Table S1 Contribution rate of factors.

Factors	PC1	PC2
DPPH scavenging (IC)	0.46	-0.22
DPPH scavenging (CFE)	0.35	-0.48
Hydroxyl radical scavenging (IC)	0.45	-0.16
Hydroxyl radical scavenging (CFE)	0.43	-0.19
Reducing ability (IC)	0.38	0.58
Reducing ability (CFE)	0.36	0.57

Table S2 The rating form of antioxidative ability of *Lactobacillus* strains.

Bacteria	Score	Bacteria	Score
L. helveticus KLDS1.8701	2.310864	L. fermentum KLDS1.0709	-0.03133
L. acidophilus KLDS 1.0732	2.052496	*L. acidophilus* KLDS 1.0701	-0.10728
L. rhamnosus GG	2.047866	*L. rhamnosus* KLDS1.0911	-0.1453
L. plantarum KLDS1.0601	1.624462	*L. paracasei* KLDS1.1015	-0.40707
L. plantarum KLDS1.0602	1.022417	*L. brevis* KLDS1.0721	-0.95843
L. casei KLDS1.0720	0.818617	*L. fermentum* KLDS1.0711	-0.98218
L. plantarum KLDS1.0603	0.562809	*L. brevis* KLDS1.0722	-1.24618
L. acidophilus KLDS 1.0738	0.555076	*L. paracasei KLDS1.1014*	-1.27833
L. helveticus KLDS1.0633	0.38543	*L. reuteri* KLDS1.0737	-1.52136
L. casei KLDS1.0348	0.332947	*L. rhamnosus* KLDS1.0644	-1.56538
L. fermentum KLDS1.0710	0.14387	*L. helveticus* KLDS1.0639	-1.79051
L. casei KLDS1.0349	0.02715	*L. reuteri KLDS1.0736*	-1.82995
L. rhamnosus KLDS1.0922	-0.0207		

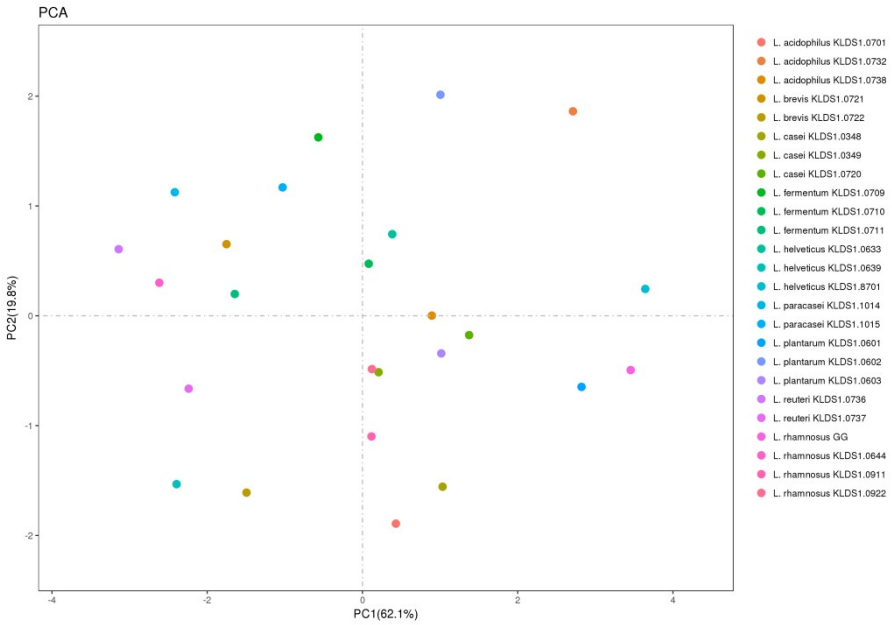

Figure S1 The principal component analysis of antioxidative property of *Lactobacillus* strains showing PC1 vs. PC2.

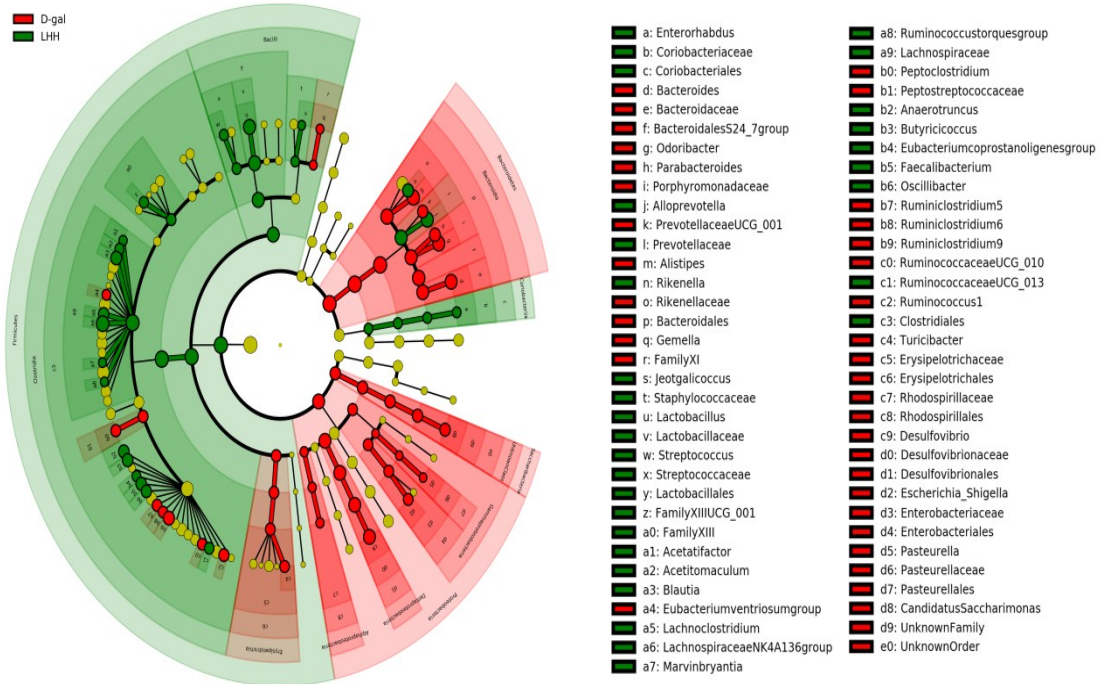

Figure S2 LEfSe comparison of the gut microbiota between the D-gal and LHH groups. n = 5 per group.

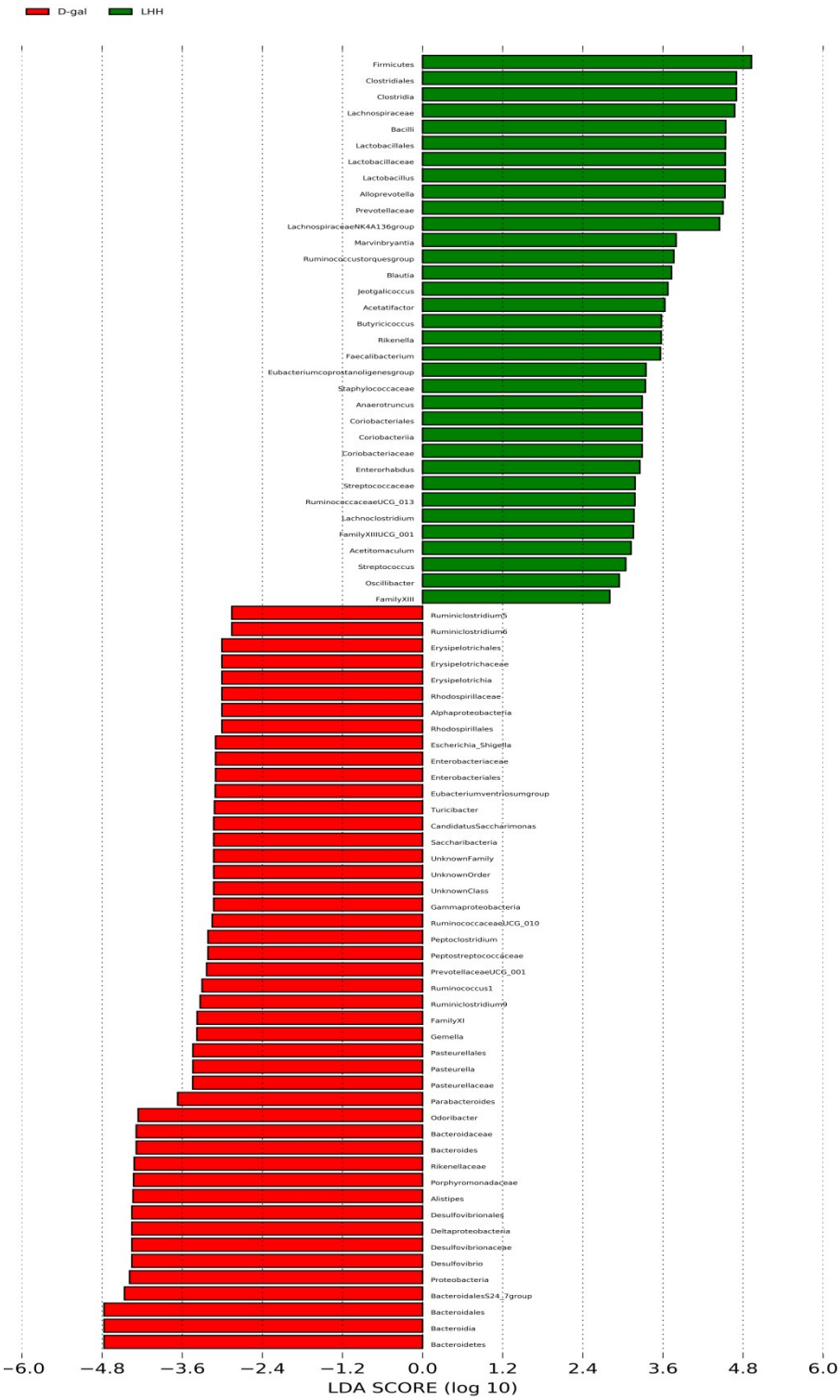

Figure S3 The LDA score indicates the effect size and ranking of each differentially abundant taxon between the D-gal and LHH groups. n = 5 per group.

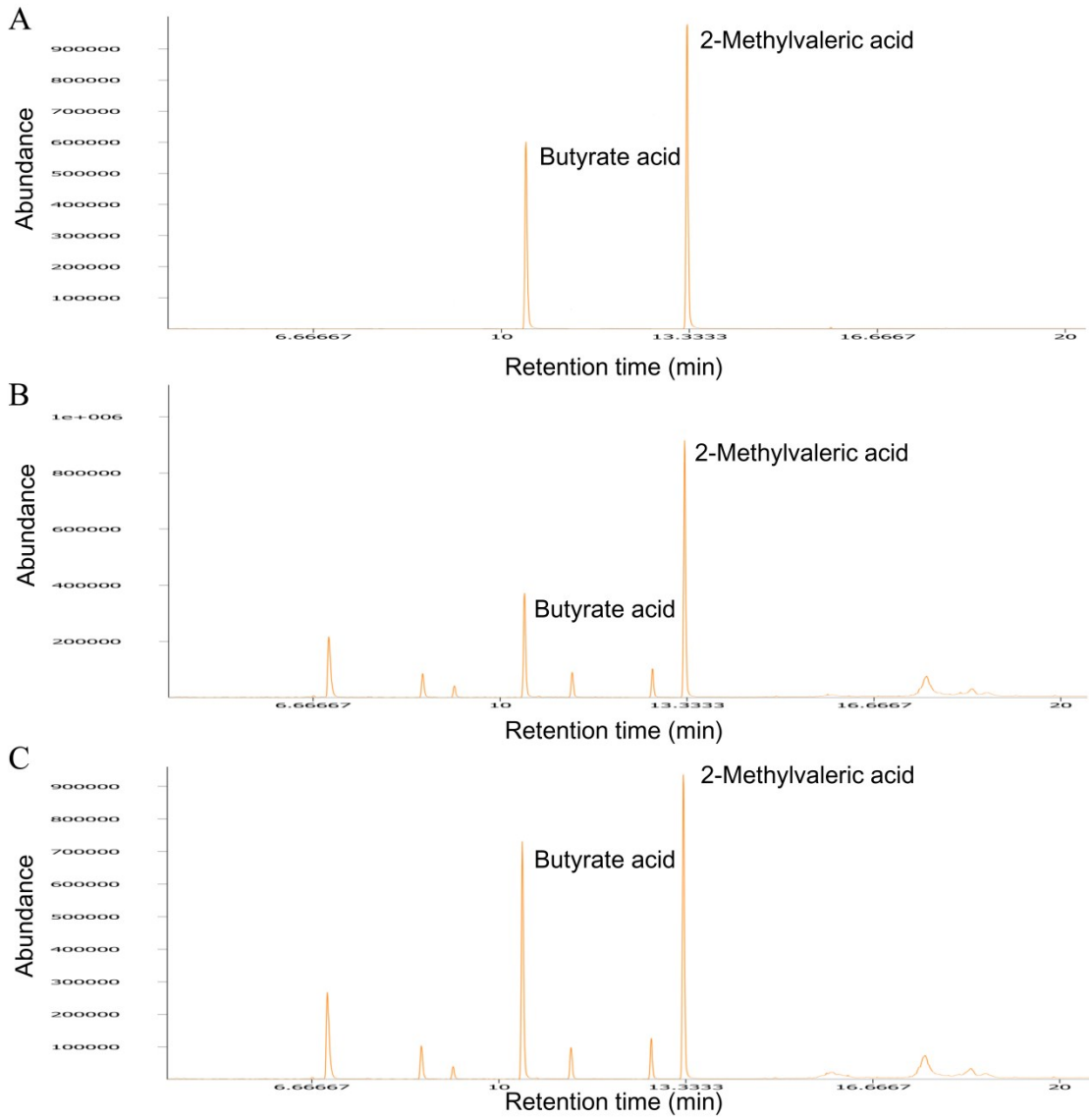

Figure S4 Representative GC-MS chromatograms of standard (A), the cecal content of the D-gal group (B), and the cecal content of the LHH group (C). 2-Methylvaleric acid was used as internal standard.