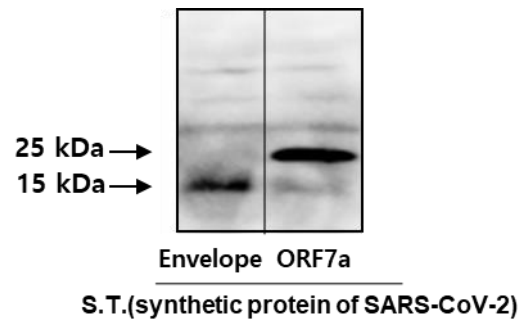
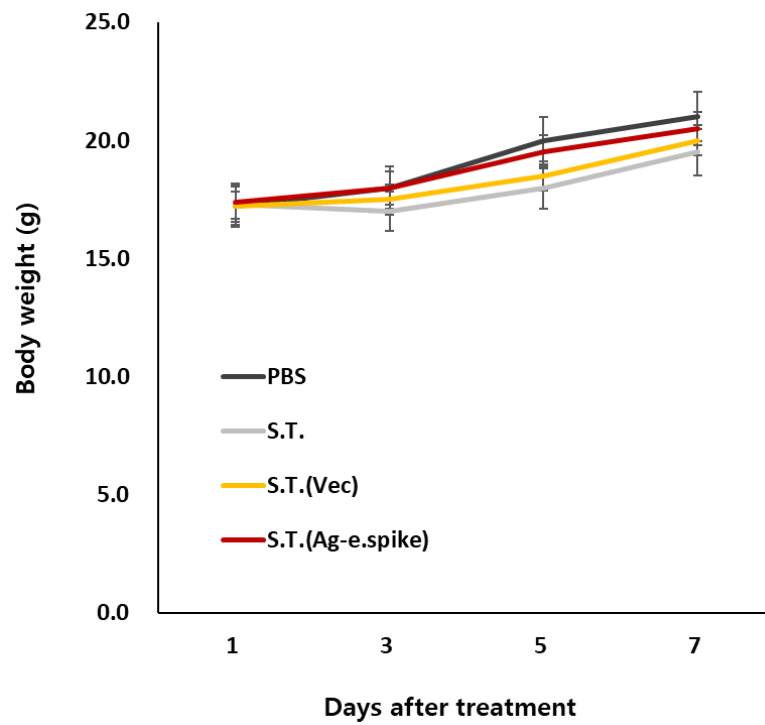


Supplement Figure S1



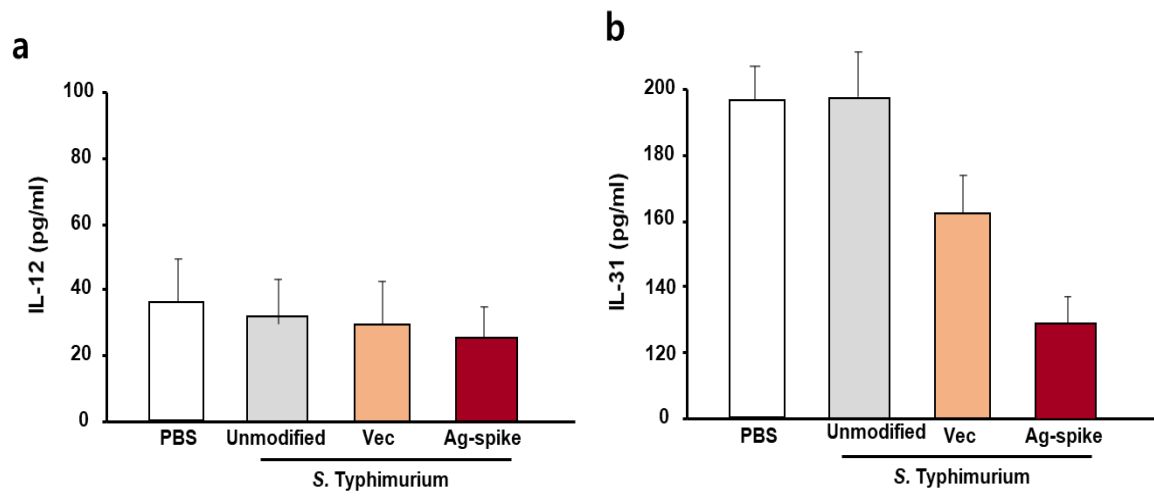
Supplementary Figure S1. Construction of *Salmonella* Typhimurium expressing engineered proteins of SARS-CoV-2 as an antigen. Expression of engineered protein (Envelope and ORF7a) of SARS-CoV-2 in genetically engineered *S. Typhimurium* was measured by western blot.

Supplement Figure S2



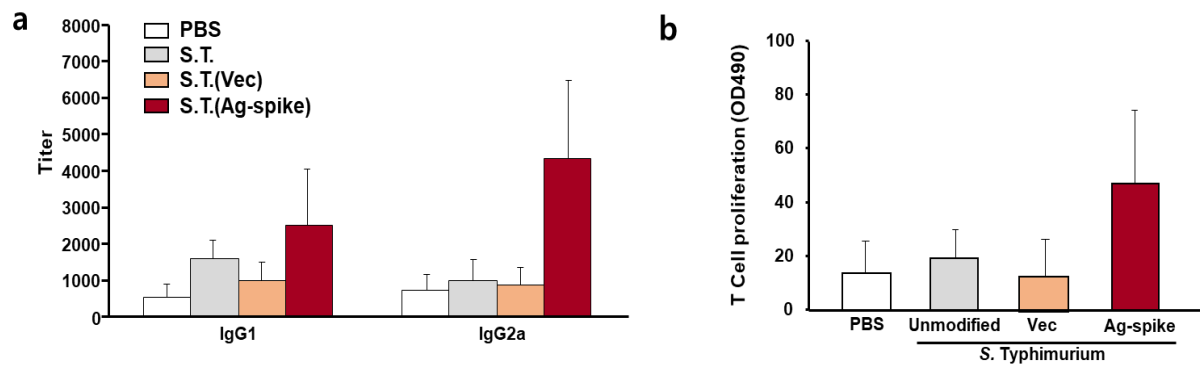
Supplementary Figure S2. *In vivo* effects of *S. Typhimurium* expressing Ag.e.spike. Body weight change was examined in mice after oral administration 1×10^7 bacterial cells for the indicated time.

Supplement Figure S3.



Supplementary Figure S3. Inflammatory cytokine analysis in mice. Mice were treated with PBS or 1×10^7 bacteria cells. Serum was collected 7 days after inoculation and Cytokines (IL-12, IL-31) levels were analyzed with enzyme-linked immunosorbent assay (ELISA).

Supplement Figure S4.



Supplementary Figure S4. *In vivo* effects of oral treatment with *S. Typhimurium* expressing Ag-spike. Balb/c mice were orally inoculated on days 1, 14, and 28 with PBS or with 1×10^7 CFU of attenuated unmodified *S. Typhimurium*, *S. Typhimurium* carrying the empty expression vector (vec), or *S. Typhimurium* expressing Ag-spike. **(a)** Sera at 6 week were reacted with *S. Typhimurium*/Ag-spike to determine IgG1 and IgG2a isotype titers. **(b)** T-cell proliferation in mouse spleen cells after orally immunization. CD4 T cells from mouse after oral inoculation with 10^7 CFU *S. Typhimurium*s were activated by spike protein and tests by MTT cell proliferation assay.