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Food Pathogen Interventions: A Fresh Look at Ozone

By Gretchen Goetz | May 4, 2011

Editor's Note: This article is the second in a series on new and food pathogen interventions discussed at the Food Pathogen Interventions Symposium hosted by the Seafood Products Association.

Last week, the Foodborne Pathogen Interventions Symposium highlighted several evolving technologies for fighting foodborne pathogens. Food Safety News is profiling some of these interventions in a series. Today's installment discusses ozone gas.

Ozone

Presented by Jon Brandt of Ozone International

Ozone, or O3, is best known for the protective layer it forms around Earth's atmosphere, shielding the planet from the sun's harmful UV rays. But this gas can also play a defensive role closer to home by arming food and water against harmful microbes.

A much less stable form of oxygen than O2, ozone is a strong oxidizing agent. When injected into water, ozone reacts with the molecules of pathogens, purifying the water itself as well as surfaces onto which it is sprayed. After the gas is used up, it breaks back down into O2, leaving no harmful residue.

While ozone has been used in most bottled water since its approval by FDA in 2001, some have questioned its safety for use on food, because excess ozone gas that escapes from liquids can be poisonous when inhaled, causing harm to the respiratory system.

However, according to Jon Brandt of Ozone International, this problem has been addressed by new technologies that remove insoluble gas from water, making ozone a safe and effective cleaning agent for production facilities, and even for some foods themselves — "some" being the operative word.

Brandt stressed that ozone is only effective on specific foods in specific situations — a fact that has caused misunderstanding in the past among those who viewed it as a cure-all for foodborne pathogens.

“You’ve got to be very careful in your evaluation of ozone,” Brandt said. “I think any time new technologies come about, people tend to make it sound like they can solve the world. And they really can’t. And ozone is no different. So it’s very important in your validation of ozone that you understand what it can do for your facility versus what it can’t do,” he said.

For example, ozone works well on a filet of fish, as long as it’s not layered, but is ineffective on something shelled, like shrimp. It also wouldn’t be practical to spray ozone on beef, Brandt says, because achieving the required 2-log reduction in E. coli would take too much time and too much water.

What ozone can do very effectively in almost every situation is clean-processing facilities. All surfaces can be sprayed with ozonated water at any time during the work day, because unlike many chemicals, it is not harmful if it comes into contact with food. Doing this will prevent buildup of biofilm that can harbor pathogens and contribute to cross-contamination.

“We’re intervening as we go. So we’re not giving this organism a chance to come out of the processing environment,” said Brandt. Ozone is particularly useful for preventing the growth of Listeria in production plants, he said.

Another pro for ozone? It’s organic certified. Because its only byproduct is O2, it leaves no harmful chemical residue on foods or in the environment once it breaks down.

As an added benefit for workers, ozone reduces odor in facilities, and cuts down on allergens in the air, Brandt said.

For those using ozone, he cautioned, it’s important to test air regularly to ensure that ozone in the manufacturing plant does not exceed the limit set by the Environmental Protection Agency.

So where is ozone used now, and where is it headed? Ozonated water is currently used widely in the seafood industry on both food and equipment, and used as a facility sanitizer by many meat companies. Research is being done on applying ozone to leafy greens and in-shell eggs, and some studies have shown that it can be more effective than chlorine in reducing pathogens on these foods.

In the wake of the recent outbreak of E. coli O157:H7 traced back to shelled hazelnuts, the hazelnut industry is looking into using ozone as a way to disinfect the nuts while maintaining their organic status, said Polly Owen of the Oregon Hazelnut Marketing Board in an interview with **Food Safety News** in March.

How do producers know whether or not ozone is appropriate for use in their facility? By testing it themselves, Brandt said. He advised seafooders and anyone considering using the technology to measure the level of foodborne pathogens before and after spraying ozone, to see whether it indeed makes the product leaving the plant safer for consumption.

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