

Evaluation of antimicrobial resistance and risk factors for recovery of intrauterine *Escherichia coli* from cows with metritis on California commercial dairy farms

C. Basbas,¹ PhD(c); A. Garzon,¹ DVM, MS, PhD(c); N. Silva del Rio,^{1,4} DVM, PhD;
B. A. Byrne,² DVM, PhD, DACVIM, DACVPM; B. M. Karle,³ BS, MS; S. S. Aly,⁴ DVM, MPVM, PhD;
D. R. Williams,⁴ DVM, MPVM, DACVPM; R. Pereira,¹ DVM, PhD

¹Department of Population Health and Reproduction, School of Veterinary Medicine,
University of California, Davis, Davis, CA 95616

²Department of Pathology, Microbiology & Immunology, School of Veterinary Medicine,
University of California, Davis 95616

³Cooperative Extension, Division of Agriculture and Natural Resources,
University of California, Orland, CA 95963

⁴Veterinary Medicine Teaching and Research Center, School of Veterinary Medicine,
University of California, Tulare, CA 93274

Introduction

Metritis is a major uterine disease in dairy cattle, typically occurring within 21 days post-partum, and the fourth most common health issue in cows as identified by producers. Currently, little is known of MICs of intrauterine *E. coli* (EC) to common antimicrobial drugs used to treat metritis in California dairies. The goals of this study were to evaluate factors affecting recovery and antimicrobial resistance (AMR) in intrauterine *E. coli* in post-partum dairy cows with and without metritis from commercial California dairy farms.

Materials and methods

A cross-sectional study was designed to collect uterine swabs from post-partum cows between 3 and 21 DIM. Cows were categorized in 1 of 3 clinical presentation groups before enrollment: metritis (MET, n = 86), defined as a cow with watery, red or brown colored, and fetid vaginal discharge; cows with purulent discharge (PUS, n = 106), defined as a non-fetid purulent or mucopurulent vaginal discharge; and control cows, (CTL, n = 115) defined as cows with either no vaginal discharge or a clear, non-purulent mucus vaginal discharge. Logistic regression models were used to evaluate animal-level risk factors associated with the odds of isolating EC from an intrauterine swab sample and to evaluate the association between intrauterine EC antimicrobial resistance and animal-level factors.

Results

Cows diagnosed as MET had significantly higher odds for recovery of EC compared to cows diagnosed as CTL (OR = 2.16, 95% CI: 1.17 – 3.96), with no significant difference observed between PUS and CTL. An increase in days in milk (DIM) at the time of sampling was significantly associated with a decrease in the odds ratio for EC recovery from intrauterine swabs (OR = 0.94, 95% CI: 0.89 – 0.98). All intrauterine EC were resistant to ampicillin (AMP), with an AMR prevalence of 30.2% and 33.9% observed for chlortetracycline and oxytetracycline, respectively. Only 8.6% of isolates were resistant to ceftiofur (CEFT), one of the most common drugs used to treat cows on the study

farms. No significant difference in the prevalence of AMR was observed among clinical groups. A significantly higher odds for isolating intrauterine *E. coli* resistant to chlortetracycline (OR: 2.6; 95% C.I: 3.7 – 58.0) or oxytetracycline (OR: 1.9; 95% C.I: 1.4 – 33.8) was observed at farms that used an intrauterine infusion of oxytetracycline as a treatment for metritis when compared to those farms that did not use this practice.

Significance

The low prevalence of AMR to CEFT indicates its potential as an effective treatment of metritis of cows. Resistance of all isolates to AMP was unexpected, and discordant with previous field clinical studies using AMP for the treatment of metritis, using older MIC breakpoint references; this supports the need for more research related to pharmacokinetics, pharmacodynamics and definition of antimicrobial breakpoints for AMP within cattle uterine tissues and infections.

