

Understanding, combating foodborne pathogens **E. coli 0157** and salmonella

October 16 2007

Understanding the ecology of two dangerous foodborne pathogens and devising ways to combat them is a big job. That's why Kansas State University has a team of seven researchers and six collaborators taking on *E. coli* 0157 and salmonella.

"It's becoming more and more difficult to study these pathogens because you have to be a jack of all trades," said T.G. Nagaraja, professor of diagnostic medicine pathobiology at K-State's College of Veterinary Medicine.

Nagaraja leads a research group that includes epidemiologists, molecular biologists, production animal medicine experts and feedlot nutritionists.

For the past five years, Nagaraja has been leading the team on an *E. coli* 0157 research project that goes back more than a decade at K-State. *E. coli* 0157 doesn't cause problems for livestock, but it's zoonotic -- that is, it can be passed on to humans through the food supply.

"Our goals are fairly simple," Nagaraja said. "We want to understand the ecology of *E. coli* 0157 in cattle and come up with practical, on-farm intervention strategies."

The rest of the research team includes Sanjeev Narayanan, assistant professor of pathology and molecular biology; Richard Oberst, professor of microbiology; David Renter, assistant professor in epidemiology; Mike Sanderson, associate professor of epidemiology and production

animal medicine; Daniel Thomson, assistant professor of feedlot production medicine; and Ludek Zurek, associate professor of entomology.

Collaborators include K-State's Mike Apley, associate professor of production animal medicine; Jim Drouillard, professor of feedlot nutrition; Larry Hollis, professor in animal sciences and industry; Justin Kastner, assistant professor of food safety and security; and Abby Nutsch, assistant professor of food microbiology; as well as Kelly Lechtenberg, director of Midwest Veterinary Research Inc. in Oakland, Neb.

The research team is working to answer questions like why some cattle have E. coli 0157 and some don't, and why some shed the bacteria for a longer time or at higher levels than others.

The K-State researchers also want to understand why the presence of 0157 is higher during some months than in others, and why animals under stress shed more of the bacteria than other animals.

"If we find out answers to these questions, we can come up with intervention strategies," Nagaraja said. "The first part of the research is to look at the ecology, and the second part is to develop tests and practical intervention strategies."

For instance, Thomson is doing research with a company in Minnesota on a vaccine with antibodies that prevent the bacteria from getting iron, which they need to live. All three studies have shown a reduction in the prevalence of 0157 when the vaccine is used, Nagaraja said.

He also said that researchers are looking at what changes they could make in cattle diets that would make the animals' digestive systems less hospitable to 0157. Because the bacteria seem to congregate in the

hindgut, Nagaraja said feeding cattle a diet that will reach the hindgut and produce acid will be effective in killing 0157. He also said that probiotics -- beneficial bacteria, like what humans can get through eating yogurt -- can reduce 0157 because they out compete the bacteria for resources.

Salmonella, one of the most common causes of gastroenteritis and which is spread through contaminated ground beef and manure-fertilized produce, also harms livestock. It causes bloody diarrhea in feedlot cattle and causes dairy cattle to abort. Renter's work centers on finding out why feedlot cattle that are being treated for other infections may show a higher rate of salmonella than healthy cattle. To find out the serotype of the salmonella, veterinarians and researchers have to send samples to a laboratory in Iowa. Narayanan is working to develop a rapid, molecular-based testing method that is more accessible.

Nagaraja said that in the future the research team will pursue the goal of eliminating 0157 and salmonella. Although 0157 also is spread by grain-eating birds that carry the bacteria from one feedlot to another, it poses less of a challenge than salmonella. Nagaraja said that rodents and other animals that live in barns carry salmonella, so the research team hopes to at least reduce its prevalence. The research team also is studying antimicrobial resistance with the hopes of preventing foodborne pathogens from becoming more dangerous to humans and animals.

"Salmonella is notorious for becoming resistant to multiple antibiotics," Nagaraja said. "Also, it can transfer the genes that cause antibacterial resistance to other bacteria. Our primary objective is to develop a synergistic program to evaluate the role of the cattle industry on the prevalence, amplification and spread of antimicrobial resistance."

Source: Kansas State University

Citation: Understanding, combating foodborne pathogens E. coli 0157 and salmonella (2007, October 16) retrieved 24 April 2024 from <https://medicalxpress.com/news/2007-10-combating-foodborne-pathogens-coli-salmonella.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.