EU Harmonised Survey of Antimicrobial Resistance (AMR) on retail meats (pork and beef/chicken)

Maes o ddiddordeb ymchwil: Antimicrobial resistance
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Cwblhau arfaethedig: 1 Rhagfyr 2020
Cod prosiect: FS102109
Cynhaliwyd gan: Sampling: Hall Mark Meat Hygiene Ltd, Testing: Animal and Plant Health Agency (APHA), Survey Design: Royal Veterinary College
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Background

In accordance with Directive 2003/99/EC on monitoring of Zoonoses and Zoonotic agents, Member States must ensure that monitoring provides comparable data on the occurrence of antimicrobial resistance (AMR) in zoonotic agents. Also foreseen is the possibility of broadening the scope of the AMR monitoring to other zoonotic agents in so far as they present a threat to public health. The commission implementing decision 2013/652/EC lays down specific technical requirements for AMR testing and reporting in representative isolates deriving from randomised sampling of broilers, laying hens, fattening turkeys, fattening pigs and calves, performed at farm and/or slaughter, and of meat from broilers, pork and beef at retail. This survey concerns the mandatory sampling and testing of raw meat at retail within the UK. The Veterinary Medicines Directorate (VMD) is undertaking all slaughterhouse sampling.

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Research Approach

As the UK Competent Authority, we are undertaking this survey on behalf of the EC and as such, must adhere to the Commission's Decision in relation to scope, sampling methodology, analytical methods, and reporting of data.

Whilst the survey actually runs from 2014 to 2020, there is no requirement to take retail samples for AMR in the first year. The sampling regimes are outlined below:

- 300 beef and 300 pork retail samples to be collected/tested in 2015, 2017 and 2019
- 300 poultry meat retail samples to be collected/tested in 2016, 2017 and 2020

Sampling will represent 80% retail market share and 80% population coverage of the four countries of the UK; sampled proportionally throughout the full year. Analysis will require initial isolation and enrichment of E. coli from all meat samples, prior to testing for AMR E. coli (i.e. Extended Spectrum Beta Lactamases (ESBLs), AmpC and Carbapenemase-producing). Analysis will be performed in a step-wise process against a two-tier panel of antimicrobial agents

depending on presence of positive isolates. Data collected by the testing facility will be submitted to the EC on an annual basis in May following each year of completion; aggregated to UK datasets with no identification of retail names or product brands.

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Results

Year 1 Retail Beef and Pork Results (2015)

A total of 312 beef & 312 pork samples were tested between January and December 2015. Only 8 (1.28%) of the 624 samples tested yielded E. coli colonies on MacConkey agar + 1mg/L cefotaxime. These samples comprised 2 (0.64%) beef and 6 (1.92%) pork samples.

Two of the isolates (1 beef (0.32%), 1 pork (0.32%)) had an AmpC phenotype, whilst all the others (1 beef (0.32%), 5 pork (1.6%)) had an ESBL phenotype.

None of the isolates were resistant to the last resort carbapenem antibiotics imipenem, ertapenem, meropehen or to colistin. All isolates were resistant to the beta-lactam antibiotic ampicillin and all of the ESBL isolates were resistant to the cephalosporin antibiotics cefepime, cefotaxime and ceftazidime, but were sensitive to cefoxitin. Conversely, the AmpC isolates were resistant to cefoxitin.

Several of the isolates were resistant to the antibiotics sulfamethoxazole, tetracycline and trimethoprim. None of the isolates were resistant to the early quinolone antibiotic nalidixic acid, but one isolate was resistant to the fluoroquinolone antibiotic ciprofloxacin, ciprofloxacin resistance in the absence of nalidixic acid resistance suggesting transferable fluoroquinolone resistance, but this was not confirmed. The only other resistances seen were to chloramphenicol and gentamicin for some isolates.

Overall, results showed about 1% of retail beef and pork samples in the UK that were tested were positive for AmpC or ESBL-producing E. coli. Comparison with results from other European countries should be possible in early 2017 when EFSA are expected to publish the results for all reporting European countries in the EU Summary Report (EUSR) on Antimicrobial Resistance for 2015.

Year 2 Retail Chicken Results (2016)

A total of 313 chicken samples were tested between January and December 2016 of which 141 (45.1%) yielded E. coli colonies on MacConkey agar + 1mg/L cefotaxime. None of the samples were positive on carbapenem agar.

Of the 141 isolates from MacConkey agar + 1mg/L cefotaxime, 93 had an ESBL phenotype, representing 29.7% of chicken samples tested overall. Forty eight of the 141 isolates were found to have an AmpC phenotype, representing 15.3% of samples tested overall. Using CHROMagar ESBL, 95 (30.4%) of samples were positive for presumptive ESBL phenotype E. coli, of which 88 (28.1%) were confirmed to be blaCTX-Mpositive (mainly blaCTX-M 1) and a further 5 isolates were positive for blaSHV, giving 93 (29.7%) of isolates positive for either blaCTX-M or blaSHV.

None of the 141 isolates from MacConkey agar + 1 mg/L cefotaxime were resistant to carbapenem antibiotics ertapenem, imipenem and meropenem or to colistin. Additionally, none of the isolates were resistant to the antibiotics azithromycin, temocillin and tigecycline. Only three isolates were resistant to gentamicin and only about 25% of isolates were resistant to chloramphenicol, but as expected, all isolates were resistant to the beta-lactam antibiotic ampicillin.

All of the isolates designated as ESBL phenotype were resistant to the cephalosporin antibiotics cefepime and ceftazidime, and all but one isolate was resistant to cefotaxime. All of the isolates designated as AmpC were resistant to cefoxitin.

Overall, results showed that 29.7% (93) and 16.3% (51) of retail chicken samples were positive for ESBL or AmpC-producing E. coli respectively. Results showed a decrease in the proportion of samples positive for ESBL-producing E. coli compared to a previous (2013-2014) UK study, which reported that 65.4% of 159 retail chicken samples were positive for ESBL-producing E. coli.

Comparison with results from other European countries should be possible in early 2018 when EFSA are expected to publish the results for all reporting European countries in the EU Summary Report (EUSR) on Antimicrobial Resistance for 2016.

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Additional Info

We are undertaking this survey on behalf of the European Commission Research report

Research report

England, Northern Ireland and Wales

PDF
Gweld EU Harmonised Surveillance of Antimicrobial Resistance (AMR) in Bacteria from Retail Meats (Year 1) as PDF(Open in a new window) (493.9 KB)

England, Northern Ireland and Wales

PDF
Gweld EU Harmonised Surveillance of Antimicrobial Resistance (AMR) in E. coli from Retail Meats (Year 2 - Chicken) as PDF(Open in a new window) (1.48 MB)