

TITLE: Zoonotic pathogens and antibiotic resistance near concentrated animal feeding operations and among dairy farmworkers and community members in California's Central Valley

ABSTRACT:

Background: Fecal waste from concentrated animal feeding operations (CAFOs) is a known reservoir of antibiotic-resistant bacteria (ARB) and contaminants from these industrial cattle, poultry, and swine farms can pollute air, soil, and waterways. CAFO workers, their household members, and residents of high-density CAFO communities are at risk of livestock-associated bacterial and antibiotic-resistant infections. Evidence to date is largely focused on multidrug-resistant *Staphylococcus aureus* (MRSA) on hog and poultry farms. There is a need to characterize occupational and community health risks associated with concentrated cattle operations in the U.S., especially in California's Central Valley, a high-density CAFO regions with low-income, Latinx CAFO communities.

Research Objective: Our objective is to determine which zoonotic pathogens and types of antibiotic resistance are present in environmental exposure pathways, CAFO workers, and residents in communities with versus without CAFOs in the Central Valley of California.

Methods: We will partner with Tracking California and the Central California Environmental Justice Network (CCEJN) to lead this community-engaged pilot study. Using evidence from community focus groups and a geocoded list of licensed dairy farms in the state of California provided by the CA State Water Boards, we will identify at-risk communities in the Central Valley and CAFOs for inclusion in this study. We will sample air, soil/sediment, well water, and household dust to detect pathogens and antibiotic resistance in possible exposure pathways in two communities with at least five CAFOs within a 5-km radius from the community center, and in two communities with no CAFOs within a 10-km radius from the community center for comparison. From each of these communities, we will also collect biological samples (nasal and rectal swabs) from CAFO workers, their household members, and other community members to detect human carriage of pathogens and antibiotic resistance. In total, we will collect 200 biological samples from 100 participants (2 samples each), 160 environmental samples at 40 participant households (4 samples each), and 80 environmental samples at 20 CAFO fencelines (4 samples each). We will compare three innovative microbiological and molecular approaches for the detection of antibiotic resistant bacteria and antibiotic resistance genes in humans, as well as environmental reservoirs at the workplace and in the home.

Goal & impact: The proposed project will compare and optimize field and laboratory methods to inform a future cohort study, which will assess health impacts of CAFOs on farm workers and

community members from an environmental justice and equity lens. Preliminary data from this pilot study will lead to impactful research with major policy implications on antibiotic use, waste management, and community health in cattle-producing regions across the U.S. and globally.