PARTNERING WITH TECHNOLOGY for food safety

by Dan Moser/Mary Garbacz

Based on an interview by Emily Taylor

“‘All along the chain, everyone who handles food has the responsibility to ensure the safety of the product and if they can, improve it.’”

—Harshvardhan Thippareddi, Professor, UNL Department of Food Science and Technology, and Extension Food Safety Specialist

FOOD SAFETY IS A DIVERSE FIELD, and includes chemistry, microbiology, engineering, taste science, veterinary science, food production, food processing and consumer education. Multidisciplinary scientific and industry partnerships, along with the newest technologies developed by the scientists, help ensure a safe food supply for the world.

It requires coordination, vigilance and communication.

“When somebody consumes a product that we make, as a food processor, we need to absolutely make sure that the product is safe, because we are affecting the lives of other people,” said Harshvardhan Thippareddi, University of Nebraska–Lincoln professor of food science and technology and Extension food safety specialist.

“All along the chain, everyone who handles food has the responsibility to ensure the safety of the product and if they can, improve it,” Thippareddi said.

The U.S. has one of the best food safety programs in the world, compared to other countries such as Canada, those in Europe and other developing countries, Thippareddi said — but it requires ongoing research, as well as the cooperation of producers, processors and consumers who prepare foods at home.

Nebraska, as a top producer of beef in the U.S., has benefited from research into safe beef production and processing. The U.S. has the best and the safest beef available anywhere in the world, Thippareddi said, adding that the food safety risk is very minimal when another country chooses to import products from the Midwest.

“The eventual goal — the long-term goal of our research — is to improve public health,” he said. “The short-term goal is to improve the safety of these specific products of economic importance to Nebraska and to processors and producers, and to make sure the food they produce is safe.”

EXTENSION/OUTREACH

Thippareddi assists food processors every day offering input on improving processes and product safety. He also conducts workshops frequently in Nebraska and around the world. Even though U.S. food safety is among the best, that is not true of some developing countries. That is especially important when those countries export food products to the U.S. Thippareddi often travels to those countries to conduct workshops so processes, testing and food safety requirements meet the food safety requirements of the U.S. so products being imported into the U.S. are not turned away at the U.S. port of entry due to quality issues, he said.

Thippareddi’s current work with the meat processing industry includes the scope of livestock production and products. His work with the poultry and egg industry, for example, involves the egg processor, the shell processor and liquid egg and dried egg processors as they improve their processes and the safety of their products. “They consult with me on a daily basis, as does the beef industry here in Nebraska and across the U.S.,” he said.

The food industry in the U.S. and in other countries uses Hazard Analysis and Critical Control Points (HACCP), which is a system of preventive measures that can assure the safe production of food products. It is based on technical and scientific principles that ensure product safety from farm to table. HACCP can be applied to production, meat slaughter and processing, shipping and distribution, food service and in-home food preparation. The University of Nebraska–Lincoln holds HACCP workshops visit http://food.unl.edu/meatproducts/safety for more information.

FOODBORNE ILLNESS: CAUSES

Several different pathogens, parasites and viruses cause foodborne illness outbreaks, Thippareddi said, but are largely controlled due to continued research and educational outreach to producers, processors and consumers. In order of the number of illnesses they cause, they are: Salmonella, Escherichia coli O157:H7 and six other types of Shiga toxin-producing E. coli (STEC); Listeria monocytogenes; Clostridium perfringens; and Clostridium botulinum.

Thippareddi and his colleagues not only study the characteristics of the foodborne pathogens, bacteria and viruses that cause foodborne illness and their behavior in foods, they also develop predictive models for use by industry and communicate this information to producers, processors and consumers.

SHIGA TOXIN-PRODUCING E. COLI (STEC) RESEARCH

Foodborne illness can be mild or quite serious. It also can mean the end of a food company. Thippareddi noted that in 1997, Hudson Foods, then a state-of-the-art company based in Columbus, Nebraska, had to recall 20 million pounds of ground beef — two months’ worth of product because a sample of one day’s production tested positive for E. coli O157:H7. The company went bankrupt as a result.

“Assuring the safety of beef is very important, especially for Nebraska, as beef is a critical component of the state economy — the production as well as the processing after,” Thippareddi said.

Nebraska’s strength in beef production and processing led scientists from the University of Nebraska–Lincoln and 15 other educational institutions and food industries to apply for grant funding from the U.S. Department of Agriculture to study Shiga toxin-producing Escherichia coli (E. coli), or STEC. The group was awarded $2.5 million in funding over a five-year time period; the researchers are now initiating the third year of research focused on controlling not only E. coli O157:H7, but also six other serotypes of STEC.

The STEC team’s research addresses the risk mitigation strategies, from production and processing to consumer handling of meat products. (Read about the researchers’ work at http://www.stecbeefresearch.org.)

Progress has been made in methods of detection of STEC organisms, Thippareddi said. Researchers discovered that methods being used were not adequately sensitive or specific; so they have developed new techniques to improve detection methods. The USDA Food Safety and Inspection Service (FSIS) has reported greater prevalence of STECs inveal cuts and ground veal. The research team has focused on developing interventions that can be used duringveal slaughter and identified options for their use during processing. Those interventions already have been implemented inveal processing to reduce risk, he said.

“Some of the work we have done so far has been successful,” Thippareddi said. “It is commandeering a lot of time and money, but I think in the long run it will be worth it.”

Harshvardhan Thippareddi
CONSUMER RESPONSIBILITY FOR FOOD SAFETY

Consumers are responsible for the safe storage, handling and preparation and cooking of food products once they are purchased, Thippareddi said. Consumers can minimize the risk of foodborne illness by:

- Refrigerating meat, fish, eggs and produce immediately so pathogens don’t have the opportunity to grow.

- Keeping fresh produce separate from raw meat, fish and eggs, including use of separate utensils and cutting boards.

- Cooking meat, fish and eggs to the correct temperatures; a good resource is [http://www.foodsafety.gov/keep/charin implicated/mintemp.html](http://www.foodsafety.gov/keep/charin implicated/mintemp.html). Even though the risk of E. coli is very low, cooking it to an internal temperature of 160°F can destroy the organism if it happens to be present.

- Sensitive populations, like children, pregnant women, the elderly and those with compromised immune systems may wish to take extra care, as foodborne illness risks are greater for these individuals.

The need for feeding more than 9 billion people by 2050 requires careful management of water and other resources, but there are other needs as well.

“We need to improve our ability to properly store, handle, and process and prepare these products,” Thippareddi said. Products will have to be stored for extended periods of time in the future, so it will be necessary to ensure they are safe at the point of consumption.

If you look at the U.S. compared to the rest of the world, the number of people getting sick from foodborne disease in the U.S. is relatively small, Thippareddi said. That shows the industry is doing an excellent job in ensuring a safe product, but at the same time, researchers, producers and industry must continue to work to make products continually safer.

“There’s always room for improvement,” he said.