Oil-based systems show promise for eradicating Salmonella on food production machinery

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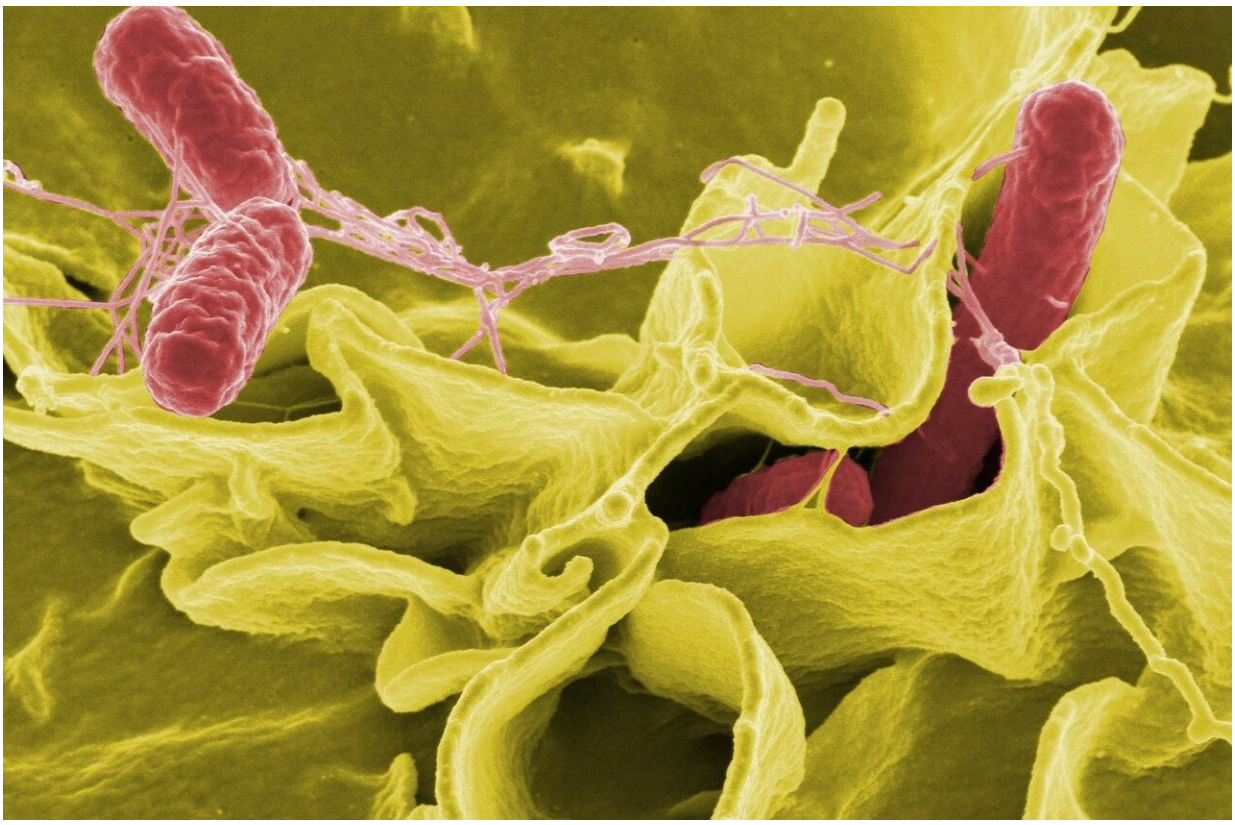

Salmonella bacteria (red) cause up to a million deaths a year worldwide and there is a need for effective vaccines. New work from UC Davis shows how salmonella-specific T-cells can be stimulated to take up residence in the liver, ready to quickly fight off the infection. Credit: Rocky Mountain Laboratories, NIAID, NIH

Recent outbreaks of food-borne Salmonella have been associated with chocolate and peanut butter. Although Salmonella cannot grow in either of these low-water foods, the cells survive, becoming more resistant to heat treatment, which has contributed to recent outbreaks. New research published in *Applied and Environmental Microbiology* suggests that oil formulations with food-grade organic acids can kill dried Salmonella on stainless steel surfaces.

"Cleaning and sanitation of manufacturing environments are critical for a safe food supply," said lead author Lynne McLandsborough, Ph.D., a professor of food science at University of Massachusetts Amherst. However, water-based cleaning is rarely used in processing peanut butter, because it promotes microbial growth. "Also, as anyone who has baked peanut butter cookies can tell you, peanut butter and water do not mix, and cleanup with water is challenging," said McLandsborough.

Instead, manufacturers often remove residual peanut butter from manufacturing systems using heated oil, followed by overnight cooling and application of flammable alcohol-based sanitizing agents.

In the study, McLandsborough and collaborators dried Salmonella on stainless steel surfaces at controlled relative humidity. They then covered the dried bacteria with various oils with organic acids, varying the acid type, concentration, contact time and treatment temperature to identify highly antimicrobial formulations.

By using peanut oil mixed with acetic acid at a concentration about half that of household vinegar and applying heat, "killing was much greater than expected, indicating a synergistic effect," said McLandsborough. "Our results show that acidified oils could be used as an effective means of sanitation in low-moisture food processing facilities, where water-based cleaning can be challenging."

"To our knowledge, using oils as a carrier of organic acids is a novel approach to delivering antimicrobial compounds against food-borne pathogens," said McLandsborough. The research may thus lead to adaptation of oil-based systems for industrial cleaning, for example, of machinery for processing chocolate and peanut butter, said McLandsborough. "That would enable more frequent cleaning, boosting the safety of these products."

More information: Mrinalini Ghoshal et al, Efficacy of Acidified Oils against Salmonella in Low-Moisture Environments, *Applied and Environmental Microbiology* (2022). DOI: 10.1128/AEM.00935-22

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