

Supplementary Materials

Table S1. Changes in body weight and nutrient intake overall and in each group ¹.

Weight, Nutrients	Overall (<i>n</i> = 10)			Group 1 (<i>n</i> = 5)			Group 2 (<i>n</i> = 4)			Group 1 vs. 2
	Before	After	^a <i>p</i> value	Before	After	^a <i>p</i> value	Before	After	^a <i>p</i> value	^b <i>p</i> value
Weight (kg)	25.3 ± 3.2	25.4 ± 3.1	0.600	31.2 ± 4.7	30.9 ± 4.5	0.593	20.2 ± 3.1	20.9 ± 3.1	0.285	0.190
Energy (kcal)	1123 ± 166	1105 ± 140	1.000	1021 ± 184	1047 ± 156	0.593	1381 ± 317	1305 ± 264	0.317	0.286
Water (ml)	795 ± 122	763 ± 99	0.465	824 ± 174	825 ± 161	1.000	858 ± 215	858 ± 215	0.317	0.730
Protein (g)	43.2 ± 5.3	43.6 ± 4.9	1.000	39.8 ± 6.0	41.7 ± 6.1	0.593	51.6 ± 10.0	50.4 ± 8.9	0.317	0.556
Fat (g)	36.0 ± 6.9	36.0 ± 6.5	1.000	35.1 ± 7.9	35.4 ± 6.5	1.000	42.8 ± 13.8	42.4 ± 13.6	0.317	1.000
Carbohydrate (g)	157 ± 22	151 ± 16	0.465	135 ± 21	137 ± 17	1.000	199 ± 42	181 ± 28	0.317	0.190
Sodium (mg)	1428 ± 394	1481 ± 372	1.000	1719 ± 623	1893 ± 731	0.593	1310 ± 627	1227 ± 545	0.317	0.905
Potassium (mg)	1573 ± 262	1479 ± 202	0.144	1401 ± 211	1344 ± 172	0.285	1974 ± 571	1810 ± 420	0.317	0.556
Calcium (mg)	567 ± 102	563 ± 108	0.715	503 ± 112	481 ± 112	0.285	721 ± 201	740 ± 212	0.317	0.286
Magnesium (mg)	181 ± 23	174 ± 18	0.273	158 ± 16	152 ± 9	0.593	227 ± 45	216 ± 35	0.317	0.286
Phosphorus (mg)	612 ± 100	617 ± 94	0.715	619 ± 99	637 ± 84	0.593	689 ± 214	681 ± 207	0.317	0.905
Iron (mg)	8.5 ± 1.7	8.1 ± 1.7	0.144	7.2 ± 1.7	6.7 ± 1.7	0.285	11.4 ± 3.6	11.0 ± 3.3	0.317	0.730
Zinc (mg)	8.5 ± 1.6	8.5 ± 1.5	1.000	8.1 ± 1.9	8.3 ± 1.8	0.593	10.1 ± 3.2	10.0 ± 3.1	0.317	1.000
Copper (mg)	1.1 ± 0.2	1.1 ± 0.1	0.465	0.9 ± 0.2	0.9 ± 0.2	1.000	1.4 ± 0.3	1.4 ± 0.2	0.317	0.063
Manganese (mg)	2.0 ± 0.5	2.0 ± 0.4	1.000	2.1 ± 0.6	2.2 ± 0.6	0.593	2.1 ± 1.0	2.0 ± 0.9	0.317	0.730
Retinol equivalent (μg)	850 ± 129	795 ± 131	0.144	643 ± 118	554 ± 127	0.285	1150 ± 228	1125 ± 203	0.317	0.111
Vitamin D (μg)	6.4 ± 1.4	6.7 ± 1.4	0.465	5.5 ± 0.8	6.0 ± 0.8	0.593	8.6 ± 3.3	8.7 ± 3.4	0.317	1.000
α-tocopherol (mg)	15.2 ± 4.4	14.9 ± 4.3	0.465	14.3 ± 5.8	14.0 ± 5.9	1.000	19.2 ± 8.6	18.7 ± 8.2	0.317	1.000
Vitamin K (μg)	162 ± 56	121 ± 28	0.273	218 ± 99	140 ± 30	0.285	127 ± 61	123 ± 58	0.317	0.556
Vitamin B ₁ (mg)	1.86 ± 0.37	1.84 ± 0.37	0.465	0.84 ± 0.22	0.85 ± 0.21	1.000	3.03 ± 0.26	2.98 ± 0.30	0.317	0.016*
Vitamin B ₂ (mg)	1.81 ± 0.27	1.79 ± 0.27	0.465	1.28 ± 0.32	1.23 ± 0.32	0.285	2.56 ± 0.28	2.57 ± 0.29	0.317	0.063
Niacin (mgNE)	15.7 ± 2.4	16.1 ± 2.3	1.000	10.9 ± 1.6	12.1 ± 2.2	0.593	23.7 ± 1.7	23.2 ± 1.3	0.317	0.016*
Vitamin B ₆ (mg)	2.14 ± 0.35	2.12 ± 0.33	0.715	1.24 ± 0.31	1.26 ± 0.30	0.593	3.24 ± 0.09	3.17 ± 0.08	0.317	0.016*
Vitamin B ₁₂ (mg)	3.92 ± 0.58	4.33 ± 0.67	0.068	3.75 ± 0.32	4.52 ± 0.71	0.109	4.62 ± 1.34	4.69 ± 1.41	0.317	1.000
Folic acid (μg)	295 ± 41	273 ± 37	0.144	218 ± 36	187 ± 22	0.285	409 ± 55	392 ± 43	0.317	0.063
Pantothenic acid (mg)	7.3 ± 1.1	7.2 ± 1.1	0.465	4.9 ± 0.8	4.9 ± 0.8	1.000	10.6 ± 1.6	10.4 ± 1.6	0.317	0.016*

Vitamin C (mg)	181 ± 34	173 ± 31	0.273	98 ± 25	96 ± 27	0.593	287 ± 30	270 ± 20	0.317	0.016 *
Soluble dietary fiber (g)	2.8 ± 1.3	2.5 ± 1.3	0.144	3.5 ± 1.8	3.1 ± 1.9	0.285	2.6 ± 2.6	2.3 ± 2.3	0.317	0.286
Insoluble dietary fiber (g)	2.7 ± 1.2	2.1 ± 0.9	0.144	3.8 ± 1.7	3.2 ± 1.3	0.285	2.0 ± 2.0	1.3 ± 1.3	0.317	0.556
Total dietary fiber (g)	5.6 ± 2.1	4.7 ± 1.7	0.144	7.4 ± 2.1	6.5 ± 1.7	0.285	4.6 ± 4.6	3.6 ± 3.6	0.317	0.413
Sodium chloride amount (g)	3.8 ± 0.9	3.9 ± 1.0	1.000	4.7 ± 1.4	5.1 ± 1.7	0.593	3.3 ± 1.6	3.1 ± 1.4	0.317	0.730

¹Data are shown as the mean ± SEM. ^a Wilcoxon signed rank test. ^b *p* values indicate a comparison between the groups before intervention. Mann-Whitney *U* test. * *p* < 0.05.

Table S2. Changes in gut microbiota overall and in each group ¹.

Phylum	Class	Order	Family	Genus	Overall (n = 10)			Group 1 (n = 5)			Group 2 (n = 4)			Group 1 vs. 2		
					Before	After	^a p value	Before	After	^a p value	Before	After	^a p value	^b p value		
Firmicutes					4849 ± 698	4608 ± 619	0.878	6871 ± 553	5207 ± 998	0.225	3011 ± 282	3202 ± 391	1.000	0.016 *		
	Bacilli				525 ± 277	1381 ± 425	0.022*	85 ± 24	563 ± 202	0.138	794 ± 604	1621 ± 412	0.144	0.063		
		Lactoba-cillales			519 ± 277	1365 ± 426	0.022*	76 ± 25	553 ± 198	0.138	789 ± 602	1595 ± 425	0.144	0.063		
			Lactoba-cillaceae			250 ± 250	462 ± 299	0.249	0 ± 0	0 ± 0	0.317	624 ± 624	1126 ± 652	0.715	0.286	
				Pediococ-cus		213 ± 213	416 ± 282	0.180	0 ± 0	0 ± 0	1.000	531 ± 531	1041 ± 615	0.180	0.556	
				Strepto-coccaceae		31 ± 10	357 ± 343	0.515	38 ± 17	18 ± 7	0.500	29 ± 15	10 ± 6	0.285	0.905	
					Strepto-coccus		30 ± 10	356 ± 343	0.514	37 ± 17	18 ± 7	0.500	29 ± 15	9 ± 5	0.276	0.905
				Entero-coccacea	Entero-coccus		238 ± 160	505 ± 122	0.169	37 ± 22	500 ± 180	0.138	135 ± 65	422 ± 208	0.273	0.111

Clos- tridia		4106 ± 888	3020 ± 753	0.169	6527 ± 520	4469 ± 1046	0.138	2000 ± 642	1290 ± 738	0.273	0.016 *
	Clostrid- iales	4105 ± 888	3020 ± 753	0.169	6526 ± 520	4469 ± 1046	0.138	2000 ± 642	1290 ± 738	0.273	0.016 *
	Lachno- spiraceae	3008 ± 779	2623 ± 647	0.646	4793 ± 987	3870 ± 853	0.345	1434 ± 451	1094 ± 704	0.715	0.063
	<i>Anaerosti- pes</i>	572 ± 485	452 ± 355	0.799	1043 ± 972	799 ± 711	0.500	127 ± 41	130 ± 34	1.000	0.730
	<i>[Eubacte- rium] hallii group</i>	115 ± 64	453 ± 288	0.225	190 ± 118	531 ± 481	0.465	50 ± 49	468 ± 468	0.317	0.905
	<i>Lachno- clostrid- ium</i>	174 ± 64	207 ± 124	0.721	198 ± 102	369 ± 236	0.500	187 ± 104	51 ± 30	0.068	1.000
	<i>[Rumino- coccus] torques group</i>	462 ± 185	309 ± 122	0.477	743 ± 307	561 ± 187	0.893	226 ± 173	49 ± 17	0.285	0.190
	<i>Blautia</i>	573 ± 234	486 ± 151	0.953	1044 ± 368	495 ± 114	0.345	96 ± 38	200 ± 144	0.593	0.016 *
	Rumino- coccaceae	974 ± 326	279 ± 120	0.066	1536 ± 530	433 ± 226	0.225	505 ± 231	127 ± 64	0.109	0.190
	<i>Sub- doligranu- lum</i>	130 ± 123	12 ± 9	0.058	248 ± 248	19 ± 19	0.414	15 ± 8	7 ± 4	0.109	0.413
	<i>[Rumino- coccus]</i>	137 ± 116	191 ± 122	0.686	268 ± 227	382 ± 220	1.000	7 ± 7	0 ± 0	0.317	0.413

			<i>gauvreauii</i> <i>group</i>										
			<i>Feacali- bacterium</i>	263 ± 234	11 ± 8	0.225	484 ± 469	3 ± 2	0.180	53 ± 53	21 ± 20	0.655	0.730
Erysipe- lotrichia	Erysipe- lotricha- les	Erysipe- lotricha- ceae		126 ± 36	117 ± 31	0.878	180 ± 59	155 ± 39	0.893	87 ± 36	91 ± 55	0.713	0.413
			<i>Erysipela- tocolostrid- ium</i>	86 ± 36	76 ± 23	0.721	127 ± 67	100 ± 36	0.893	54 ± 24	58 ± 36	0.713	0.905
Nega- tivicutes	Seleno- mona- dales			92 ± 37	90 ± 76	0.260	80 ± 41	20 ± 19	0.068	131 ± 78	201 ± 189	1.000	0.556
Actinobacteria				3155 ± 907	4907 ± 712	0.093	1088 ± 388	4431 ± 910	0.080	6508 ± 470	6588 ± 445	0.715	0.016 *
Actino- bacteria				2955 ± 913	4720 ± 783	0.059	960 ± 367	4230 ± 973	0.080	6187 ± 392	6465 ± 446	0.273	0.016 *
	Bifidobac- teriales	Bifidobac- teriaceae	<i>Bifidobac- terium</i>	2948 ± 910	4492 ± 788	0.093	958 ± 366	4008 ± 1005	0.080	6172 ± 394	6176 ± 613	0.715	0.016 *
	Coryne- bacte- riales			4 ± 3	176 ± 107	0.063	1 ± 0	203 ± 189	0.144	10 ± 7	187 ± 152	0.285	0.111
		Coryne- bacteri- aceae		4 ± 3	176 ± 107	0.063	0 ± 0	203 ± 189	0.144	10 ± 7	187 ± 152	0.285	0.111
			<i>Coryne- bacterium</i> 1	0 ± 0	172 ± 106	0.115	0 ± 0	198 ± 188	0.285	0 ± 0	183 ± 149	0.285	1.000

Corio- bacte- riia	Coriobac- teriales	Coriobac- teriaceae		201 ± 68	187 ± 43	0.646	128 ± 52	202 ± 72	0.080	321 ± 147	123 ± 32	0.144	0.286
		<i>Colli- nesella</i>		94 ± 65	89 ± 36	0.753	18 ± 18	83 ± 49	0.273	213 ± 151	39 ± 27	0.180	0.413
Bacteroidetes				931 ± 408	132 ± 65	0.051	1633 ± 745	135 ± 80	0.080	287 ± 182	158 ± 151	0.109	0.111
Bacte- roidia	Bacteroi- dales			931 ± 428	132 ± 68	0.051	1632 ± 745	135 ± 80	0.080	287 ± 182	158 ± 151	0.109	0.111
		Bacteroi- daceae	<i>Bac- teroides</i>	653 ± 377	96 ± 57	0.173	1130 ± 714	80 ± 58	0.225	221 ± 150	138 ± 131	0.109	0.413
		Rikenel- laceae	<i>Alistipes</i>	197 ± 125	23 ± 12	0.141	369 ± 235	46 ± 21	0.345	31 ± 17	0 ± 0	0.109	0.730
Proteobacteria				993 ± 728	262 ± 203	0.022*	378 ± 134	56 ± 25	0.043*	54 ± 43	42 ± 18	0.715	0.063
Gamma- proteo- bacteria				981 ± 765	261 ± 213	0.053	355 ± 140	55 ± 25	0.080	53 ± 43	41 ± 18	0.854	0.111
	Entero- bacte- riales	Entero- bacteri- aceae		981 ± 765	256 ± 212	0.047*	355 ± 140	49 ± 25	0.080	52 ± 43	40 ± 18	0.854	0.111
			<i>Escheri- cia-Shi- gella</i>	881 ± 713	222 ± 191	0.028*	265 ± 99	35 ± 23	0.080	52 ± 43	27 ± 15	0.465	0.111

¹ Based on the relative abundance of 10,000 in each intestinal bacterium, changes in the bacterium that has the relative abundance higher than 100 (1%) are shown. Data are shown as the mean ± SEM. ^a Wilcoxon signed rank test. ^b *p* values indicate a comparison between the groups before intervention. Mann-Whitney *U* test. * *p* < 0.05.