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

Area of research interest: 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 to. 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.

Our organisation 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 (2014-15), 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 the risk to public health.

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Research Approach

The overall survey tested 4,011 samples of whole, UK-produced, fresh chicken during the period February 2014 to March 2015. The samples were evenly distributed throughout the year and the UK (in proportion to the population size of each country), and testing was performed by six laboratory sites. Retailers were sampled in proportion to their market share, according to available data, with their share of free-range, organic and standard chickens taken into account.

A subset (283) 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 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 1 of the retail chicken survey that were resistant to a range of antimicrobial agents relevant to public health.

To determine resistance, Iso-Sensitest Agar with the addition of 5% horse blood containing specified breakpoint concentrations of antimicrobials was used. An isolate suspension was made in brain heart infusion broth 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 antimicrobials and concentrations as described in Thwaites & Frost (1999).

Results

A subset of the Campylobacter jejuni (230) and C. coli (53) isolates from retail chicken were tested to determine the antimicrobial resistance profiles of the isolates. Ciprofloxacin resistance was identified in 49% (113/230) of the C. jejuni isolates and 55% (29/53) of the C. coli isolates tested. All isolates were sensitive to gentamycin, neomycin and kanamycin and 24% (55/230) C. jejuni and 28% (15/53) C. coli isolates were susceptible to all antimicrobials tested. The proportion of multi-resistant isolates (resistant to 3 or more antimicrobial classes) was higher for C. coli (11/53, 21%) than C. jejuni (2/230, 0.9%). The data suggest that the proportion of ciprofloxacin resistant C. jejuni and C. coli strains has increased significantly since 2007-08 while the proportion of erythromycin resistant C. coli appears to be unchanged and may be decreasing in C. jejuni. In comparison with findings from a previous retail chicken survey in 2007-08 there was no significant change in the level of resistance found to aminoglycosides, chloramphenicol or tetracycline.

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 cook thoroughly to reduce the risk to public health.

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Research report

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