



Dogs and cats as a potential reservoir of resistant *Escherichia coli*

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Aim: Companion animals such as dogs and cats are increasingly recognized as potential reservoirs of antimicrobial resistance (AMR) determinants with relevance to both veterinary and human medicine. Close contact between pets and humans creates opportunities for the exchange of resistant bacteria and resistance genes, raising concerns within the One Health framework. The aim of this study was to comprehensively characterize the antimicrobial resistance profiles of *Escherichia coli* isolates obtained from dogs and cats in 2024, using an integrated approach that combined phenotypic susceptibility testing with whole-genome sequencing (WGS) analysis.

MATERIALS AND METHODS

A total of 115 fecal samples collected from 63 dogs and 52 cats from animal shelters were screened for the presence of cephalosporin-resistant *Escherichia coli*. A total of 65 isolates were obtained and tested for antimicrobial resistance using the broth microdilution method with EUVSEC3 and EUVSEC2 plates (TREK Diagnostic Systems). Results were interpreted according to the EUCAST (European Committee on Antimicrobial Susceptibility Testing) guide with ECOFFs (Epidemiological Cut-Off Value). Whole-genome sequencing (WGS, 2×300 bp, NextSeq platform, Illumina) was performed for selected isolates to identify AMR genes and plasmid replicons.

Materials and Methods

- 115 fecal samples from 63 dogs & 52 cats in animal shelters**
Screened for cephalosporin-resistant *E. coli* (65 isolates)
- Broth microdilution method (EUVSEC2 / EUVSEC3, TREK)**
Results interpreted by EUCAST ECOFF
- Whole-genome sequencing**
Illumina NextSeq, 2×300 bp
AMR genes & plasmid replicons



RESULTS

- A high level of multidrug resistance was observed among *E. coli* isolates from companion animals. **Nearly all isolates were resistant to third-generation cephalosporins (cefotaxime 100%, ceftazidime 98.5%), as well as to ampicillin and ciprofloxacin (both 100%).**
- High resistance rates were also noted for tetracycline (98.5%), chloramphenicol (95.4%), and gentamicin (90.8%).
- All isolates remained fully susceptible to last-resort antimicrobials, including meropenem, imipenem, colistin, and amikacin.
- Whole-genome sequencing revealed predominance of *E. coli* ST457 and widespread presence of ESBL genes, mainly **blaCTX-M-32**, with IncF plasmids commonly detected.

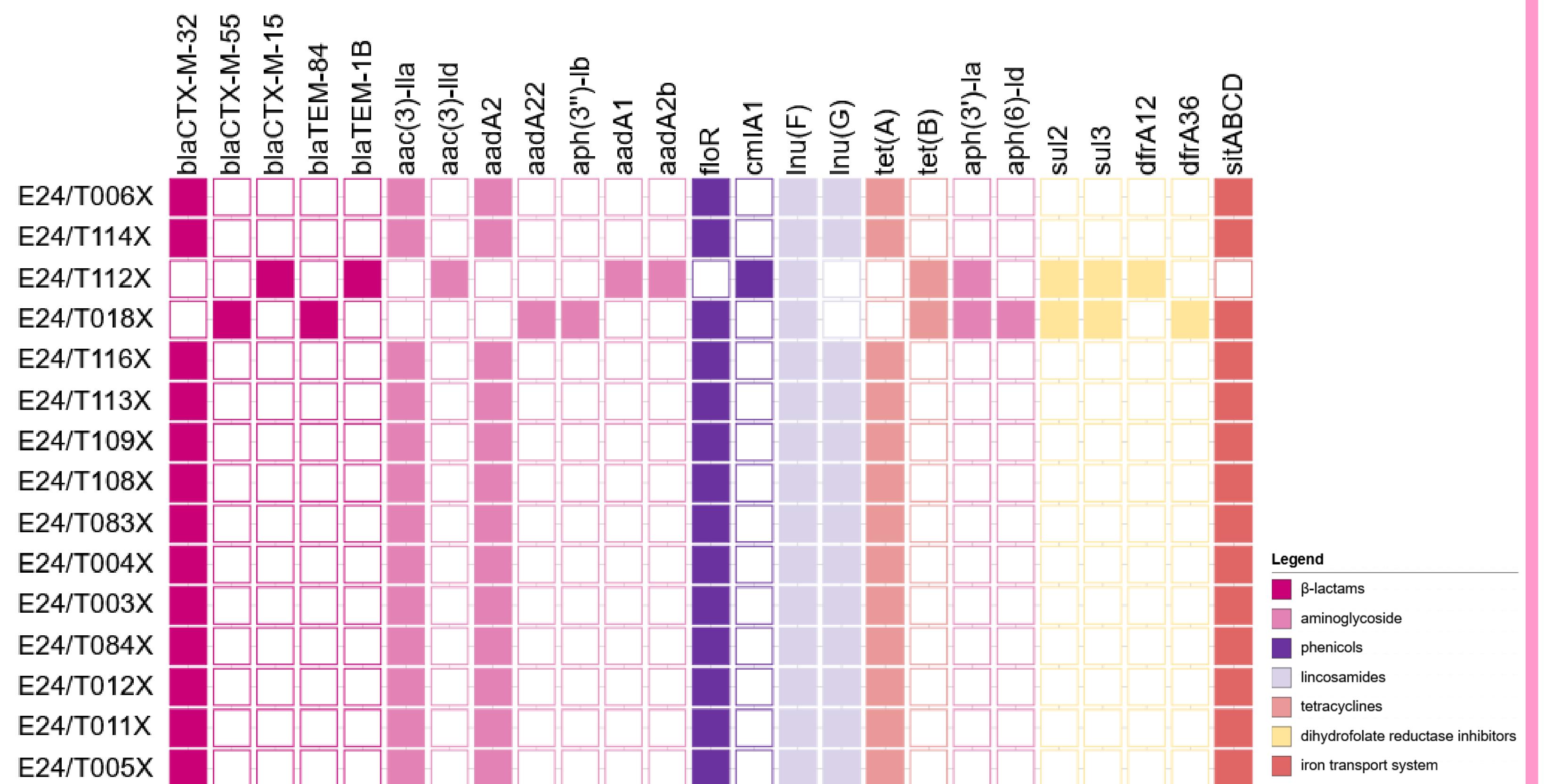


Figure 2. Map of resistance genes of *E. coli* strains prepared with an online tool iTOL v7

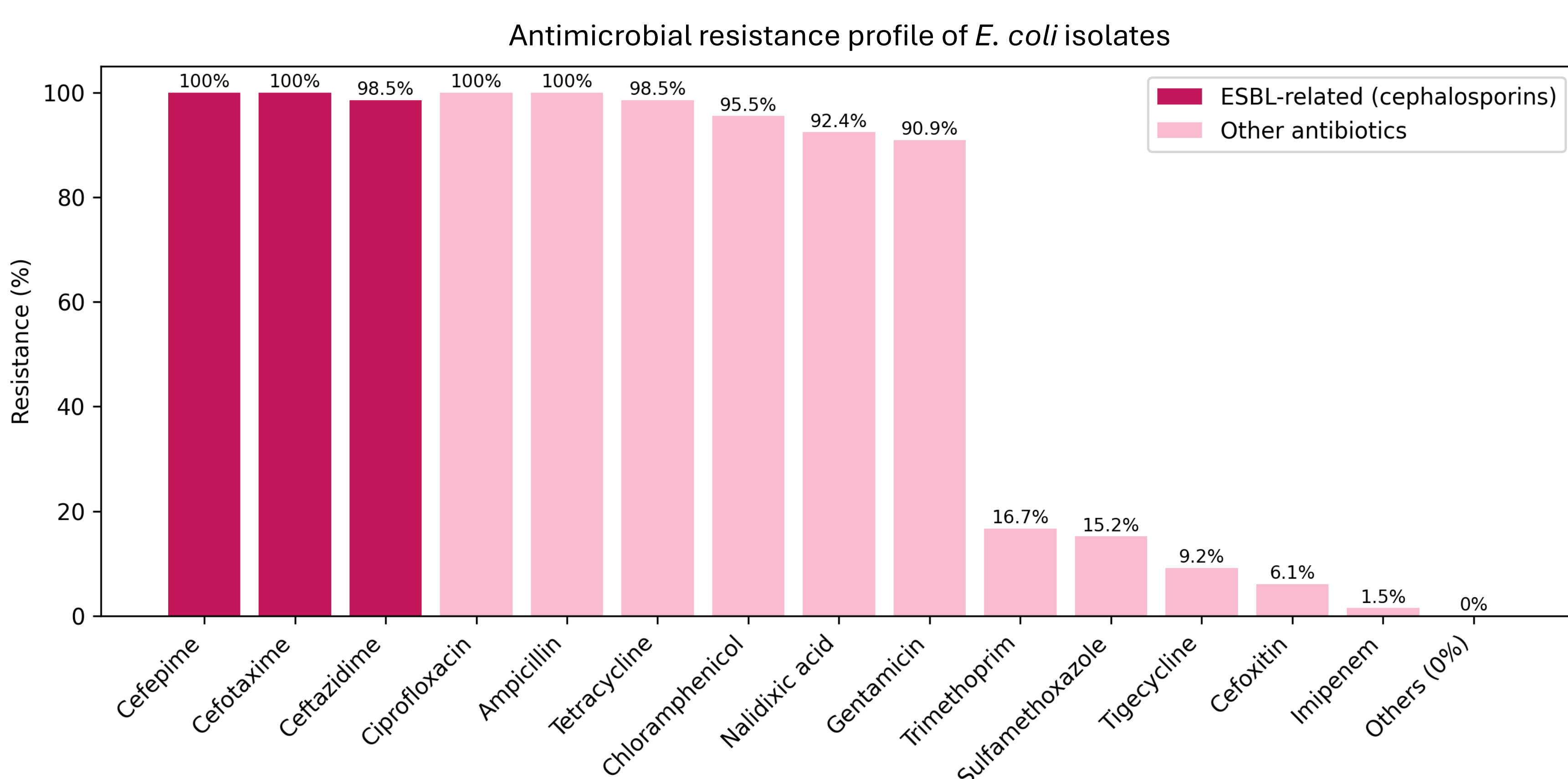


Figure 1. Antimicrobial resistance profile of *E. coli* isolates from companion animals



CONCLUSIONS

The findings of this study indicate that dogs and cats may act as an important reservoir of multidrug-resistant and ESBL-producing *E. coli*.

The high prevalence of resistance to critically important antimicrobials, combined with the possibility of clonal spread and plasmid-mediated resistance, highlights the potential risk of transmission between animals and humans.

