Food Safety Centennial Presentations

542 ASAS Centennial Presentation: Developments and future outlook for preharvest food safety. S. P. Oliver*[1], D. A. Patel[1], T. R. Callaway[2], and M. E. Torrence[3], [1]*The University of Tennessee, Knoxville*, [2]*USDA/ARS Southern Plains Agricultural Research Center, College Station, TX*, [3]*National Program Leader, Food Safety, USDA/ARS, Beltsville, MD*.

While the United States food supply is one of the safest in the world, CDC estimates that 76 million people get sick, more than 300,000 are hospitalized, and 5,000 die each year from foodborne illness. Consequently, preventing foodborne illness and death remains a major public health concern. Challenges to providing a safe, abundant and nutritious food supply are complex because all aspects of food production from farm to fork must be considered. Given the national/international demand and expectations for food safety as well as the formidable challenges of producing and maintaining a safe food supply, food safety research and educational programs have taken on a new urgency. Remarkable progress has been made during the last century. Sagacious wisdom from a century of animal agriculture research now includes the realization that on-farm pathogens are intricately associated with animal health and well-being, production of high quality food, and profitability. In this review, developments that have occurred over the last few decades will be summarized including types, sources and levels of disease-causing pathogens encountered in food-producing animal environments and their association with food safety; current and future methods to control/reduce foodborne pathogens on the farm; and present and future preharvest food safety research directions. Future scientific breakthroughs will no doubt have a profound impact on animal agriculture and production of high quality food but we will also be faced with moral, ethical and societal dilemmas that must be reconciled. A strong science-based approach that addresses all the complex issues involved in continuing to improve food safety and public health is necessary to prevent foodborne illnesses. Not only must research be conducted to solve complex food safety issues, but results of that research must be communicated effectively to producers and consumers.

Key Words: Food Safety, Foodborne Pathogens, Food Safety Research

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Humans have consumed meat for thousands of years and consumption has increased with agricultural advances and increases in disposable income. It is natural for raw meat and other foods to become contaminated with spoilage and pathogenic microorganisms during exposure to the environment. Following advances in microbiology in the 19th century, meat safety and quality became of public interest and led to federal inspection regulations early in the 20th century. However, food safety became a major public issue only in recent decades along with changes in animal production, product processing and distribution; increased international trade; consumer preference for minimally processed foods; increased worldwide meat consumption; higher numbers of consumers at-risk for infection; and, increased scrutiny by consumers and news media. The 1906 meat inspection regulation underwent a major revision in the 1990s, following intense public scrutiny of an outbreak of *Escherichia coli* O157 transmitted through undercooked ground beef. The new inspection regulations are based on the principles of hazard analysis critical control point (HACCP) and have as target the prevention of hazards before consumer exposure. In efforts to meet regulatory requirements and commercial specifications for lower contamination, and to provide safer products to consumers, the meat industry, which also expanded along with regulatory developments and scientific advances, has recently employed various decontamination and pathogen control interventions as multiple hurdles. Major current and future meat safety issues and challenges include the need to control pathogens which may be of increased virulence or resistant to antibiotics or other stresses, control of cross-contamination of foods and water with zoonotic pathogens, and manure treatment and disposal issues. Other issues include additives and chemical residues, organic and natural products, animal identification and traceability, rapid pathogen detection, regulatory harmonization at the national and international level, establishment of risk assessment based food safety objectives, and optimization of HACCP implementation based on food handler training and consumer education.

Key Words: Meat, Safety, Food