**Supplementary Figure 1.** The influence of dietary methionine restriction on symptoms in C57BL/6 adolescent mice. (A) Experimental protocol for dietary methionine restriction in adolescent mice. (B) Weight of mice. (C) The difference between the body weight of the mice on the last day and the body weight on the first day. (D) Water intake of mice. (E) Average daily water consumption per mouse. (F) Food intake of mice. (G) Average daily food consumption per mouse. (H) Difference between body temperature at the second hour after gluten challenge and the initial body temperature of mice. (I) Mice symptom score. (J) Number of scratches. (K) Mice behavioral observation score. (L) Mice fecal score. *\*P < 0.05*; *\*\*P < 0.01*; *\*\*\*P < 0.001*.

**Supplementary Figure 2.** The effects of dietary methionine restriction on small intestine (including duodenum, jejunum, and ileum) damage in adolescent mice.

**Supplementary Figure 3.** Influence of dietary methionine restriction on the intestinal flora of mice at phylum level. (A) The Alpha Diversity analysis. (B) The Beta Diversity analysis. (C) Species difference analysis at the phylum level. (D) Venn diagram of the number of species differences at the species level. *\*P < 0.05*; *\*\*P < 0.01*; *\*\*\*P < 0.001*.

**Supplementary Figure 4.** Functional joint analysis of metagenome and target short-chain fatty acid metabolomics in the *ko04973* pathway (carbohydrate digestion and absorption). (A) Metagenome mapping on the *ko04973* pathway. Darker colors represented higher enrichment. (B) Short chain fatty acids mapping on the *ko04973* pathway. The red color represented a significant up-regulation of metabolites. The blue color represented metabolites were detected but no significant change in levels. The green color represented a significant down-regulation of metabolites.

**Supplementary Figure 5.** Functional joint analysis of metagenome and target short-chain fatty acid metabolomics in the *ko04974* pathway (protein digestion and absorption). (A) Metagenome mapping on the *ko04974* pathway. Darker colors represented higher enrichment. (B) Short chain fatty acids mapping on the *ko04974* pathway. The red color represented a significant up-regulation of metabolites. The blue color represented metabolites were detected but no significant change in levels. The green color represented a significant down-regulation of metabolites.