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Evaluation of meat, fruit and vegetables from retail stores in five United Kingdom regions as sources of extended-spectrum beta-lactamase (ESBL)-producing and carbapenem-resistant *Escherichia coli*.

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Abstract

We determined the prevalence and types of extended-spectrum β -lactamase (ESBL)-producing and carbapenem-resistant *Escherichia coli* in raw retail beef, chicken, pork, fruit and vegetables in five UK regions in 2013-14. Raw meat (n=397), and fruit and vegetable samples (n=400) were purchased from retail stores in London, East Anglia, North West England, Scotland and Wales. Samples were tested for the presence of ESBL-producing *E. coli* by plating enriched samples on CHROMagar CTX and CHROMagar ESBL, for AmpC-type *E. coli* by plating on "CHROMagar FOX" (CHROMagar ECC+16mg/L cefoxitin), and for carbapenem-resistant *E. coli* by plating on CHROMagar KPC. Additionally, pre-enrichment counts were performed on the above agars, and on CHROMagar ECC. Isolates of interest were characterised by MALDI-ToF to confirm identification, by PCR for *bla*_{CIT}, *bla*_{CTX-M}, *bla*_{OXA}, *bla*_{SHV} and *bla*_{TEM} genes; ESBL or *bla*_{CIT} genes were sequenced. Only 1.9% and 2.5% of beef and pork samples, respectively were positive for ESBL-producing *E. coli* after enrichment compared with 65.4% of chicken samples. 85.6% positive samples from chicken meat carried *bla*_{CTX-M-1}; *bla*_{CTX-M-15} was not detected. None of the fruits or vegetables yielded ESBL-producing *E. coli* and none of the meat, fruit or vegetable samples yielded carbapenem-resistant *E. coli*. Retail chicken was more frequently a source of ESBL-producing *E. coli* than were beef, pork, fruit or vegetables. None of the foodstuffs yielded *E. coli* with CTX-M-15 ESBL, which dominates in human clinical isolates in the UK, and none yielded carbapenem-resistant *E. coli*.

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KEYWORDS: Beef; Carbapenem-resistant; Chicken; ESBL; *Escherichia coli*; Extended-spectrum beta-lactamase; Fruit; Meat; Pork; United Kingdom; Vegetables