



### Another outbreak linked to Melons

There is a definite feeling of Déjà vu surrounding our top two stories this month as they are related to very familiar themes which have been covered in many previous Micro Bulletins.

An outbreak of *Salmonella* carrau which has affected at least 93 people across 9 US states has been linked to the consumption of pre-cut melons. This is not the first time that melons have caused food poisoning outbreaks in the United States. Since 1985, there have been 1,520 illnesses, 297 hospitalizations, and 36 deaths linked to the consumption of melons, mostly cantaloupes.

The most infamous of the recent outbreaks occurred in 2011 when a *Listeria monocytogenes* outbreak that was linked to cantaloupe melons affected 146 people in 28 states across the country. More than 30 people died and one woman suffered a miscarriage. Three infants were born with Listeriosis. The source of the outbreak was traced to Jensen Farms in Colorado. The FDA investigation revealed unsanitary handling conditions, dirty equipment, water pooling near the packing equipment, use of equipment that was difficult to clean, and the lack of a cooling system as the major issues in the outbreak.

In the last 8 years there have also been at least 4 other outbreaks of *Salmonella* associated with the consumption of melons. In 2012 nearly 300 people were infected with *Salmonella* typhimurium from melons grown in Guatemala, and in 2018 a *Salmonella* adelaide outbreak was linked to pre-cut watermelon, honeydew and cantaloupe melons from Indiana.

The big problem associated with the processing of melons is that any bacteria on the surface of the melon will be transferred to the fleshy part during slicing. As this is rich in sugar and moisture and has a relatively neutral pH, then it is a perfect growth media for the potential pathogens. Temperature control may be effective against *Salmonella* but will have limited effect against *Listeria*.

The key control in the process is therefore effective sanitisation of the melon surface prior to cutting and slicing, but for the cantaloupes with their rough outer skin, this is clearly not always effective.

### Petting Farms/Zoos in the news again

The other recurring theme this month surrounds the microbiological hazards associated with Petting Farms and Zoos.

Petting farms/zoos are a popular attraction around the world, allowing direct and indirect exposure of both children and adults to a diverse range of animal species. They are different from regular zoos because rather than visitors just looking at the animals, petting zoos are interactive with children visiting, holding and petting the animals.

There has however been many documented cases of children acquiring both *Salmonella* and STEC infections as a result of the close contact to the animals in the farms and zoos.

Now, researchers in Israel have looked at the prevalence, molecular epidemiology, and risk factors for animals in petting zoos becoming colonised by Multi Drug Resistant (MDR) bacteria. The researchers stated that Extended spectrum beta-lactamase (ESBL) and AmpC-producing Enterobacteriaceae (AmpC-E), which are resistant to a number of commonly used antibiotics, have become a matter of great concern in both human and veterinary medicine, so understanding the likelihood of them colonising the animals is critical to evaluating the risk that may be posed to visitors.

The study found that petting zoos provide a reservoir for a diverse range of ESBL/AmpC-E species, and are a potential source for shedding these highly virulent pathogens that may be transmitted to humans (mostly children) who visit these facilities.

The report concluded "we strongly recommend that petting zoo management teams implement a strict hygiene and infection control policy, together with rationalised antibiotic policy, in order to reduce the risk of transmission between animals and visitors."

So, having now put you off eating cantaloupe melons and visiting your local petting farm or zoo, let's take a look at what else has been happening in the world of microbiology this month.....

## Two people seriously ill in France due to Listeria in cheese

Two people in France are seriously ill with listeriosis after eating contaminated cheese, according to the public health agency. A spokeswoman for Santé publique France stated that both cases of listeriosis occurred in early March and two women were seriously ill. Investigations made it possible to identify the consumption of cheeses produced by Société Fromagère de la Brie as a source of contamination for these cases. Strains of *Listeria monocytogenes* isolated from the two patients were sent to the Centre National de Référence des Listeria (Institut Pasteur de Paris) for molecular typing. These analyses showed that strains isolated from these two individuals had the same microbiological characteristics.

## Research claims that Salmonella can use electrical switches to aid pathogenicity

Salmonella bacteria flip an electric switch as they hitch a ride inside immune cells, causing the cells to migrate out of the gut toward other parts of the body, according to a new study by researchers at New York University published this month.

The paper claims to reveal a new mechanism underlying the toxicity of Salmonella which causes over 400,000 deaths every year. Many of those deaths result when the bacteria escape the gut inside immune cells called macrophages. Macrophages are drawn to bacteria in the gut by a variety of signals, most prominently chemicals released from the site of infection. Once there, they engulf the bacteria as a regular part of their infection-fighting job. However, rather than remaining there, bacteria-laden macrophages often leave the site and enter the bloodstream, disseminating the bacteria and greatly increasing the risk of a more serious systemic infection.

Tissues like the gut often generate small electrical fields across their outer surfaces, and these electrical fields have been known to drive migration of cells, including macrophages. In the new study, the authors first showed that the lining of the mouse cecum (the equivalent of the human appendix) maintains a cross-membrane electrical field, and that Salmonella infection altered this field and contributed to the attraction of macrophages. Measurements of the polarity of the local charge indicated that the macrophages were attracted to the anode, or positively charged pole within the field. Once they engulfed bacteria, however, they became attracted to the cathode and reversed their migratory direction, moving away from the gut lining, toward vessels of the circulatory system. The mechanism by which bacterial engulfment triggers this change is still under investigation.

However, the paper fails to explain how the bacteria which have been absorbed within the macrophages as part of the normal functioning of the immune system, can then break free from the macrophages once they enter the circulatory system.

## European STEC annual report for 2017 published

The European Centre for Disease Prevention and Control (ECDC) have published their latest annual report on STEC infections. It states that in 2017 there were 6,457 laboratory confirmed cases of STEC and the highest notification rates were reported in Denmark, Ireland, Norway and Sweden.

The number of reported cases have risen significantly since the surveillance began in 2007, but this may be due to increased awareness and the development of more advanced laboratory techniques such as PCR.

Non-O157 accounted for a higher proportion of Haemolytic Uraemic Syndrome cases than reported for serogroup O157, emphasising an emerging risk of severe non-O157 infections.

The report concludes that adequate cooking of food, particularly beef, and the use of pasteurised milk may reduce the risk of foodborne STEC infections.

## European Campylobacteriosis report for 2017 also published

The ECDC have also published the latest report on the incidence of Campylobacter. Campylobacteriosis is the most commonly reported gastrointestinal disease in the EU with 29 countries reporting over 250,000 cases in 2017. Human Campylobacteriosis was more common in children under five years of age than in other age groups. Campylobacteriosis shows clear seasonality, with a sharp peak of cases in the summer months and a smaller peak at the beginning of the year.

## Eugenol can be used to decontaminate fresh produce

To conclude this month's bulletin, we look at another topic we have mentioned previously; the use of naturally occurring anti-microbial agents to help decontaminate ready to eat food surfaces. Eugenol is naturally present in cloves and has well known anti-microbial properties. In a recently published article, researchers in Thailand showed that application of Eugenol onto the surface of whole tomatoes was effective in reducing the levels of Salmonella and E coli which had been inoculated onto the surface of the tomato. The report concluded that "washing of tomatoes with novel antimicrobial interventions that increase the dispersion of antimicrobials over the surface of the tomato should result in greater reduction of microbial foodborne pathogens through enhanced contact of antimicrobial with the pathogen". It is claimed that the use of naturally occurring antimicrobial agents administered in the correct way will significantly reduce surface bacteria and therefore have a major impact on food safety.