

## Best Water Related Presentation at Environ 2023

### Winner Elena Anedda, University of Galway

#### Occurrence of AMR Enterobacterales in soil and spinach in the presence and absence of zinc amendment

Antimicrobial resistance (AMR) is one of the greatest public health concerns globally. The overuse and the misuse of antimicrobials in human and animal medicine has contributed to the development of AMR in microorganisms. Extended-spectrum beta-lactamases producing Enterobacterales (ESBL-PE) and carbapenem-resistant Enterobacterales (CRE) are among the antimicrobial resistant bacteria (ARB) of greatest concern due to their spread in clinical settings. These bacteria are commonly present in the environment; however, anthropogenic activities, such as the use of contaminated irrigation water, can facilitate ARB dissemination in the environment, and to humans and animals (Figure 1). Consequently, foods such as vegetables and fruit can potentially be vehicles of ARB to humans and animals through the food chain. Moreover, external factors, such as the presence of heavy metals, can influence AMR dissemination in the environment. One Health recognises that the health of humans is closely connected to the health of animals and our shared environment. Such an approach is needed to address AMR.

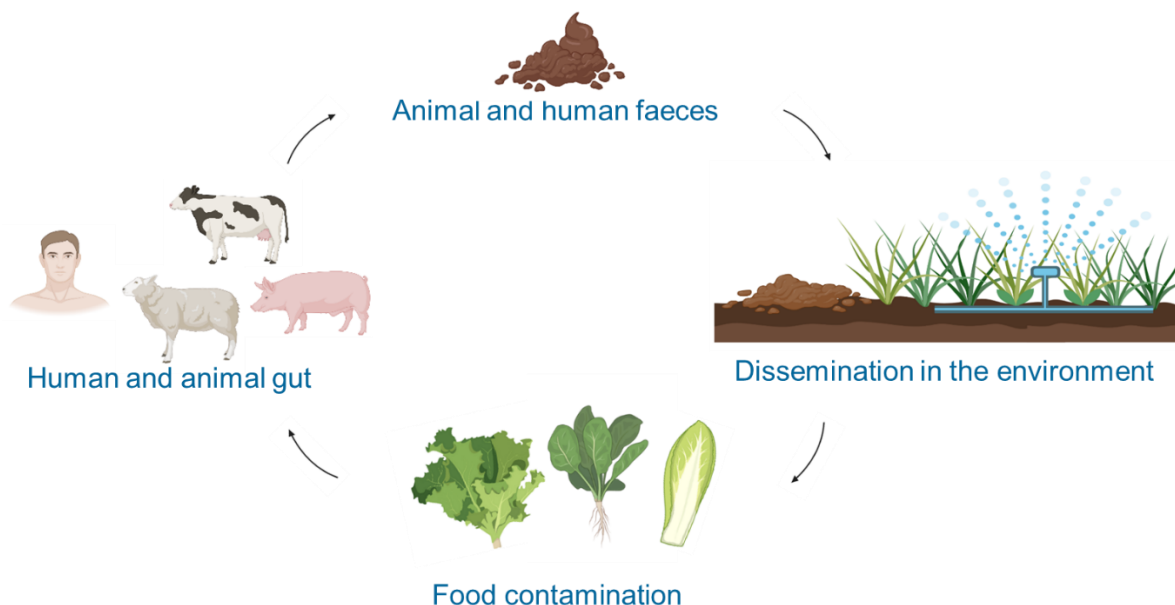


Figure 1. Transfer of antimicrobial resistant bacteria between different One Health domains.

This study as part of the One Health European Joint Programme aimed to assess the presence of ESBL-PE and CRE in spinach and soil samples collected from zinc-containing environments. Soil and spinach samples were collected

from two different locations, where ZnSO<sub>4</sub> was added in 2019 or 2020, and from control plots. Selective media were used for the enumeration of Enterobacterales and isolation and identification of resistant Enterobacterales followed by susceptibility testing to 15 antimicrobials, sequencing of whole genomes and bioinformatic analysis. Heavy metal concentrations in the soil samples were also determined.

The results showed that fresh products and the primary food production environment can harbour Enterobacterales with relevant resistance phenotypes and genotypes. A number of species were identified and some were multidrug resistant. No differences in AMR profiles of isolates from zinc and control plots or from spinach and soil were detected; therefore, further studies, including metagenomic analysis, are needed.

Overall, this study highlighted the importance to employ a “One Health” approach to tackle AMR.

