Title Differences in attachment of *Salmonella enterica* serovars to cabbage and lettuce leaves

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Abstract

This study investigated the ability of five *Salmonella enterica* serovars to attach to and colonize intact and cut lettuce (Iceberg, Romaine) and cabbage surfaces. Biofilm formation and attachment of *Salmonella* serovars to intact and cut leaves were determined. Populations of loosely and strongly attached *Salmonella* were obtained to calculate the attachment strength (S_R). Biofilm formation, as determined by microtiter plate assay, varied with strain and growth medium used. *Salmonella* Tennessee and *S.* Thompson produced stronger biofilms compared to *S.* Newport, *S.* Negev, and *S.* Braenderup. Biofilm formation was also stronger when *Salmonella* spp. were grown in diluted TSB (1:10). *S.* Tennessee, which produced strong biofilms, attached to produce surfaces at significantly higher numbers than the populations of *S.* Negev. Overall, *S.* Tennessee displayed more biofilm formation *in vitro* and attached more strongly to lettuce than other serovars. All *Salmonella* serovars attached rapidly on intact and cut produce surfaces. *Salmonella* spp. attached to Romaine lettuce at significantly higher numbers than those attached to Iceberg lettuce or cabbage. *Salmonella* attached preferentially to cut surface of all produce; however, the difference between *Salmonella* populations attached to intact and cut surfaces was similar ($P > 0.05$). *Salmonella* attachment to both intact and cut produce surfaces increased with time. The overall attachment strength of *Salmonella* was significantly lower on cabbage (0.12) followed by Iceberg (0.23) and Romaine lettuce (0.34). Cabbage, intact or cut, did not support attachment of *Salmonella* as well as Romaine lettuce. Understanding the attachment mechanisms of *Salmonella* to produce may be useful in developing new intervention strategies to prevent produce outbreaks.