



Another Listeria outbreak...this time in Canada

Following this summer's Listeria outbreaks in the UK and Spain, there are now reports of a Listeria outbreak in Canada (and possibly the US) associated with diced chicken.

Based on the investigation findings to date, Rosemount brand cooked diced chicken has been identified as a likely source of the outbreak. Rosemount cooked diced chicken was supplied to institutions (including cafeterias, hospitals and nursing homes) where many of the individuals who became sick resided, or visited, before becoming ill.

In August the Canadian Food Inspection Agency issued a food recall warning for Rosemount brand cooked diced chicken meat. Additional affected products containing the contaminated raw material have been identified and updated food recall warnings have been issued.

There have been seven confirmed cases of Listeriosis in three Canadian provinces. Individuals became sick between November 2017 and June 2019 and six people have been hospitalised. Whole genome sequencing (WGS) of the strains identified in the affected patients showed a link to the strain identified in the diced chicken.

The investigation is ongoing, and it is possible that more products linked to the outbreak investigation will be identified. In the U.S. the Centre for Disease Control is also investigating an outbreak of Listeriosis occurring in several states. The type of Listeria identified in the U.S. is closely related genetically (by WGS) to the Canadian outbreak strain.

In 2008 there was a large outbreak of Listeriosis in Canada which affected 57 people and resulted in 22 fatalities. The outbreak was traced to the Maple Leaf Foods plant in Ontario.

The outbreak was first noticed when the companies own regular surveillance programme detected an increase in detections and Maple Leaf voluntarily instigated a product recall which was estimated to cost the company over 20 million dollars. Subsequent lawsuits were settled for 27 million dollars.

European wide recall of raw cow's milk cheese

Raw cow's milk cheese distributed to at least five European countries has been recalled due to possible E. coli and Listeria contamination.

A warning was issued by German authorities about E. coli O26:H11 and Listeria monocytogenes in the raw cow's milk Bethmale cheese from France. There have been no illnesses linked to the recall.

Affected cheese has also been distributed to Austria, Belgium, Spain and Switzerland, according to the Rapid Alert System for Food and Feed (RASFF).

Increase in UK outbreaks associated with the consumption of raw cow's milk

A review published in the Journal of Epidemiology has shown an increase in the number of outbreaks associated with the consumption of raw cow's milk in England and Wales.

During a 15-year period a total of 26 foodborne outbreaks were due to consumption of raw, unpasteurised milk, according to the study. The review reports the risk of illness from raw drinking milk (RDM) has increased since 2014.

Between 1992 and 2002, there were 19 outbreaks linked to raw milk or products made with raw milk, involving 229 people, of which 36 were hospitalised. The most outbreaks recorded in one year was three, as seen in 1993, 1994, 1996 and 2000.

There was an 11-year period from 2003 to 2013 where no outbreaks linked to RDM were reported. However, since 2014 seven outbreaks, three of E. coli O157:H7 and four of Campylobacter jejuni, caused by contaminated RDM were investigated.

There has been an increase in consumer popularity and registered producers in the UK, which may account for the increase, but despite labeling requirements and recommendations that children should not consume RDM, children made up almost a third of outbreak patients.

Sweden Salmonella outbreak - Update

The number of people affected by the Salmonella outbreak in Sweden which we reported on last month has now risen to 71, although the suspected vector of the outbreak, cherry tomatoes are no longer on sale and the Swedish Health Authorities state that the threat has now subsided.

More antimicrobial applications of graphene

We have discussed the amazing antibacterial properties of Graphene in a previous Micro bulletin (February 2015 to be exact). Graphene is pure carbon in the form of a very thin, nearly transparent sheet, which is exactly one atom thick. It is also remarkably strong for its very low weight and it conducts heat and electricity with great efficiency. Scientists at the University of Manchester won the Nobel Prize for Physics in 2010 for their work on graphene. The applications of graphene are endless, but the material has been shown to have significant antibacterial properties.

Scientists at Rice University in America have developed an air filter which traps airborne microorganisms in a polymer base incorporating sheets of graphene. It is manufactured by an industrial laser cutter producing a fine, three-dimensional lattice of the polymer to reinforce the graphene foam. Laser-building at different temperatures results in a thick forest of graphene fibres which is small enough to trap microorganisms.

Like all pure graphene, the foam conducts electricity, and where this research differs from previous applications, the filter is able to be electrically heated to temperatures above 300°C, enough to not only kill trapped pathogens but also to decompose any toxic by-products so that the filter effectively becomes self-sterilising.

Applications for this air sterilising unit are cited as hospitals and operating theatres, but there could also be potential for use in ready to eat food manufacturing facilities where risk assessments show the possibility for airborne contamination of the product.

Further research on the antimicrobial properties of eugenol

We have also reviewed and discussed the potential applications of the natural antimicrobial Eugenol which is present in clove oil, nutmeg, cinnamon, basil and bay leaves in numerous micro bulletins. New research published this month looked at the effect of colloidal silver nanoparticles and eugenol when used both singularly and in combination against *Staph aureus* and *Salmonella* in a variety of foodstuffs.

The study, published in this month's edition of the *Journal of Food Protection* showed that the silver nanoparticles and eugenol acted synergistically, but had a reduced effect when the organisms were in food materials which had a high protein and fat content. This study shows that antimicrobials may not have the same universal effect across all different types of food matrices.

Epidemiological data from WGS reveals the extent of Polish egg Salmonella outbreak

The European Centre for Disease Prevention and Control has published new epidemiological information based on whole genome sequencing on the multi-country outbreak of *Salmonella* in 2017 and 2018 which was traced to the consumption of eggs produced in Poland.

Although the majority of cases (412) were recorded in the UK, 15 European countries were affected. Overall, 1,412 cases have been found associated with this outbreak: 532 confirmed and 166 probable cases since 1 February 2017 and 343 historical-confirmed and 367 historical-probable cases between 2012 and 31 January 2017.

How the most virulent Shiga Toxin E coli strains colonise the guts of cattle due to toxin production

Scientists at the University of Edinburgh's Moredon and Roslin research institutes have showed that rapid and high levels of toxin expression by Shiga Toxin producing *E coli* enable the organism to colonise the guts of cattle and in turn also means infected people are likely to have more serious symptoms.

Shiga Toxin *E. coli* (STEC) O157 is present in the gastrointestinal tract of cattle but doesn't cause disease in these animals. However, STEC O157 in the faeces of infected cattle can be passed to humans through exposure to contaminated water, meat or vegetables.

STEC produces Shiga toxins of various sub-types. These toxins can cause a variety of diseases from diarrhoea with or without blood to more severe and potentially fatal kidney disease. The most dangerous toxin subtype is 2a (Stx2a).

In the United Kingdom, phage type (PT) 21/28 O157 strains are the predominant cause of life-threatening STEC infections and this phage-type commonly encodes Stx2a and Stx2c toxin types.

In a series of controlled cattle trials, researchers showed that calves orally dosed with a PT21/28 strain excreted the organism at significantly higher levels than those dosed with a different phage type (PT32) strain.

The hypothesis that Stx2a is important for super-shedding and calf-to-calf transmission was tested by comparing the excretion and transmission dynamics of *E. coli* O157 strains with and without Stx2a.

Dr Tom McNeilly from the Moredon Research Institute stated that "Our study shows for the first time that Stx2a toxin plays a key role in allowing *E. coli* O157 to colonise the cattle gut, increasing the ability of Stx2a positive bacteria to transmit between animals and shed at high levels into the environment. This matters because most human infections are thought to originate from cattle, and infections with *E. coli* O157 strains containing Stx2a are associated with more severe forms of human disease."