

Title: Virulence of layer farm or egg associated *Salmonella* isolates
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Summary

Salmonella infection is one of the most common foodborne infections worldwide, including Australia. Despite the fact that eggs produced in Australia are of high quality and safety, eggs have been implicated in several *Salmonella* foodborne disease outbreaks. Major studies that investigated the pathogenicity of *Salmonella* serovars for human epithelial cells have been mainly focused on *Salmonella* Enteritidis or *Salmonella* Typhimurium to some extent. The authors' hypothesis was that not all *Salmonella* isolates/serovars recovered specifically from layer farm environments or eggshell wash have the same level of virulence. Thus the main objective of the study was to identify the *Salmonella* serovars isolated from egg wash and poultry environmental samples with high or low invasiveness for human epithelial cells and animal models, and also to study their ability to colonise or invade cells from the chicken oviduct.

The predominant *Salmonella* serovars were used in this study. The isolated *Salmonella* serovars were tested by PCR for virulence genes. The invasion potential of the *Salmonella* serovars was tested in a well-differentiated human intestinal cell culture model and also by cell invasion assay. The results were further confirmed by *in vivo* invasion assay in a *Salmonella* mouse model. The *Salmonella* serovars with high invasive ability were also tested for their ability to invade the oviduct organ culture. *Salmonella* Typhimurium infection in laying hens was also investigated.

PCR was a rapid method for *Salmonella* spp. detection. This tool was not conclusive for discriminating virulent or non-virulent *Salmonella* serovars. *In vitro* results of virulence typing of *Salmonella* serovars indicated that the *Salmonella* Typhimurium definitive types DT44, DT135, DT170=108, DT193, as well as *S. Virchow*, all remained highly invasive. The findings of intestinal epithelial invasive assays suggest that some strains of *Salmonella* require prior enrichment to stimulate virulence. It is possible to raise *Salmonella* free birds, provided that good hygiene, sanitation and biosecurity conditions are maintained. *S. Typhimurium* DT9 was able to persist in the gut of laying hens for up to 16 weeks post infection. All egg contents were negative for *S. Typhimurium*.