Understanding Campylobacter on Australian poultry farms

Campylobacter bacterial strains are the most frequently reported causes of food-borne gastrointestinal disease in Australia.

To date, raw or under-cooked poultry has been held responsible for a high proportion of cases of human infection. However, several studies in recent years have challenged this idea.

In this project, Australian researchers used new technologies to better understand the types of Campylobacter being found in conventional and free range poultry flocks across states and regions, across multiple years and within flocks owned by a single company.

The research findings will enable the chicken meat industry, food safety professionals and regulators to better understand and monitor Campylobacter incidence and transmission into the human population.

Campylobacter and poultry

Campylobacter jejuni (C. jejuni) is the most common species of these bacteria found in Australia and it lives in the intestinal tract of many warm-blooded animals; it is a commensal organism or normal gut flora in a chicken.

The optimum growth temperature for C. jejuni is about 42°C, which is the body temperature of a chicken. During poultry processing and spin-chilling, the bacteria can spill on to the carcass and contaminate it.

International studies have indicated Campylobacter contamination is predominantly transmitted to commercial poultry farms from an environmental source. Campylobacters could be carried into the sheds from these environmental sources by several modes, including human activity associated with routine flock management.

Campylobacter and human infection

Human infections caused by C. jejuni and the closely related Campylobacter coli primarily involve acute diarrhoea of varying severity, which may last from two to ten days. Fever, headache and dizziness may precede the onset of diarrhoea and the severity of the accompanying abdominal pain may be misdiagnosed as acute appendicitis.

Widespread outbreaks of Campylobacter are not common and the majority of infections occur as sporadic cases.

Recent studies using molecular typing techniques have indicated a significant proportion of Campylobacter infections found in humans may not originate from poultry products.

Other known sources of transmission in humans include drinking contaminated water or unpasteurised milk and having contact with pets experiencing Campylobacter diarrhoea.
Regional, temporal and company influences

The aim of this project was to use new DNA-based techniques to better understand the incidence and distribution of genotypes of *C. jejuni* in Australian poultry flocks across:

- a national company
- a production region featuring multiple companies
- multiple years in two production regions.

The researchers used Multilocus Sequence Typing (MLST) Single Nucleotide Polymorphism (SNP) High-Resolution Melt (HRM) testing – or MLST SNP HRM – to compare more than 650 *Campylobacter* isolates collected mainly from poultry at slaughter.

This included sampling one company operating in six Australian states: undertaking two regional surveys that included several companies in one production region, and comparing incidence within two regional areas across multiple years.

The MLST SNP HRM test was found to be a robust and convenient first line tool for screening for *Campylobacter* isolates. It proved to be user friendly, relatively cheap and a tool that could be used by researchers and food safety professionals.

The project also found:

- a company can have a dominant genotype of *C. jejuni* that persists for at least one year and across multiple farms
- evidence of a regional influence where several companies in a region had the same genotypes of *C. jejuni* in poultry at slaughter
- some genotypes persist across multiple years and others do not
- free range poultry flocks have a similar range of genotypes of *C. jejuni* as those detected in conventional flocks
- NSW appears to have a dominant novel – or ‘unresolved’ – genotype (possibly *C. coli*) across companies that can persist for multiple years.

Recommendations

Recommendations stemming from this project for food safety professionals, regulators and the poultry industry research body include:

- using MLST SNP HRM tests as a front line method to identify *C. jejuni* strains
- undertaking regular genotype monitoring to detect any single strains becoming dominant within a company
- further studies to boost confidence in identifying (at the species level) and understanding the public health implications of the unresolved genotype that, at the time of these studies, was dominant in NSW and was emerging in Queensland.

For more information

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RIRDC publication no. 14/032 “Campylobacter genotypes in chickens - National and regional influences” is available from the RIRDC website www.rirdc.gov.au or by phoning 1300 634 313

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