coli 157:H7 and, of these cases, 230 were culture-confirmed. In addition, 12 people had become ill in Idaho and 30 in Nevada. It was also learned that illness had occurred among 34 persons in San Diego, California, in December and January. The outbreaks in each of these States all had in common the consumption of hamburger at the same chain of fast food restaurants. The greater proportion of these cases were primary infections, that is, the persons affected became ill directly from eating contaminated hamburgers. The other cases were secondary infections-the affected persons contracted their illnesses through contact with a person who was infected with the pathogen.

Eventually, four people died and more than 500 other persons became ill during the course of the epidemic.

An important aspect of the Department's review of this experience was the finding that the winter 1992-93 outbreak was not caused by a failure in the operation of the inspection system as currently designed. Rather, it stemmed in part from an inspection system that does not directly require the reduction, minimization, or elimination, if possible, of pathogenic microorganisms in raw product leaving inspected establishments. The specific pathogen in this example was highly virulent, meaning that a very low dose was sufficient to cause illness. During the beef-grinding process, harmful bacteria can easily be spread throughout a large volume of product. When such product becomes widely distributed and is cooked inadequately to kill any pathogens that might be present, preventable deaths may result.

The Relationship Between Foodborne Illness and Consumer Knowledge and Behavior

The National Academy of Sciences' Cattle Inspection: Committee on Evaluation of USDA Streamlined Inspection System for Cattle (SIS-C) (1990) reiterated the theme of numerous other studies, "* * * the public expects the government to ensure zero risk of meat-borne disease through inspection. The [NAS] committee heard little evidence that the public is aware that some bacterial contamination of raw meat is inevitable and no mention of the crucial role of food handling. preparation, and serving methods in limiting foodborne diseases." The disturbing but real fact that consumers fail to make a connection between their food handling behavior and safe food recurs throughout the literature on the subject.

Behavioral research shows that food habits are the most difficult of all forms

of human behavior to change. This finding is supported by research of consumer knowledge and practices, which indicates that a large portion of the U.S. population lacks basic food safety information and skills and engages in food handling and preparation practices that epidemiological studies have linked with a significant number of foodborne illness outbreaks. Moreover, little correlation exists between consumers' food safety knowledge and their food handling and preparation practices. Even people who characterize themselves as "knowledgeable" do not necessarily follow good food safety procedures.

These findings about consumer behavior related to safe food handling and preparation support the need for a comprehensive pathogen reduction effort. Food safety can best be assured only if each participant in the food system—from the producer all the way through to the consumer-understands, accepts, and acts on his or her responsibility for food safety. While FSIS will pursue and support all possible means of consumer education and outreach, the Agency realizes that consumer education alone will not control pathogen-related foodborne illness. This is truer today than ever before, as more people in our society are assuming responsibility for food handling and preparation in the home and elsewhere, without experience in food preparation and knowledge of safe food handling and storage methods. These people include:

 Food service workers, many of whom are high-turnover, part-time, or teenaged workers who receive inadequate training;

• Men and women in the workplace, who have minimal time for food preparation and often little experience or interest in food preparation;

• Children, who are increasingly expected to shop for and prepare their own meals;

• Immigrants, who might not be able to read food handling instructions, or whose cultural practices include eating raw or rare meat and poultry products.

Vulnerable sectors of the population, more severely affected by foodborne illness, are also increasing in size:

• Immunocompromised persons (i.e., persons with diabetes, cancer, chronic intestinal diseases, organ transplants, and AIDS);

• Persons 65 years and older—a growing proportion of the population who, due to the normal decline in immune response, are at increased risk.

In 1993, to increase awareness about pathogens, FSIS promulgated a

regulation requiring safe handling labels on most raw meat and poultry products. The Agency's Meat and Poultry Hotline provides consumers with immediate responses to questions about meat and poultry handling and safety. These steps and other education activities are important but they are not a substitute for building into the meat and poultry production and regulatory system measures to reduce to the maximum extent possible the presence of pathogenic microorganisms in meat and poultry products purchased by U.S. consumers.

External Studies and Recommendations for Change

During the past decade, the National Academy of Sciences (NAS), the General Accounting Office (GAO), the National Advisory Committee on Microbiological Criteria for Food (NACMCF), and consumer groups have evaluated and called for change in the current inspection system.

In 1983, FSIS asked NAS to evaluate the scientific basis of its inspection system and recommend a modernization agenda. The resulting report, Meat and Poultry Inspection: The Scientific Basis of the Nation's Program, was issued in 1985. This was the first comprehensive evaluation of the scientific basis for the Federal meat and poultry inspection system. The report provided a blueprint for change, recommending that FSIS focus on pathogenic organisms and require that all official establishments operate under a Hazard Analysis and Critical Control Point (HACCP) system to control pathogens and other safety hazards. This report "encourages FSIS to move as vigorously as possible in the application of the HACCP concept to each and every step in establishment operations, in all types of enterprises involved in the production, processing, and storage of meat and poultry products.

Two later NAS studies reinforced these recommendations, urging the Agency to focus on public health goals:

• Poultry Inspection: The Basis for a Risk Assessment Approach (1987) concluded that a risk-assessment approach is needed to evaluate health hazards associated with poultry. Critical control points at which known pathogenic microorganisms may be introduced into the poultry production system should be identified and monitored, preferably as part of a HACCP program.

• The most recent NAS report, *Cattle Inspection: Committee on Evaluation of USDA Streamlined Inspection System for Cattle (SIS-C)* (1990) stated that traditional meat inspection, relying on