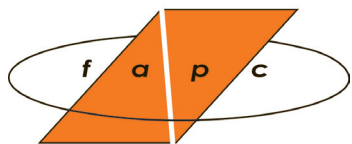


Food & Agricultural Products Center



FLASH!!

OKLAHOMA STATE UNIVERSITY™

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E. coli in Spinach Deals Big Blow to Spinach and Fresh-Cut Salad Industries

STILLWATER, Okla. – The recent bagged spinach *Escherichia coli* outbreak is a devastating setback to the spinach and fresh-cut salad industries, especially this growing season.

As of Sept. 28, 192 people had been infected with *E. coli* O157:H7 in 26 states. Of those infected, 98 were hospitalized, 30 developed kidney failure and one adult died. Two additional deaths are still being investigated for connection with the outbreak, according to the Centers for Disease Control and Prevention.

E. coli O157:H7 has now been recovered from 11 packages of spinach, said Peter Muriana, food microbiologist at the Food & Agricultural Products Center on the campus of Oklahoma State University.

“Several possible scenarios can be considered that could lead to such an outbreak,” Muriana said. “Federal regulatory officials are trying to find out what the source of the contamination was, which is good because we need to know if a mistake was made by someone or perhaps it was something unforeseen that could pose a problem again in the future if left unattended.”

Currently, the CDC recommends consumers not eat fresh, uncooked spinach. Cooking spinach to a temperature of at least 160 degrees Fahrenheit for 15 seconds by boiling will destroy the *E. coli* organism.

E. coli is an inhabitant of the gastrointestinal tract of animals and is shed in their feces. A potentially lethal serotype of *E. coli* is *E. coli* O157:H7, which can pro-

duce bloody diarrhea and a toxin in the intestinal tract that can shut down kidney and liver function.

Wild animals, such as rabbits, mice or fox, could have shed *E. coli* O157:H7 in the spinach fields, Muriana said. The organism then could have been spread around the fields by workers’ shoes.

“Less likely, but still plausible, is that the *E. coli* was spread by human shedding via unsanitary practices of farm workers,” Muriana said. “How far apart were the portable johns?”

Muriana said a more likely cause of the outbreak is the use of contaminated irrigation water because cheap water is often used to lower irrigation costs. *E. coli* O157:H7 in the water could have contaminated the outer surface of the spinach, which somehow survived subsequent processing steps.

An alternative scenario being considered is contaminated water facilitating the uptake of *E. coli* into the vascular system of the spinach plants, allowing the bacteria to withstand bactericidal rinses during processing, he said.

“Let’s hope this is not the case, as this would really cause a head spin on the safety of such products, or in the very least, prompt regulatory oversight over the condition of irrigation water used for products that are not cooked prior to consumption,” Muriana said.

It is possible that if a chlorine-containing rinse solution was used, its capacity could have been exhausted,

Muriana said. Chlorine-containing solutions have to be replenished to keep the oxidizing power of the chlorine high enough to be biocidal to bacteria.

If an exhausted solution was used, it could have allowed the survival of the *E. coli* O157:H7 on the treated spinach, he said.

Organic growers often use manure as fertilizer, and if not properly composted to kill the organisms that could be shed in the manure, the crops that may have been fertilized with raw manure could have been contaminated.

Although the produce that was affected was not organically grown, investigators have found *E. coli* O157:H7 in manure in cattle pastures next to the farms linked to the tainted spinach.

“This introduces the possibility of water run off from contaminated animal pasture into neighboring crop fields,” Muriana said.

The microbial problem has been traced to spinach produced by Natural Selections Foods of California, a cooperative that is one of the largest U.S. producers of organic produce.

The cooperative packages produce under the following names: Bellissima, Cheney Brothers, Compliments, Cross Valley, D'Arrigo Brothers, Dole, Earthbound

Farm, Emeril, Fresh Point, Green Harvest, Jansal Valley, Mann, Mills Family Farm, Natural Selection Foods, Nature's Basket, O Organic, Premium Fresh, President's Choice, Pride of San Juan, Pro-Mark, Rave Spinach, Ready Pac, River Ranch, Riverside Farms, Snoboy, Superior, Sysco, Tanimura & Antle, Trader Joe's and The Farmer's Market.

Other companies, including Triple B Corp., and their subsidiaries, S.T. Produce of Seattle, Wash., and Pacific Coast Fruit Company of Portland, Ore., have initiated voluntary recalls because some of their products may include spinach from Natural Selections Foods.

“Here’s some additional ‘food for thought,’” Muriana said. “If the current problem was experienced by a commercially regulated industry that often follows best manufacturing practices and processing for food safety, what kind of food safety check-and-balance is in place or liability protection for produce sold at farmers markets?”

For more information, visit www.cdc.gov/foodborne/ecolispinach/current.htm or www.fda.gov/bbs/topics/NEWS/2006/NEW01466.html.

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