

Assessing Farm-Source *E. coli* and *Salmonella* Mobility to Water.

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Grant Number: 2008-35102-04462

Justification

Microbial pathogens, such as *Salmonella* and *Escherichia coli*, are continually deposited in the environment and have been shown to contaminate groundwater by leaching through the vadose zone. Therefore, understanding the factors influencing the transport of these pathogens through porous media is critical to protecting drinking water supplies.

Objectives

To assess the mobility of *E. coli* and *Salmonella* enterica isolates in soils with laboratory and field experiments.

Progress to date

The laboratory study investigated the relationship between biofilm formation and curli production and the transport of environmental *Salmonella* through porous media. Thirty two *Salmonella* isolates were initially assayed for their ability to form biofilms, from which a subset of these was selected to represent a range of high and low biofilm and curli formation capabilities. These were subsequently examined in unsaturated sand columns for transport characteristics (Figure 1). No obvious correlation was observed between *Salmonella* phenotypes and column retention. The results indicate that while transport of well-characterized laboratory *E. coli* strains can often be hindered by the presence of curli and the ability to form biofilms, the presence of curli did not retard the transport of the *Salmonella* strains.

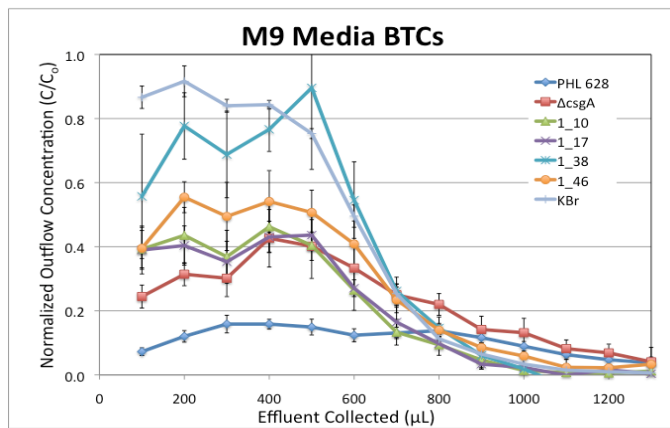


Figure 1: Breakthrough curves of M9-suspended bacteria sand columns. Data shown are *E. coli* strains, PHL628 (dark blue diamond) and $\Delta csgA$ (red square), and *Salmonella* sp. I-10 (green triangle), I-17 (purple cross), I-38 (light blue star), I-46 (orange circle). A conservative tracer, KBr (lavender dash) is also shown. Results are averages from 8 replicate columns, and error bars represent one standard deviation from the mean.

that in the manure and in the surface soils, indicating preferential transport of the some strains through the soils above the tile lines.

Impact and Publication

Results can be used to better assess transport of *E. coli* and *Salmonella* enterica isolates to drinking water wells.

Salvucci, A.E., W. Zhang, V. L. Morales, M. E. Cakmak, A. G. Hay, T. S. Steenhuis. 2009. Role of biofilms and curli in environmental *Salmonella* transport through unsaturated porous media, *Biologia*. In Press.