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Antecedent growth conditions cause large changes in adhesion and transport in periodically wetted porous media within a collection of environmental *Escherichia coli* isolates

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While *E. coli* is the most widely used indicator of faecal pollution, its physical transport in the environment is ill-studied. We have quantitatively examined the surface characteristics of a set of environmental *E. coli* isolates with antecedent growth conditions that mimic *intestinal* or *external* environments and observed that most strains become significantly more hydrophobic and more biofilm-forming on abiotic surfaces under *external* conditions. Eight isolates were selected to conduct operational retention tests (ORT) in columns filled with various porous materials (0.5 mm glass beads, or similarly-sized Pyrax® or dolomite minerals). The minerals were chosen because of their hydrophobic surface properties, which might favor bacterial adhesion by postulated long-range attractive forces. The conditions in the ORT were chosen to simulate pulse application of a bacterial load followed by rainfall infiltration and then natural drainage. The degree of bacterial motility, surface hydrophobicity, Ag43 expression (auto-aggregation) all influenced surface attachment and transport in the ORTs. Flagella-mediated motility explained most of the variability for all tested mate-

rials; hydrophobicity was the second most important variable in cell retardation to the most hydrophobic substratum, dolomite. Ag43 expression was an important variant explaining *E. coli* retention in glass and dolomite columns. A significant variability in bacterial transport was observed across the *E. coli* isolate collection. *E. coli* O157:H7 was retained the least in the ORTs with all of the examined matrices. *E. coli* K-12 displayed moderate adhesion and may not be a proper model strain to predict *E. coli* transport. Overall, external growth conditions enhanced bacterial adhesion to all materials across the feedlot *E. coli* collection, and Pyrax® might serve as a good candidate biobarrier material given its superior removal ability across the tested *E. coli* strains.