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Can Salmonella detections really take place within eight hours?

Researchers from the Fraunhofer Institute in Germany have this month publicised a method in which they claim can reduce the time to achieve Salmonella detections to less than eight hours.

Traditional methodologies employ a resuscitation step followed by selective enrichment. This is followed by either rapid ELISA methodologies or plating onto solid selective agars. This means that most of the conventionally approved methods can take between 2-4 days to get a result.

With this new technique, the researchers claim to have reduced the initial enrichment process to between four and six hours by creating a rapid culture with optimised growth conditions so that Salmonella will have increased in sufficient numbers. They can then be subsequently detected after only a few hours using DNA amplification molecular methodologies. The Salmonella DNA is recognised by specific “capture molecules”.

There are many rapid DNA amplification techniques available, but I remain sceptical that stressed cells of pathogens can always be adequately and successfully recovered by these rapid resuscitation steps.

These techniques are often primarily developed for the clinical environment, but in food microbiology, we very rarely encounter pathogens which are robust or are actively growing. Food manufacturing creates conditions of thermal shock (either by high or low temperatures), low pH, low water activity, addition of preservatives and adverse atmospheric environments. All of which will damage and “stress” the bacterial cells so that they often need the traditional resuscitation step for them to recover before they can subsequently start to grow and become detectable.

Any reduction in the time it takes to detect bacterial pathogens in food is desirable, but it is essential that thorough validation studies are performed across all types of food matrices including all of the possible stress factors, to ensure that there is no resultant loss of sensitivity before these rapid technologies can be universally adopted.

FSA publish latest results from AMR survey

The Food Standards Agency (FSA) has published the latest results of two surveys on Antimicrobial Resistance (AMR) of Campylobacter and E coli isolated from fresh chickens on sale in the UK. The results are from Year 4 of the surveys (2017 to 2018).

The FSA state that the AMR E.coli contamination in retail chicken has declined in comparison to previous years, which suggests that the tighter control on antimicrobial usage in industry might be having a positive impact although they state that further work is required to explore this.

However, the proportion of AMR Campylobacter isolates and multi-drug resistance found were similar to those in Year 3 (August 2016 to July 2017).

The overuse and/or misuse of antimicrobials in both animal husbandry and healthcare settings has been linked to the emergence and spread of microorganisms which are resistant to them, rendering treatment ineffective and posing a risk to public health.

The transmission of AMR microorganisms through the food chain is thought to be one of the possible routes by which people are exposed to AMR bacteria. However, there is no clear evidence to support this, and there is still uncertainty around the contribution food makes to the problem of AMR in human infections.

Organic Almonds recalled due to possible Salmonella contamination

The Food Standards Agency has recently published details of a recall of organic almonds from a major retailer due to the possible presence of Salmonella.

Conflicting Campylobacter trends

Recently published data across several European countries on the incidence of Campylobacter has shown inconsistent patterns.

Slovakia has seen a large increase in both Campylobacter and Salmonella infections. Scotland’s annual surveillance figures for 2019 showed levels of Campylobacter which were consistent with previous years. Denmark has published figures which show Campylobacter levels at a record high, whilst all time low figures have been released for the incidence of Campylobacter in Swedish poultry.

Should the raw milk legislation be changed to include pathogen testing?

The current testing regime in England for raw, unpasteurised milk is not fit for purpose, according to a study published in the Journal of Epidemiology and Infection describing a 2016 Campylobacter outbreak that affected 69 people.

The authors of the study state that the legal testing criteria should be changed to include pathogen assessments alongside the current indicator tests of Aerobic Colony Counts (ACCs) and Coliforms to ensure future outbreaks are prevented.

In December 2016, Public Health England (PHE) investigated an outbreak of Campylobacteriosis in North West of England, which caused 69 infections. Epidemiological, microbiological and environmental investigations linked the outbreak to the consumption of unpasteurised cows' milk from Low Sizergh Barn Farm in Kendal, where it was mainly sold from a vending machine. Campylobacter was detected in milk samples which were identical to the outbreak strain.

Sellers of raw drinking milk for direct human consumption must ensure the unpasteurised milk is routinely tested for Coliforms and ACCs. The legislative criteria is that the Coliform count should be less than 100cfu/ml and the ACC at 30˚C should be less than 20,000 cfu/ml.

There are no legislative requirements for pathogen testing, and during the investigation, a bulk tank of raw drinking milk sample complied with legislative standards, having ACC and Coliform levels of 1,060 and 15 cfu/ml respectively, despite also containing Campylobacter jejuni. The researchers claimed that the current testing regimes appear to be inadequate to find pathogens and are not a failsafe indicator of product safety.

Following the outbreak, a survey was done in Lancashire by PHE over four months in 2017. Despite only analysing 59 samples, Salmonella dublin, Campylobacter jejuni, and STEC O133:H4, were all detected. The Coliform and ACC results were all satisfactory, providing further evidence (according to the researchers) that legally compliant samples are poor indicators of the presence of pathogens.

It is reasonable to assume that ACC and Coliforms will act as an effective indicator for Salmonella and the pathogenic E coli, but that may not be the case for Campylobacter as the specific and prescriptive microaerophilic growth requirements of Campylobacter mean that it will not grow in the same environment as many of the organisms which will grow in the ACC and Coliforms tests and vice versa.

There is however a very important point to remember. Due to the low numbers and uneven distribution of pathogens (even in liquid samples such as milk), no amount of pathogen testing will ever totally guarantee the safety of any product being tested, and the absence of pathogens should never be taken as an absolute indicator of food safety.

There is a wonderful quote attributed to the Advisory Committee of the Microbiological Safety of Food which states that "the only way to gain 100% assurance of food safety is by the adoption of 100% testing with methods which are 100% accurate". We cannot do the former (otherwise there would be no product left to sell), and no test method can be described as the latter, so a pathogen result of "Not Detected" should never be taken as a categorical assurance of product safety.

Salmonella outbreak in France linked to unpasteurised cheese

With an obvious link to the above, Salmonella has affected 13 people in France following consumption of a raw milk cheese. They have all been infected with the same strain of Salmonella dublin, according to the National Reference Center for Salmonella at the Institut Pasteur.

Eight men and five women with a median age of 72 have fallen ill from late November 2019 up to early January this year. Cases are spread across seven regions of France and nine people needed hospital treatment. Three people have died but it is not clear what role Salmonellosis played in the deaths,

Can the new strain of Coronavirus have a foodborne transmission?

Coronaviruses are a large family of viruses that usually cause respiratory illness. They include viruses that cause the common cold and seasonal flu, as well as more serious illnesses like Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS). A novel coronavirus is a new strain that has not been previously identified in humans. The 2019 Coronavirus is referred to as a novel Coronavirus and has been named COVID-19.

Experience with SARS and MERS suggest that people are not infected with the virus through food. It is therefore unlikely the virus is passed on through food and there is no evidence yet of this happening with COVID-19.

Coronaviruses need a living host (animal or human) in which to grow and cannot grow in food. Thorough cooking is expected to kill the virus because we know with SARS that a heat treatment of at least 30min at 60ºC is effective.

Coronaviruses are most commonly passed between animals and people and from person to person. The source of COVID-19 is believed to be animals, but the exact source is not yet known.

The virus is commonly passed on through direct mucus membrane contact by infectious droplets, for example breathing in airborne virus from the sneeze of someone who is infected.