

1 **SUPPORTING INFORMATION**

2 **Dynamic viscoelastic properties of EPS solutions and cryogels.** The
3 results of the small-amplitude oscillatory shear measurements of the 2% (w/v)
4 EPS solution and 2% (w/v) EPS cryogel are shown in Figure S1. Storage (G') and
5 loss (G'') modulus changes through frequency sweeps provide an understanding
6 of the structure of polymer solutions or gels. Figure S1A represents the frequency
7 sweeps of an EPS solution stored at 4°C for 96 h. The G' modulus was greater
8 than the G'' modulus in the frequency range studied; this indicates weak gel-like
9 behavior and strong frequency dependence in the mechanical spectra observed.
10 After freezing and thawing, the EPS solution exhibited a much stronger gel-like
11 behavior than the unfrozen sample, with high increases in both the G' and G''
12 moduli and a decrease in frequency dependence (Figures S1B and C). G' is
13 greater than G'' , and both moduli were completely independent in the frozen
14 samples; this is consistent with the behavior of cryogels.

15 At a defined frequency (10 Hz), the G' value of the EPS cryogels (23.5 ± 0.4
16 Pa) was 5 times higher than that of the EPS solutions (5.2 ± 0.5 Pa; Figure S1C).
17 This value correlates with $\tan \delta$ (G''/G'), which changes from 0.586 for the EPS
18 solution to 0.222 for the EPS cryogels. The $\tan \delta$ values for both solutions and
19 cryogels were lower than 1, indicating that the elastic properties are greater than
20 the viscous properties in both the samples. These results indicate an alteration
21 from weak-gel to strong-gel behaviors. These flow changes seem to be caused by

22 aggregation of the polysaccharide molecules during freezing and the exclusion of
23 solvating water in the freeze–thaw process.

24

25 **FIGURE LEGENDS**

26 **Figure S1.** Mechanical spectra of exopolysaccharide (EPS), measured at 25 °C.
27 Spectra of (A) 2% (w/v) EPS solutions refrigerated at 4°C for 96 h and (B) 2%
28 (w/v) EPS cryogels frozen at -20°C for 48 h and thawed at 4°C for 48 h. The
29 curves show changes in the storage modulus (G') and loss modulus (G'') as the
30 frequency increased.

31 **Figure S2.** Principal coordinates analysis (PCoA) of feces obtained from mice fed
32 5% microcrystalline cellulose (MCC; Con), 5% β -glucan (5% BG), 5% EPS, or
33 8% residue remaining after EPS isolation from kefir grains (8% Res) for 4 weeks
34 ($n = 5/\text{group}$).

Supporting Information

Fig. S1

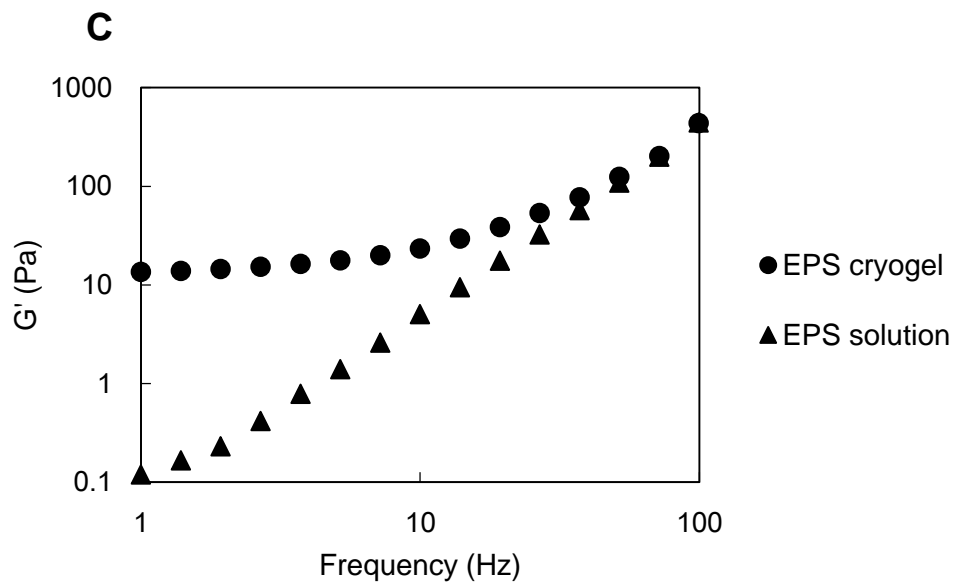
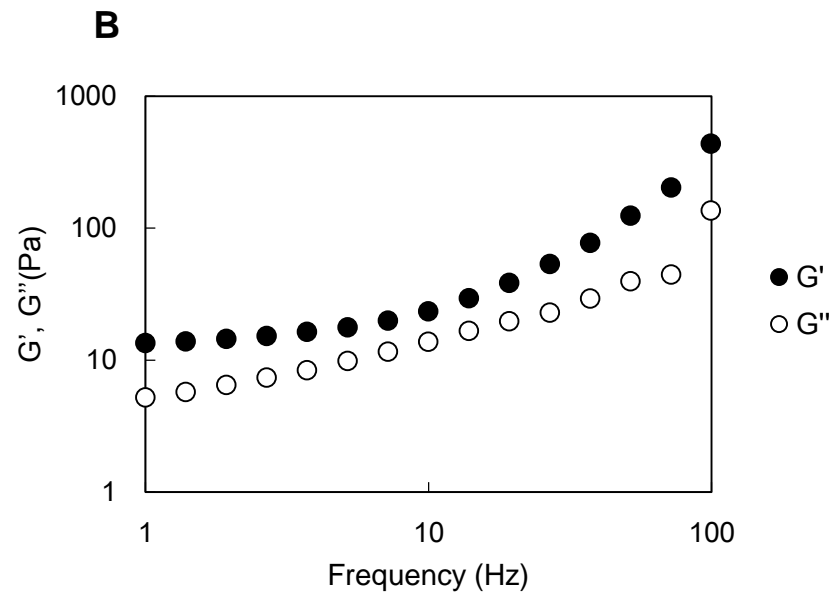
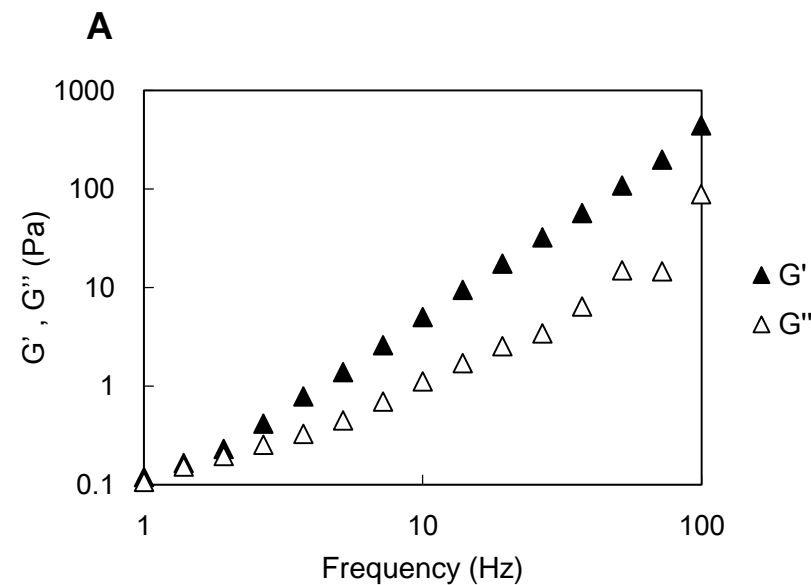


Fig. S2

