



# RESEARCH AND EXTENSION

## PROGRAM UPDATES AND HIGHLIGHTS

### MAKING GROUND BEEF PATTIES AND SAUSAGE SAFER

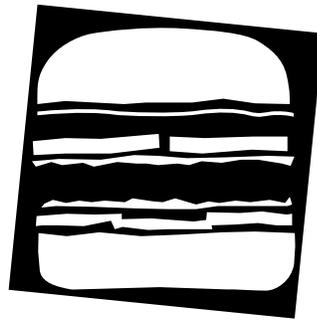
#### SITUATION

Foodborne illness remains a serious problem. A report by the Council for Agricultural Science and Technology has estimated that foodborne diseases in the United States caused by pathogenic bacterial may cause as many as 9,000 deaths each year and 6.5 million to 33 million cases of diarrheal disease. The annual economic losses associated with foodborne disease may be as large as \$5 billion to \$6 billion.

#### THE PROBLEM

##### COLOR AND SAFETY OF COOKED GROUND BEEF

Premature browning occurs when the interior of ground beef patties appears thoroughly cooked but the internal end-point temperature is



below that necessary to ensure destruction of any potentially pathogenic microorganisms. Normally, the cooked color of ground beef patties progresses from red to pink to brown as end-point temperature increases. With premature

browning, patties appear cooked at temperatures as low as 55°C. This phenomenon is of critical importance given recent *E. coli*0157:H7 outbreaks.

#### THE RESEARCH

Researchers analyzed the chemical and physical properties of normal and prematurely browned ground beef. They found that premature browning is related to the form of the pigment in the raw ground beef when cooked.

#### THE IMPACT

The findings of this research have influenced the Food Safety and Inspection Service (FSIS) to significantly alter its recommendations to the public about cooking ground beef. The new statement contains nothing about internal color and focuses on end-point temperature. Premature browning may not be as important an issue in the fast-food industry or in USDA-inspected establishments where specific time-temperature heating is used, but it is extremely critical in home and institutional preparation of ground beef patties.

#### THE PROBLEM

##### VALIDATION OF DRY, FERMENTED SAUSAGES

In 1994, an *E. coli*0157:H7 foodborne disease outbreak associated with dry, fermented sausage occurred in the Pacific Northwest. Dry, fermented sausage products rely on the natural production of acid by starter cultures and on drying to control pathogens. Typically, heat is not involved in the process. The safety of those products was questioned by consumers and the USDA. The USDA-FSIS has called for complete process validation of those products to assure that they can eliminate *E. coli* 0157:H7.

## THE RESEARCH

The meat microbiology processing laboratory at K-State Research and Extension has been equipped with state-of-the-art dry, fermented sausage production units to perform process validation studies. This unique facility for sausage research allows a replication of any standard industry process. Products also can be inoculated with pathogens. Validation studies have been successfully performed on Lebanon bologna, pepperoni, and summer sausage. Various antimicrobial agents have been inserted into the products to test the production processes, and steps have been taken to enhance pathogen destruction effectiveness during the production processes.

## THE IMPACT

Validation studies of most commercially utilized dry, fermented sausage production processes will provide industry and USDA answers on how current systems can achieve adequate pathogen reductions to assure consumer safety. K-State Research and Extension will additionally provide processors, currently using protocols that are shown to be inadequate, an alternative process to meet USDA *E. coli* 0157:H7 process elimination standards.

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