Medical Xpress

Combination of technologies works best against E. coli

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No one weapon in the food-safety arsenal will take out E. coli 0157:H7, a nasty little pathogen that's becoming far too familiar to Americans, say University of Illinois scientists Scott Martin and Hao Feng.

And they should know because they work on this problem in their labs every day. The food science professors work with ozone, high-intensity ultrasound, electrolyzed water, irradiation, and temperature, and they say no treatment singlehandedly can reduce the number of pathogens sufficiently to meet the standards set by the FDA.

"We don't believe there's any one technique out there that's going to be effective," said Martin. "We're constantly trying different combinations to achieve the 5-log (99.999 percent) reduction in the number of organisms required by the FDA," he said.

"Obviously maintaining quality is a real challenge because if you do anything very harsh to something like spinach or lettuce, the product won't be acceptable even if it's pathogen-free," Martin said.

Both scientists believe they're getting closer to a solution. "With ultrasound, we can actually damage the pathogen's cells to the point that they can't be repaired. Ultrasound is a complicated technology, and we're still trying to learn how to use it effectively. But this technology causes physical damage--ruptures in the pathogen's cells--and that's important," said Feng.

In Martin's lab, a graduate student has eliminated all Listeria monocytogenes on a stainless steel chip in 30 seconds, using a combination of ultrasound and ozone. This extremely positive result has promising implications for the sanitation of processing equipment, the scientist said.

And Martin said the scientists have reduced the length of time it takes to reach the FDA's 5-log reduction standard to 30 seconds, which may still be too long for industry. "The thing is we're making steady progress," he said.

And the work goes on. Feng's use of ultrasound, irradiation, and acidic electrolyzed water to eliminate E. coli on alfalfa and broccoli seeds and his use of high-intensity ultrasound to eliminate E. coli in apple cider were published in the February and June 2006 issues of the Journal of Food Science.

Their work on inactivation of E. coli 0157:H7 with peroxyacetic acid, acidic electrolyzed water, and chlorine on cantaloupes and fresh-cut apples was published in the November 2006 article of the Journal of Food Safety.

"We've shown that we have some effective weapons to use against the pathogens that have been in the news so often lately," Martin said. "But we've seen the best results when we've combined the various technologies."

Source: University of Illinois at Urbana-Champaign