Antimicrobial Resistance in Campylobacter jejuni and Campylobacter coli from Retail Chilled Chicken in the UK

Area of research interest: Antimicrobial resistance
Study duration: 2015-07-10
Planned completion: 1 July 2018
Project code: FS102121
Conducted by: Public Health England

Background

The development and spread of antimicrobial resistance (AMR) is a public health concern worldwide. It is a complex issue driven by a variety of interconnected factors enabling microorganisms to withstand antimicrobial treatments to which they were once susceptible. The use of antibiotics is important in treating infections and preventing disease from arising in both animals and humans. However, the overuse and/or misuse of antibiotics 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 FSA is responsible for food safety. It assesses whether current agricultural practices may be having an effect on public health, via the food chain and works to affect change where this is considered to be the case. The transmission of AMR microorganisms through the food chain is thought to be one of the routes by which people are exposed to AMR bacteria. However, there is uncertainty around the contribution food makes to the problem of AMR in human infections.

This report forms part of the project: A Microbiological Survey of *Campylobacter*Contamination in Fresh Whole UK Produced Chilled Chickens at Retail Sale (2015-16), and presents antimicrobial resistance data for a subset of those *Campylobacter*isolates collected as part of this survey. There is a continued need to monitor the prevalence and types of AMR bacteria in retail chicken and other foods to inform a baseline and also assess the risk to public health.

Research approach

The overall survey tested 2,998 samples of whole, UK-produced, fresh chicken during the period July 2015 to March 2016. A pilot study was also carried out from April 2016 to July 2016 to assess a new sampling methodology. Approximately 416 chilled chickens were sampled and tested during this pilot period. The samples for the main survey were evenly distributed throughout the year and the UK, and retailers were sampled with their share of free-range, organic and standard chickens taken into account.

A subset (548) of the *Campylobacter* isolates was tested for antimicrobial resistance. These were selected as every tenth isolate (or next viable isolate) but selection was adjusted to ensure adequate representation of producer premises and retailers. All recoverable organic and a high proportion of free range chicken isolates were included. The objective of the AMR analysis was to:

- Establish the proportion of *Campylobacter jejuni* and *C. coli* strains isolated from year 2 of the retail chicken survey that were resistant to a range of antimicrobial agents relevant to public health.

To determine resistance, Muller Hinton Agar with the addition of 5% horse blood containing specified breakpoint concentrations of antimicrobials was used. An isolate suspension was made in sterile saline to McFarland 0.5 turbidity and was inoculated onto the surface of each of the antimicrobial containing agars. An isolate was considered resistant if it grew on the agar and scored sensitive if there was no growth, and the corresponding antimicrobial free plate showed pure growth from the suspension. AMR profiles were determined using the epidemiological cut-off (ECOFF) values as recommended in the ECDC EU protocol for harmonising monitoring of AMR in human *Salmonella* and *Campylobacter* isolates (EFSA and ECDC 2016).

Results

A total of 437 *Campylobacter jejuni*, 108 *C. coli* and 3 mixed *C. jejuni/C. coli* isolates from 548 samples of retail chicken were tested for antimicrobial resistance. Ciprofloxacin resistance was identified in 54.2% (237/437) of the *C. jejuni* isolates and 48.1% (52/108) of the *C. coli* isolates tested. None of the *C. jejuni* and only 2 (1.9%) of the *C. coli* isolates were resistant to erythromycin. Just over three quarters of all isolates were resistant to tetracycline but all isolates tested were sensitive to gentamicin. Multi-drug resistance (resistance to 3 or more antimicrobial classes) was found in 1.5% of the *Campylobacter* isolates examined. It occurred in 7.4% of *C. coli* isolates, but not in any of the *C. jejuni* isolates examined.

Differences in the levels of ciprofloxacin and tetracycline resistant strains between standard and organic birds were examined. No significant differences were found, however the small sample size, especially for organic chickens, may have limited the ability to detect important differences where they exist.

Overall, the proportions of antimicrobial resistant isolates found in this study were similar to that reported in the previous year (2014-2015), with erythromycin resistance continuing to show a decreasing trend. Multi-drug resistance in *C. coli* was lower compared to that found in the previous year and MDR in *C. jejuni* was not detected and thus likely to be very low. However, the data demonstrated significantly higher proportions of ciprofloxacin resistance compared to older data from the 2007/2008 FSA survey and in the CLASSP survey (2010). In agreement with recent EFSA data, resistance to fluoroquinolones (ciprofloxacin and nalidixic acid) and tetracycline was most common. Resistance to erythromycin and gentamicin was much rarer in the *Campylobacter* isolates examined.

This survey provides evidence that AMR *Campylobacter* isolates are found on whole fresh chickens sold at retail in the UK. It is therefore important to handle chicken hygienically and to cook it thoroughly to reduce the risk to public health.

England, Northern Ireland and Wales

PDF
View Research report: Antimicrobial resistance in Campylobacter jejuni and Campylobacter coli from retail chilled chicken in the UK (as PDF(Open in a new window) (207.76 KB)

England, Northern Ireland and Wales

EXCEL
View Research report: Antimicrobial resistance in Campylobacter jejuni and Campylobacter coli from retail chilled chicken -Appendix 1 as Excel(Open in a new window) (37.22 KB)

England, Northern Ireland and Wales

EXCEL
View Research report: Antimicrobial resistance in Campylobacter jejuni and Campylobacter coli from retail chilled chicken -Appendix2 as Excel(Open in a new window) (18.15 KB)