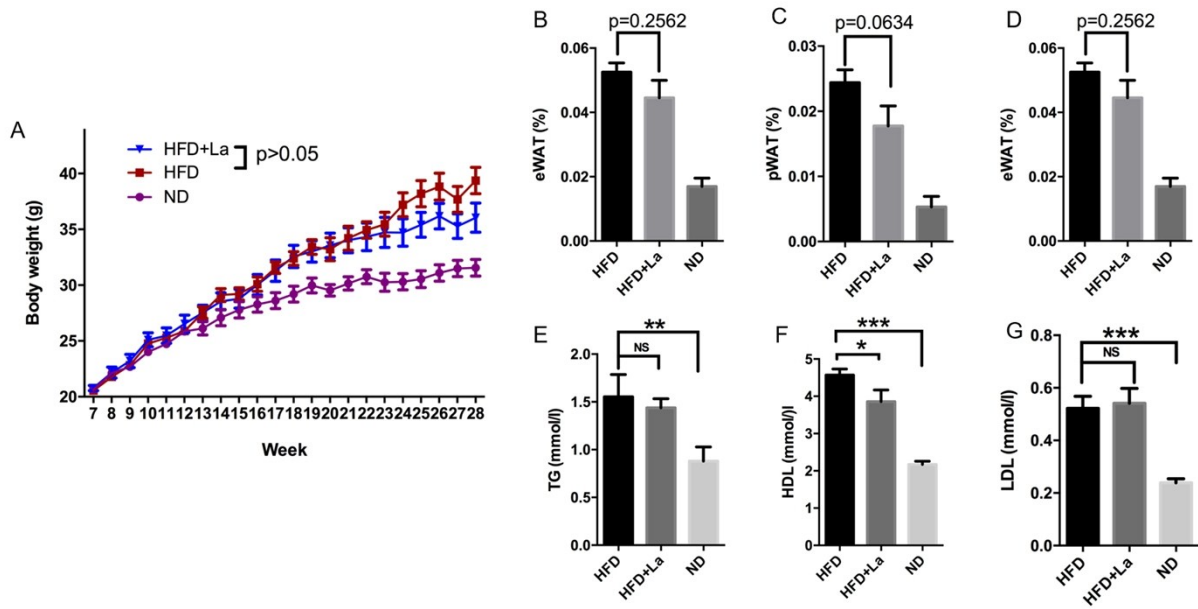


## Supplementary materials

**Supplementary Fig.1** Changes in mice body weight over 28 weeks (A). Epididymal white adipose tissue (eWAT) (B), perirenal white adipose tissue (pWAT) (C) and mesenteric white adipose tissue (mWAT) (D) weights in HFD-induced obese mice treated with *Lactobacillus acidophilus* SJLH001 (*La*-SJLH001). Effects of *La*-SJLH001 on total triglyceride (TG) (E), high-density lipoprotein (HDL) (F) and low-density lipoprotein (LDL) (G) levels in HFD-induced obese mice. Data are presented as mean±SEM (n=8). \*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ . ND, Normal diet group; HFD, High-fat diet group; HFD+La, High-fat diet + *Lactobacillus acidophilus* SJLH001 group.



Supplementary Fig.1

**Supplementary Table 1: Content of normal diet (ND) and high-fat diet (HFD)**

Ingredients	Normal diet (g)	High-fat diet (g)
Casein	200	258.45
L-Cystine	3.00	3.88
Maltodextrin10	132.00	161.53
Corn starch	397.00	0
Sucrose	100	88.91
Soybean oil	70.00	32.31
Lard	0	316.60
Cellulose	50.00	64.61
Choline Bitartrate	2.50	2.58
DiCalcium Phosphate	0	16.80
Calcium Carbonate	0	7.11
Potassium Citrate, 1H <sub>2</sub> O	0	21.32
Vitamin mix (AIN93G)	10	12.92
Mineral mix (AIN93G)	35.00	12.92
Antioxidant TBHQ	0.014	0
Total	1000	1000

**Supplementary Table 2: qPCR primer sequences used**

Gene	Forward	Reverse
<i>Hmgcr</i>	TGTGCTGCTTTGGCTGTATGTCCG	AATTGGACGACCCTCACGGCTTTC
<i>Fabp4</i>	ATGATCATCAGCGTAAATGG	GCCTTTCATAACACATTCCA
<i>Saa3</i>	CAGGATGAAGCCTTCCATTG	CATGACTGGGAACAACAGGA
<i>Slc9a3</i>	GAGTCCTTCAAGTCGACCAAG	CAGGGTTGTCAATTCCTGCAG
<i>Slc10a2</i>	GCCTCTTTGCCTCTTCGTCT	AATCGTTCCCGAGTCAACCC
<i>Tlr2</i>	CAGTCCCAAAGTCTAAAGTC	CTACGGGCAGTGGTGAAAAC

**Supplementary Table 3: Bacterial species identified from HFD group mice via culture.**

Source	Species	
76 Bacteria only identified from HFD group mice	<i>Achromobacter denitrificans</i>	<i>Gordonia amarae</i>
	<i>Achromobacter xylosoxidans</i>	<i>Hyphomicrobium sp.</i>
	<i>Actinobacillus suis</i>	<i>Kocuria kristinae</i>
	<i>Actinomyces denticolens</i>	<i>Lactobacillus fermentum</i>
	<i>Actinomyces graevenitzii</i>	<i>Lactobacillus malefermentans</i>
	<i>Actinomyces neuui</i>	<i>Lactobacillus saerimneri</i>
	<i>Actinomyces radingae</i>	<i>Legionella parisiensis</i>
	<i>Aeromonas caviae/hydrophila/jandaei</i>	<i>Legionella rubrilucens</i>
	<i>Aeromonas sharmana</i>	<i>Leptothrix mobilis</i>
	<i>Aneurinibacillus aneurinilyticus</i>	<i>Microbacterium aurum</i>
	<i>Arcobacter butzleri</i>	<i>Mycobacterium szulgai</i>
	<i>Aspergillus terreus</i>	<i>Ornithobacterium rhinotracheale</i>
	<i>Avibacterium endocarditidis</i>	<i>Paenibacillus jamilae</i>
	<i>Avibacterium gallinarum</i>	<i>Paenibacillus kobensis</i>
	<i>Bacillus acidicola</i>	<i>Paracoccus versutus</i>
	<i>Bacillus litoralis</i>	<i>Prevotella intermedia</i>
	<i>Bacillus niacini</i>	<i>Propionibacterium australiense</i>
	<i>Bacillus salarius</i>	<i>Pseudomonas congelans</i>
	<i>Bacillus subterraneus</i>	<i>Pseudomonas hydrocarboxydans</i>
	<i>Brenneria nigrifluens</i>	<i>Rahnella aquatilis</i>
	<i>Campylobacter jejuni</i>	<i>Rhodococcus rhodnii</i>
	<i>Candida kefyr</i>	<i>Rhodococcus rhodochrous</i>
	<i>Candida valida</i>	<i>Ruminococcus gnavus</i>
	<i>Capnocytophaga sputigena</i>	<i>Salmonella sp.</i>
	<i>Chaetomium globosum</i>	<i>Serratia quinivorans</i>
	<i>Clostridium fallax</i>	<i>Sphingobium xenophagum</i>
	<i>Clostridium sporogenes</i>	<i>Sphingomonas aerolata</i>
	<i>Corynebacterium amycolatum</i>	<i>Staphylococcus arlettae</i>
	<i>Corynebacterium glutamicum</i>	<i>Staphylococcus hominis</i>
	<i>Corynebacterium macginleyi</i>	<i>Staphylococcus simiae</i>
	<i>Devosia riboflavina</i>	<i>Staphylococcus simulans</i>
	<i>Eggerthella lenta</i>	<i>Streptococcus orisuis</i>
	<i>Enterobacter gergoviae</i>	<i>Streptococcus ratti</i>
	<i>Enterococcus gallinarum</i>	<i>Streptococcus sobrinus</i>
	<i>Erwinia mallotivora</i>	<i>Streptococcus thermophilus</i>
	<i>Eubacterium brachy</i>	<i>Streptococcus uberis</i>
	<i>Finegoldia magna</i>	<i>Streptomyces galilaeus</i>
	<i>Globicatella sp.</i>	<i>Tatumella ptyseos</i>

**Supplementary Table 4: Bacterial species identified from both HFD and HFD+La group mice via culture.**

Source	Species	
64 Bacteria identified from both HFD and La group mice	<i>Actinobacillus lignieresii</i>	<i>Lactobacillus gasseri</i>
	<i>Actinobaculum urinale</i>	<i>Lactobacillus ingluviei</i>
	<i>Actinomyces cardiffensis</i>	<i>Lactobacillus johnsonii</i>
	<i>Actinomyces europaeus</i>	<i>Lactobacillus murinus</i>
	<i>Actinomyces hordeovulneris</i>	<i>Lactobacillus paracasei</i>
	<i>Actinomyces viscosus</i>	<i>Lactobacillus plantarum</i>
	<i>Aeromonas molluscorum</i>	<i>Microbacterium saperdae</i>
	<i>Aeromonas salmonicida</i>	<i>Mycobacterium bovis</i>
	<i>Aeromonas veronii</i>	<i>Mycobacterium pseudoshottsii</i>
	<i>Alloiococcus otitis</i>	<i>Mycobacterium tuberculosis</i>
	<i>Aquicola tertiariicarbonis</i>	<i>Pantoea ananatis</i>
	<i>Arcanobacterium pyogenes</i>	<i>Pediococcus acidilactici</i>
	<i>Arcobacter skirrowii</i>	<i>Photobacterium iliopiscarium</i>
	<i>Aureobasidium pullulans</i>	<i>Pichia cactophila</i>
	<i>Bacillus cereus</i>	<i>Porphyromonas gulae</i>
	<i>Bacillus pumilus</i>	<i>Propionibacterium acnes</i>
	<i>Bacillus taeanensis</i>	<i>Pseudomonas veronii</i>
	<i>Bacteroides vulgatus</i>	<i>Rhodococcus equi</i>
	<i>Burkholderia cepacia complex</i>	<i>Rhodococcus erythropolis</i>
	<i>Candida sorbosa</i>	<i>Rhodococcus gordoniae</i>
	<i>Carnobacterium maltaromaticum</i>	<i>Shewanella putrefaciens/algae</i>
	<i>Chromobacterium violaceum</i>	<i>Sphingobacterium thalpophilum</i>
	<i>Enterococcus faecalis</i>	<i>Staphylococcus capitis</i>
	<i>Enterococcus faecium</i>	<i>Staphylococcus epidermidis</i>
	<i>Erysipelothrix rhusiopathiae</i>	<i>Staphylococcus saprophyticus</i>
	<i>Escherichia coli</i>	<i>Staphylococcus xylosus</i>
	<i>Geobacillus stearothermophilus</i>	<i>Streptococcus agalactiae</i>
	<i>Issatchenkia orientalis</i>	<i>Streptococcus anginosus group</i>
	<i>Lactobacillus acidophilus</i>	<i>Streptococcus iniae</i>
	<i>Lactobacillus alimentarius</i>	<i>Streptomyces phaeochromogenes</i>
	<i>Lactobacillus animalis</i>	<i>Vibrio alginolyticus</i>
	<i>Lactobacillus fructivorans</i>	<i>Vibrio vulnificus</i>

**Supplementary Table 5: Bacterial species identified from HFD+La group mice via culture.**

Source	Species			
	<i>Abiotrophia defectiva</i>	<i>Brevibacterium iodinum</i>	<i>Lactobacillus delbrueckii</i>	<i>Pseudomonas mandelii</i>
	<i>Acetobacter aceti</i>	<i>Brevundimonas vesicularis</i>	<i>Lactobacillus kefir</i>	<i>Pseudomonas marginalis</i>
	<i>Acholeplasma laidlawii</i>	<i>Burkholderia fungorum</i>	<i>Lactobacillus paraplantarum</i>	<i>Pseudomonas monteilii</i>
	<i>Acidovorax facilis</i>	<i>Burkholderia thailandensis</i>	<i>Lactobacillus rennini</i>	<i>Pseudomonas putida</i>
	<i>Acinetobacter calcoaceticus-baumannii</i>	<i>Campylobacter coli</i>	<i>Lactobacillus reuteri</i>	<i>Pseudomonas resinovorans</i>
	<i>Acinetobacter radioresistens</i>	<i>Campylobacter fetus</i>	<i>Lactobacillus sakei</i>	<i>Pseudomonas saccharophila</i>
	<i>Acinetobacter schindleri</i>	<i>Candida albicans complex</i>	<i>Legionella anisa</i>	<i>Pseudomonas stutzeri</i>
	<i>Actinobacillus pleuropneumoniae</i>	<i>Candida parapsilosis</i>	<i>Legionella longbeachae</i>	<i>Pseudomonas taetrolens</i>
	<i>Actinomyces dentalis</i>	<i>Candida robusta</i>	<i>Legionella moravica</i>	<i>Rhizobium rhizogenes</i>
	<i>Actinomyces israelii</i>	<i>Candida sphaerica</i>	<i>Leuconostoc citreum</i>	<i>Rhodococcus coprophilus</i>
				<i>Rhodococcus</i>
276	<i>Actinomyces meyeri</i>	<i>Candida tropicalis</i>	<i>Leuconostoc lactis</i>	<i>corynebacterioides</i>
Bacteria	<i>Actinomyces nasicola</i>	<i>Candida zeylanoides</i>	<i>Listeria innocua</i>	<i>Rhodococcus kroppenstedtii</i>
only	<i>Adlercreutzia equolifaciens</i>	<i>Capnocytophaga granulosa</i>	<i>Listeria ivanovii</i>	<i>Rhodococcus maanshanensis</i>
identified	<i>Aerococcus viridans</i>	<i>Clostridium beijerinckii</i>	<i>Listeria monocytogenes</i>	<i>Rhodococcus triatomae</i>
from La	<i>Aeromonas enteropelogenes</i>	<i>Clostridium bifermentans</i>	<i>Listonella anguillarum</i>	<i>Rothia nasimurium</i>
group	<i>Aeromonas media</i>	<i>Clostridium butyricum</i>	<i>Malikia spinosa</i>	<i>Saccharomyces cerevisiae</i>
mice	<i>Aeromonas schubertii</i>	<i>Clostridium difficile</i>	<i>Mannheimia granulomatis</i>	<i>Saccharothrix mutabilis</i>
	<i>Aggregatibacter segnis</i>	<i>Clostridium hathewayi</i>	<i>Mannheimia varigena</i>	<i>Schizosaccharomyces pombe</i>
	<i>Agrobacterium tumefaciens</i>	<i>Clostridium perfringens</i>	<i>Microsporum gypseum</i>	<i>Serratia plymuthica</i>
	<i>Agromyces rhizosphaerae</i>	<i>Clostridium spiroforme</i>	<i>Moraxella osloensis</i>	<i>Slackia exigua</i>
	<i>Arcanobacterium haemolyticum</i>	<i>Comamonas kerstersii</i>	<i>Mycobacterium chelonae</i>	<i>Sphingomonas paucimobilis</i>
	<i>Aromatoleum aromaticum</i>	<i>Corynebacterium afermentans</i>	<i>Mycobacterium farcinogenes</i>	<i>Sphingomonas wittichii</i>
	<i>Aromatoleum tolivorans</i>	<i>Corynebacterium appendicis</i>	<i>Mycobacterium fortuitum</i>	<i>Sphingomonas yunnanensis</i>
	<i>Arthrobacter cumminsii</i>	<i>Corynebacterium aurimucosum</i>	<i>Mycobacterium manitobense</i>	<i>Sporobolomyces salmonicolor</i>
				<i>Sporolactobacillus</i>
	<i>Aspergillus flavus</i>	<i>Corynebacterium bovis</i>	<i>Mycobacterium seoulense</i>	<i>laevolacticus</i>

<i>Atopobium parvulum</i>	<i>Corynebacterium mycetoides</i>	<i>Myroides odoratus</i>	<i>Staphylococcus caprae</i>
<i>Atopobium rimae</i>	<i>Corynebacterium propinquum</i>	<i>Neisseria gonorrhoeae</i>	<i>Staphylococcus cohnii</i>
<i>Avibacterium avium</i>	<i>Corynebacterium urealyticum</i>	<i>Neisseria meningitidis</i>	<i>Staphylococcus haemolyticus</i>
<i>Azoarcus communis</i>	<i>Dermatophilus chelonae</i>	<i>Nocardia abscessus</i>	<i>Stenotrophomonas maltophilia</i>
<i>Azoarcus indigens</i>	<i>Dermatophilus congolensis</i>	<i>Nocardia africana</i>	<i>Streptococcus bovis</i>
<i>Azoarcus sp.</i>	<i>Dichelobacter nodosus</i>	<i>Nocardia concava</i>	<i>Streptococcus canis/equi</i>
<i>Bacillus fortis</i>	<i>Dietzia cinnamea</i>	<i>Nocardia ignorata</i>	<i>Streptococcus didelphis</i>
<i>Bacillus gibsonii</i>	<i>Dietzia natronolimnaea</i>	<i>Nocardia sp.</i>	<i>Streptococcus dysgalactiae</i>
<i>Bacillus jeotgali</i>	<i>Eikenella corrodens</i>	<i>Novosphingobium lentum</i>	<i>Streptococcus</i> <i>dysgalactiae/pyogenes</i>
<i>Bacillus muralis</i>	<i>Enterobacter aerogenes</i>	<i>Novosphingobium</i> <i>pentaromativorans</i>	<i>Streptococcus equinus</i>
<i>Bacillus mycoides</i>	<i>Enterococcus avium</i>	<i>Novosphingobium resinovororum</i>	<i>Streptococcus gallolyticus</i>
<i>Bacillus okhensis</i>	<i>Enterococcus durans</i>	<i>Obesumbacterium proteus</i>	<i>Streptococcus pyogenes</i>
<i>Bacillus pseudocaliphilus</i>	<i>Erwinia psidii</i>	<i>Paenibacillus chondroitinus</i>	<i>Streptococcus sanguinis</i>
<i>Bacillus soralis</i>	<i>Erwinia sp.</i>	<i>Paenibacillus glucanolyticus</i>	<i>Streptomyces avidinii</i>
<i>Bacillus subtilis</i>	<i>Erwinia tracheiphila</i>	<i>Paenibacillus sabiniae</i>	<i>Streptomyces sp.</i>
<i>Bacillus weihenstephanensis</i>	<i>Eubacterium limosum</i>	<i>Paenibacillus stellifer</i>	<i>Thauera aminoaromatica</i>
<i>Bacteroides caccae</i>	<i>Eubacterium yurii</i>	<i>Paenibacillus thiaminolyticus</i>	<i>Trichophyton mentagrophytes</i>
<i>Bacteroides nordii</i>	<i>Flavobacterium gelidilacus</i>	<i>Pantoea stewartii</i>	<i>Trichosporon cutaneum</i>
<i>Bacteroides ovatus/xylanisolvans</i>	<i>Francisella philomiragia</i>	<i>Pasteurella multocida</i>	<i>Trichosporon mucoides</i>
<i>Bacteroides suis</i>	<i>Fusarium poae</i>	<i>Pasteurella testudinis</i>	<i>Tsakamurella paurometabola</i>
<i>Bifidobacterium breve</i>	<i>Geotrichum ingens</i>	<i>Penicillium sp.</i>	<i>Veillonella parvula</i>
<i>Bifidobacterium gallinarum</i>	<i>Gordonia rubripertincta</i>	<i>Phenylobacterium sp.</i>	<i>Vibrio aestuarianus</i>
<i>Bifidobacterium thermacidophilum</i>	<i>Helicobacter pylori</i>	<i>Photobacterium damsela</i>	<i>Vibrio anguillarum/fluviialis</i>
<i>Bordetella bronchiseptica</i>	<i>Kingella kingae</i>	<i>Photorhabdus luminescens</i>	<i>Vibrio fluvialis</i>
<i>Bordetella hinzii</i>	<i>Klebsiella oxytoca</i>	<i>Porphyromonas gingivalis</i>	<i>Vibrio gazogenes</i>
<i>Bordetella parapertussis</i>	<i>Kocuria varians</i>	<i>Prevotella stercorea</i>	<i>Vibrio ordalii</i>
<i>Bordetella pertussis</i>	<i>Lactobacillus brevis</i>	<i>Pseudomonas antarctica</i>	<i>Yarrowia lipolytica</i>
<i>Brevibacillus laterosporus</i>	<i>Lactobacillus buchneri</i>	<i>Pseudomonas libanensis</i>	<i>Yersinia enterocolitica</i>

---