

Feeding Sodium Chlorate to Livestock To Kill *Salmonella* and *E. coli*

When fed in low doses, sodium chlorate kills *Salmonella typhimurium* and *Escherichia coli* O157:H7 in pigs and cows. Agricultural Research Service scientists in College Station, Texas, have shown that levels of these harmful bacteria can be reduced in the intestinal tract of pigs and cows if they're given sodium chlorate before slaughter.

"Because the gut and lymph tissue of meat animals and chickens are major reservoirs for *Salmonella* and *E. coli* O157:H7, this research offers a practical approach for reducing on-farm concentrations of these pathogens," says David J. Nisbet, an ARS microbiologist and research leader for the Food and Feed Safety Research Unit in College Station. Fewer bacterial pathogens in the gut can significantly reduce the chance of carcass contamination during food processing.

These two bacteria—culprits in most cases of human food poisoning—can live both aerobically and anaerobically, that is, with or without air. That makes them different from most gut bacteria, which are anaerobes.

Salmonella and *E. coli* O157:H7 contain an enzyme known as a respiratory nitrate reductase. This enzyme coincidentally converts the chlorate to chlorite, which kills the harmful bacteria. Beneficial bacteria in the intestinal tract lack respiratory nitrate reductase, so they are not affected by the addition of chlorate. The cost of using sodium chlorate at a meat processing facility could be less than 10 cents per pig, estimates ARS microbiologist Robin C. Anderson.

In laboratory studies, 45 weaned pigs were fed up to 0.04 grams of sodium chlorate per kilogram of body weight after being infected with *S. typhimurium*. Within 16 hours, the treatment produced a 150-fold reduction in the number of pathogenic cells in the intestines.

"The research is in the early stages," cautions Anderson. Before this approach could be widely used in the United States, the Food and Drug Administration would need to approve its use.

"But if results from large field trials hold up, I can envision a marketing system that includes feeding chlorate to animals before they're transported to slaughter. Another opportunity would be

to add chlorate to drinking water at the slaughterhouse," Anderson adds.

The Centers for Disease Control and Prevention estimate that about 1.4 million cases of salmonellosis and 73,000 cases of diarrheal illness due to *E. coli* O157:H7 occur in the United States each year.

Anderson, Nisbet, and ARS microbiologist Larry H. Stanker have applied for a patent. Results of the study conducted with weaned piglets were published in the February 2001 issue of *The Journal of Food Protection*.—By **Linda McGraw, ARS.**

This research is part of Food Safety (Animal and Plant Products), an ARS National Program (#108) described on the World Wide Web at <http://www.nps.ars.usda.gov>.

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