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Effectiveness of antimicrobial interventions in animal production: systematic review & meta-analysis

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In animal production, the rational use of antimicrobials has been promoted to decrease antimicrobial resistance (AMR) in microorganisms. This systematic review evaluated the effectiveness of interventions to reduce/adequate antimicrobial use and decrease AMR. Articles were identified in PubMed, Scopus, The Cochrane Library, Web of Science, and grey literature in DANS EASY, WorldCat, RCAAP. Eligible studies included original studies, assessing broiler/pig populations, antimicrobial interventions, comparator with standard/no use of antimicrobials, outcomes related to AMR, farm level and analytical observational studies. Meta-analysis was conducted for combinations including type of intervention, bacterial species, production type, population. Interventions effectiveness was estimated using odds ratio of resistance to antimicrobial substances/classes by bacteria and populations

with and without intervention. A total of 46 studies were eligible. For broilers, restrictions were all non-therapeutic use (46%), complete restriction (27%), prohibition on antimicrobials used for growth promotion (23%). For pigs, restrictions included: all non-therapeutic use (37%), complete restriction (37%), group treatments (22%). For meta-analysis (21 studies), combinations indicated a protective effect for most antimicrobial classes in *E. coli*, *Campylobacter* and *Enterococcus* and broilers, and *Escherichia coli* and *Campylobacter* and pigs, compared to conventional production or without intervention. An increased odds of resistance were observed for cephalosporins in *E. coli* and broilers raised without antimicrobials, and to fluoroquinolones/quinolones in *Campylobacter* and pigs raised without antimicrobials, compared to conventional production. Our study revealed that organic, antimicrobial-free farms and group treatment restrictions in conventional production were mostly associated with AMR reduction, providing information on available options that may support decision-making to tackle AMR.

Key messages:

- Organic/antimicrobial-free farms indicated a protective effect on resistance to most antimicrobials.
- Fluoroquinolones resistant *Campylobacter* may persist in pigs raised without antimicrobials.