Antimicrobial Resistance in Turkey Flocks

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BACKGROUND

Antimicrobial resistance (AMR) is a global health threat worldwide that requires urgent attention. Previous studies have reported the presence of multidrug-resistant bacteria in samples obtained from turkey farms, slaughterhouses, and retail stores, indicating a public health risk. Surveillance systems include *E. coli* as an indicator bacteria for the selection pressure of antimicrobial use because they can acquire and transmit AMR genes to other enteric bacteria. Whereas, evaluating AMR in *Campylobacter* is important since *Campylobacter* is the most common human enteric pathogen. Therefore, the goal of this study is to estimate the prevalence and determine AMR patterns in *E.coli* and *Campylobacter* isolates of Canadian turkey flocks monitored by the Canadian Integrated Program for Antimicrobial Resistance Surveillance (CIPARS) between 2013 and 2020.

METHODS

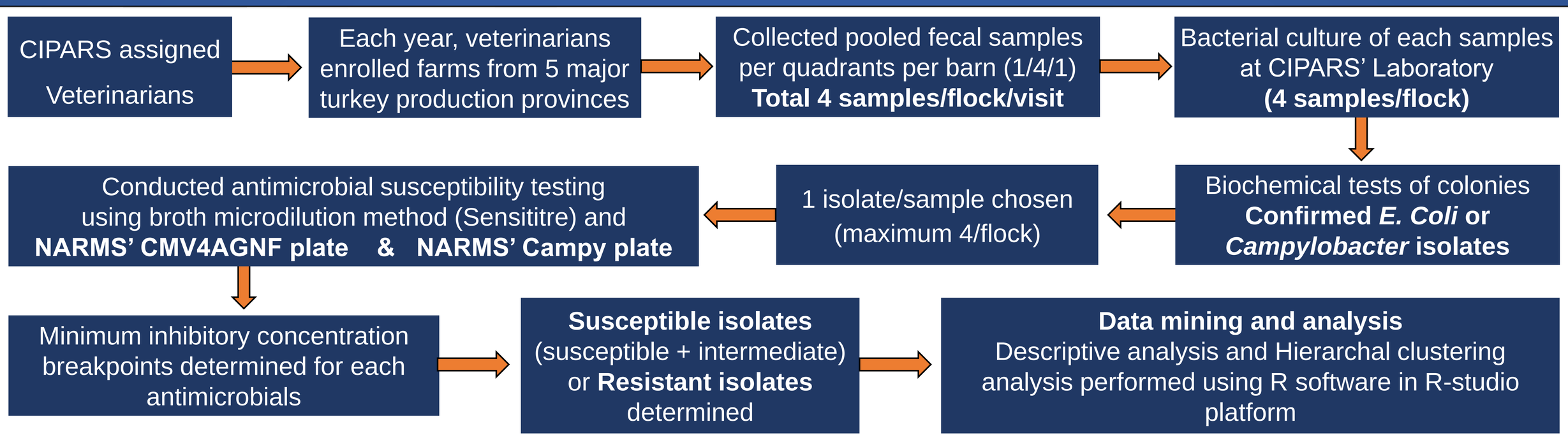

Figure 1: Schematic flow diagram of sample collection, and laboratory and data analysis

RESULTS AND CONCLUSIONS

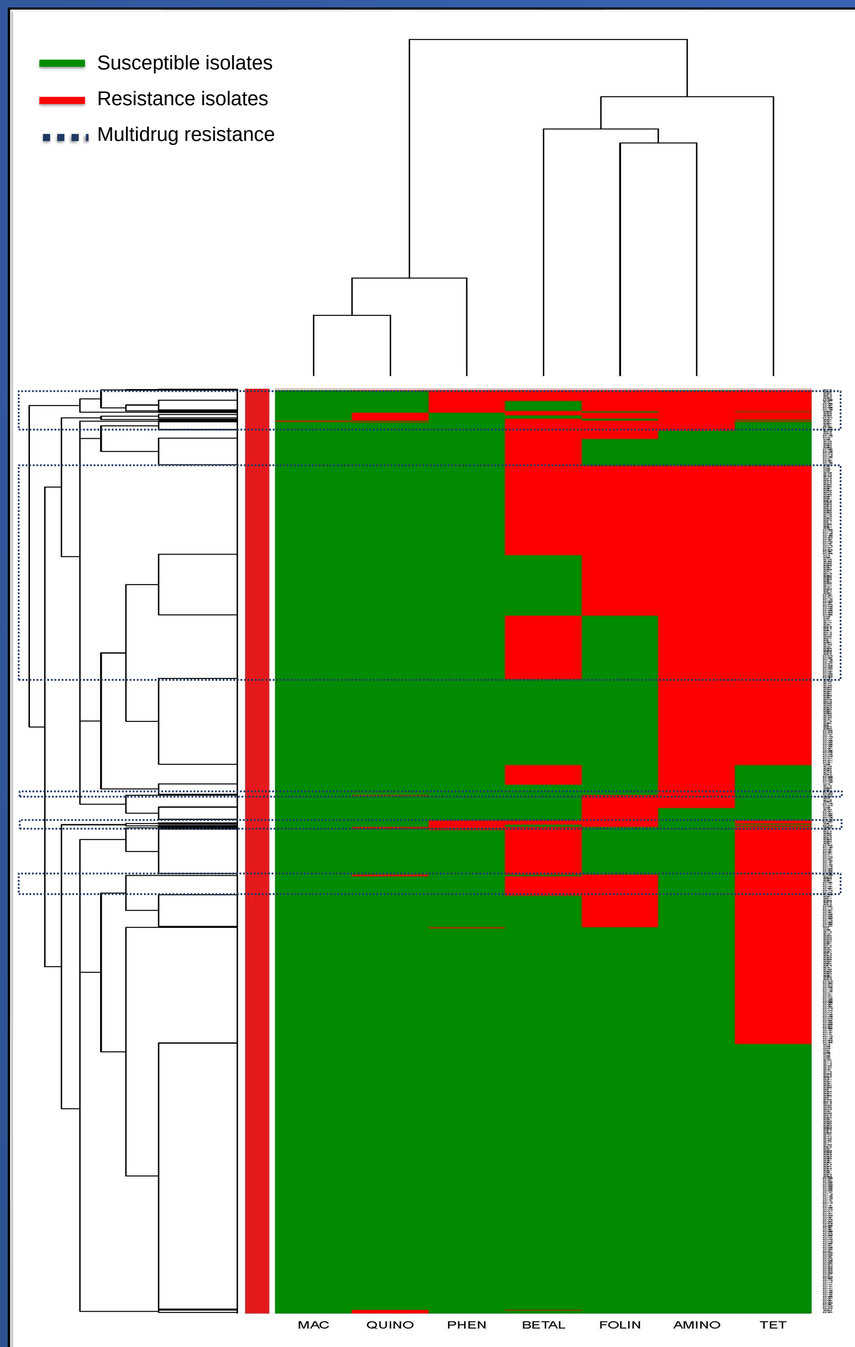

Figure 2: Resistance patterns of *Escherichia coli* isolates to seven antimicrobial classes

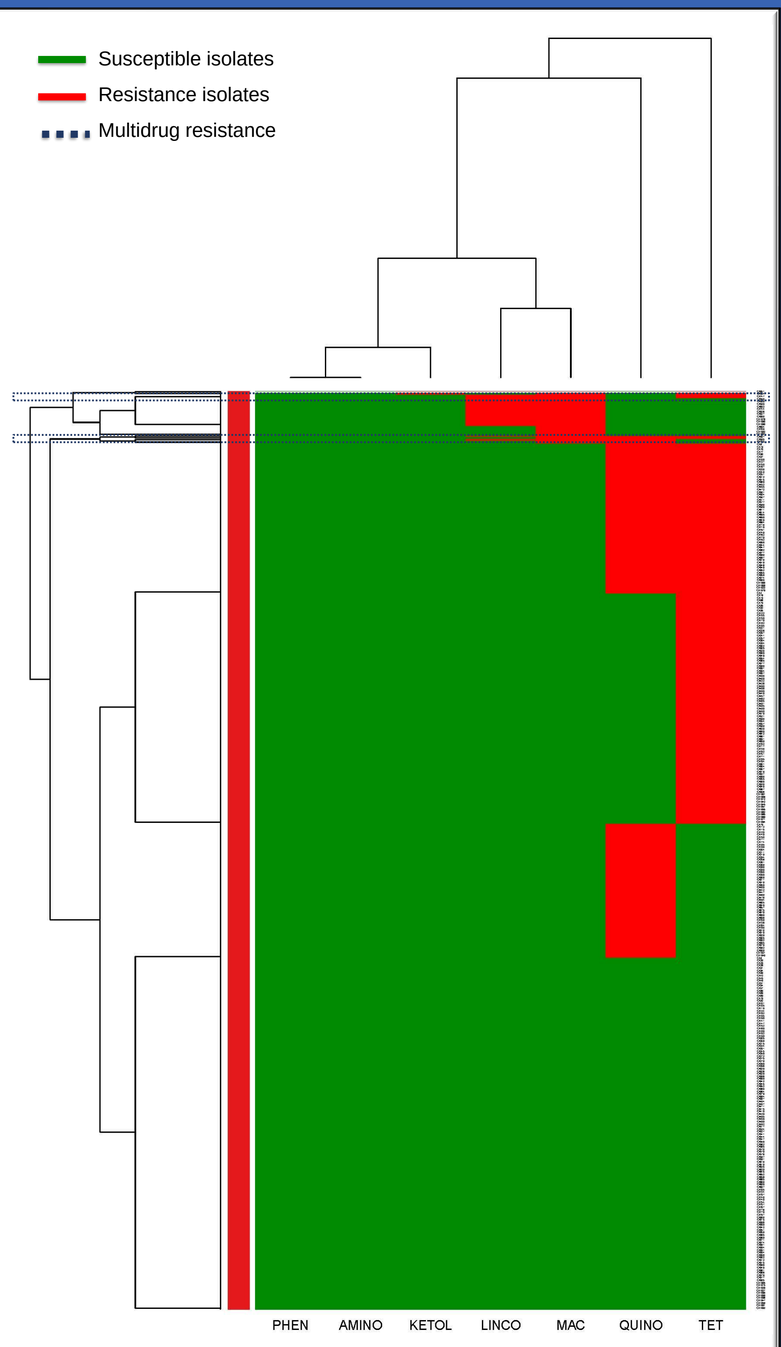

Figure 3: Resistance patterns of *Campylobacter* isolates to seven antimicrobial classes

X-axes of heatmaps represent the antimicrobial classes: macrolides (MAC), fluoroquinolones (QUINO), phenicols (PHEN), folate pathway inhibitors (FOLIN), beta-lactams (BETAL), aminoglycosides (AMINO), tetracyclines (TET), ketolides (KETOL), lincosamides (LINCO). Y-axes of heatmaps represent the isolates of this study.
Multidrug resistant isolates were those isolates resistant to ≥3 classes. All the isolates of this study were collected between 2013 and 2020.

Escherichia coli

- 1876 isolates were detected from 478 flocks
- *E. coli* isolates had
  - a very high resistance to tetracyclines (59.7%).
  - a high resistance to aminoglycosides (41.5%), beta-lactams (33.3%) and folate pathway inhibitors (30.4%).
  - a high multidrug resistance (resistance to ≥3 classes; 30.9%).
  - a very low resistance to phenicols (3.7%), quinolones (1.9%), and macrolides (0.16%).

***Campylobacter* species**

- 1094 isolates were detected from 298 flocks.
- 63.9% isolates were *C. jejuni and* 28.5% were *C. coli*.
- *Campylobacter* isolates had
  - a high resistance to tetracyclines (42.5%) and quinolones (31.5%).
  - a low resistance to macrolides (5.7%).
  - a very low resistance to lincosamides (3.7%) and ketolides (0.36%).
  - a low multidrug resistance (MDR; 17.8%).
  - MDR were lower in *C. jejuni* (17.1%) than *C. coli* (18.6%) isolates.

***E. Coli* and *Campylobacter* species**

- MDR in *E. Coli* and *Campylobacter* species significantly differed among years ($p<0.001$; $p<0.001$)
- MDR in the both bacteria were significantly higher in turkey flocks from western than eastern provinces (*E. Coli:* $p=0.016$ & *Campylobacter* species: $p<0.001$) of Canada.

FUTURE DIRECTION

Evaluating associations between antimicrobial resistance and antimicrobial use in turkey flocks.

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