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## Insights and Challenges of *Salmonella* Infection of Laying Hens

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### Abstract

*Salmonella* infection of laying hens and subsequent contamination of eggs continues to be a public health concern. The focus of this review is to discuss some of the current and future issues that impact *Salmonella* association with laying hens and egg contamination. Among these issues are the impact of shifting to alternative cage free layer hen housing and away from cage batteries. Most of the focus will be on *Salmonella* Enteritidis as the serotype primarily associated with laying hens and the mechanisms that ensure its successful colonization, infection and subsequent contamination of table eggs. The variability in virulence and survival characteristics among *S. Enteritidis* strains will also be discussed including studies on detailed characterization at the molecular level. Finally, the comprehensive assessment of the laying hen gastrointestinal tract microbiota to better understand *S. Enteritidis* colonization and the subsequent host response will be examined.

### Introduction

Eggs as a source of foodborne disease continues to be a concern. For the most part *Salmonella* is considered the primary foodborne organism associated with eggs and foodborne disease outbreaks originating from eggs and egg products. As more has become understood about the dynamics of bacterial egg contamination and the means that bacteria implement to overcome the antibacterial mechanisms inherent within the egg and its structure, improvements in egg processing, and recommendations for proper egg handling have been established. Consequently, efforts to construct egg wash water that does not support bacterial growth, managing temperatures to limit bacterial penetration into the eggshell and

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