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Immunization with *Salmonella enteritidis* secreting mucosal adjuvant labile toxin confers protection against wild type challenge via augmentation of CD3+CD4+ T-cell proliferation and enhancement of IFNc, IL-6 and IL-10 expressions in chicken

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The protective efficacy and immunological profiles of chickens immunized with an attenuated *Salmonella enteritidis* (SE) constitutively secreting double mutant heat labile enterotoxin (dmLT) were investigated. The dmLT is a detoxified variant of *Escherichia coli* heat labile toxin and is a potent mucosal adjuvant capable of inducing both humoral and cell-mediated immunity. In this study, four-week-old chickens were inoculated with SE-dmLT strain JOL1641, parental SE strains JOL1087 or phosphate buffered saline control. Peripheral blood mononuclear cells of SE-dmLT inoculated birds showed significant proliferation upon stimulation with SE antigens as compared to the control and JOL1087 groups ($P \leq 0.05$). One week post-challenge, the ratio of CD3+CD4+ to CD3+CD8+ T-cells showed a significant increase in the immunized groups. Significant increases in IFN-c levels were observed in JOL1641 birds immunized via oral and intramuscular routes. While immunizations with the JOL1087 strain via the intramuscular route also induced significant increase in IFN-c, immunization via the oral route did not trigger significant changes. Pro-inflammatory cytokine IL-6 was also elevated significantly in immunized birds; a significant elevation of IL-10 was observed only in oral immunization with JOL1641 ($P \leq 0.05$). JOL1641 immunized birds showed significant reduction of challenge bacterial-organ recovery as compared to JOL1087 and non-immunized birds. Collectively, our results revealed that immunization with the adjuvant-secreting *S. enteritidis* confers protection against wild type SE challenge via induction of strong cell proliferative response, augmentation of CD3+CD4+: CD3+CD8+ T-cells ratio and enhancement of IFN-c, IL-6 and IL-10 cytokine secretion.

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