



### **Does Chlorine washing of fresh produce simply make pathogens undetectable?**

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Research carried out at Southampton university which has been recently published in the American Society for Microbiology has shown that chlorine washing of fresh produce may be ineffective in killing pathogens such as Salmonella and Listeria and may simply stress the cells so they remain viable and capable of causing illness, but make them not detectable in the laboratory using conventional cultural methodologies.

The report states that many bacteria are known to enter a viable but non culturable (VBNC) state in response to environmental stresses. VBNC cells cannot be detected by standard laboratory culture techniques, presenting a problem for the food industry, which uses these methodologies to detect pathogen contaminants. The study found that chlorine, a sanitiser commonly used for fresh produce, induces a VBNC state in both Listeria and Salmonella. It was also found that chlorine was ineffective at killing total populations of these pathogens.

The viability of the chlorine washed bacteria was demonstrated by using fluorescent tagged bacteria which, after being subjected to the chlorine wash process were fed to nematode worms. Whilst there is conflicting data on the pathogenicity of the VBNC organisms, this study claimed that a life span reduction was observed in the nematodes that ingested the VBNC pathogens.

The authors of the paper claimed that the data showed that VBNC food-borne pathogens can both be generated and avoid detection by industrial practices while potentially retaining the ability to cause disease.

Although the researchers claim to have seen pathogenic effects in their animal model, there is not a clear correlation to human consumption where the already stressed cells will not only have to survive in the low temperatures during product storage and the reduced oxygen atmospheres encountered in many fresh product packaging, but also the low pH environment of the stomach before they reach the more conducive conditions for growth of the small and large intestine, providing they are able to compete with the established gut microflora. Whether these non culturable stressed cells are capable of acting as pathogens is an area which obviously requires more research.

### **Another innovation in active packaging.**

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We have covered research in active packaging with the use of biodegradable polymers and natural preservatives in previous bulletins but recently published research has identified that seeds from the tree *Zanthoxylum rhetsa* are particularly rich in natural antimicrobial compounds, and can be effectively incorporated into food packaging. The tree is commercially cultivated in Sri Lanka and its seeds are exported to China and Iran for culinary use as spices. The study found that the seeds were rich in phenolic and flavonoid compounds. When extracted and incorporated into packaging it was claimed that this extended the shelf life of chilled products such as ground chicken meat from 6 to 12 days.

In a similar study into natural antimicrobial compounds, researchers in Brazil have found that a phenolic compound found in an essential oil which is derived from the oregano plant is effective in reducing the numbers of *Staphylococcus aureus* from food contact surfaces such as stainless steel. The authors claimed that the compound was as effective as sodium hypochlorite without having any of the corrosive side effects of the widely used chemical.

### **Recall of Turmeric due to Salmonella contamination**

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The Foods Standards Agency issued a recent recall notice for Turmeric Powder due to possible Salmonella contamination. Turmeric does actually contain a natural antimicrobial compound curcumin (which is responsible for the bright yellow colour of turmeric), so once again the ability of Salmonella to survive and remain viable in a low water inhospitable environment is ably illustrated.

Researchers at Minnesota University have recently published details of an ongoing study into using high intensity pulsed light as a way of killing bacteria like Salmonella in dried powdered products like turmeric and also products which have been implicated in recent outbreaks such as desiccated coconut and infant formula milk powder. The type of pulse and the wavelengths used have not been specified but any workable interventions to reduce the ability of organisms to survive in these dried powders should have significant commercial opportunities.

### **South Africa Listeriosis outbreak: number of people affected now exceed 1,000**

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Fifty new cases of Listeriosis have been reported since affected food products were recalled on March 4, according to the South African National Institute of Communicable Diseases (NICD). This illustrates the long incubation period of Listeriosis and also the potential for contaminated product still being held and consumed. As of 17 April, a total of 1,019 laboratory-confirmed Listeriosis cases which have been linked to the outbreak have reported to NICD since January 2017. The number of deaths currently stands at 193 with 81 of these fatalities attributed to babies aged less than 28 days.

### **E coli 0157 outbreak may be linked to romaine lettuce**

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An outbreak of E coli 0157 which has affected 53 people across 16 US states has been linked to the consumption of romaine lettuce produced in the Yuma growing region in Arizona. At this stage however no common grower, supplier or distributor of the lettuce has been identified. The Centre for Disease Control has issued advice to consumers to avoid all types of romaine lettuce,

### **Are bacteria distributed evenly in liquid environments?**

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We are used to the random and heterogeneous distribution of microorganisms in food samples but there is a common misconception that microorganisms are evenly distributed in liquid samples.

This error has been highlighted in a recent report by researchers from Brunel University who have studied the quality of water held in cold water storage tanks supplying public drinking water. They found that samples taken as standard from the top of the tank are 40% less likely to cause an out of specification result for bacteria like Legionella than samples taken from the opposite end.

Cold water storage tanks are often found on the roofs or in the basements of public buildings such as schools and hospitals, and can be a source of repeated bacterial contamination. Current safety regulations and codes of practice require a sample of water be taken from under the ball valve at the top of the tank for regular microbiological monitoring. The report authors are now calling for the standard safety tests to be changed to look at samples taken from the far end of the tank, where water is likely to be warmer and hold more bacteria-feeding sediment.

### **Biofilm formation on bath toys**

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The problems associated with colonisation of food contact surfaces by the formation of biofilms was further illustrated by a paper published in the journal Nature which looked into the formation of biofilm's on bath toys. Disturbingly (but not surprisingly) the research found that microbial populations of up to 1 million were detected on each square centimetre of the plastic toy's used in the study. The article concluded that biofilms are influenced by a mixture of the organic carbon leaching from the flexible plastic material, the chemical and biological quality of the tap water, additional nutrients from care products, as well as additional bacteria from dirt and/or the end-users' microbiome.....

Enjoy your next relaxing soak in a nutrient rich bubble bath with or without your plastic ducks, but I think that I will risk the Legionella and stick to taking a shower!!!