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ESBL plasmid transfer by host- and country- associated *E. coli* within an *in vitro* model of the chicken caeca

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Abstract

ESBL plasmids confer antimicrobial resistance in *E. coli* and other bacteria. However, the impact of inoculating an *in vitro* model simultaneously with multiple *E. coli* isolates harbouring different ESBL plasmids has not yet been explored. Here, we inoculated a continuous flow *in vitro* model of the chicken caeca with a cocktail of 17 ESBL harbouring *E. coli* isolates. The isolates were associated with four different hosts (pig, cattle, humans and chickens) and isolated from four different countries (UK, Vietnam, Germany and Spain). The isolates were able to persist in the model during the 72 hour experiment, although the total CFU/ml for the isolates and number of individual isolates decreased over time. The presence of individual isolates within the model was assessed using ORFan gene multiplex PCR assays, targeting genes unique to each isolate. These showed that different isolates were present in the vessels for varying lengths of time, irrespective of their host-association. No trans-conjugants were detected when 10^8 CFU/ml of the *E. coli* isolate cocktail was added to the model. However, when the vessels were inoculated with a cocktail containing 10^{10} CFU/ml, potential trans-conjugants were isolated in samples between taken 48 and 72 hours post addition of the *E. coli* cocktail. Here, we have shown that multiple ESBL-producing *E. coli* isolates can persist within an *in vitro* model of the chicken caeca and some of these appear able to transfer their ESBL plasmid to the pre-existing commensal *E. coli*.