

Supplementary Materials for

Bioinspired oral delivery of gut microbiota by self-coating with biofilms

Xinyue Wang, Zhenping Cao, Mengmeng Zhang, Lu Meng, Zunzhen Ming, Jinyao Liu*

*Corresponding author. Email: jyliu@sjtu.edu.cn

Published 24 June 2020, *Sci. Adv.* **6**, eabb1952 (2020)
DOI: [10.1126/sciadv.abb1952](https://doi.org/10.1126/sciadv.abb1952)

This PDF file includes:

Figs. S1 to S10

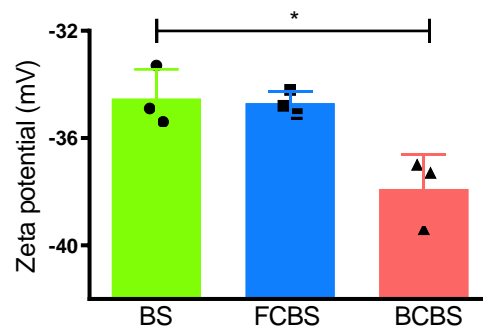


Figure S1 Zeta potential characterization. Zeta potential was analyzed by dynamic light scattering (Malvern Zetasizer nano ZS, UK). Error bars represent standard deviation ($n = 3$). Significance was assessed using Student's t-test, giving p values, $p < 0.05$, *.

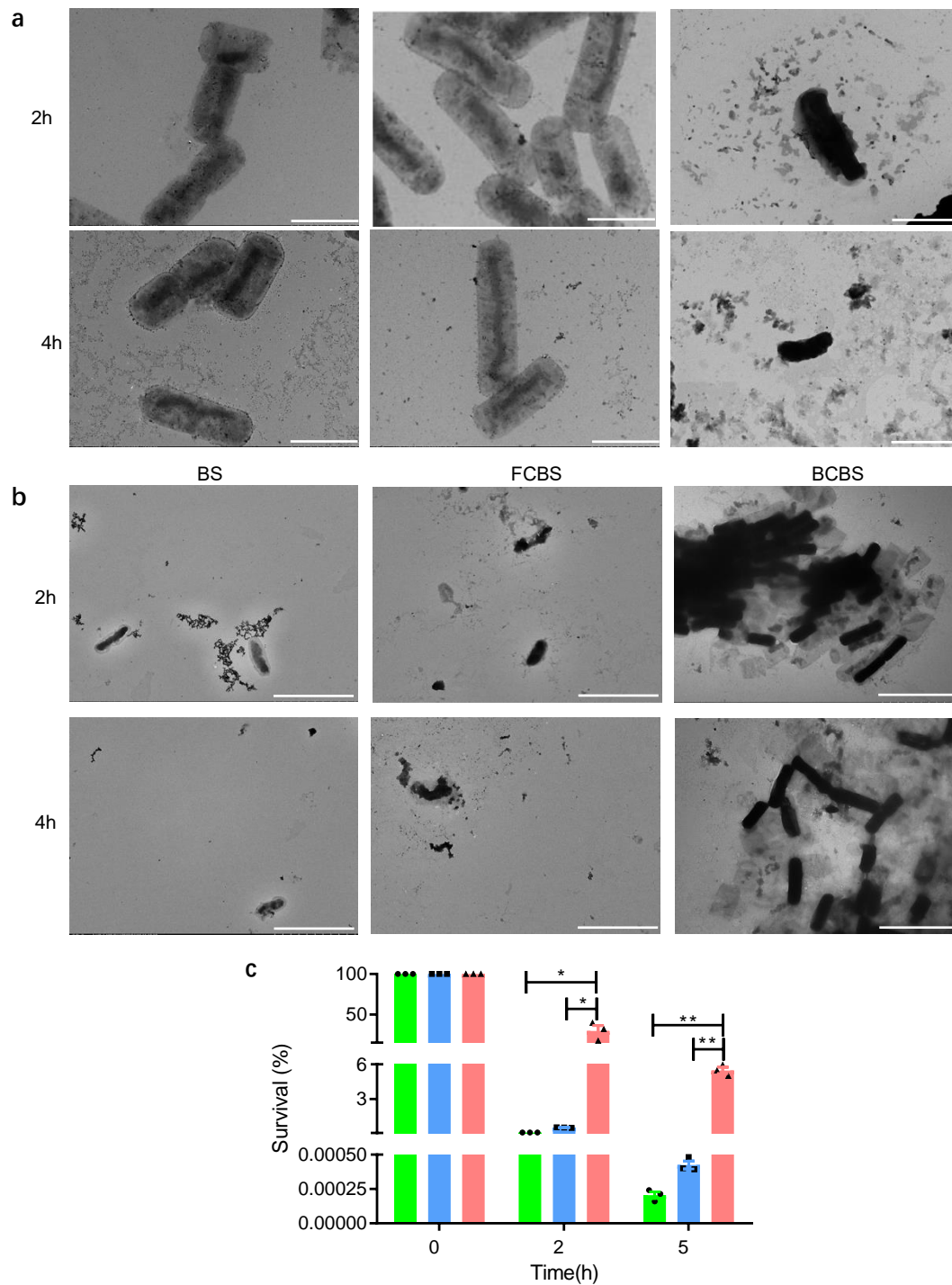


Figure S2 Resistance of the bacteria against environmental assaults. **a, b** TEM images of BS, FCBS and BCBS after culture in **(a)** SGF (pH 1.2) and **(b)** bile salts (0.3 mg/ml) at 37 °C for the indicated time points. Scale bar: **(a)** 2 μ m, **(b)** 5 μ m. **c** Equal amounts of BS (circle), FCBS (square) and BCBS (triangle) were separately exposed to ampicillin (10 mg/ml). After incubation at 37 °C for the indicated time points, 50 μ l of each sample was washed twice with PBS, spread onto LB agar plates and incubated at 37 °C for 24 hours before bacterial counting. Error bars represent standard deviation ($n = 3$). Significance was assessed using Student's t-test, giving p values, $p < 0.05$, *; $p < 0.01$, **; $p < 0.001$.

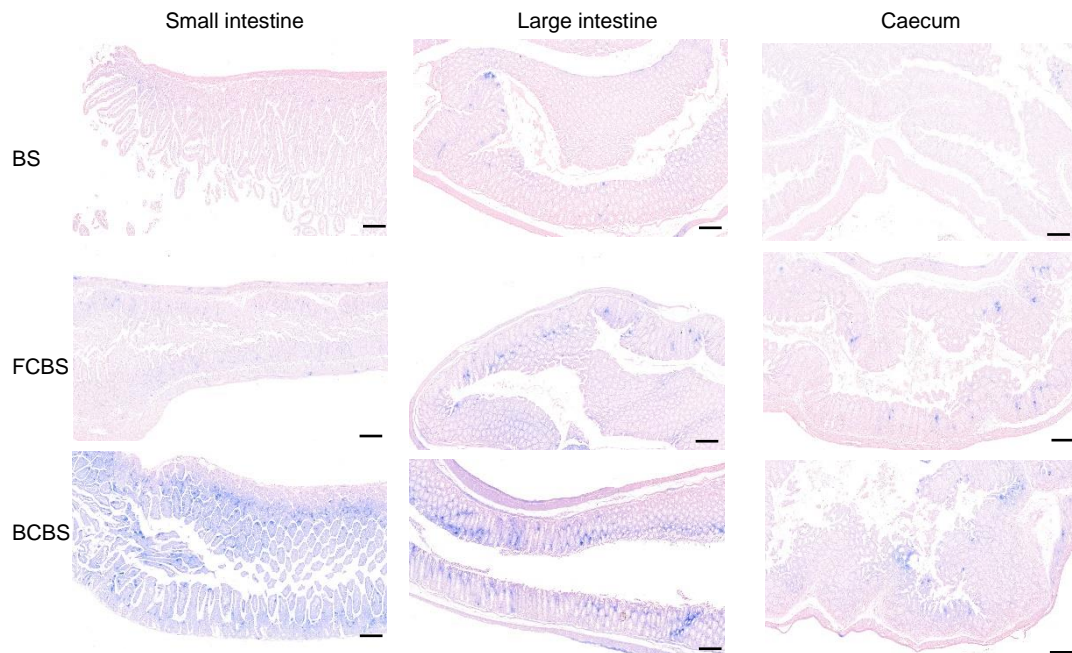


Figure S3 Mucoadhesion of BCBS in mouse intestines. Representative microscopic images of Gram staining of the intestines harvested from mice orally delivered with 1×10^7 CFUs of bacteria at 24 hours post-administration. Scale bar: 200 μm .

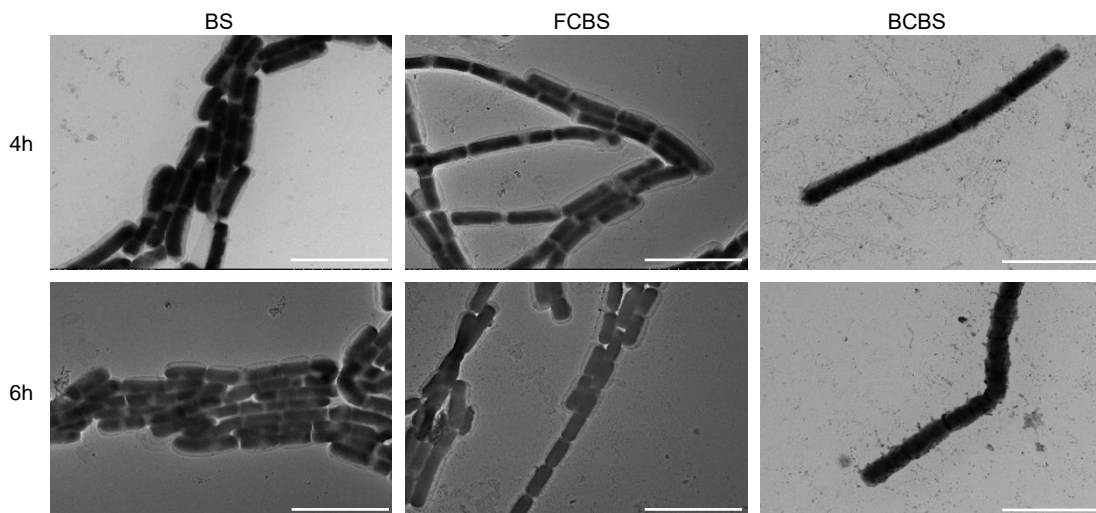


Figure S4 Bacterial viability. TEM images of BS, FCBS and BCBS after culture with SIF at 37 $^{\circ}\text{C}$ for the indicated time points. Scale bar: 5 μm .

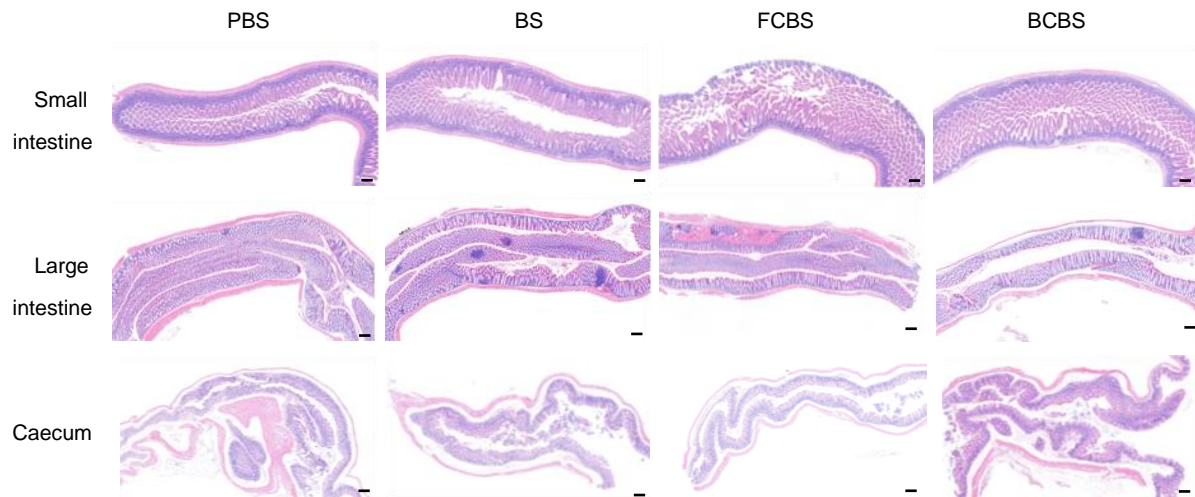


Figure S5 Biosafety in mice. Representative H&E staining images of mouse intestines harvested from mice orally administrated with 1×10^7 CFUs of bacteria at 120 hours post-administration. Scale bar: 200 μm.

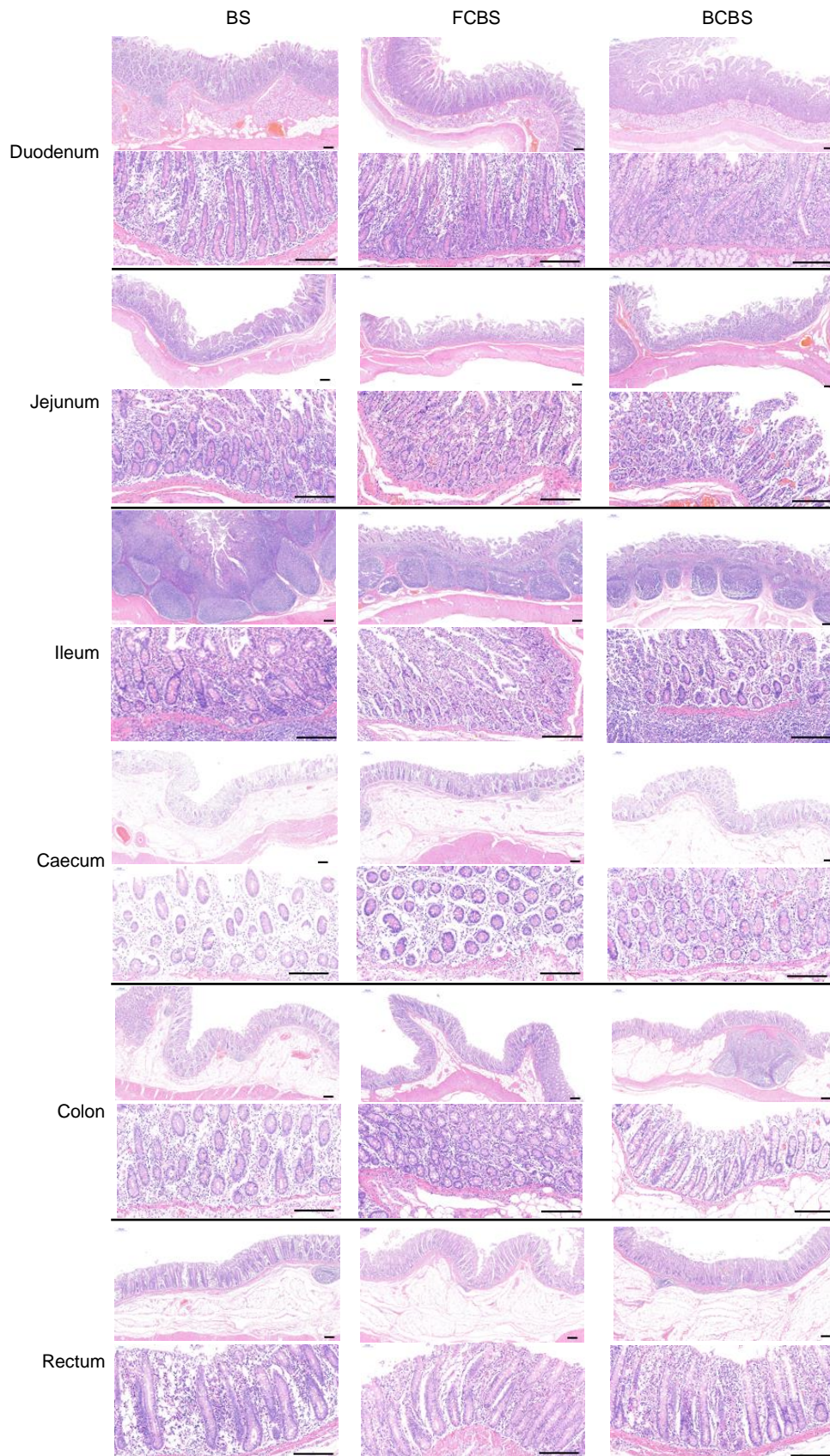


Figure S6 Biosafety in swine. Representative H&E staining images of intestines harvested from swine orally administrated with 3.5×10^8 CFUs of bacteria at day 8 post-administration. Scale bar: 200 μ m.

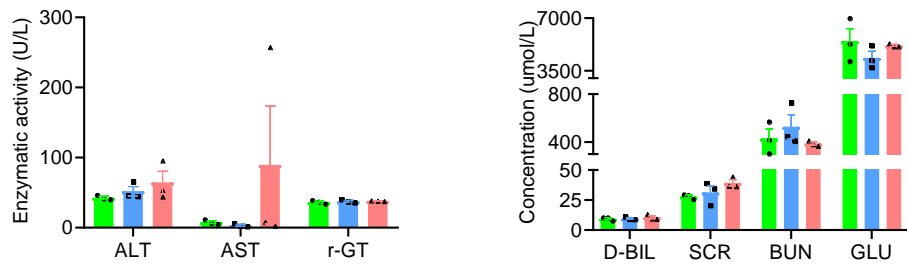


Figure S7 Cytokine assays. Liver function tests including ALT, AST and r-GT. Kidney function tests containing D-BIL, SCR, BUN and GLU. The blood samples were withdrawn from swine orally administrated with 3.5×10^8 CFUs of bacteria at day 8 post-administration. Circle, square and triangle represent BS, FCBS and BCBS, respectively.

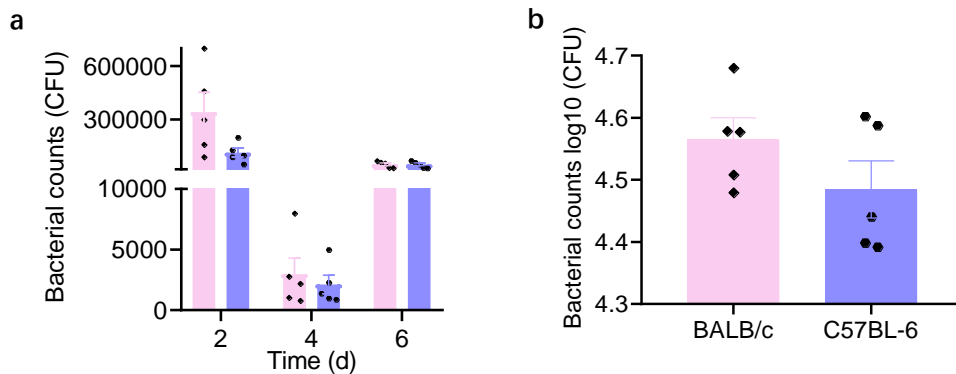


Figure S8 Intestinal colonization of *S. aureus* in mice. **a** Quantities of the colonized *S. aureus* in feces separately collected from BALB/c (tetragon) and C57BL-6 (hexagon) at the indicated time points. **b** Colonization of *S. aureus* in mouse intestines harvested at day 7 post-administration of 1×10^9 CFUs of *S. aureus*.

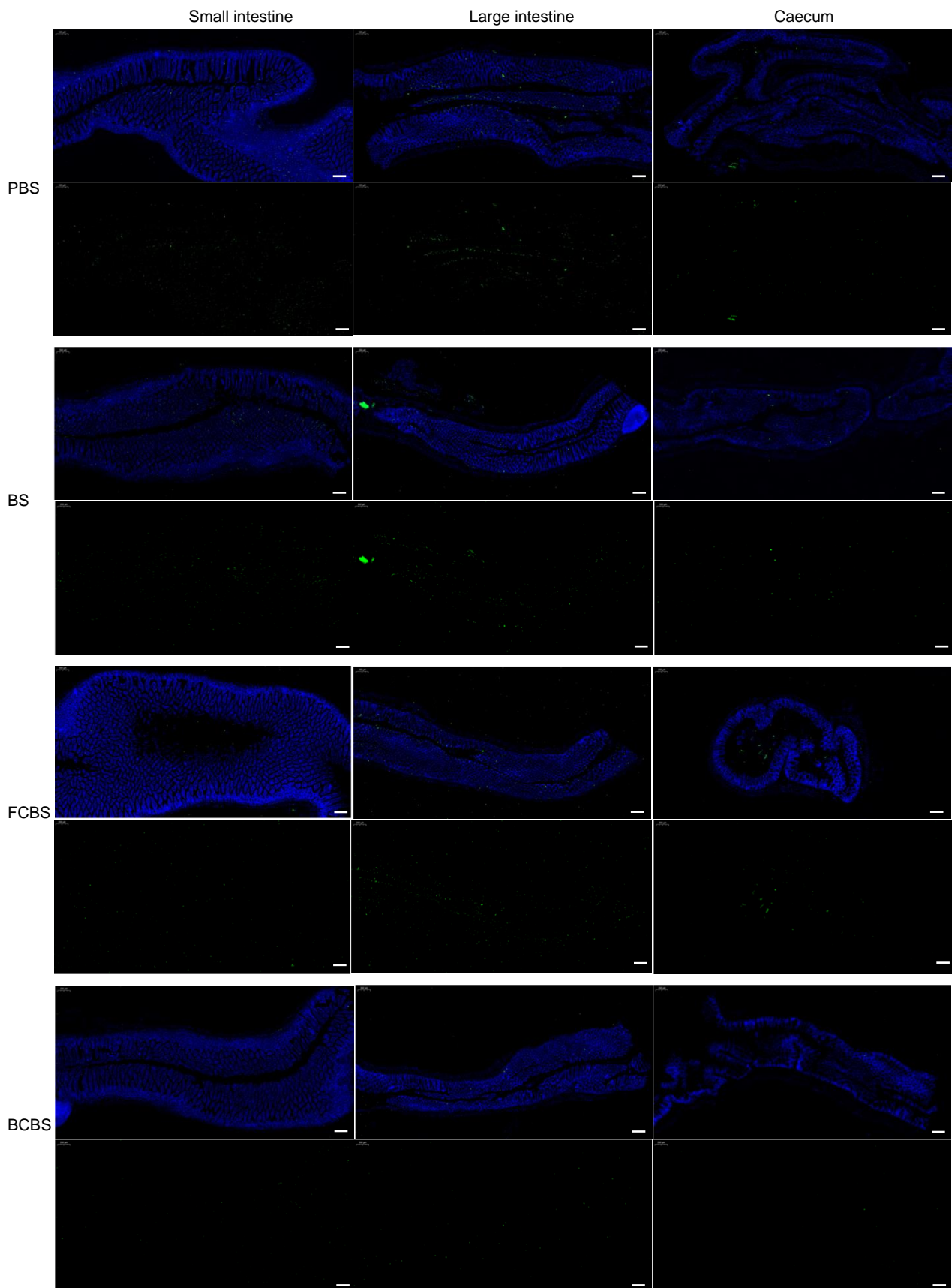


Figure S9 Treatment of intestinal colonization of *S. aureus*. Typical microscopic images of *S. aureus* colonized in the bowel wall 7 days post-treatment. Green fluorescence represents *S. aureus* colonized in the intestines. Scale bar: 200 μm .

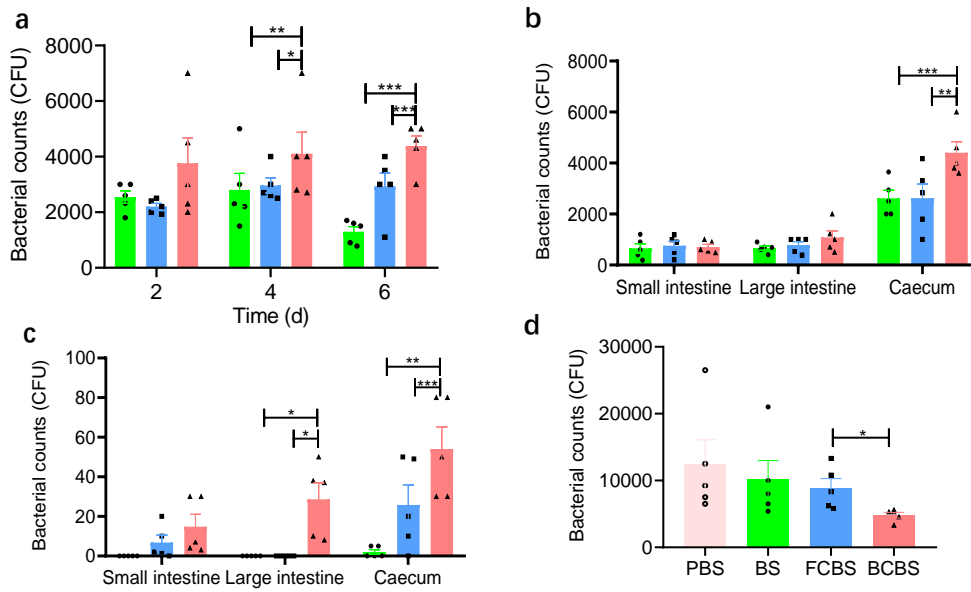


Figure S10 Reservation of BCBS in mice colonized with *S. aureus*. **a-c** Numbers of the colonized probiotics in **(a)** feces collected at the indicated time points as well as intestinal **(b)** contents and **(c)** tissues sampled 7 days post-treatment. Circle, square and triangle represent BS, FCBS and BCBS, respectively. **d** Amounts of *S. aureus* invaded in blood sampled from the mice 7 days post-treatment. Error bars represent standard deviation ($n = 5$). Significance was assessed using Student's t-test, giving p values, $p < 0.05$, *; $p < 0.01$, **; $p < 0.001$, ***.