

# Associations with selective antimicrobial use practices in adult dairy cattle

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## Introduction

A cross-sectional study was conducted to characterize and evaluate dairy producers' attitudes and practices on antimicrobial use (AMU) and antimicrobial resistance (AMR).

## Materials and methods

U.S. dairy producers (n = 1,000) in 5 states (Florida, Michigan, Ohio, Vermont and Wisconsin) were selected using stratified random sampling. The questionnaire included questions probing 1) producers' demographics and farm characteristics, 2) producers' attitudes toward AMU and AMR, 3) on-farm treatment protocols and recording, and 4) treatment responses to metritis vignettes (hypothetical cases). Three vignettes described clinical signs typically observed in cows with mild, moderate and severe metritis. Producers' level of agreement for 14 statements regarding general AMU and AMR were descriptively summarized. Producers that indicated they would normally treat all 3 described cases with antimicrobials were considered using antimicrobials non-selectively, whereas those only treated moderate and/or severe vignettes were selective users. Producers that did not choose AMU for 3 vignettes and those chose to use antimicrobials for mild but not for moderate and/or severe vignette, and for moderate but not for severe vignette were excluded from analysis. Producers' level of agreement toward 14 statements regarding AMU and AMR were descriptively analyzed. The effect of producers' demographics and farm characteristics, attitudes toward AMU and AMR, and on-farm treatment protocols on selective AMU was first screened by univariable logistic regression models, where those with  $P \leq 0.20$  were included in the final multivariable models. Variable with variance inflation factor  $\geq 10$  were excluded from the final model to avoid multicollinearity. Variables with  $P < 0.05$  in the final model were considered having significant effect on the selective AMU of dairy producers.

## Results

By May 2021, 315 usable responses (33.1%) were returned by U.S. dairy producers. Over 75% of producers had had discussion with their herd veterinarians about AMU and believed they could explain the concept of AMR to their neighbors. Approximately one-third of producers disagreed that antimicrobials were being overused in the dairy industry, on-farm AMU could cause AMR in humans, and selective dry-cow therapy was more appropriate than blanket therapy. Using univariable models, certain variables related to producers' demographics, attitudes, treatment protocols, and farm characteristics were screened included in the final multivariable models by the univariable models. After excluding correlated collinear variables, the final model reported that who went to college were 12.5 times more likely to use antimicrobials selectively than those did not finish high school ( $P = 0.04$ ).

## Significance

Farm characteristic and producers' demographic were associated with selective AMU practices on U.S. dairy farms. Producers who went to college were more likely to indicate selective use of antimicrobials for treating cows with metritis. These qualities can inform additional research to better understand how to implement best practices on farms.

