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## Environmental factors in the development of antimicrobial resistant bacteria at dairy facilities

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The increased use of antibiotics is a major promotor for microorganisms to acquire antibiotic resistance. Once airborne, the genes can be transported via wind and be introduced into new bacterial species by vertical gene transfer. This can eventually lead to the development and dissemination of multidrug resistance in bacterial communities, which poses a serious threat to animal and human health. This is especially true in open dairy farms where environment plays a significant role. Not only is wind blowing from all four sides of the dairy farm, but there were also 36 axial fans that were used for evaporative cooling. Twenty-three manure samples were collected from a dairy facility in Stephenville, Texas for antibiotic resistance screening. Once a single bacterial isolate was separated from each sample, Kirby-Bauer test was performed. The same procedure was carried out after a few months, this time with 10 manure and 10 air samples. The antibiotic resistance test revealed that bacteria located in the more shaded region of the farm were more resistant to certain antibiotics, such as ampicillin, cephalothin, and tetracycline, compared to those that received more sunlight. A three-dimensional model of the dairy farm with the fans was constructed using a computational fluid dynamics (CFD) software called OpenFOAM. The airflow model of the barn was calculated and simulated according to the blueprint of the building and fan specifications to track the movement of the antibiotic resistant genes across the dairy farm. The next step is to sequence the bacterial DNA for each isolate to determine which species carry the antimicrobial resistance genes and to validate the simulation data with the air sample data.

### Biography

Hyoungmook Pak is a graduate student pursuing a Master's degree in Biotechnology. His research focus is currently on antimicrobial resistance and airflow modeling using a computational fluid dynamics (CFD) software known as OpenFOAM. He grows and isolates bacteria cultures from air and manure to identify their level of antibiotic resistance and sequence them to identify their species.

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