

Title: Effect of surface characteristics of *Salmonella* Newport on the bacterial transfer during cucumber peeling

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Introduction: Fresh cucumbers have recently been recognized as a vehicle in foodborne disease outbreaks. Several US multistate outbreaks of salmonellosis have been linked to fresh cucumbers.

Purpose: Little is known about microbial cell surface characteristics known to affect adhesion on subsequent bacterial cross-contamination and transfer. This study determined the effects of surface characteristics of *Salmonella* on the transfer of *Salmonella* Newport from cucumber skin to interior flesh and peeler during peeling.

Methods: Wild type *Salmonella* Newport, and putative attachment mutants, JDB 279 (*rpoS::Tn10:lac:kan*) and JDB 287 (*Tn10:lac:kan* insertion in the *agfD/agfB* intergenic region) were used to inoculate cucumbers. Bacterial transfer from cucumber skin to the flesh and peeler during peeling was quantified. The attachment strength values (S_R) of *Salmonella* Newport to the cucumber surface were calculated using standard methods. Cell surface structures including curli, flagella, cellulose, and capsular polysaccharide expression of *Salmonella* Newport were also determined.

Results: The population of curli-positive *Salmonella* Newport wild type attached to the cucumber surface was greater than curli-negative mutant strains (JDB 279 and JDB 287). The S_R value of *Salmonella* Newport wild type on cucumber (0.998) was higher than that of JDB 287 (0.996) and JDB 279 (0.995) but not statistically significantly different. Increased attachment of *Salmonella* Newport wild type on cucumber surface resulted in the lowest transfer to the flesh and peeler during cucumber peeling. Relatively higher bacterial transfer to the flesh (-0.84 log %, $p=0.1346$) and peeler (-0.60 log %, $p=0.0277$) was observed during peeling of cucumbers inoculated with JDB 287 compared to the transfer of *S. Newport* wild type (-1.31 to -1.15 log %) and JDB 279 (-1.10 to -1.07 log %).

Significance: This study shows *Salmonella* attachment does affect subsequent bacterial transfer during cucumber peeling. The finds may help in the development of washing and/or peeling technologies to reduce *Salmonella* contamination risk.