

Food safety, milk quality international issues for National Mastitis Council

Milk quality and food safety in dairy products are concerns shared by milk producers, milk processors, veterinarians, regulatory officials, and consumers throughout the world. This was clearly evident at the 36th annual meeting of the National Mastitis Council held in Albuquerque, NM, Feb 16-19. Experts from the United States, Canada, Mexico, and Europe presented information to support the need for standardization of milk quality throughout the world.

In a seminar titled "Milk production: hazards and risks from microbial pathogens and chemical residues," cosponsored by the International Dairy Federation A2 group of mastitis experts and the NMC, speakers from the United States and Europe reiterated the importance of using Hazard Analysis Critical Control Point (HAACP) programs to reduce the risk of chemical and microbial contamination of milk, dairy products, and dairy beef.

Dr. J. Eric Hillerton of the Institute for Animal Health in Compton, England reported on the risk of milk as a source of bovine spongiform encephalopathy, implicated as a disease transmitted to human beings that causes a variant form of Creutzfeldt-Jakob disease. He reported that the BSE prion protein has never been identified in milk and that there is no evidence the disease can be transmitted via milk.

Similarly, concerns about the zoonotic implications of milk as a source of *Mycobacterium paratuberculosis* infection that could cause Crohn's disease in people were addressed. When added to milk, *M paratuberculosis* organisms can survive pasteurization, but it is unknown whether the number of organisms shed in the milk of infected dairy cattle would be sufficiently high to survive pasteurization and pose a threat to human health. Studies are being conducted to assess such risks.

Antibiotic residues in milk receive the most publicity as a threat to food safety, but the risk from microbiologic sources such as *Listeria*, *Salmonella*, *Escherichia*, and *Clostridia* organisms may be the most serious human health hazards. Outbreaks of foodborne illness from bacteria are more likely to result from eating contaminated seafood or vegetables than from consumption of milk and other dairy products. However, the ubiquitous nature of these organisms in the farm environment should lead milk producers and veterinarians to explore means of improving the conditions in which dairy cattle are housed, fed, and milked to minimize the risk of environmental contamination.

The potential for antibiotic residues will continue to be a concern, especially in light of passage and implementation of the Animal Medicinal Drug Use Clarification Act of 1994. The use of tests to detect antibiotic residues in milk and the use of HACCP principles can substantially reduce the risk of violative

residues in bulk milk tank samples. The good news is that, of 3.3 million tankers of milk tested for residues in 1996, only 3,507 were positive. Thus, 99.9 percent of all milk did not have violative residues for antibiotics. Furthermore, most of these residues could be traced to human error (eg, a cow given antibiotics had been improperly marked and her milk incorrectly put into the bulk tank; or milk from one treated quarter had been discarded, but milk from the other three quarters of that same cow had been put into the bulk tank).

As part of their mission to provide education, research, and promotional materials, the NMC printed 3,300 copies of "Current Concepts in Bovine Mastitis" in 1996. The NMC is updating its fact sheets on environmental mastitis and teat dips. The "Field Handbook for Laboratory Diagnosis of Mastitis" is scheduled to be available at the 1998 NMC annual meeting. The NMC also has launched a home page. Dr. Keith Sterner, of Ionia, Mich, the newly-elected president of the NMC, believes such efforts can help people involved with the milk production industry use available technology to address longstanding international concerns. Such efforts will improve the health of dairy cattle, which will help ensure the production of quality milk and dairy products. These foods of animal origin can be a vital part of a healthy, wholesome human diet.

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HACCP: A State-of-the-Art Approach to Food Safety

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Space-age technology designed to keep food safe in outer space may soon become standard here on Earth.

The Food and Drug Administration has adopted a food safety program developed nearly 30 years ago for astronauts and is applying it to seafood. The agency intends to eventually use it for much of the U.S. food supply. The program for the astronauts focuses on preventing hazards that could cause food-borne illnesses by applying science-based controls, from raw material to finished products. FDA's new system will do the same.

Traditionally, industry and regulators have depended on spot-checks of manufacturing conditions and random sampling of final products to ensure safe food. This approach, however, tends to be reactive, rather than preventive, and can be less efficient than the new system.

The new system is known as Hazard Analysis and Critical Control Point, or HACCP (pronounced hassip). Many of its principles already are in place in the FDA-regulated low-acid canned food industry. And, in a 1995 final rule that took effect in December 1997, FDA established HACCP for the seafood industry.

Also, FDA has incorporated HACCP into its Food Code, a document that gives guidance to and serves as model legislation for state and territorial agencies that license and inspect food service establishments, retail food stores, and food vending operations in the United States.

The U.S. Department of Agriculture has established HACCP for meat and poultry processing plants, as well. Most of these establishments were required to start using HACCP by January 1999. Very small plants have until Jan. 25, 2000. (USDA regulates meat and poultry; FDA all other foods.)

In April 1998, FDA proposed requiring HACCP controls for fruit and vegetable juices. FDA now is considering developing regulations that would establish HACCP as the food safety standard throughout other areas of the food industry, including both domestic and imported food products.

To help determine the degree to which such regulations would be feasible, the agency is conducting pilot HACCP programs with volunteer food companies. The programs have involved cheese, frozen dough, breakfast cereals, salad dressing, fresh and pasteurized juices, bread, flour and other products.

HACCP has been endorsed by the National Academy of Sciences, the Codex Alimentarius Commission (an international food standard-setting organization), and the National Advisory Committee on Microbiological Criteria for Foods.

A number of U.S. food companies already use the system in their manufacturing processes, and it is in use in other countries, including Canada.

What is HACCP?

HACCP involves seven principles:

- Analyze hazards. Potential hazards associated with a food and measures to control those hazards are identified. The hazard could be biological, such as a microbe; chemical, such as a toxin; or physical, such as ground glass or metal fragments.
- Identify critical control points. These are points in a food's production--from its raw state through processing and shipping to consumption by the consumer--at which the potential hazard can be controlled or eliminated. Examples are cooking, cooling, packaging, and metal detection.
- Establish preventive measures with critical limits for each control point. For a cooked food, for example, this might include setting the minimum cooking temperature and time required to ensure the elimination of any harmful microbes.
- Establish procedures to monitor the critical control points. Such procedures might include determining how and by whom cooking time and temperature should be monitored.

- Establish corrective actions to be taken when monitoring shows that a critical limit has not been met--for example, reprocessing or disposing of food if the minimum cooking temperature is not met.
- Establish procedures to verify that the system is working properly--for example, testing time-and-temperature recording devices to verify that a cooking unit is working properly.
- Establish effective recordkeeping to document the HACCP system. This would include records of hazards and their control methods, the monitoring of safety requirements and action taken to correct potential problems. Each of these principles must be backed by sound scientific knowledge: for example, published microbiological studies on time and temperature factors for controlling foodborne pathogens.

Need for HACCP

New challenges to the U.S. food supply have prompted FDA to consider adopting a HACCP-based food safety system on a wider basis. One of the most important challenges is the increasing number of new food pathogens. For example, between 1973 and 1988, bacteria not previously recognized as important causes of food-borne illness--such as *Escherichia coli* O157:H7 and *Salmonella enteritidis*--became more widespread.

There also is increasing public health concern about chemical contamination of food: for example, the effects of lead in food on the nervous system.

Another important factor is that the size of the food industry and the diversity of products and processes have grown tremendously--in the amount of domestic food manufactured and the number and kinds of foods imported. At the same time, FDA and state and local agencies have the same limited level of resources to ensure food safety.

The need for HACCP in the United States, particularly in the seafood industry, is further fueled by the growing trend in international trade for worldwide equivalence of food products and the Codex Alimentarius Commission's adoption of HACCP as the international standard for food safety.

Advantages

HACCP offers a number of advantages over the current system. Most importantly, HACCP:

- focuses on identifying and preventing hazards from contaminating food is based on sound science
- permits more efficient and effective government oversight, primarily because the recordkeeping allows investigators to see how well a firm is complying with food safety laws over a period rather than how well it is doing on any given day

- places responsibility for ensuring food safety appropriately on the food manufacturer or distributor
- helps food companies compete more effectively in the world market reduces barriers to international trade.

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