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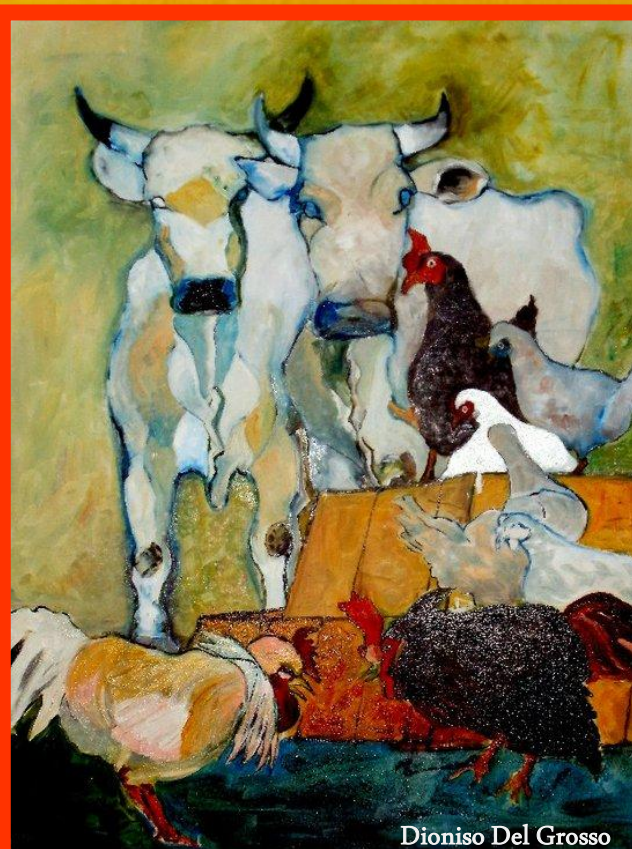
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ANTIMICROBIAL RESISTANCE TRENDS OF ESCHERICHIA COLI: 2012-2017 RETROSPECTIVE STUDY IN CENTRAL ITALY

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The WHO has classified *Escherichia coli* (EC) resistant to third-generation Cephalosporins, extended spectrum β-Lactamases, and Fluoroquinolones as one of seven bacteria of international concern [1]. Surveillance actions became important and necessary to monitor epidemiological trends in both human and veterinary medicine [2]. To improve the knowledge of multiple drug resistance spread of EC in Central Italy, a retrospective study (2012-2017) on animal and human EC strains was carried out. A total of 364 EC isolated from dogs/cats (50%), cattle/sheep/goats (15%), horses/pigs (14%), poultry/rabbits/reptiles (20%), and humans (1%), were isolated and characterized. Susceptibility testing to both veterinary and human antibiotics was evaluated by disk diffusion method [3] following the CLSI and EUCAST guidelines. Chi squared or Fisher exact tests, as appropriate, was used (Software STATA 13.0). To examine temporal changes in antimicrobial resistance, logistic regression was used to test for a linear trends throughout the six-year study period. $P<0.05$ was considered statistically significant. Overall, the EC strains were cultured from respiratory/ocular (24%), enteric (25%), genital/urinary (26%), skin/breast (10%), ear (4%), joint/bones (1%) sites and systemic infections (10%). The 91% of isolates were resistant to >1 antibiotic showing a higher number of resistance in animal (81%) vs human strains (40%, $P=0.025$), especially in dogs/cats and poultry ($P<0.05$). The most common resistance phenotypes to older classes, such as Tetracyclines (average 79%: range 40-78%), Penicillins (66%: range 32-78%), Sulphonamides (65%: range 24-97%), and Quinolones (48%: range 20-60%), were observed. Nevertheless, from 2012 to 2017, significant decreasing resistance trends for Aminoglycosides ($P<0.001$), Quinolones ($P<0.001$), Sulphonamides ($P<0.001$), Penicillins ($P=0.0004$), first and fourth generation Cephalosporins ($P=0.0001$; $P=0.0007$), were recorded. A not significant increase of resistance trend was observed for Carbapenems ($P=0.346$) in dogs/cats, Tetracyclines ($P=0.330$) and second-generation Cephalosporins ($P=0.088$) in cattle/sheep/goats, Tetracyclines ($P=0.523$) in poultry/lagomorphs, first and second generation Cephalosporins ($P=0.371$) and Sulphonamides ($P=0.408$) in horses/pigs. The study confirms the high average resistance rates for EC strains. The decreasing resistance trends observed during 2012-2017 for some classes of antibiotic is encouraging. The steady and incisive veterinary awareness has proved to be an important strategy for the proper use of antimicrobials. Our results could help the medical choice in case of empirical therapy considering the pathogen resistance profile in the geographic area concerned. When coupled with previous surveillance data, these results could provide a wider picture of evolution of resistance and lay the groundwork for understanding genetic mechanisms of resistance development.

[1] World Health Organization. Antimicrobial resistance: global report on surveillance 2014: http://apps.who.int/iris/bitstream/10665/112642/1/9789241564748_eng.pdf?ua=1. [2] Piano Nazionale di contrasto dell'Antimicrobico-Resistenza (PNCAR) 2017-2020, 24 Ottobre 2017. [3] Badger et al. Relative performance of antimicrobial susceptibility assays on clinical *Escherichia coli* isolates from animals, Veterinary Microbiology, 214:56-64, 2018.