



Food-borne bacteria evolving, becoming more dangerous

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By Elizabeth Weise, USA TODAY

The first rule of public health is one most of us learn in kindergarten: Don't eat poop.

But that's what the people were eating who were struck down with E. coli in the late summer outbreak tied to bagged spinach, California health officials now say.

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There was deadly E. coli O157:H7 in water samples taken on the Salinas Valley ranch where the spinach was grown, in wild pigs that rampaged through the fields, in cattle and calves that grazed nearby, and on cow manure in adjacent pastures, says Kevin Reilly, deputy director of prevention services for the California Department of Health Services.

"It's not unusual or unexpected that we'd find O157:H7 in the environment where those species exist," Reilly says. Three people died and more than 200 others were sickened in the outbreak that spread to 26 states.

Because E. coli lives in the gut of warm-blooded animals (though it likes cattle and deer best), it gets transferred between them via what the squeamish call "fecal contact." People have been experiencing such contact for as long as there's been farming. Before the advent of modern agriculture, all fields were fertilized with manure, and wild animals were abundant.

But today the pathogenic reality of agriculture is different — and deadly. "The microbial world has changed, but people haven't quite caught up with it," says Douglas Powell, a professor of pathobiology at Kansas State University in Manhattan.

It's certainly caught up with us. There have been 20 reported outbreaks of E. coli O157:H7 in lettuce or leafy greens since 1995. And Monday, the Centers for Disease Control and Prevention said it is tracking a salmonella outbreak, possibly linked to produce, which has sickened at least 172 people in 18 states.

### **Troubling trends**

Several trends have converged to create a perfect storm of dangerous produce:

- The evolution of ultra-dangerous versions of common food pathogens with which humans have coexisted for millennia. E. coli lives in the guts of most mammals. Almost all forms are harmless; some are actually necessary for health. It wasn't until the 1970s that a deadly version — O157:H7 — emerged that causes kidney damage and death.

This strain of E. coli was only isolated in 1982 in hamburger, and the Centers for Disease Control and Prevention has tracked it back as far as 1976. It picked up the ability to produce verotoxin from a closely related bacteria that causes shigella dysentery, according to the Food and Drug Administration.

- Two forms of the salmonella bacteria, *Salmonella typhimurium* and *Salmonella newport*, have evolved to resist most of the antibiotics that doctors are comfortable giving to children, says Patricia Griffin, who studies food-borne and diarrheal illnesses at the CDC.

Both are most common in cattle and other farm animals but are also turning up in fresh produce.

- A lack of understanding about what food safety requires. Just last month five people were paralyzed and had to be put on ventilators because of botulism from bottled carrot juice. The spores occur naturally in the soil. In carrot juice, the spores can germinate into bacteria that grow and produce toxin, says Powell. The juice has to be refrigerated at temperatures below 40 degrees to inhibit botulism.

Officials suspect that at some point in its journey from the bottling plant to the consumer's glass, the carrot juice from Bolthouse Farms in Bakersfield, Calif., was allowed to get too warm, and the spores were able to multiply and produce their deadly neurotoxin.

"People don't pay enough attention to refrigeration, and that's absolutely critical with the fresh-cut produce," says Linda Harris, a professor of microbiology and an expert on food safety at the University of California-Davis.

- And in a potentially more disturbing development, Harris and other scientists at UCD have discovered that at least one form of salmonella, formerly thought to be able to live for only a few days outside of the gut of a warm-blooded animal, now appears to be able to take up residence in the soil.

In 2001, Harris and other researchers were brought in to investigate an outbreak of salmonella in raw almonds in California that couldn't be traced to any animal. They found it instead in the soil between the rows of trees.

While researchers had long thought salmonella required body temperature to live, Harris says it can survive and reproduce at temperatures as low as 50 degrees. So with moisture from rain, sugar from the almond hulls and even the coolest of days, the orchard's loam provided a home to the bacteria in a way no one had thought possible.

These trends are causing scientists to rethink their assumptions about how bad bugs get into our food. And if conventional wisdom about the transmission of food-borne illnesses is wrong, getting rid of them is going to be a whole lot harder, says Jack Guzewich, an epidemiologist at the FDA's Center for Food Safety and Applied Nutrition.

## **A call for action**

Companies are going to have to start talking not just about how natural and wholesome their food is, but exactly what they are doing to protect customers from microbial illnesses, says Powell.

A newly assembled group of produce buyers is calling on three of the major produce industry associations to come up with new, enforceable food safety standards.

The buyers represent some of the biggest food retailers, including Safeway, Costco and Denny's restaurants. They sent a letter to the Produce Marketing Association, United Fresh Produce Association and Western Growers Association last Thursday.

They set a Dec. 15 deadline for putting together safety protocols for lettuce and leafy greens and a Feb. 15 deadline for melons, tomatoes and green onions.

"We believe the power to change the industry is in the hands of the buyers," says Tim York, president of Markon Cooperative and leader of the ad hoc group.