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Evaluation of chitosan/alginate polymer blend for the oral delivery of a marketed fowl typhoid vaccine

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Achieving oral vaccination for all human and veterinary vaccines is of economic importance as well as safety from needlestick injuries. This study was undertaken to compare the immune responses of birds to marketed fowl typhoid vaccine given as an injection or orally. Sixty-day-old chicks were divided into three groups of twenty birds each. This comprised a negative control group NEG451 (non-vaccinated and non-challenged used as control for cytokine quantification), SC567 (injection route) and OCV 634 (oral route adjuvanted with chitosan/alginate biopolymers). Vaccination was done at 10 weeks and 14 weeks of age followed by challenge at 16 weeks of age. IgG was measured using ELISA and mRNA fold expression of IFN-γ in spleen was measured using RT-PCR. ELISA showed E-values of 0.05, 0.03 and 0.01 for OCV 634, SC 567 and NEG 451 respectively after primary vaccination. Also E-values were 0.10, 0.12 and 0.00 for OCV 634, SC567 and NEG 451 respectively after boost vaccination. The expression of IFN-γ in spleen calculated using the $2^{\Delta-}\Delta\Delta CT$ was upregulated with values of 1.97 and 0.75 for OCV 634 and SC 567 resp. Five days after challenge with three times the standard concentration of the virulent *S. gallinarum* 9 strain, the birds showed mild clinical signs of infection but without detectable shedding of the *Salmonella gallinarum* (SG). Six weeks after challenge, there was no mortality either in group OCV 634 or SC 567. In conclusion, fowl typhoid vaccination either by injection or oral route (containing the chitosan/alginate biopolymers) are effective in preventing mortality induced by infection. However, it is noteworthy to mention that the protective efficacy of the oral route is due to the chitosan/alginate biopolymers which coated the vaccine preventing destruction in the gastrointestinal tract.

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