

UNL leads \$25 million project targeting E. coli threat

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The University of Nebraska-Lincoln will lead a \$25 million project to reduce throughout the beef production chain the occurrence of E. coli strains that pose a major threat to public health.

The U.S. Department of Agriculture's National Institute of Food and Agriculture announced the grant at UNL Monday (Jan. 23).

The project targets Shiga-toxin producing E. coli, or STEC, which cause more than 265,000 illnesses in the United States annually. Eating contaminated food or having direct contact with fecal matter from infected cattle and other ruminants cause most of these illnesses.

UNL will lead a team of 48 scientists from 11 land-grant universities and other partner institutions to conduct integrated research, education and extension projects on eight types of STEC. Studies will include the best-known STEC, E. coli O157:H7, along with seven strains that are not as well understood, partly because outbreaks due to these strains are rarely identified.

UNL and Kansas State University—with 32 scientists—will conduct most of the research, education and extension work for this project.

"This research has enormous ramifications here in Nebraska and across the nation," said UNL Chancellor Harvey Perlman. "Beef is big business in the state, and the industry prides itself on delivering a safe product to consumers. This project will help ensure the safety of beef products, through the research conducted at participating institutions, the transfer of this knowledge to collaborators in the beef industry and educational programs for consumers."

The \$25 million grant is the largest-ever USDA grant to UNL and one of the single largest grants it's ever received.

"Shiga toxin-producing E. coli are a serious threat to our food supply and public health, causing more than 265,000 infections each year," said Chavonda Jacobs-Young, acting NIFA director. "As non-O157 STEC bacteria have emerged and evolved, so too must our regulatory policies to

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protect the public health and ensure the safety of our food supply. This research will help us to understand how these pathogens travel throughout the beef production process and how outbreaks occur, enabling us to find ways to prevent illness and improve the safety of our nation's food supply.”

Jim Keen, a UNL veterinary scientist who is leading the project, said there are 500 known STEC, 100 of which can cause illness in humans. This research will focus on the seven most dangerous strains of E. coli, plus a new strain that made its first widespread appearance in an outbreak in Europe in 2011.

“We will be studying the entire beef chain, from the time an animal is born until the time beef products are consumed,” said Keen. He is based at the Great Plains Veterinary Educational Center near Clay Center, Neb.

Scientists will build on years of research into E. coli O157:H7 by UNL and other institutions as a baseline, Keen said. He noted that O157:H7 is something of an anomaly among STEC because it is relatively easy to culture and study. The other 99 strains of STEC that can cause illness typically come and go without being diagnosed. While large-scale E. coli outbreaks garner headlines, they represent only about 25 percent of infections. The rest are individual or small-scale outbreaks.

The first step will be to develop diagnostic techniques to determine the presence of STEC in cattle, both pre- and post-harvest. Scientists also will:

study the biological and epidemiological factors that drive STEC-caused illnesses;

develop intervention techniques to reduce STEC risks from cattle, hides, carcasses and beef and devise ways to implement these interventions for all sizes of beef producers;

develop a risk analysis model to evaluate the cost-effectiveness of mitigation strategies; and

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communicate findings to stakeholders, food safety professionals, regulators, educators and consumers so they can implement efforts to lower STEC exposure.

About one-third of the \$25 million will be devoted to extension and educational efforts, Keen said. For example, university students from across the country will have opportunities for internships with any of the 48 scientists.

“Part of this project is to help educate the next generation of scientists” who will deal with these issues in the coming decades, Keen said.

In addition to UNL and KSU, participating institutions include: North Carolina State University; the University of California, Davis; the University of Delaware; Virginia Polytechnic Institute and State University; the New Mexico Consortium; USDA-Agricultural Research Service; New Mexico State University; Texas A&M University; and the University of Arkansas.

Ronnie Green, Harlan vice chancellor of UNL’s Institute of Agriculture and Natural Resources, said UNL is well-suited to lead the research.

“With 6.2 million cattle and the nation’s No. 1 ranking for red meat production, Nebraska is an economic epicenter for the beef industry,” Green said. “This collaborative research will enable the University of Nebraska and 10 partner institutions to expand on a long history of high impact research to ensure the safety of beef products on dinner tables around the world.”

Prem S. Paul, UNL vice chancellor for research and economic development, said: “Today’s complex challenges simply demand this kind of large-scale collaborative and interdisciplinary approach. Working together, we can accomplish so much. I commend USDA NIFA for funding big, multi-institutional grants to address big problems.”