

Figure.S1 Rarefaction curves of the three group.

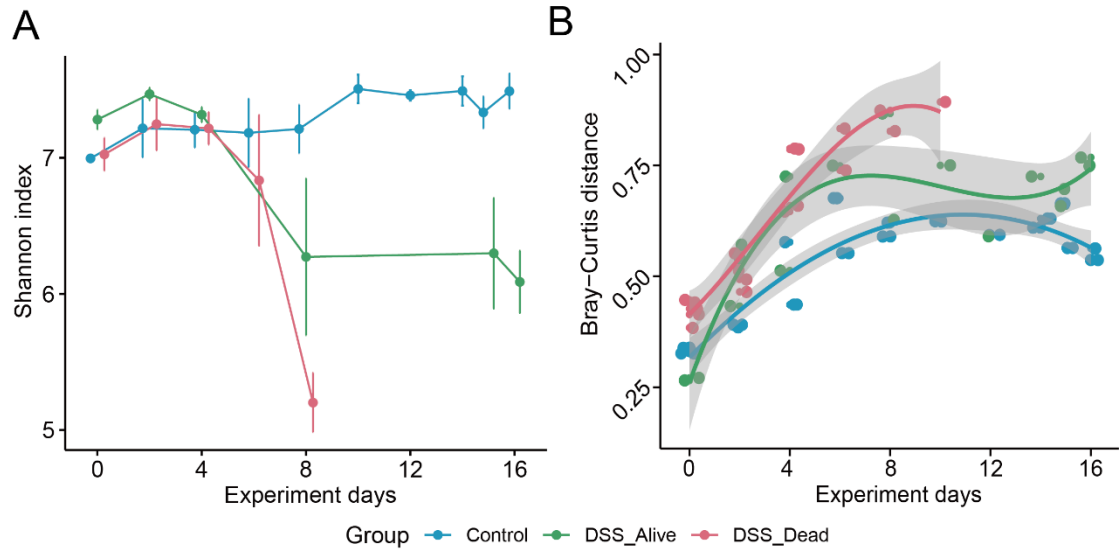


Figure.S2 The alpha and beta diversity of the three group over experiment time.
 (A) Changes of Shannon index over time for three groups. (B) The change of Bray-Curtis distances over experiment time.

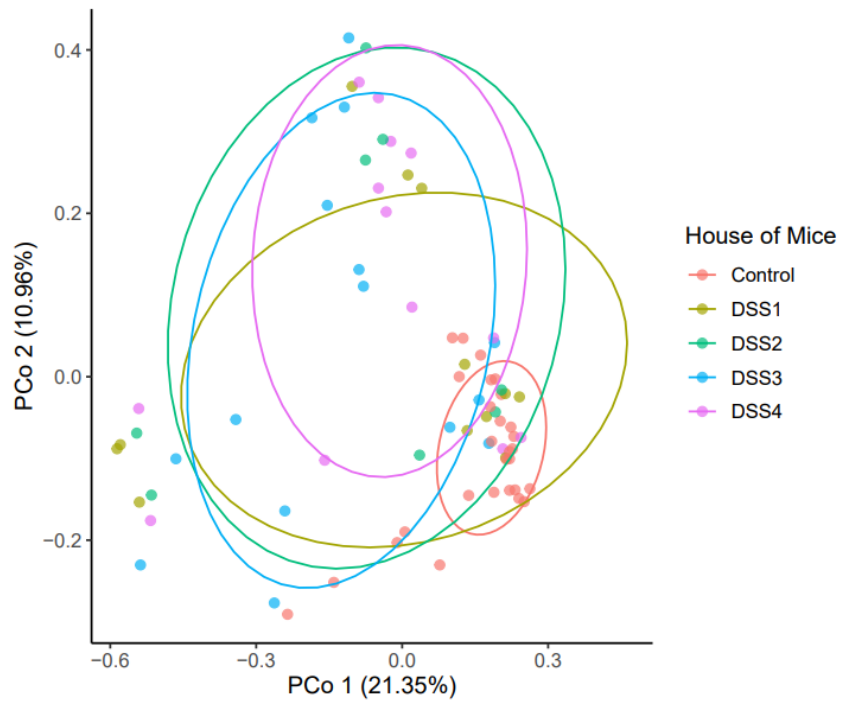


Figure.S3 Beta diversity of different cages analyzed by PCoA.

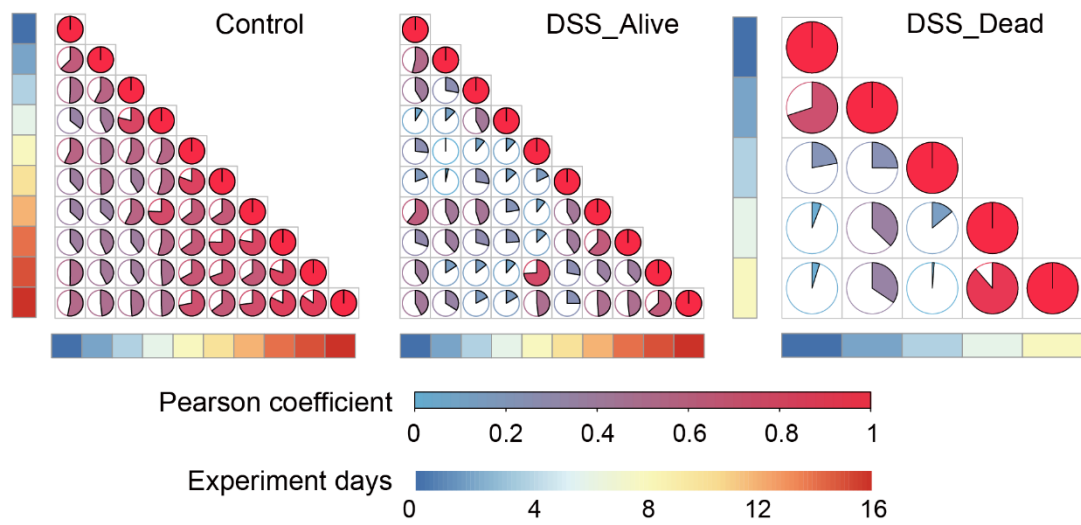


Figure.S4 The analysis of beta diversity within the three group. Pearson correlation analysis showing the correlation between experimental time and changes in microbial community structure for each group in the Control, DSS_Alive and DSS_Death. The area and color of each pie chart means the Pearson coefficient of two corresponding samples.

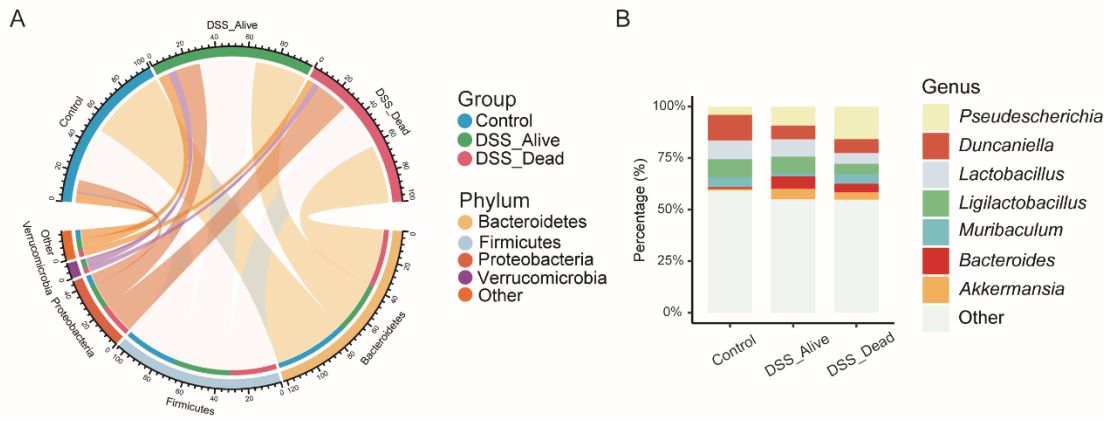


Figure.S5 The analysis of microbial composition at different taxonomic levels. The figures present the microbial composition at the levels of phylum (A) and genus (B).

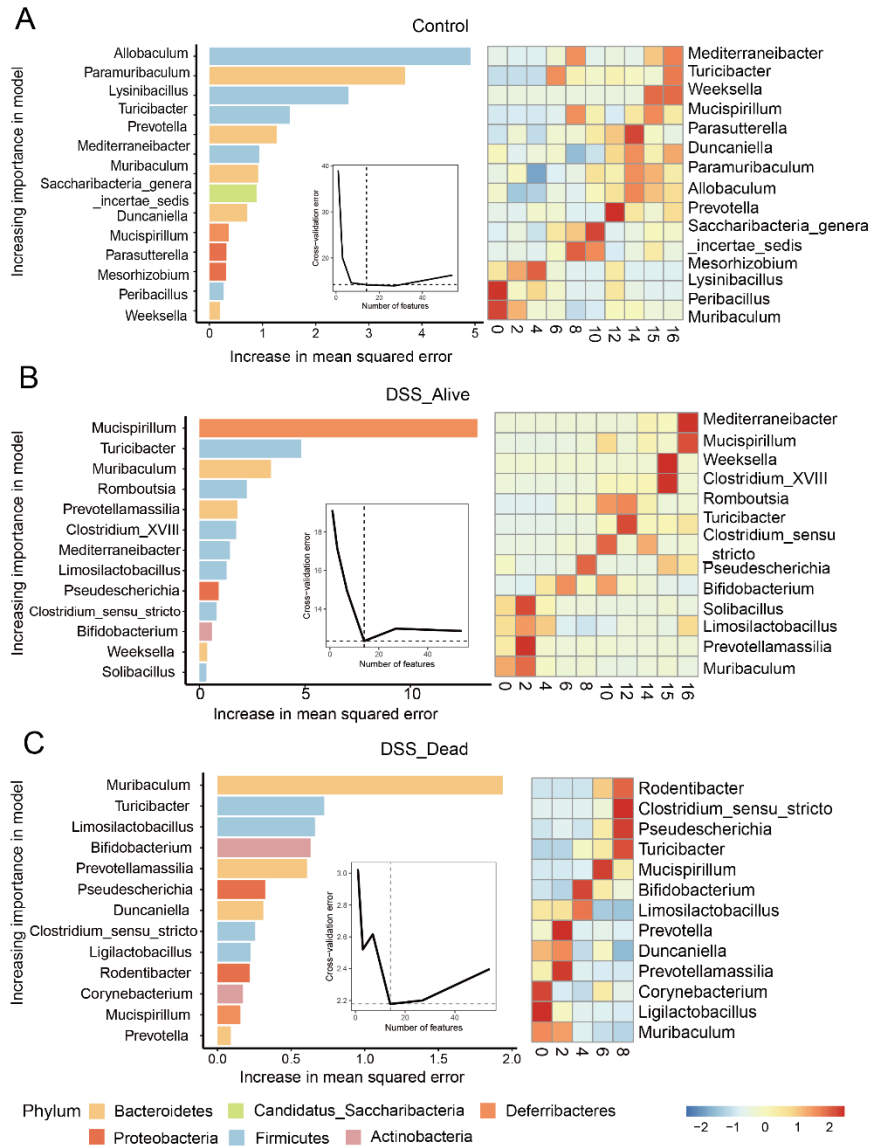


Figure.S6 Biomarkers of progression over time among the three group. The importance of biomarkers Control group (A), DSS Alive group (B), and DSS Dead group (C) through machine learning. The heat maps were used to show changes in key genera over the time of the experiment. Heat map color bars represent correlations.

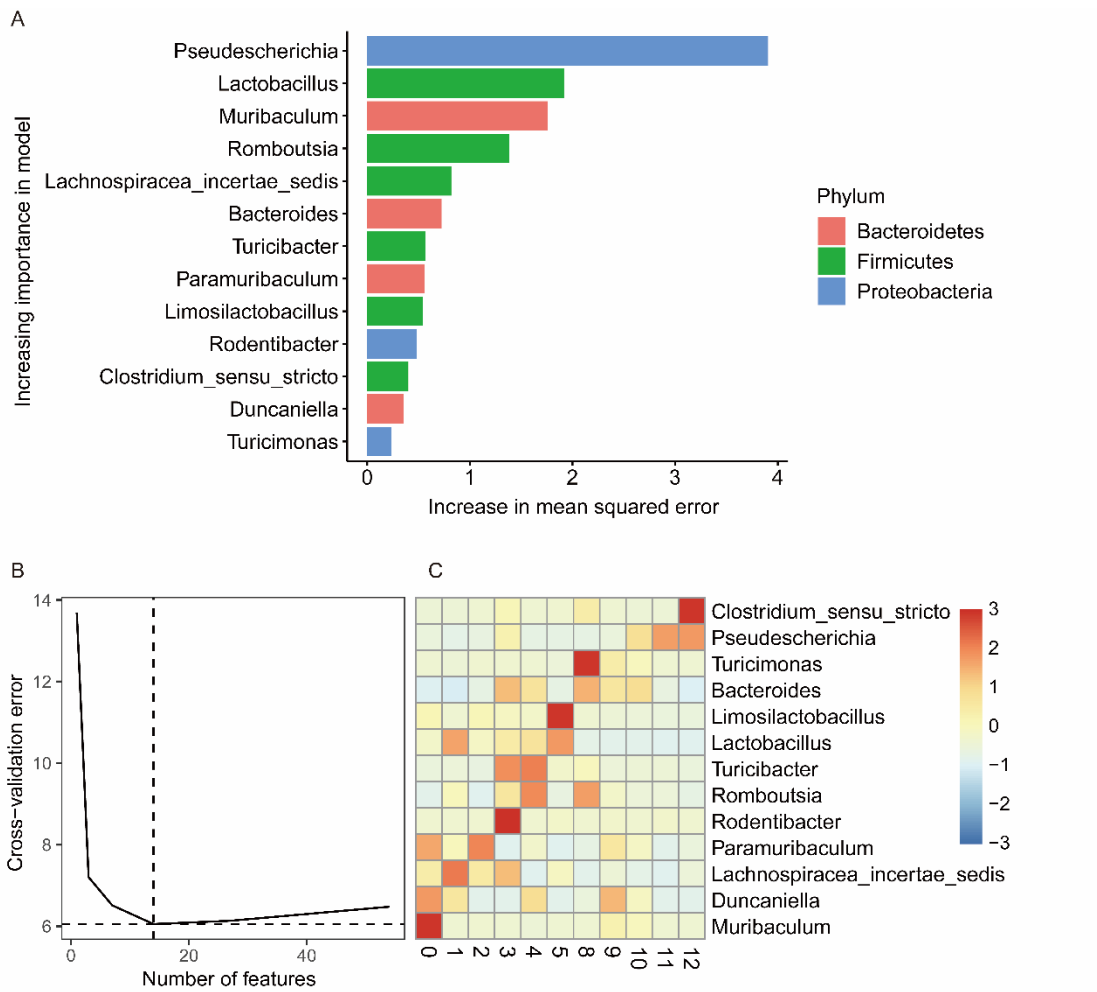


Figure.S7 The relationship between DAI scores and biomarkers. (A) The top 13 biomarkers based on DAI scores by applying Random Forests regression. (B) The Cross-validation of Random Forests regression. (C) Heatmap of the top 13 biomarkers and DAI scores. Heatmap color bars represent correlations.

Table.S1 Adonis test of microbial composition in different groups.

| | Variable1 | Variable2 | Pvalue of adonis |
|---|------------------|------------------|-------------------------|
| Grouped by housing | Control | DSS1 | 0.0003 |
| | Control | DSS2 | 0.0001 |
| | Control | DSS3 | 0.0001 |
| | Control | DSS4 | 0.0001 |
| | DSS1 | DSS2 | 0.5221 |
| | DSS1 | DSS3 | 0.3300 |
| | DSS1 | DSS4 | 0.2071 |
| | DSS2 | DSS4 | 0.1949 |
| | DSS2 | DSS3 | 0.2835 |
| | DSS3 | DSS4 | 0.4587 |
| Grouped by treatment and outcome | DSS_Alive | DSS_Dead | 0.0496 |
| | DSS_Alive | Control | 0.0001 |
| | DSS_Dead | Control | 0.0001 |

Table.S2 Degrees of hub genus in different groups.

| Genus | Group | Degree |
|---------------------------|-----------|--------|
| <i>Prevotellamassilia</i> | Control | 7 |
| <i>Parasutterella</i> | Control | 7 |
| <i>Lawsonibacter</i> | DSS_Alive | 4 |
| <i>Neglecta</i> | DSS_Alive | 4 |
| <i>Oscillibacter</i> | DSS_Alive | 4 |
| <i>Millionella</i> | DSS_Dead | 51 |

Table.S3 Metadata of the 16s rRNA gene sequencing.

| Mice | Group | Day |
|-------------|--------------|------------|
| T036 | Control | 0 |
| S045 | Control | 0 |
| T016 | Control | 0 |
| T036 | Control | 2 |
| S045 | Control | 2 |
| T016 | Control | 2 |
| T036 | Control | 4 |
| S045 | Control | 4 |
| T016 | Control | 4 |
| T036 | Control | 6 |
| S045 | Control | 6 |
| T016 | Control | 6 |
| T036 | Control | 8 |
| S045 | Control | 8 |
| T016 | Control | 8 |
| S045 | Control | 10 |
| T016 | Control | 10 |
| S045 | Control | 12 |
| T036 | Control | 12 |
| S045 | Control | 14 |
| T016 | Control | 14 |
| T036 | Control | 14 |
| S045 | Control | 15 |
| T016 | Control | 15 |
| T036 | Control | 15 |
| S045 | Control | 16 |
| T016 | Control | 16 |
| T036 | Control | 16 |
| T035 | DSS_Alive | 0 |
| S034 | DSS_Alive | 0 |
| S097 | DSS_Alive | 0 |
| S034 | DSS_Alive | 2 |
| S035 | DSS_Alive | 2 |
| S097 | DSS_Alive | 2 |
| T035 | DSS_Alive | 2 |
| S034 | DSS_Alive | 4 |
| S097 | DSS_Alive | 4 |
| T035 | DSS_Alive | 4 |
| S035 | DSS_Alive | 6 |
| S034 | DSS_Alive | 8 |
| S035 | DSS_Alive | 8 |
| T035 | DSS_Alive | 8 |

| | | |
|------|-----------|----|
| S034 | DSS_Alive | 10 |
| S097 | DSS_Alive | 12 |
| S034 | DSS_Alive | 14 |
| S097 | DSS_Alive | 14 |
| S034 | DSS_Alive | 15 |
| S097 | DSS_Alive | 15 |
| T035 | DSS_Alive | 15 |
| S034 | DSS_Alive | 16 |
| S035 | DSS_Alive | 16 |
| S097 | DSS_Alive | 16 |
| T035 | DSS_Alive | 16 |
| S038 | DSS_Dead | 0 |
| S042 | DSS_Dead | 0 |
| S043 | DSS_Dead | 0 |
| T004 | DSS_Dead | 0 |
| T012 | DSS_Dead | 0 |
| T018 | DSS_Dead | 0 |
| S038 | DSS_Dead | 2 |
| S042 | DSS_Dead | 2 |
| T004 | DSS_Dead | 2 |
| T012 | DSS_Dead | 2 |
| T018 | DSS_Dead | 2 |
| S042 | DSS_Dead | 4 |
| S043 | DSS_Dead | 4 |
| T004 | DSS_Dead | 4 |
| T012 | DSS_Dead | 4 |
| T018 | DSS_Dead | 4 |
| S038 | DSS_Dead | 6 |
| S043 | DSS_Dead | 6 |
| T018 | DSS_Dead | 6 |
| S042 | DSS_Dead | 8 |
| S043 | DSS_Dead | 8 |
| T012 | DSS_Dead | 8 |
