

Antimicrobial resistance in *Campylobacter jejuni* and *Campylobacter coli* from retail chilled chicken in the UK

Research programme [Research projects -](#)

Study duration July 2015 to July 2018

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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 have 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 (2015-2018) and presents AMR 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 assess the risk to public health and also to inform a baseline to monitor future progress in reducing AMR in the food chain.

Research Approach

The overall survey tested 4,268 samples of whole, UK-produced, fresh chicken during the period August 2016 to July 2017. 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 (585) of the *Campylobacter* isolates was tested for AMR. These were selected as every tenth isolate (or next viable isolate) but selection was adjusted to ensure adequate representation of producer premises and retailers, as deduced from market share data. 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 *C. jejuni* and *C. coli* strains isolated from year 3 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 harmonised monitoring of AMR in human *Salmonella* and *Campylobacter* isolates (EFSA and ECDC 2016).

Results

A total of 489 *C. jejuni* and 96 *C. coli* isolates from 585 samples of retail chicken were tested for antimicrobial resistance. Ciprofloxacin resistance was identified in 41% (201/489) of the *C. jejuni* isolates and 52% (50/96) of the *C. coli* isolates tested. Only two (0.4%) *C. jejuni* isolates and none of the *C. coli* isolates were resistant to erythromycin. Of all the *Campylobacter* isolates tested, 55% were resistant to tetracycline and 3% to streptomycin, but all were sensitive to gentamicin. Multi-drug resistance (resistance to 3 or more unrelated antimicrobial classes) was found in 9 (9.4%) *C. coli* isolates and 8 (1.6%) *C. jejuni* isolates.

Differences in levels of ciprofloxacin and tetracycline resistance for isolates from standard and free-range birds were examined. There were no differences within *C. jejuni* isolates but a higher proportion of *C. coli* isolates from free-range chickens were resistant to ciprofloxacin or tetracycline compared to *C. coli* isolates recovered from standard chickens. This finding must be interpreted with caution as this was not reflected in all three survey years but also, low numbers of isolates were examined and bias in the isolate sample may not be ruled out. Differences in levels of ciprofloxacin and tetracycline resistance in isolates from standard and organic birds were also examined. No significant differences were found, however the small sample size for organic chickens, may have limited the ability to detect important differences should they exist.

Overall, the proportions of AMR *Campylobacter* isolates found in this study were similar to that reported in the previous survey year (July 2015 to July 2016), although the percentage of *C. coli* isolates with resistance to erythromycin may be decreasing. Multi-drug resistance was similar to that found in the previous survey years. The percentages of fluoroquinolone resistant isolates were similar to that found in the two previous years but higher compared to past data (2007/2008 FSA survey and the CLASSP survey data from 2004-2006). This finding must be treated with caution, as this could relate to bias in the sample of isolates studied and/or differences in methodology. In agreement with recent EFSA data, this study found that fluoroquinolone and tetracycline-resistance was common in *Campylobacter* isolates from chicken meat (EFSA and ECDC, 2018). In comparison, resistance to erythromycin, streptomycin and gentamicin was much rarer in the *Campylobacter* spp. 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.

Research report

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