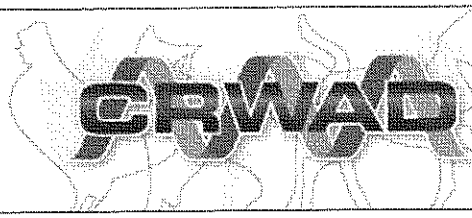

Conference of Research Workers in Animal Diseases

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Presentation Abstracts

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181 - Association between antimicrobial use and antimicrobial resistance in bacteria isolated from feces or respiratory secretions of feedlot cattle: a systematic review and meta-analysis

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Session: Antimicrobial Resistance – 6, Room 7, 12/5/2017 11:00 AM

The objective of this study was to assess whether antimicrobial use (AMU) in feedlot cattle is associated with antimicrobial resistance (AMR) in bacteria isolated from cattle feces or respiratory secretions. A literature search resulted in 344 unique publications, 32 of which were selected after evaluation by 2 independent reviewers. *Escherichia coli* was the most common bacterium studied, followed by *Enterococcus* spp., *Salmonella enterica, Campylobacter* spp., and *Mannheimia haemolytica*. The most frequently studied target bacteria/antimicrobial exposure combinations were *E. coli*/tetracyclines and *Enterococcus*/macrolides. Data extracted from 11 studies that reported the proportion of isolates resistant to antimicrobials in control and exposed groups were analyzed in a random-effect meta-analysis with 3 covariates (exposure-defined daily doses, cumulative days of antimicrobial exposure before sampling, and time between last exposure and collection of samples) to estimate relative risk (RR) of AMR associated with AMU. Overall, isolates from cattle exposed to any type of antimicrobial were 2.3 times (95% confidence interval 1.1 - 4.6) as likely to exhibit AMR to any type of drug as isolates recovered from unexposed animals. However, the relationship was weaker when some specific combinations of antimicrobials and bacteria were examined: *E. coli* isolates from cattle exposed to tetracyclines were 1.7 times (1.1 - 2.5) and *Enterococcus* isolates from cattle exposed to macrolides were 1.8 times (0.5 - 6.6) as likely to show AMR to homologous drugs as unexposed cattle. Conversely, a study researching florfenicol exposures on resistance in *E. coli* found a very high likelihood of recovering resistant bacteria when compared to unexposed cattle (RR=25.0; 1.5 - 415.7). When pooling studies for meta-analysis, careful consideration must be given to the impact of comparing studies examining disparate antimicrobials and bacteria. Meta-analysis should be performed on studies restricted to specific antimicrobial/bacterial combinations to avoid inappropriate amalgamation of RR results that are actually quantifying different mechanisms of AMR.

182 - Ionophore use in food animal production and its impact on human health in terms of antimicrobial resistance: a scoping review

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Session: Antimicrobial Resistance – 6, Room 7, 12/5/2017 11:15 AM

Ionophores are widely used in food animal production, primarily for coccidiosis control, feed efficiency, and growth promotion. Antimicrobial use can lead to antimicrobial resistance (AMR), the increase of which has put antimicrobial use in food animal production under scrutiny. To date, the general consensus has been that ionophores pose little or no public health threat in terms of AMR because of their unique mode of action, lack of evidence of genes encoding resistance, and the fact that they are not used therapeutically in humans. However, the recent finding of putative plasmid-mediated elevated minimum inhibitory concentrations (MIC) of narasin in *Enterococcus faecium* has challenged previously held assumptions. To examine this issue further, a scoping review was performed to address whether use of ionophores in food animals has an impact on AMR affecting human health. English language literature, published from 1990, was searched on 5 databases. Title and abstract screening, full text review, and data extraction were completed by 2 reviewers, with a 3rd reviewer resolving disagreements. Database searches resulted in 2553 publications, with 35 ultimately included in the study. Monensin was the most studied ionophore (n=18), and poultry the most examined commodity (n=23). The most common organism examined was *E. faecalis* (n=10), followed by *Clostridium perfringens* (n=9), and *E. faecium* (n=7). In general, documentation of bacterial resistance to ionophores was uncommon. However, the lack of a standardized method for determining resistance (i.e., standard MIC breakpoint interpretive criteria) is problematic. Many questions remain unanswered regarding ionophore use in food animals, and its possible impact on human health through AMR. This scoping review is the first part of a larger review that will also consider ionophore use for treatment in humans, impact on animal health in terms of AMR, impact on pathogen prevalence, as well as the evidence concerning the benefits of ionophore use in food animal production.