Microbiology bulletin 24 July 2015

Faster pre-enrichment technique described

A combined research project has described how a recent innovation in chemistry known as click chemistry can be applied to microbiological enrichment techniques.

Bacteria are fed on a synthetic sugar which mimics a sugar naturally present on the surface of the bacteria. Only viable bacteria are then able to assimilate the sugar, which is then found on their membranes, effectively labelling the bacteria. Using the click chemistry technique, the live bacteria are concentrated by the addition of magnetic beads which attach to the assimilated surface sugar. In a process similar to Immuno-magnetic Separation (IMS), it is then possible to concentrate the bacteria.

It is claimed that this technique has a number of advantages over traditional IMS methods. The marker is only taken up by live organisms, so false positive reactions caused by traditional immunological techniques which can detect and react with markers on dead cells are less likely to occur. The researchers also claimed that the time taken for the concentration of cells to a detectable level is faster than conventional techniques.

MRSA detected in retail meat products from supermarkets in the UK

A survey carried out in February of pork and chicken pre-packed fresh meat products sold in UK supermarkets detected 2 positive Methicillin Resistant Staphylococcus aureus (MRSA) isolates. Both isolates were from pork products, one from sausage and one from minced pork.

Analysis of the bacteria showed that it belonged to a strain of MRSA known as LA-MRSA CC398 which has emerged over the last few years in continental Europe but was hitherto not thought to be prevalent in the UK.

Unlike the food borne illness where consumption of heat stable pre-formed toxin is the issue, cooking for 70^0C for 2 minutes is sufficient to kill the bacteria. Dr Mark Holmes from the Department of Veterinary Medicine at the University of Cambridge stated that “sensible food precautions and good hygiene should prevent its spread. The organism only causes health problems if it infects someone in poor health or gets into a wound.”

Extremophiles

We are familiar with the groups of bacteria with differing temperature requirements for growth such as Psycrophiles, Mesophiles and Thermophiles, but I had not previously come across the group of bacteria known as Extremophiles. This topic was the subject of the BBC Radio 4 programme “In Our Time” and the programme is available as a free download from the BBC Radio 4 website.

In 1977, scientists exploring the deep ocean bed off the Galapagos Islands discovered hydrothermal vents, like chimneys, from which superheated water flowed. Around the vents there was an extraordinary variety of life, feeding on microbes which were thriving in the acidity and extreme temperature of the

vents. Since the discovery, the increased study of extremophile microorganisms has revealed much about what is and is not needed to sustain life on Earth and given rise to new theories about how and where life began. It has also suggested forms and places in which life might be found elsewhere in the Universe.

Can gut bacteria alter our behaviour?

In last month's Chemistry bulletin my colleague Dr Jack Chudy described work carried out by Professor Tim Spector at King's College London and I felt I should share it with the micro bulletin audience.

Professor Spector has suggested that highly processed foods and a lack of diversity in the diet are decreasing the variety of bacteria present in our digestive systems and therefore making us more susceptible to becoming obese and succumbing to cancers. According to his findings, 80% of processed food is made up of only four ingredients - maize, wheat, soya and meat: it is estimated that 15,000 years ago man regularly had access to 150 different food ingredients a week.

The professor's son was (voluntarily) put on a junk food diet for 10 days. After three days stool samples showed a 40% loss in the diversity of microbial species present in his gut. It is speculated that, on a junk food diet, 'bad' microbes start to take over in our intestine: the craving for junk food increases as the 'bad' bacteria send signals to the brain for more of the food that keeps them happy.

It is this aspect of the research which I find most fascinating and worrying in equal measures; in that the research is suggesting that it is possible for our own intestinal bacterial flora to influence our behaviour.

Second largest UK STEC outbreak linked to handling raw leeks and potatoes

Between December 2010 and July 2011, 252 cases of STEC O157 were reported in England, Scotland and Wales. This was the largest outbreak of STEC reported in England and the second largest in the UK to date. Eighty cases were hospitalized, with two cases of haemolytic uraemic syndrome and one death reported. Routine investigative data were used to generate a hypothesis of the cause of the outbreak, but the subsequent case-control study was inconclusive. A second, more detailed, hypothesis generation exercise identified consumption or handling of vegetables as a potential mode of transmission. The further study demonstrated that cases were more likely than controls to live in households whose members handled or prepared leeks bought unwrapped and potatoes bought in sacks. This appears to be the first outbreak of STEC O157 infection linked to the handling of leeks.

FSA publish their 5 year strategic plan "Food we can trust"

Last month the Food Standards Agency published details of their strategic plan for 2015-2020. Specific targets include the development of a Listeria reduction plan and the maintenance of the current Campylobacter campaign (which has the aim of achieving a target of less than 10% of whole birds at end of production line which have a count of more than 1,000 cfu/g).

However, speaking at the Advisory Committee for the Microbiological Safety of Food Dr Alec Kyriakides, head of product quality at J Sainsburys questioned whether the stated targets will actually have an impact on reducing the number of cases of Campylobacter infections. There has been a reduction from 30% to 20% of birds with the highest level of contamination, but as yet there has been no observed reduction in the number of human cases of Campylobacter.

Salmonella in more low Aw products

To add to our popular "low water activity products involved in recalls due to Salmonella contamination" section, this month we can add; Fruit and Nut Mix, Cashew Nuts, Macadamia Nuts, Smoked Paprika Powder, dried Betel leaves from India and processed dried animal feed. All of which underlines the ability of Salmonella to survive in hostile enivironments.