

# Development and implementation of an on-farm animal health and diagnostic educational training program for farm workers in antimicrobial stewardship in adult dairy cattle

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## Introduction

Antimicrobial stewardship (AMS) is a holistic approach, which promotes judicious use of antimicrobial drugs to preserve their effectiveness and availability. Dairy farm workers are commonly responsible for disease diagnosis and routine treatment decisions. This highlights the importance of farm workers' knowledge and skills to successfully implement judicious use of antimicrobials in livestock production systems. Knowledge gaps in animal health and behavior have been recognized before as an important reason to provide training to farm workers. A better understanding of cattle sickness behavior will improve early identification of clinical signs of disease and improve treatment success. The main objective of this project was to develop and implement an on-farm educational training program for farm workers in antimicrobial stewardship in adult dairy cattle.

## Materials and methods

A longitudinal quasi-experimental study design was used by enrolling a total of 18 conventional dairy farms in the United States (9 in California and 9 in Ohio), with 6 farms allocated to the training intervention group (TG) and 3 in the control group (CG) in each state. For the TG, farm worker(s) responsible for treatment decision on the farm participated in a didactic and hands-on 12-week training program led by the investigators. All the training materials were pilot-tested to evaluate overall understanding of the training program. All materials were available in Spanish and English. Interactive short videos with audio were developed to cover objectives for each of the 6 teaching modules (antibiotic resistance, treatment protocols, and visual identification of sick animals, clinical mastitis, puerperal metritis, and lameness). Printed materials were used to reinforce the learning objectives of the modules, and a hands-on session focused on clinical examination of sick animals was also included as part of the training program. Pre- and post-training assessments were administered to evaluate changes in

knowledge about AMS. Change in knowledge was evaluated through 27 multiple choice/single answer and multiple choice/multiple answer questionnaire, with a maximum score of 27 points overall. Paired t-tests were used to confirm whether scores were significantly higher post-training compared with pre-training.

## Results

A total of 25 workers completed the training program. Of the 25 participants, 48% (n = 12) were enrolled in CA and 52% (n = 13) in OH. A median of 2 workers were enrolled in each farm (range: 1 - 5). Self-identified females represented 12% of the participants (n = 3) while 88% (n = 22) self-identified as male. Training assessments were answered in Spanish by 68% of the participants (n = 17) and in English by 32% (n = 8). Results from the pre-training assessment showed that participants had important knowledge gaps for the identification of sick animals and disease diagnosis (e.g., correct identification of disease, classification of disease severity). Based on the results from the post-training assessment, improved knowledge on antimicrobial stewardship practices and diagnosis of sick animals were detected (e.g., use of clinical signs for disease identification). A significant difference was detected between the mean pre- and post-training assessments scores at 10.85 (range: 1.69 - 23.42) and 19.15 (range: 4.18 - 24.27), respectively; paired t-test:  $t(24) = -4.62, (P < 0.0001)$ .

## Significance

Knowledge of participants on AMS and identification of sick animals improved after completing the educational training program. This improvement emphasized the potential value for educational training program tailoring farm workers for improving antimicrobial stewardship knowledge.

