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Exploring the relationship between attachment, transport and resistance of E. coli from swine systems

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Broad spectrum antibiotics, used to treat infections in farm animals, are often administered at subtherapeutic levels along with feed rations to promote growth and for prophylaxis. The presence of antibiotic-resistant bacteria in animal waste has raised concern related to their transport to surface and groundwater sources. Previous studies have shown that bacteria preferentially attach to sediments affecting their transport in overland flow; however, quantitative understanding regarding the attachment mechanisms and their relationship to virulence factors affecting human health is still mostly unknown. The objective of this study is to study the relationships between transport, resistance, and virulence in Escherichia coli collected from swine manure. Five hundred and fifty-six colonies were isolated from six locations, two organic and four with antibiotics in their feeding regime. Isolates were subjected to an attachment assay. Approximately 70% of isolates from non-organic and 53% from organic operations showed preferential attachment to sediments. Resistance was quantified using 13 antibiotics at susceptible, intermediate, and resistant MIC concentrations. Relationships between attachment and resistance were noted among the operation types for individual antibiotics screened. Finally, PCR was used to screen for known virulence genes in all 556 isolates. Of the virulence genes screened, only one appears to be directly related to preferential attachment and therefore sediment fate and transport. ext here.