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

Maes o ddiddordeb ymchwil: Antimicrobial resistance
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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.

Objective and approach

The overall chicken survey tested 1,769 samples of whole, UK-produced, fresh chicken during the period August 2017 to July 2018 for Campylobacter. These samples 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 (393) of the Campylobacter isolates collected from 392 retail chicken samples was tested for AMR (there were 1,114 Campylobacter positive samples to choose from). These were selected as every fourth positive Campylobacter 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 4 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 328 C. jejuni and 65 C. coli isolates (a total of 393 isolates) collected from 392 retail chicken samples were tested for a range of antimicrobial resistance. Ciprofloxacin resistance was identified in 52% of the C. jejuni isolates (171/328) and just under half (48%) of the C. coli isolates (31/65) tested. Two of the C. jejuni (1%) and two of the C. coli (3%) isolates were resistant to erythromycin and 52% of C. jejuni (171/328) and 60% of C. coli isolates (39/65) to tetracycline. None of the C. jejuni or C. coli isolates tested were resistant to gentamicin whereas 2% of C. jejuni (5/328) and 9% of C. coli (6/65) were resistant to streptomycin. Multi-drug resistance (resistance to 3 or more unrelated antimicrobial classes) was found in 6 out of 65 C. coli isolates (9%) and 5 out of 328 C. jejuni isolates (2%).

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 or C. coli isolates from free-range chickens compared to isolates recovered from standard chickens. Differences in levels of ciprofloxacin and tetracycline resistance in isolates from standard and organic birds were also examined. No significant differences were found; the small sample size for organic and to a lesser extent free-range chickens, may have limited the ability to detect important differences should they exist.

Overall, the proportions of antimicrobial-resistant isolates found in this study were similar to that reported in the previous survey year (August 2016 to July 2017). Multi-drug resistance was also similar to that found in the previous survey years. The percentages of fluoroquinolone-resistant isolates were similar to that found in the previous survey years but higher compared to data from earlier studies (2007/2008 FSA survey and the Coordinated Local Authority Sentinel Surveillance of Pathogens (CLASSP) survey data from 2004-2006). This finding must be treated with caution, as it 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 quinolone (ciprofloxacin and nalidixic acid) and tetracycline resistance was common in campylobacters isolated 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.

PDF
Gweld AMR in Campylobacter jejuni and Campylobacter coli from retail chilled chicken in the UK (Year 4: 2017 to 2018) as PDF(Open in a new window) (399.47 KB)
EXCEL
Gweld AMR in Campylobacter jejuni and Campylobacter coli - Year 4 raw data as Excel(Open in a new window) (31.29 KB)

Results of previous surveys

Year 3

PDF
Gweld Antimicrobial resistance in Campylobacter jejuni and Campylobacter coli from retail chilled chicken in the UK (Year 3 2016-17) as PDF(Open in a new window) (1.26 MB)
EXCEL
Gweld Data: AMR in Campylobacter jejuni and Campylobacter coli from retail chilled chicken in the UK (Year 3 2016-17) as Excel(Open in a new window) (38.11 KB)