



Food Standards Scotland issue a further update on the 0157 outbreak linked to unpasteurised cheese

The fallout from the E coli 0157 outbreak linked by the Food Standards Scotland to unpasteurised cheese shows no signs of abating.

Errington Cheese has been banned from selling its products by the Scottish Food Standards Agency after they had linked its unpasteurised cheese to an outbreak of E coli 0157 during the summer which resulted in 15 hospitalisations and one fatality.

However, work carried out in Geneva claims that the strains of E coli isolated from the products manufactured by Errington cheese do not possess the virulence genes and could not have caused the outbreak.

Food Standards Scotland have now issued a third update and state “Shiga toxin producing *E. coli* (STEC) has been detected in batches of Dunsyre Blue (F15) and Lanark Blue (E24) cheese produced by Errington Cheese Ltd. STEC are known to cause severe illness in humans. A *stx* gene negative strain of *E. coli* O157 has been isolated from three batches (G14, H3 and H24) of Lanark White ewes’ milk cheese. *Stx* gene negative strains of *E. coli* O157 have been isolated from cases of human illness consistent with *E. coli* O157 infection. The Food Examiner declared these samples of Lanark White cheese to be “potentially injurious to health and/or unfit for human consumption”.

So although Food Standards Scotland are confirming that they have not detected the *stx* gene (which is regarded as being a marker for virulence) they are still regarding the products as a risk to health.

This is because what is deemed to be the markers of pathogenicity and virulence in the Shiga Toxin E coli is still

very much up for debate and is quite confusing. As well as the *stx* genes, there are *eae*, *aaiC* and *aggR* genes which are all associated with strains of STEC which have caused illness.

In the 3rd draft EC guidance on the application of article 14 of 178/2002 as regards foods contaminated with STEC, the target is (1) for ready to eat foods –any *E.coli* containing an *stx* gene; However for non-RTE foods that are going to be fully cooked before eating the target is (2) an *E.coli* containing *stx* and *eae* or *aaiC* plus *aggR* that belongs to serogroup O157, O26, O103, O145, O111 or O104

It is assumed that there is a hierarchy of pathogenicity with STEC that contain *eae* (or *aaiC* & *aggR*) being more pathogenic than others, and those with *stx*, *eae* (or *aaiC* & *aggR*) belonging to O157, O26, O111, O103, O145, and O104:H4 being even more potentially pathogenic.

As it stands this is all very complicated, and it will probably take some time for the emergent technology to offer a standardised method which will be adopted by everyone. Hopefully will then become a universal marker to accurately assess the pathogenicity of the Shiga Toxin E coli.

Prevention of biofilm formation and pathogenesis of E coli 1014:H4

An article in the The Journal of Bioadhesion and Biofilm Research looked at how the biofilm production and pathogenesis of the STEC E coli 0104:H4 could be controlled.

The 2011 outbreak of E coli 0104:H4 centered in Germany caused 4,000 illnesses and 48 fatalities. Based on prior results, it was hypothesized that compounds inhibiting biofilm formation by O104:H4 would reduce its

pathogenesis. The nonionic surfactants polysorbate 80 (PS80) and polysorbate 20 (PS20) were found to reduce biofilms by $\geq 90\%$ at sub-micro molar concentrations and elicited nearly complete dispersal of preformed biofilms. The authors suggest that as PS20 and PS80 are classified as 'Generally Recognized as Safe' (GRAS) compounds by the Food and Drug Administration (FDA), these compounds have clinical potential to treat future O104:H4 outbreaks.

Salmonella in shell eggs

A pan-European Salmonella outbreak which has affected 8 countries has been linked to the consumption of shell eggs which were packed in Poland. Salmonella enteritidis phage type 8 is the causative organism of the outbreak which has caused 112 confirmed and 148 probable illnesses and led to the death of a child in Croatia.

And...Reducing Salmonella in shell eggs

A research paper published in Food Microbiology suggests that Salmonella present in faecal material on the surface of hen eggs can be inactivated by a combination of treatment with Chlorine dioxide gas and a heat treatment of 55°C in 100% humidity (what they refer to as mild wet heat). The researchers claimed that total inactivation occurred within 1 hour and that the treatment is an effective sanitisation programme to enhance the microbiological safety of shell eggs.

Potential new source of targeted antibiotics

There have been many news articles recently on bacteria which are resistant to conventional antibiotics.

A paper published in the Science Journal has investigated the possible use of proteins called microcins which are secreted by some bacteria, which can have an antimicrobial effect on other pathogenic bacteria.

They claim to have demonstrated that microcins enable the probiotic bacterium *Escherichia coli* Nissle 1917 (EcN) to limit expansion of competing Enterobacteriaceae (including pathogens) during intestinal inflammation. Microcin-producing EcN limited growth of competitors in the inflamed

intestine, including commensal *E. coli*, adherent-invasive *E. coli*, and the related pathogen *Salmonella*. They also stated that therapeutic administration of the wild-type, microcin-producing EcN to mice previously infected with *S. enterica* substantially reduced intestinal colonization of the pathogen.

The work provides the first evidence that microcins mediate inter and intra-species competition among the Enterobacteriaceae in the inflamed gut. Moreover, they show that microcins can be narrow-spectrum therapeutics to inhibit enteric pathogens.

This could be a significant breakthrough as traditional broad spectrum antibiotics are non-selective and often cause problems such as those seen with *Clostridium difficile* in Antibiotic Associated Diarrhoeal infections.

Survival of Salmonella in recycled plastic materials

Another use of Bacteriocins (substances produced by some bacteria which are harmful to others) has been suggested by researchers in Slovakia.

They have investigated the potential for bacteriocins produced by some species of Enterococci which they claim have proved effective in reducing the levels of *Campylobacter* in broiler chickens. They also claimed that the *Campylobacter* strains which had developed resistance to conventional antibiotics were more likely to succumb to the bacteriocins.

Survival of Salmonella in recycled plastic materials

We are all fans of recycling but new research at the University of Arkansas published in the Journal of Environmental Science has highlighted the ability of *Salmonella* to survive the sanitisation processes in plastic recycling.

They used scanning electron microscopy to demonstrate that *Salmonella* which had been introduced to the plastic surface were still visible after sanitiser applications.

Whilst the demonstration of visible cells does not necessarily confer viability, we have mentioned in these monthly bulletins on numerous occasions how *Salmonella* has the ability to survive, persist and

endure the most hostile of environments and remain viable, and this appears to be another example.