Table S1. Pearson correlation coefficients of body weight gain, food intake, tissue weights, colonic SCFAs, lipid profiles, and satiety-related hormones in Sprague-Dawley rats.

Variables	BWG	Food intake	Liver	Cecum	SCFAs	Acetate	Propionate	Butyrate	BCFAs	TC	TG	HDL	LDL	PYY	GLP-1
BWG		0.721**	0.147	-0.630**	-0.629**	-0.557**	-0.708**	-0.734**	-0.525**	0.613**	0.674**	0.501**	0.622**	-0.463**	-0.583**
Food intake	0.721**		-0.095	-0.771**	-0.942**	-0.881**	-0.910**	-0.917**	-0.865**	0.400*	0.659**	0.236	0.735**	-0.484**	-0.742**
Liver	0.147	-0.095		0.389*	-0.020	-0.089	0.112	0.168	-0.134	0.234	0.080	0.153	0.198	-0.175	0.211
Cecum	-0.630**	-0.771**	0.389*		0.598**	0.490**	0.745**	0.807**	0.473**	-0.207	-0.505**	-0.108	-0.422*	0.316	0.621**
SCFAs	-0.629**	-0.942**	-0.020	0.598**		0.983**	0.889**	0.838**	0.943**	-0.463**	-0.596**	-0.304	-0.780**	0.493**	0.707**
Acetate	-0.557**	-0.881**	-0.089	0.490**	0.983**		0.809**	0.735**	0.944**	-0.475**	-0.542**	-0.322	-0.773**	0.504**	0.652**
Propionate	-0.708**	-0.910**	0.112	0.745**	0.889**	0.809**		0.931**	0.806**	-0.407*	-0.576**	-0.260	-0.696**	0.464**	0.702**
Butyrate	-0.734**	-0.917**	0.168	0.807**	0.838**	0.735**	0.931**		0.749**	-0.342	-0.657**	-0.198	-0.617**	0.345	0.771**
BCFAs	-0.525**	-0.865**	-0.134	0.473**	0.943**	0.944**	0.806**	0.749**		-0.372*	-0.647**	-0.206	-0.779**	0.611**	0.655**
TC	0.613**	0.400*	0.234	-0.207	-0.463**	-0.475**	-0.407*	-0.342	-0.372*		0.390*	0.946**	0.622**	-0.392*	-0.346
TG	0.674**	0.659**	0.080	-0.505**	-0.596**	-0.542**	-0.576**	-0.657**	-0.647**	0.390*		0.296	0.637**	-0.497**	-0.638**
HDL	0.501**	0.236	0.153	-0.108	-0.304	-0.322	-0.260	-0.198	-0.206	0.946**	0.296		0.421*	-0.271	-0.316
LDL	0.622**	0.735**	0.198	-0.422*	-0.780**	-0.773**	-0.696**	-0.617**	-0.779**	0.622**	0.637**	0.421*		-0.635**	-0.472**
PYY	-0.463**	-0.484**	-0.175	0.316	0.493**	0.504**	0.464**	0.345	0.611**	-0.392*	-0.497**	-0.271	-0.635**		0.314
GLP-1	-0.583**	-0.742**	0.211	0.621**	0.707**	0.652**	0.702**	0.771**	0.655**	-0.346	-0.638**	-0.316	-0.472**	0.314	

Only significantly correlated variables and coefficients are shown. BWG: body weight gain; SCFAs: short chain fatty acids; BCFAs: branched-chain fatty acids; TC: total cholesterol; TG: triglyceride; HDL: high-density lipoproteins; LDL: low-density lipoproteins.

** $p < 0.01$.

* $p < 0.05$.

Table S2. Combined effects of food intake, tissue weights, lipid profiles, satiety-related hormones, and colonic SCFAs on body weight gain in rats.

	Variables[a]	R_{adjust}^2	β	p
Model 1	Butyrate	0.524	-0.734	0.000
Model 2	Butyrate		-0.594	0.000
	TC	0.666	0.410	0.001

[a] Based on Pearson correlation analysis between food intake, tissue weights, colonic SCFAs, lipid profiles, and/or satiety-related hormones significantly associated with body weight gain. TC: total cholesterol.

Table S3. The relative abundance of gut bacterial phyla in rats.

Phylum	CO	PL	PM	PH	PHer	p value[1]
Firmicutes	0.627	0.568	0.477	0.426	0.398	0.005**
Bacteroidetes	0.264	0.357	0.389	0.416	0.378	0.035*
Actinobacteria	0.00779	0.0419	0.0890	0.130	0.194	0.031*
Proteobacteria	0.0376	0.0165	0.0198	0.0146	0.0200	0.065
Tenericutes	0.0531	0.00891	0.0131	0.00743	0.00171	0.017*
Verrucomicrobia	0.00581	0.00449	0.0110	0.00368	0.00434	0.207
Cyanobacteria	0.00308	0.000694	0.000361	0.00220	0.00312	0.023*
Deferribacteres	0.00113	0.00186	0.000144	0.0000421	0.0000252	0.292
unclassified_k__norank	0.000326	0.0000789	0.000313	0.000349	0.000320	0.317
Others (< 0.01%)	0.0000947	0.0000421	0.0000240	0.0000120	0.0000337	-

[1] Kruskal-Wallis H test for multi-group comparison. CO: rats fed with an AIN-93 G diet; PH: rats fed with a high concentration of potato diet; PHer: rats fed with a higher concentration of potato diet.
** $p < 0.01$, * $p < 0.05$.

Table S4. The relative abundance of gut bacterial genera in rats.

Genus	CO	PL	PM	PH	PHer
norank_f__Bacteroidales_S24-7_group	0.104	0.210	0.220	0.292	0.231
Bifidobacterium	0.000631	0.0350	0.0850	0.122	0.187
Bacteroides	0.127	0.0789	0.0987	0.0546	0.0243
unclassified_f__Lachnospiraceae	0.115	0.101	0.0497	0.0261	0.00606
Ruminococcaceae_UCG-005	0.0314	0.0522	0.0518	0.0717	0.0683
Phascolarctobacterium	0.0490	0.0507	0.0588	0.0552	0.0317
Prevotellaceae_NK3B31_group	0.0000421	0.0333	0.0407	0.0482	0.103
Lactobacillus	0.0103	0.0213	0.0213	0.0195	0.124
Ruminococcus_2	0.0200	0.0910	0.0492	0.0115	0.00794
Ruminococcaceae_UCG-014	0.0302	0.0265	0.0322	0.0283	0.0242
Romboutsia	0.0273	0.0121	0.0518	0.0209	0.01150
Blautia	0.0241	0.0299	0.0140	0.0295	0.0179
Lachnospiraceae_NK4A136_group	0.01701	0.00849	0.00981	0.0458	0.0159
norank_f__Lachnospiraceae	0.0409	0.0241	0.00858	0.00485	0.00215
norank_o__Mollicutes_RF9	0.0528	0.00718	0.0103	0.00642	0.000808
Turicibacter	0.00133	0.00200	0.0198	0.0285	0.0130
[Ruminococcus]_gauvreauii_group	0.0158	0.0222	0.0163	0.00615	0.00213
norank_f__Ruminococcaceae	0.0191	0.00980	0.0115	0.0101	0.00923
Butyricimonas	0.0104	0.0144	0.0155	0.00793	0.00661
[Ruminococcus]_torques_group	0.0341	0.00952	0.00237	0.00249	0.00256
Parabacteroides	0.0125	0.0116	0.00719	0.00623	0.00660
Ruminococcus_1	0.000137	0.0133	0.00646	0.0112	0.0104
unclassified_f__Ruminococcaceae	0.0117	0.00837	0.00616	0.00540	0.00604
Lachnospiraceae_UCG-010	0.0260	0.000694	0.00102	0.000835	0.00144
Akkermansia	0.00581	0.00449	0.0110	0.00368	0.00434
Lachnoclostridium	0.0103	0.00406	0.00426	0.00739	0.00201
Desulfovibrio	0.0127	0.00377	0.00531	0.00156	0.00162
Anaerotruncus	0.0139	0.00452	0.00284	0.00227	0.00132
Parasutterella	0.0000631	0.000826	0.000835	0.00700	0.0159
Bilophila	0.0101	0.00462	0.00234	0.00270	0.00142
Family_XIII_AD3011_group	0.0102	0.00409	0.00170	0.00121	0.000194
Others (< 1%)	0.156	0.101	0.0835	0.0589	0.0602

Table S5. Proportion of total variance in principal co-ordinate analysis (PCoA).

	Proportion of Variance		Proportion of Variance
PC1	26.98%	PC20	1.39%
PC2	7.37%	PC21	1.35%
PC3	5.79%	PC22	1.23%
PC4	5.58%	PC23	1.20%
PC5	4.46%	PC24	1.08%
PC6	4.20%	PC25	0.96%
PC7	3.94%	PC26	0.88%
PC8	3.53%	PC27	0.84%
PC9	3.27%	PC28	0.65%
PC10	3.14%	PC29	0.60%
PC11	2.77%	PC30	0.56%
PC12	2.48%	PC31	0.44%
PC13	2.30%	PC32	0.37%
PC14	2.21%	PC33	0.28%
PC15	2.16%	PC34	0.19%
PC16	2.00%	PC35	0.10%
PC17	1.96%	PC36	0.00%
PC18	1.84%	PC37	0.15%
PC19	1.72%		
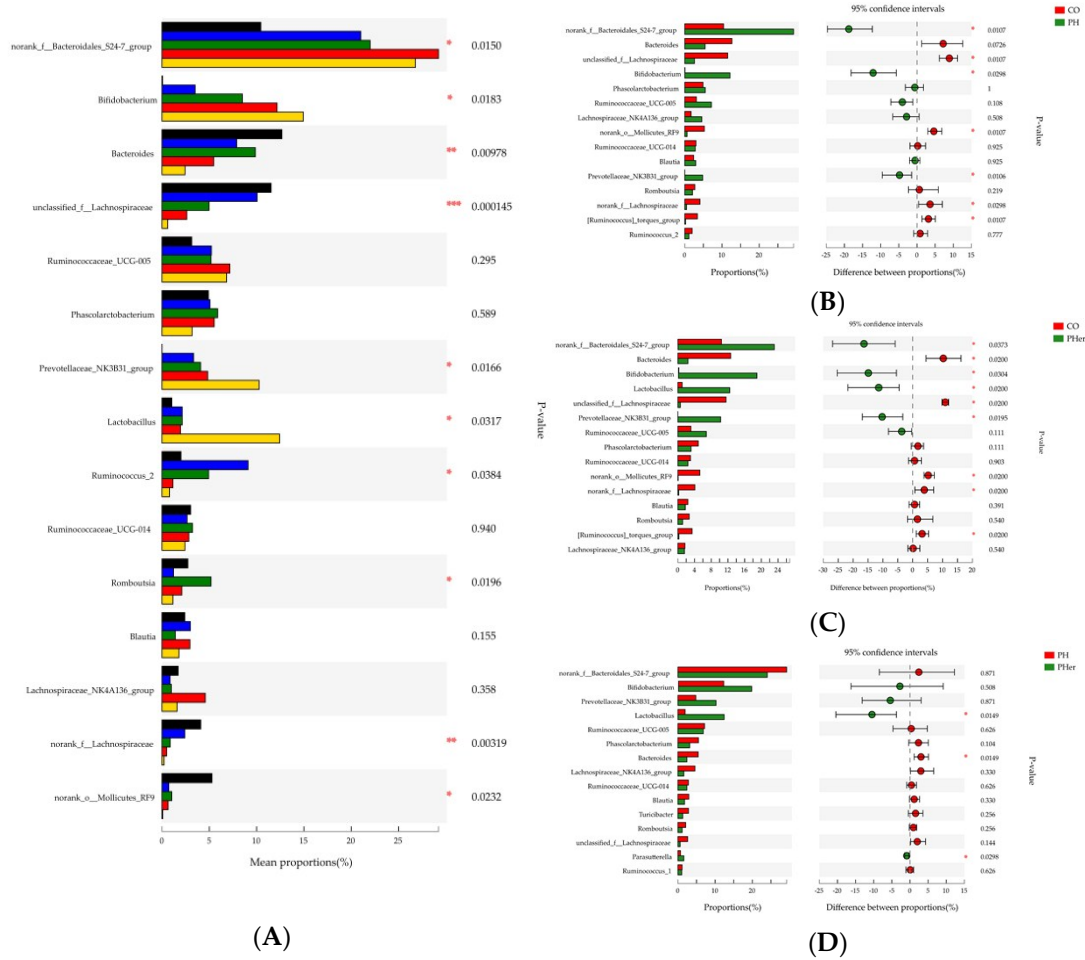
Fig. S1. Bar plots of the intergroup differences between relative abundance (top 15 OTUs) of bacterial communities in rats fed different diets at genus level. **(A)** Kruskal-Wallis H test for multi-group comparison; Mann–Whitney U test for pairwise comparison: CO vs. PH **(B)**; CO vs. PHer **(C)**; PH vs. PHer **(D)**. CO: rats fed with an AIN-93 G diet; PH: rats fed with a high concentration of potato diet; PHer: rats fed with a higher concentration of potato diet. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.