Food Safety
Interventions and Future Directions in Food Safety

674 Preharvest intervention strategies to reduce food borne pathogens in food animals. T. R. Callaway*, R. C. Anderson, T. S. Edrington, R. O. Elder, K. J. Genovese, K. M. Bischoff, T. L. Poole, and D. J. Nisbet, *Agricultural Research Service/USDA, Food and Feed Safety Research Unit, College Station, TX.*

Annually, food borne pathogenic bacteria sicken more than 76 million Americans. Many of these illnesses are caused by consumption of foodstuffs produced from animals. Although post harvest intervention strategies are targeted at reducing bacterial contamination from the abattoir to the table, foodborne illnesses deaths still occur, suggesting that preharvest intervention strategies are needed to effectively reduce human foodborne illness. Several preharvest intervention strategies have been contemplated and are currently under investigation. Potential strategies to be discussed include vaccination, competitive exclusion, substrate-adapted competitive exclusion, the use of probiotics and prebiotics (e.g., fructooligosaccharides). Other strategies such as the use of bacteriophage to specifically target certain pathogenic bacteria, and the exploitation of the physiology of specific pathogens, the use of antibiotics to reduce specific pathogens, as well as the effects of management strategies (e.g., dietary changes, transportation and stress) will also be discussed. The use of preharvest intervention strategies at multiple critical control points can potentially reduce the incidence of human food borne illnesses by erecting multiple hurdles against entry of pathogens into the food chain.

Key Words: Preharvest Food Safety, Intervention Strategies, Pathogen Reduction

675 Practical preharvest food safety interventions for dairy production. P.L. Ruegg*, *University of Wisconsin, Dept. of Dairy Science, Madison, WI.*

Consumers are increasingly concerned about the safety of their food and uncertain about food production practices. Apprehension regarding potential liability from illnesses related to consumption of tainted food products has some food retailers considering the extension of HACCP programs to farm production units. Potential threats to human health related to dairy products and dairy farming include: errors in pasteurization, consumption of raw milk products, contamination of milk products by emerging heat resistant pathogens, emergence of antimicrobial resistance in zoonotic pathogens, chemical adulteration of milk, transmission of zoonotic pathogens to humans through animal contact and foodborne disease related to cull dairy cows. Most dairy farmers feel responsible for the safety of milk and beef that originate on their farms but linkage between farm production practices and the quality of processed products have been weak. The safety of dairy products can be enhanced by adoption of a number of management practices. All animals should be identified and accounted for throughout their life cycle and farmers must take responsibility for the market cattle leaving their farms. Systematic procedures that divert diseased animals and adulterated or abnormal milk from the marketing chain must be in place on all farms. Many potential pathogens are shed in feces and fecal contamination of milk products, carcasses and animal facilities and equipment must be minimized. The inappropriate or prophylactic use of antimicrobial agents must be minimized to ensure that antimicrobial resistance does not development in animal pathogens. Consumers can have confidence in food safety programs on dairy farms that promote awareness and accountability for the products that are produced.

Key Words: Food Safety, Dairy Production, Zoonotic Disease

676 Effective methods for postharvest intervention in dairy processing. J. R. Stabel*[1], *USDA-ARS, National Animal Disease Center, Ames, IA.*

Food safety has become a top priority for regulatory agencies in the US. Illness and/or death due to contamination of food products with zoonotic pathogens is rare in the US but does occur. Recent outbreaks of Bovine Spongiform Encephalopathy and Foot and Mouth Disease Virus (FMDV) in the UK have raised concerns about contamination or transmission of pathogens from farm animals to consumers. Raw milk contains a number of pathogens and the potential is high for these pathogens to cause disease in consumers if the milk is not adequately treated to destroy or reduce the pathogen load. Proper intervention methods during the processing of food products significantly reduce the risks of transmission of infectious agents from the farm to the table. This paper will summarize methods of intervention used by dairy processing plants to improve the safety of dairy products for consumers. Methods include inactivation by heat (pasteurization and ultra-high-temperature); high hydrostatic pressure; irradiation and fermentation. Efficacy of these methods for inactivation of pathogens such as *Listeria*, *Yersinia*, *Salmonella*, *E. coli*, Bovine Leukemia Virus, FMDV and *Mycobacterium paratuberculosis* will be summarized. The potential for contamination of dairy products to occur post-processing in the dairy plant environment will also be discussed.

Key Words: Dairy products, Pathogens, Intervention methods

Growth and Development
Skeletal Muscle Plasticity, Development, and Hypertrophy

677 Importance of muscle fiber types in animal agriculture. D.E. Gerrard* and A.L. Grant, *Purdue University, West Lafayette, IN USA.*

Adult skeletal muscle is a mosaic collection of muscle fiber types. There are four different muscle fiber types in porcine skeletal muscle, which are slow-oxidative or type 1, fast oxido-glycolytic or type 2A, and fast glycolytic 2X(D) and 2B fibers. This type of classification scheme is based solely on the different types of myosin heavy chain isoforms that predominate a given fiber type. Muscle fiber types are extremely sensitive to a myriad of physiological, environmental and cellular stimuli. Depending on the type and duration of a stimulus, muscle fibers can react by changing their contractile and metabolic capabilities. Therefore, fiber type composition in skeletal muscle is considered rather plastic in nature. From an agronomic standpoint, many production systems and programs provide sufficient stimuli to change muscle fiber type composition and, as a result, may alter production efficiency of the whole animal. After a discussion regarding muscle fiber typing and nomenclature, data regarding the effect of various production practices that change muscle fiber type will be explored. Furthermore, the role fiber type may play in controlling the development of meat quality will be discussed. Understanding how muscle fiber type is altered by various stimuli may provide meaningful insights into how animal growth performance and meat quality can be improved.

Key Words: Muscle, Growth, Fiber type

678 Heterogeneity of protein expression within muscle fibers. Everett Bandman[1] and Benjamin W.C. Rosser*[2], [1]*University of California, Davis, CA USA*, [2]*University of Saskatchewan, College of Medicine, Saskatoon, Saskatchewan, Canada.*

Skeletal muscle fibers are elongated multinucleated cells. Along its length an individual muscle fiber may contain thousands of myonuclei, each controlling protein synthesis within its surrounding cytoplasm. Thus a muscle fiber can be considered a series of nuclear domains, each responding to distinct localized signaling mechanisms that may result in differential gene expression within a single fiber. This presentation examines a number of phenomena that result in distinct subsets of proteins accumulating within different regions of a muscle fiber during growth and development. These include changes in protein expression associated with muscle maturation, denervation, and activity induced fiber type transformation. Myosin heavy chain proteins are a fundamental structural and functional component of muscle fibers that are represented by different isoforms, each of which is the product of a separate gene that may be differentially expressed during development of distinct