationships among some producers, livestock markets, and slaughter plants. Such information may actually improve the marketability of some animal classes because documentation will help the packer ensure the safety of products for sale to domestic and foreign markets. Dairy scientists are in an excellent position to explain the food safety issues to dairy farmers and to help develop the appropriate strategies that are necessary to guide the changes needed. These scientists can be conduits for information, the research leaders for practical solutions to reduce public health risks, and valuable resources to help farmers adjust to the impact of these new in-plant regulatory systems.

(Key words: food safety, HACCP, Hazard Analysis Critical Control Points, cull cows and veal calves)

Abbreviation key: FSIS = Food Safety and Inspection Service, HAACP = Hazard Analysis Critical Control Points, SSOP = sanitation standard operating procedures.

FOOD SAFETY ISSUES AFFECTING THE DAIRY INDUSTRY

On July 25, 1996, the sweeping reform of USDA food safety regulations, known as the final rule on pathogen reduction and Hazard Analysis Critical Control Points (HACCP), was published (7). Although targeted at slaughter and processing plants that handle meat and poultry, the requirements could have an impact on dairy farmers. Beginning January 27, 1997, the Food Safety and Inspection Service (FSIS) required all slaughter plants to conduct microbial testing for generic Escherichia coli and to prepare and implement standard operating procedures for sanitation (SSOP). All plants will also be required to adopt and implement their own HACCP plan, and slaughter plants and plants that produce raw ground products must ensure that the rate of contamination from Salmonella spp. is below the current national baseline incidence. These provisions will become effective at a later date.

Because all plants must develop, adopt, and implement a HACCP plan for each of their processes, the potential hazards associated with incoming animals will be considered. The need for information about the background of these animals will affect the entire chain of food animal production.

Instead of being an impedance to the dairy industry, providing certain information on the background of some animal classes—especially cull cows and veal calves—may actually improve the marketability of those animals.

Information about the source of the animals; the selection, timing, and use of animal drugs; and documentation of a valid veterinarian-client-patient relationship for prescription and extralabel drug use will help the packer evaluate risks and ensure the safety of product leaving the plant.

WHY NEW FOOD SAFETY REGULATIONS WERE NEEDED

The new rule was the result of the necessity to modernize the USDA inspection system from a visual one, based only on what FSIS inspectors could see
(e.g., evidence of animal diseases, defects, and visible contamination on meat) to a scientific system, based on the prevention of hazards and regular microbial testing. This need became urgent when, in January 1993, a widely publicized outbreak of the bacteria \emph{E. coli} O157:H7 on the West Coast struck more than 500 people and resulted in four deaths (1). This potentially deadly strain of bacteria was traced to hamburger meat that had been distributed throughout the western states.

Current data from the Centers for Disease Control and Prevention suggest that foodborne microbial pathogens account for up to 7 million cases of foodborne illness per year in the US and up to 7000 deaths. Of these, nearly 5 million cases of illness and more than 4000 deaths may be associated with meat and poultry products (2).

In 1995, a group of public health experts in the Animal Production Technical Analysis Group Subcommittee on Risk and Health Impact ranked foodborne pathogens according to perceived health effects (both acute and chronic) in the US (5). The top six were judged to be \emph{Salmonella} spp. (nontyphoid), \emph{Campylobacter} \emph{jejuni/coli}, \emph{Toxoplasma gondii}, \emph{E. coli} 0157:H7, \emph{Listeria monocytogenes}, and \emph{Yersinia enterocolitica}. Many public health experts think that reducing these organisms in animals prior to slaughter will reduce product contamination.

\section*{Food Safety Reforms Enhance US Reputation}

Around the globe, the US food system has been justifiably admired for its ability to provide consumers with an abundant supply of food products that are economical, safe, and of high quality. Under the new rule, the US reputation will be enhanced by a modernized preventive framework that continues to ensure the safest possible foods while providing companies with the flexibility to innovate to improve food safety.

The fundamental reform of the FDA inspection program for seafood and the USDA FSIS inspection program for meat and poultry adopts a common framework by incorporating HACCP, a science-based system of food safety controls. The HACCP procedures will also be valuable for the advancement of the progress of food safety internationally and be a critical element in expanding US food exports.

Many other countries, including the 15 member countries of the European Union, Canada, Australia, New Zealand, and Norway are also committing to food safety programs based on HACCP. In addition to HACCP, the FDA and FSIS are also reviewing and revising existing regulations to eliminate unnecessary burdens to the industry to enhance innovation and technological advancements.

Competition in the international arena is strong, and other countries such as Denmark have developed fully integrated production programs that track animals from farm to slaughter. Under that type of program, Danish firms are able to provide their export customers with documentation of the safety of their animal products.

To compete successfully in international markets, US producers must be able to provide similar assurances. Although more progressive producers may be able to meet these standards currently, there are still a considerable number of producers who cannot provide this assurance, which is not to say that the animal products are not equally safe and wholesome. Rather, when animal suppliers do not have adequate records of quality assurance practices, they are not able to document that their animals meet certain food safety standards being demanded by markets.

\section*{Basic Principles of the USDA Final Rule}

The new final rule on Pathogen Reduction and HACCP Systems consists of 183 pages of regulations. The rule mandates new measures in slaughter and processing plants to target and reduce the presence of pathogenic organisms in meat and poultry products. These measures include FSIS testing to verify that performance standards for pathogen reduction are being met, plant microbial testing to verify process control for fecal contamination, mandatory written SSOP, and mandatory HACCP systems in all meat and poultry plants. Industry responsibility for food safety is clearly defined. The role of FSIS is to set appropriate food safety standards and to maintain vigorous inspection oversight to ensure that those standards are met. The rule targets pathogen reduction but encompasses all physical, chemical, and biological hazards.

The HACCP requirements will be effective in plants according to a specific schedule. For large establishments (500 or more employees), the effective date is January 26, 1998. For smaller establishments (fewer than 500 but 10 or more employees), the effective date is January 25, 1999. For very small establishments, those having fewer than 10 employees or annual sales less than $2.5 million, the effective date for HACCP implementation is January 25, 2000.
The HACCP plans must be based on the seven principles described by the National Advisory Committee on Microbial Criteria for Foods: 1) hazard analysis, 2) critical control point identification, 3) establishment of critical limits, 4) monitoring procedures, 5) corrective actions, 6) record keeping, and 7) verification procedures.

Plants must identify and evaluate the hazards that could affect the safety of their food products and institute the controls necessary to prevent those hazards from occurring or to keep them within acceptable limits. The HACCP systems will be required to cover those critical control points that affect product safety rather than those related to economic adulteration and quality. Critical control points are located where hazards need to be prevented, eliminated, or reduced to acceptable levels. Plants also must monitor, verify, and document through records that the controls are working effectively. The USDA meat inspectors will verify the adequacy and the proper execution of the HACCP plan through record review, plant observations, product testing, and other inspection techniques.

The rule requires that all plants prepare and implement plant-specific SSOP to ensure that facilities and equipment are kept clean. The rule also requires plants to test for generic E. coli as an indicator of fecal contamination on carcasses. Test results are not used by FSIS to take regulatory action, but to guide inspection personnel so that they will know when to look for additional information to assess whether a problem exists that requires regulatory action. The testing frequency is based on production volume of the plants. For cattle, frequencies are 1 sample per 300 carcasses; for hogs, 1 in 1000; for turkeys, 1 in 3000; and, for broilers, 1 in 22,000.

The rule also sets performance standards for Salmonella spp.; plants that slaughter animals or that produce raw ground products will be required to meet to verify that their HACCP systems are effective in reducing contamination by pathogenic microorganisms. Salmonella spp. were selected because they are major foodborne pathogens in mammals and birds, disease from salmonella occurs frequently, and detection methods are available. The FSIS has indicated that a reduction of Salmonella spp. should result in a reduction of other enteric pathogens.

To verify compliance of plants with the standards, testing for Salmonella spp. will be conducted by FSIS; the testing frequency will be based on plant performance and other factors, and the standards will provide incentives for innovation to improve food safety. Implementation dates for the standards are based on plant size and will coincide with those for HACCP.

Prior to the implementation dates, FSIS will begin testing for Salmonella spp. to provide plants with information regarding their current level of performance relative to the performance standard for pathogen reduction.

State inspection programs must be equal to the federal program. Requirements for foreign systems are that they must be equivalent to the US HACCP and pathogen reduction systems. Experts in FSIS international programs are working with foreign countries on these requirements.

**FSIS FARM TO TABLE STRATEGY**

Ensuring the safety of food is an enormously complex task. Hazards can arise at every stage of the food production process: from the farm to the processing facility, in transportation and storage, in food service and retail establishments, and in the homes of consumers. During each of these steps along the way, measures must be taken to prevent or minimize hazards.

Although the rule mandates SSOP and HACCP systems in slaughter and processing plants only, the FSIS food safety strategy is from farm to table. Distributors, employees in retail stores and restaurants, and consumers must continue to store, handle, and prepare meat and poultry products carefully to keep food safe. The strategy addresses the growth of pathogens and other safety concerns that arise outside of the plants. Those individuals involved in the production, transportation, retail sale, and final preparation of meat and poultry products must share the responsibility for food safety.

At the animal production area, FSIS has no regulatory authority to mandate food animal production practices that could potentially reduce and control pathogens and other hazards. The efforts of FSIS in this area are strictly voluntary, and the strategy is to encourage the voluntary use of food safety and quality assurance programs based upon HACCP principles. The FSIS staff work with other federal agencies with responsibilities for food safety and animal health to ensure that animal production food safety efforts are coordinated and to foster collaborative opportunities and initiatives for public and private investment in activities for risk reduction from live animals. The FSIS also works with animal producers, scientific professionals, and other stakeholders in a collaborative way and acts as a catalyst to bring parties together to address food safety issues and research as they pertain to live animals. Although industry has
the primary responsibility for ensuring the safety of food, FSIS recognizes the importance of working with commodity groups to maintain a sustainable, wholesome, and safe supply of food from animals. In the transportation area, FSIS is working with the FDA to adopt standards to control the growth of harmful bacteria during transportation and storage. The two agencies are interested in developing performance standards for refrigeration that will minimize the growth of harmful bacteria after raw products leave plants that have been inspected by FSIS. Also, FSIS is working with FDA and with state and local authorities to improve food safety practices at the retail level. In this area, FSIS fully supports the state adoption of the food code (3), a reference that guides retail outlets such as restaurants, grocery stores, and institutions in food preparation to prevent foodborne illness. Many provisions of the FDA food code are compatible with the HACCP concept. Local, state, and federal regulators use the food code as a model to help develop or update their own food safety rules in order to be consistent with a national food regulatory policy.

Also, FSIS participates in the Conference for Food Protection and supports uniformity among states in food safety practices and standards; FSIS is working with the Conference to encourage the adoption of good sanitation, proper cooling temperature, and HACCP principles at the retail level, particularly for ground beef.

In addition, FSIS works with other government agencies, the food industry, and others to educate consumers about safe food handling practices. Consumers are also targeted by USDA with educational materials on the safe handling, storage, and preparation of meat and poultry products. The USDA Meat and Poultry Hotline is a toll-free number (1-800/535-4555) that links callers with food safety experts who can answer their questions regarding food safety, proper preparation, and storage. Numerous printed materials are available at no cost.

HAZARD ANALYSIS
FOR RESIDUE AVOIDANCE

As plants are required to meet the various measures of performance contained in the final rule and begin to implement HACCP plans, it is reasonable to expect that they will want more information on the background of animals coming into the plant. This trend will be particularly evident with residue control. Under the HACCP final rule, slaughter plants must assume more practical responsibility for the control of residues from animal drugs, pesticides, and chemicals. Residue control will need to be a component of the plant HACCP plan, and measures appropriate to control residues in specific animals must be a part of that plan. Exactly what information suppliers will need and the mechanism by which that information will be made available by producers need to be worked out by the parties involved.

In the area of live animal production, the hazard analysis process is already being applied to the avoidance of illegal residues. Commodity groups have developed quality assurance programs based on HACCP to respond to market pressure to prevent violative residues. The familiar Milk and Dairy Beef Residue Prevention Protocol is based on 10 critical control points to avoid illegal animal drug residues and stresses the importance of the relationship among veterinarian, client, and patient for the correct use of prescription drugs and, especially, extralabel use (6).

A starting point for discussions may be to request assurances that the producer is following the management practices in the Milk and Dairy Beef Residue Prevention Protocol and the recommendations included in the FDA Compliance Policy Guide 7125.37, Proper Drug Use and Residue Avoidance by Non-Veterinarians (4). Both of these documents include identification of medicated animals, record keeping, and proper use of animal drugs. Proper records and animal identification will provide documentation that certain processes were followed and that industry standards were met. Such documentation will become more important in the future.

To prevent illegal drug residues in animal products, slaughter plants may consider the first critical control point to be the animal itself. Plants can develop a better HACCP plan with knowledge about the condition and drug treatment history of incoming animals. Conversely, the less knowledge that is available on incoming animals, the more steps or processes—such as additional residue screening tests—may be needed by the plant to demonstrate the chemical residue safety of products derived from those animals.

End product testing, particularly for illegal drug residues, may be used in some cases to demonstrate product safety. But such testing may not be a cost-effective way of addressing the problem, especially if slaughter plants do not know what compounds animals have been exposed to during the production phase. One simply cannot test safety into a product. However, random sampling and testing can be used to
help monitor the effectiveness of production programs when those programs are directed at specific compounds with which the animals have been treated. An additional tier of security would be on-farm testing for residues, especially by dairy specialists who have been intimately involved with the herd health management. More research and development are needed for improved diagnostic tests for drug residues in live animals before this option can be considered seriously.

HAZARD ANALYSIS FOR BACTERIAL HAZARDS

Presently, the HACCP approach cannot be applied to live animals for bacterial pathogens because no known critical control points exist for them. It has not been determined what can and cannot be reasonably done about microbial pathogens originating during the production of food animals. However, such information is needed to determine the costs and benefits of implementing practices that reduce the potential for the presence of pathogens such as Salmonella spp. and E. coli 0157:H7 on animal commodities and to determine where the HACCP plan of processing plants and slaughterhouses can best reduce incoming pathogens.

Considerable research is needed before valid recommendations can be made to producers and others as to the appropriate actions needed on the farm, during the transportation and marketing of animals, and during preslaughter preparation. Studies need to be undertaken to determine the prevalence of these organisms, their ecology in the animal and production environment, possible mechanisms and practices for reducing their prevalence, the potential benefits from implementing these practices in the production stages, the projected costs of such efforts, and whether or not contaminants that enter the slaughterhouse door end up in the final product under the new HACCP rule.

The main recommendation to producers, livestock markets, feedlots, and transporters is to practice good management of herd health and sanitation. There also may be concomitant public health benefits by preventing animal diseases such as salmonellosis. Close cooperation among animal management and veterinary experts may go a long way to prevent problems (such as salmonellosis, listeriosis, cystercerosis, and other potential zoonotic diseases) from entering slaughter plants and the food supply.

CONCLUSIONS

Food animal production is on the edge of a new era. Over the next several years, national and international food safety concerns will continue to drive significant and positive changes in the relationships among producers, livestock markets, and packers. These changes need the expertise of dairy scientists to direct educational efforts that will strengthen producer access to markets and increase their understanding about HACCP, packer demands, and issues of public health and food safety. The ultimate result of these activities will be an enhanced consumer confidence in the safety of food products derived from animals.

REFERENCES