Meat Science and Muscle Biology Symposium: Pre-Harvest Factors Affecting the Prevalence of Pathogens in Livestock and Meat

577 Diet, fecal microbiome and *Escherichia coli* O157:H7 shedding in beef cattle. J. Wells*[1], M. Kim[1], J. Bono[1], L. Kuehn[1], and A. Benson[2], [1]*USDA, ARS, U.S. Meat Animal Research Center, Clay Center, NE,* [2]*University of Nebraska, Lincoln.*

Shiga-toxigenic *Escherichia coli*, such as *E. coli* O157:H7, are foodborne zoonotic pathogens that can cause severe illness and death in humans. The gastrointestinal tract of ruminant animals has been identified as a primary habitat for *E. coli* O157:H7, and in cattle the terminal gastrointestinal tract appears to be a primary site for colonization. This pathogen has been found in cattle feces, on cattle hides, and in the production environment, and transmission to humans has occurred as a result of consumption of contaminated ground beef, water, and produce. Interventions to reduce the pathogen at beef harvest have significantly reduced the occurrence of the pathogen, but outbreaks and recalls due to the pathogen still occur for beef products. Interventions before harvest in the feedyard have had little success, but critical control points for implementing interventions are limited compared with the beef plant. The percentage of animals shedding *E. coli* O157:H7 in the feces can be highly variable from pen to pen, and the levels in the feces can vary from animal to animal. Animals colonized and shedding *E. coli* O157:H7 at high levels are a small fraction of animals in a pen, but are important source for transferring the pathogen among the penmates. Recent research has indicated that diet may greatly influence the shedding of *E. coli* O157:H7. In addition, diet can influence the microflora composition in the feces. However, little is known about the interaction between the indigenous microflora and fecal shedding of *E. coli* O157:H7. Understanding the influence of indigenous microflora on the colonization and shedding of *E. coli* O157:H7 will provide an avenue for intervention in the preharvest production environment not yet exploited.

Key Words: Shiga-toxigenic *E. coli*, pathogens, feces

578 Ecological and dietary impactors of foodborne pathogen prevalence and methods to reduce colonization in cattle. **T. R. Callaway*,** *Agricultural Research Service/USDA, College Station, TX.*

Foodborne pathogenic bacterial infections are a significant drain on the GDP of our nation. Cattle gastrointestinal tracts are colonized by a microbial ecosystem that can be considered as a "microbial organ," but too often this microbiome is penetrated and colonized by foodborne pathogens. While foodborne pathogenic bacteria populations are reduced by processing plant treatments, not all pathogens are eliminated from the food supply. Furthermore, humans can be exposed to foodborne pathogens in water supplies and by direct animal (or feces) contact, such as at petting zoos or open farms. Thus if the burden of pathogens found in food animals can be reduced, then human public health can be enhanced. As a result, researchers have begun examining methods to reduce these pathogens in live animals on the farm. Strategies range from simple management practice changes to the effects of diet on the microbiome and water management to the addition of exogenous treatments to specifically target pathogens. Many of the approaches attempt to harness the powerful microbial population to exclude pathogens, either through probiotics, DFM, prebiotics or bacteriophage treatment. Other exogenous treatments have been utilized as well, such as vaccination and sodium chlorate utilization that directly inhibit or eliminate pathogens. No matter what, pre-harvest strategies will not eliminate the need for good sanitation and procedures in the processing plant and during food preparation and consumer handling. Instead, live-animal management interventions must be implemented as part of a multiple-hurdle approach that complements the in-plant interventions, so that the reduction in pathogen entry to the food supply can be maximized. Furthermore, pathogen reduction strategy implementation comes at an economic cost, therefore pathogen reduction methods that can enhance production efficiency will be implemented in the industry most efficaciously.

Key Words: food safety, cattle, pathogen

814 See TH220

815 See TH227