

**Table S1. The composition of experimental diets**

Ingredient	Standard Diet		High-fat Diet	
	g%	kcal%	g%	kcal%
Casein, 30 Mesh	18.96	19.72	25.85	19.72
L-Cystine	0.28	0.30	0.39	0.30
Corn Starch	29.86	31.06	0.00	0.00
Maltodextrin 10	3.32	3.45	16.15	12.32
Sucrose	33.18	34.51	8.89	6.78
Cellulose, BW200	4.74	0	6.46	0.00
Soybean Oil	2.37	5.55	3.23	5.55
Lard	1.90	4.44	31.66	54.35
Mineral Mix S10026	0.95	0	1.29	0.00
DiCalcium Phosphate	1.23	0	1.68	0.00
Calcium Carbonate	0.52	0	0.71	0.00
Potassium Citrate, 1 H <sub>2</sub> O	1.56	0	2.13	0.00
Vitamin Mix V10001	0.95	1	1.29	0.99
Choline Bitartrate	0.19	0	0.26	0.00
Energy (kcal/g diet)	3.85		5.24	

**Table S2. The sequences of primers used in Realtime PCR assays**

Genes	Forward Primer	Reverse Primer
IL6	5'-CCGGAGAGGAGACTTCAC-3'	5'-TCCACGATTTCCCAGAG-3'
IL-1 $\beta$	5'-TTGAAGAAGAGCCCATCCTC-3'	5'-CAGCTCATATGGGTCCGAC-3'
TNF- $\alpha$	5'-TAGCCAGGAGGGAGAACAGA-3'	5'-TTTTCTGGAGGGAGATGTGG-3'
MCP-1	5'-TTAAAAACCTGGATCGGAACCAA-3'	5'-GCATTAGCTTCAGATTACGGGT-3'

**Table S3. Effect of RSV administration on obesity-related parameters**

Data are expressed as the mean $\pm$ S.E.M. (n=12). Statistical analysis was performed using ANOVA. The

Variables/Groups	SD	HFD	HFDR
Final body weight (g)	27.94 $\pm$ 0.27 <sup>b</sup>	35.58 $\pm$ 1.28 <sup>a</sup>	29.41 $\pm$ 0.22 <sup>b</sup>
Weight gain (g)	6.13 $\pm$ 0.19 <sup>b</sup>	14.49 $\pm$ 1.09 <sup>a</sup>	8.18 $\pm$ 0.34 <sup>b</sup>
Mean energy intake (Kcal/day/mouse)	10.86 $\pm$ 0.15 <sup>b</sup>	14.07 $\pm$ 0.27 <sup>a</sup>	14.09 $\pm$ 0.27 <sup>a</sup>
Energy efficiency (g/Kcal)	0.42 $\pm$ 0.01 <sup>b</sup>	0.49 $\pm$ 0.01 <sup>a</sup>	0.52 $\pm$ 0.01 <sup>a</sup>
Epi-WAT/body weight (%)	0.89 $\pm$ 0.05 <sup>c</sup>	3.99 $\pm$ 0.20 <sup>a</sup>	2.09 $\pm$ 0.1 <sup>b</sup>
Per-WAT/body weight (%)	0.14 $\pm$ 0.01 <sup>c</sup>	1.50 $\pm$ 0.06 <sup>a</sup>	0.64 $\pm$ 0.08 <sup>b</sup>
Ing-WAT/body weight (%)	0.52 $\pm$ 0.05 <sup>c</sup>	1.49 $\pm$ 0.07 <sup>a</sup>	0.92 $\pm$ 0.07 <sup>b</sup>
BAT/body weight (%)	0.45 $\pm$ 0.08 <sup>b</sup>	0.44 $\pm$ 0.02 <sup>b</sup>	0.83 $\pm$ 0.05 <sup>a</sup>

means with different superscripts are considered significantly different (P<0.05), with the same letter correspond to results that show no statistically significant differences. Epi-WAT: epididymal white adipose tissue; Per-WAT:

perirenal white adipose tissue; Ing-WAT: Inguinal white adipose tissue; BAT: interscapular brown adipose tissue.

**Table S4. Serum biochemical analyses from mice in SD, HFD and HFDR groups**

	SD	HFD	HFDR
Fasting glucose (mmol/L)	6.11±0.12 <sup>b</sup>	7.80±0.18 <sup>a</sup>	6.53±0.11 <sup>b</sup>
Insulin (ng/mL)	0.60±0.03 <sup>b</sup>	1.09±0.03 <sup>a</sup>	0.91±0.02 <sup>c</sup>
Serum TC(mmol/L)	2.74±0.07 <sup>c</sup>	4.18±0.07 <sup>a</sup>	3.53±0.05 <sup>b</sup>
Serum TG(mmol/L)	0.24±0.02 <sup>b</sup>	0.42±0.03 <sup>a</sup>	0.25±0.03 <sup>b</sup>
Serum HDL(mmol/L)	2.37±0.05 <sup>c</sup>	3.22±0.05 <sup>a</sup>	2.91±0.04 <sup>b</sup>
Serum LDL(mmol/L)	0.49±0.01 <sup>c</sup>	1.30±0.03 <sup>a</sup>	0.69±0.01 <sup>b</sup>
ALT(U/L)	25.68±1.08 <sup>c</sup>	46.69±1.40 <sup>a</sup>	32.75±1.74 <sup>b</sup>
AST(U/L)	105.88±7.01 <sup>b</sup>	132.25±4.59 <sup>a</sup>	111.00±2.94 <sup>b</sup>

Data are expressed as the mean±S.E.M. (n=8). Statistical analysis was performed using ANOVA. The means with different superscripts are considered significantly different (P<0.05), with the same letter correspond to results that show no statistically significant differences.

**Table S5. Effect of FMT administration on obesity-related parameters**

Data are expressed as mean±S.E.M. (n=6). Differences were assessed by unpaired Student's t tests. The means with different superscripts are considered significantly different (P<0.05), with the same letter correspond to results that show no statistically significant differences. Epi-WAT: epididymal white adipose tissue; Per-WAT:

Variables/Groups	HFD→HFD	HFDR→HFD
Final body weight (g)	35.24±0.37 <sup>a</sup>	31.26±0.47 <sup>b</sup>
Weight gain (g)	14.03±0.17 <sup>a</sup>	9.48±0.37 <sup>b</sup>
Mean energy intake (Kcal/day/mouse)	14.03±0.39 <sup>a</sup>	14.13±0.2 <sup>a</sup>
Energy efficiency (g/Kcal)	1.54±0.13 <sup>a</sup>	1.18±0.12 <sup>a</sup>
Epi-WAT/body weight (%)	3.74±0.48 <sup>a</sup>	1.98±0.15 <sup>b</sup>
Per-WAT/body weight (%)	1.58±0.24 <sup>a</sup>	1.03±0.07 <sup>b</sup>
Ing-WAT/body weight (%)	1.54±0.13 <sup>a</sup>	1.18±0.12 <sup>b</sup>
BAT/body weight %)	0.48±0.02 <sup>b</sup>	0.72±0.06 <sup>a</sup>

perirenal white adipose tissue; Ing-WAT: Inguinal white adipose tissue; BAT: interscapular brown adipose tissue.

**Table S6. Effect of FMT on serum biochemical parameters in C56BL/6 mice**

	HFD→HFD	HFDR→HFD
Serum TC(mmol/L)	4.25±0.17 <sup>a</sup>	3.91±0.27 <sup>b</sup>
Serum TG(mmol/L)	0.81±0.11 <sup>a</sup>	0.61±0.09 <sup>b</sup>
Serum HDL(mmol/L)	3.11±0.33 <sup>a</sup>	3.22±0.12 <sup>a</sup>
Serum LDL(mmol/L)	1.38±0.14 <sup>a</sup>	1.36±0.11 <sup>a</sup>
TC/HDL	1.40	1.29
ALT(U/L)	67.00±5.76 <sup>a</sup>	52.83±5.85 <sup>b</sup>
AST(U/L)	139.17±10.22 <sup>a</sup>	118.2±8.13 <sup>b</sup>

Data are expressed as mean±S.E.M. (n=6). Differences were assessed by unpaired Student's t tests. The means with different superscripts are considered significantly different (P<0.05), with the same letter correspond to results that show no statistically significant differences.

**Table S7. The Reads and OTU numbers of intestinal bacteria**

Data are expressed as mean±S.E.M. (n=6). Statistical analysis was performed using ANOVA. The means

	Raw Reads	Qualified Reads	Average length	OTUs
SD	102605±2843 <sup>a</sup>	84693±2424 <sup>a</sup>	423±0.258 <sup>a</sup>	386.3±11.07 <sup>a</sup>
HFD	101393±1638 <sup>a</sup>	84914±1440 <sup>a</sup>	416.20±0.55 <sup>a</sup>	399.60±7.24 <sup>a</sup>
HFDR	99839±1848 <sup>a</sup>	83285±1487 <sup>a</sup>	417.40±0.85 <sup>a</sup>	395.00±8.50 <sup>a</sup>
HFD→HFD	98866±1611 <sup>a</sup>	82974±1402 <sup>a</sup>	417.10±0.53 <sup>a</sup>	403.80±7.78 <sup>a</sup>
HFDR→HFD	101717±1815 <sup>a</sup>	85382±1499 <sup>a</sup>	415.10±0.80 <sup>a</sup>	404.80±6.45 <sup>a</sup>

with different superscripts are considered significantly different (P<0.05), with the same letter correspond to results that show no statistically significant differences.