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PATTERNS OF ANTIMICROBIAL RESISTANCE IN *E. COLI* ISOLATES FROM EUROPE'S WILD BIRDS

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Abstract This review discusses the significant role of *E. coli* isolates in wild birds in Europe as reservoirs of antimicrobial resistance (AMR). Monitoring wild avian populations for antibiotic-resistant bacteria is crucial, as these species act as vectors in the spread of multidrug-resistant (MDR) *E. coli*, especially among species like yellow-legged gulls (*Larus michahellis*), mallards (*Anas platyrhynchos*), northern goshawks (*Accipiter gentilis*), common buzzards (*Buteo buteo*), and Eurasian Griffon Vultures (*Gyps fulvus*). Findings from studies between 2013 and 2024 reveal high resistance levels across bird populations, highlighting critical public health implications.

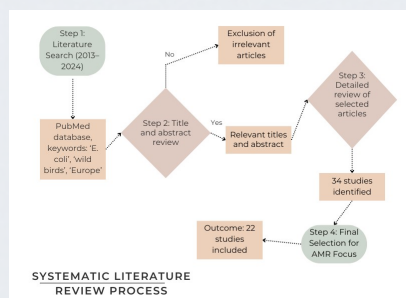
• Introduction

Escherichia coli poses a dual threat due to its public health risks and its role in economic losses within livestock industries. Wild birds can spread antibiotic-resistant bacteria, especially during migration. Although research on AMR in wildlife is growing, data remains limited. Wildlife may indirectly encounter antibiotics through environmental exposure, so further understanding of AMR in wild avian populations is essential.

The primary objective of this study was to determine the spread of AR *E. coli* in wild birds across European countries in the last decade.

• Material and method

The systematic literature review was conducted to identify publications reporting on the presence of *Escherichia coli* in wild birds across Europe. Using the PubMed database, we searched from 2013 to March 2024, with the keywords '*E. coli*', 'wild birds', and 'Europe', with no language or article type restrictions. This review targeted studies containing *Escherichia coli* isolates from European wild birds within the last decade.



Methodology of the review process



Geographic distribution of *E. coli* isolation studies in wild birds across Europe (2013-2024)

• Results and discussions

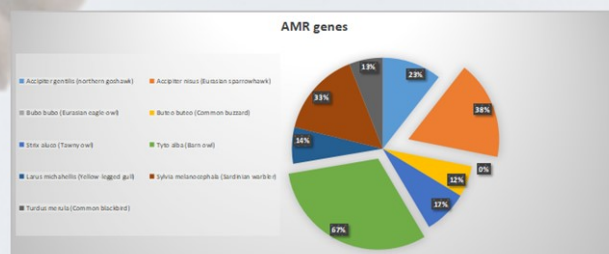


Resistance phenotype to non-Beta-lactams of wildbirds from Catalonia by Darwich et al., 2019

The data illustrates a rising trend of antimicrobial resistance in *E. coli* from various bird species across Europe. High resistance was frequently observed to antibiotics such as tetracycline, trimethoprim/sulfamethoxazole, and cephalosporins. Studies in multiple countries, including Poland, Switzerland, and Spain, report alarming rates of MDR *E. coli*.

Key Findings:

- **Tetracycline resistance** was prevalent in mallards, pigeons, and cormorants.
- **Cephalosporin-resistant strains** were notably present in gulls, showing a potential link to human-associated environmental exposure.
- **Trimethoprim/sulfamethoxazole and fluoroquinolone resistance** were also common, especially in species like Swedish gulls and goshawks.
- Environmental factors, such as water contamination from waste, likely contribute to these AMR patterns. Wild birds, interacting with varied environments and ecosystems, play a pivotal role in the AMR transmission network. This underscores the need for an integrated, cross-species approach to manage AMR spread effectively.



Antimicrobial resistance genes percents of wildbirds from Catalonia (6)

• Conclusions

The prevalence of antibiotic-resistant *E. coli* in European wild birds underlines the influence of human activity and environmental pollution in spreading AMR. Wild birds are significant AMR reservoirs with broad ecological and public health implications. Enhanced surveillance and wildlife-focused AMR strategies are critical to prevent further spread and safeguard both ecosystem and human health.