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My research falls within the scope of environmental microbiology with a focus on predicting fate and transport of fecal bacteria through soils using an advection-dispersion model. Pathogens contaminate surface and ground waters predominately via runoff from agricultural fields, which are the major landscape component in the northwest Ohio Lake Erie watershed. Edge-of-field buffer strips are a passive management strategy that reduces the densities of pathogens that may reach the local watershed. This research aims to verify the predictive capacity of an advection-dispersion model to describe transport of bacteria through the soil of a model buffer strip (shown below) and use the model to predict the soil components and path length necessary to reduce the densities of two fecal indicator bacteria, *Escherichia coli* and *Enterococcus hirae*, to achieve 235 and 33 CFUs/100 mL (colony forming units), respective densities established by the U.S. Environmental Protection Agency (EPA) Surface Water Regulations (SWRs). Through the use of site measures (soil type, hydraulic conductivity and density of bacteria in runoff) and the advection-dispersion model we can improve current best management practices (BMPs) by making them location specific.