Figures

Fig. S 1 Inhibition pattern of LAB strain against *H. pylori* by agar-well diffusion assay.

Fig. S 2 Antibiotic susceptibility pattern of LAB strain by K-B method according to CLSI "Implementation Standard for Antimicrobial Sensitivity Test".

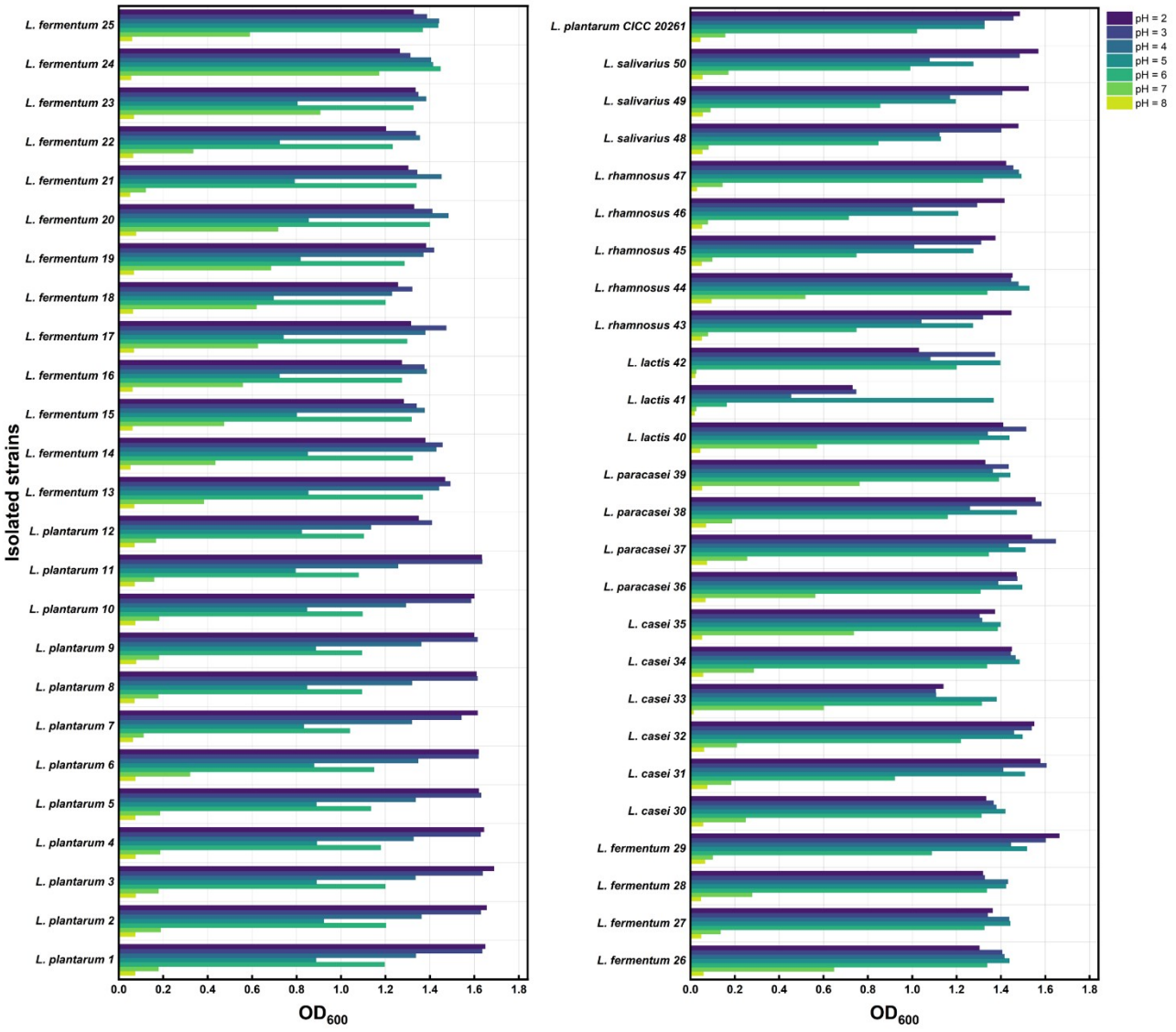
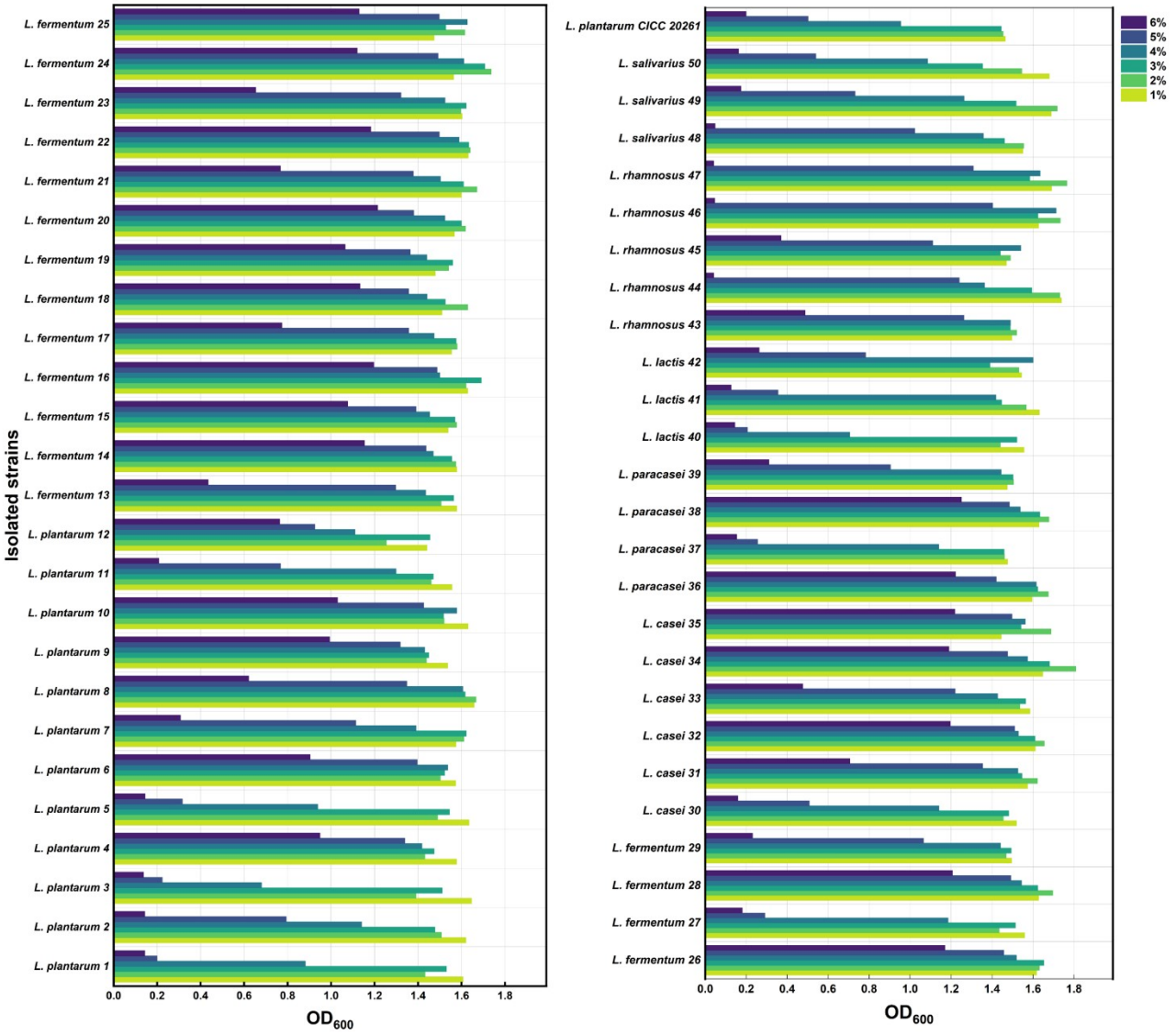


Fig. S 3 PH tolerance of LAB strains at pH 2-8. PH tolerance of LAB strains was observed by measuring absorbance at 600 nm using a Varioskan LUX microplate reader after incubating LAB in MRS broth at a pH gradient from 2 to 8 which adjusted with NaOH (5.0 M) or HCl (1.0 M) for 24 h at 37°C.



12

13 Fig. S 4 Osmotic tolerance of LAB strains at 1% - 6% (w/v) sodium chloride. Osmotic tolerance of LAB strains was observed by measuring absorbance at 600 nm

14 after incubating LAB in MRS broth at different concentrations of NaCl (1%-6%; w/v) for 24 h at 37°C.

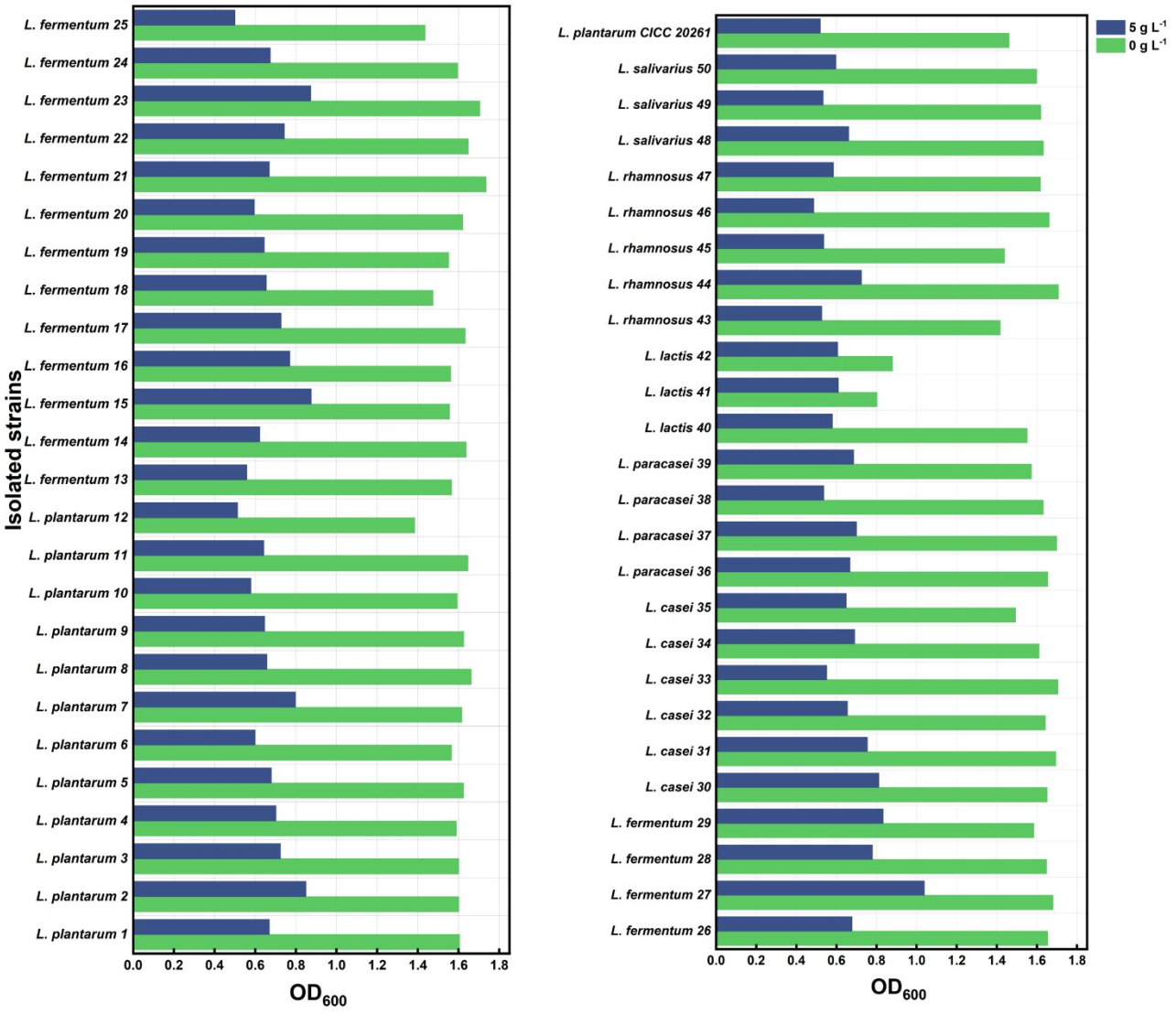


Fig. S 5 Bile tolerance of LAB strains at 5 g L^{-1} bile salts. Bile tolerance of LAB strains was observed by measuring absorbance at 600 nm after incubating LAB in MRS broth supplemented with 5g L^{-1} bovine bile salt for 24 h at 37°C.

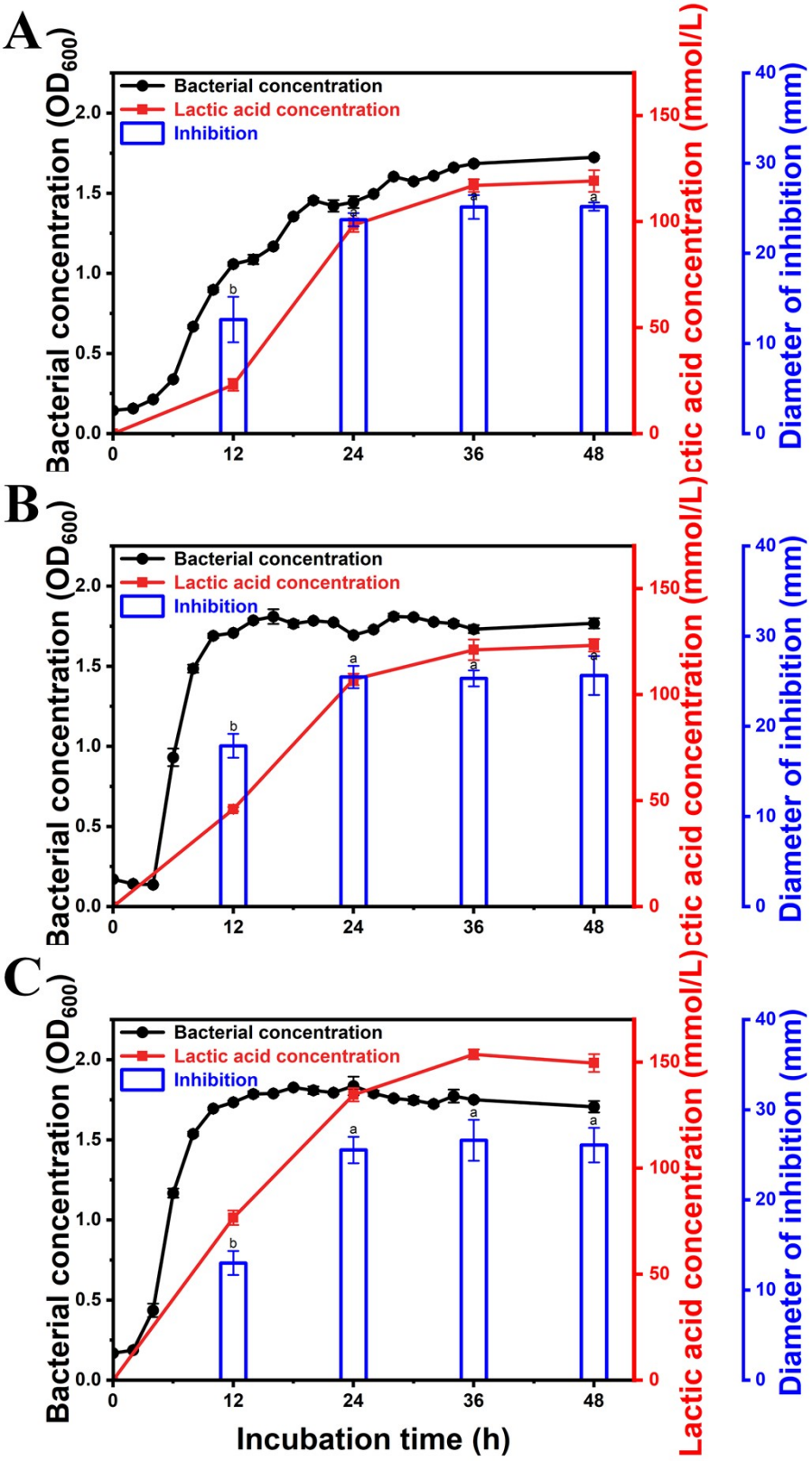


Fig. S 6 Antibacterial dynamic curves of *L. rhamnosus* NCUH061004 (A), *L. salivarius* NCUH062003 (B) and *L. plantarum* NCUH001003 (C) against *H. pylori* 26695. Antibacterial dynamic curves were plotted based on bacterial concentration, lactic concentration, and anti-*H. pylori* activity over a 36-h period.

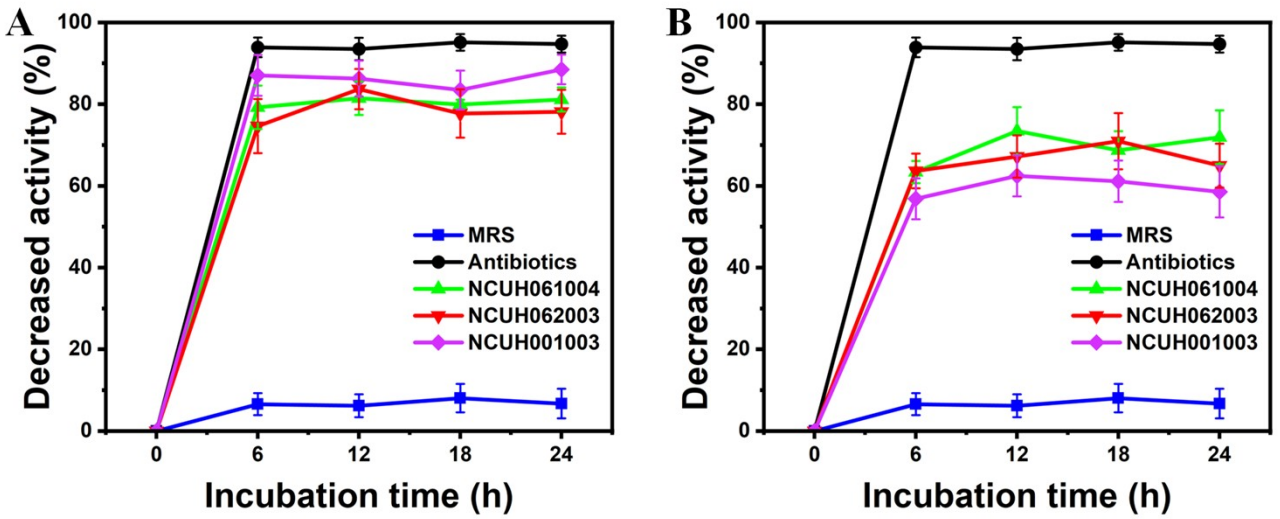


Fig. S 7 The decrease of *H. pylori* urease activity during co-cultivation with supernatants (A) and LAB cells (B). Decreased activity of *H. pylori* urease was analyzed using a modified phenol red method.

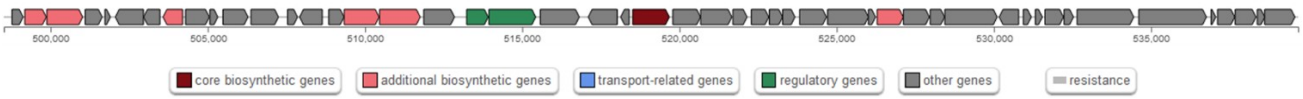


Fig. S 8 The 49 genes of secondary metabolite synthesis gene cluster T3PKS in *L. salivarius* NCUH062003.

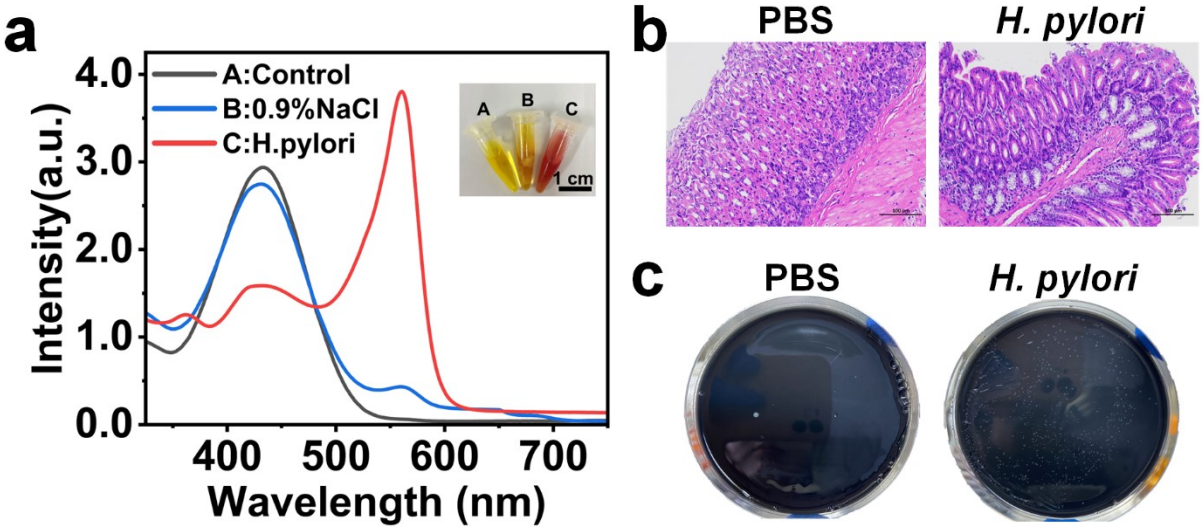


Fig. S 9 Evaluation of *H. pylori* infection in mice by urease assay (a), H&E staining (b) and plate coating (c) of gastric tissues.

Tables

Table S 1 Bacteria counts and species of colonies in the samples

Sample[a]	No.	Bacteria counts[b]	16S rDNA identification[c]
Infant feces	IF1	8.90 ± 0.09	*Lactiplantibacillus plantarum, Lacticaseibacillus rhamnosus*
	IF2	8.25 ± 0.24	*Lactiplantibacillus plantarum*
	IF3	8.30 ± 0.24	*Lactiplantibacillus plantarum, Limosilactobacillus fermentum, Lacticaseibacillus casei*
	IF4	8.40 ± 0.24	*Lactiplantibacillus plantarum*
	IF5	7.65 ± 0.30	*Limosilactobacillus fermentum*
	IF6	7.15 ± 0.19	*Limosilactobacillus fermentum*
	IF7	7.20 ± 0.32	*Limosilactobacillus fermentum*
	IF8	7.60 ± 0.27	*Lacticaseibacillus casei, Lactobacillus mucosae*
	IF9	7.60 ± 0.55	*Lacticaseibacillus casei, Lacticaseibacillus paracasei*
	IF10	8.30 ± 0.23	*Lactococcus lactis*
	IF11	8.55 ± 0.32	*Lacticaseibacillus rhamnosus*
	IF12	7.43 ± 0.36	*Lacticaseibacillus casei*
Infant saliva	IS1	6.45 ± 0.53	*Limosilactobacillus fermentum*
	IS2	7.25 ± 0.39	*Limosilactobacillus fermentum, Ligilactobacillus salivarius*
	IS3	6.90 ± 0.67	*Lactococcus lactis*
	IS4	7.20 ± 0.49	*Lactococcus lactis*
	IS5	6.35 ± 0.61	*Ligilactobacillus salivarius*
	IS6	7.09 ± 0.61	*Limosilactobacillus fermentum*
	IS7	6.78 ± 0.73	*Limosilactobacillus fermentum, Ligilactobacillus salivarius*
	IS8	6.29 ± 0.58	*Limosilactobacillus fermentum*，*Lactiplantibacillus plantarum*
	IS9	6.53 ± 0.33	*Limosilactobacillus fermentum*
	IS10	6.98 ± 0.13	*Ligilactobacillus salivarius*，*Lactiplantibacillus plantarum*
	IS11	6.43 ± 0.63	*Limosilactobacillus fermentum*
	IS12	7.15 ± 0.39	*Limosilactobacillus fermentum*

[a] Feces and saliva samples were collected from healthy infants aged 0-24 months in Nanchang area. [b] LAB colonies were obtained through Microbial Colony Picker (QPix 420), and bacteria counts were calculated by plate colony counting method. [c] 16S rDNA identification of the strain was obtained by homology matching in NCBI nucleotide database using BLAST analysis tools. Results are expressed as mean of triplicate values ± standard deviation.

Table S 2 Morphology, biochemistry and 16S rDNA identification of LAB strains from infant feces and the oral cavity[a]

No.	Morphology	Structure under the microscope	Gram staining	Catalase test	16S rDNA identification
1	3.5 mm, round, milky white, shiny glossy, convex, smooth	Short, rod shaped, biclavate	+ve	-ve	*L. plantarum*
2	2.5mm, round, milky white, glossy, convex, smooth	Short, rod shaped, biclavate	+ve	-ve	*L. plantarum*
3	2.5mm, round, off-white, dim, convex, smooth	Short, rod shaped, biclavate	+ve	-ve	*L. plantarum*
4	3.8 mm, round, milk white, shiny glossy, convex, smooth	Short, rod shaped, biclavate	+ve	-ve	*L. plantarum*
5	2.6 mm, round, milky white, shiny glossy, convex, smooth	Short, rod shaped, biclavate	+ve	-ve	*L. plantarum*
6	3.2 mm, round, milky white, shiny glossy, convex, smooth	Short, rod shaped, biclavate	+ve	-ve	*L. plantarum*
7	3.4 mm, round, milky white, shiny glossy, swelling, smooth	Short, rod shaped, biclavate	+ve	-ve	*L. plantarum*
8	2.8mm, round, milky white, shiny glossy, convex, smooth	Short, rod shaped, biclavate	+ve	-ve	*L. plantarum*
9	2.5mm, round, milky white, glossy, convex, smooth	Long, rod shaped, biclavate	+ve	-ve	*L. plantarum*
10	2.6mm, round, off-white, dim, convex, smooth	Long, rod shaped, biclavate	+ve	-ve	*L. plantarum*
11	2.5mm, round, milky white, shiny glossy, convex, smooth	Long, rod shaped, biclavate	+ve	-ve	*L. plantarum*
12	1.2 mm, round, milky white, shiny glossy, convex, smooth	Long, rod shaped, biclavate	+ve	-ve	*L. fermentum*
13	0.7mm, irregular, white, dim, flat, rough	Short, rod shaped, biclavate, partially curved	+ve	-ve	*L. fermentum*
14	0.8mm, irregular, white, dim, flat, rough	Short, rod shaped, biclavate, partially curved	+ve	-ve	*L. fermentum*

15	0.7mm, irregular, white, dim, flat, rough	Short, rod shaped, biclavate, partially curved	+ve	-ve	*L. fermentum*
16	0.8mm, irregular, white, dim, flat, rough	Short, rod shaped, biclavate, partially curved	+ve	-ve	*L. fermentum*
17	1.0mm, round, white, glossy, flat, rough	Short, rod shaped, biclavate, partially curved	+ve	-ve	*L. fermentum*
18	1.2mm, round, white, glossy, flat, rough	Short, rod shaped, biclavate, partially curved	+ve	-ve	*L. fermentum*
19	1.0mm, round, white, glossy, flat, rough	Short, rod shaped, biclavate, partially curved	+ve	-ve	*L. fermentum*
20	0.5mm, round, off-white, translucent, convex, smooth	Short, rod shaped, biclavate, partially curved	+ve	-ve	*L. fermentum*
21	0.5mm, round, off-white, translucent, convex, smooth	Short, rod shaped, biclavate, partially curved	+ve	-ve	*L. fermentum*
22	0.6mm, round, off-white, translucent, convex, smooth	Short, rod shaped, biclavate, partially curved	+ve	-ve	*L. fermentum*
23	0.6mm, round, off-white, translucent, convex, smooth	Short, rod shaped, biclavate, partially curved	+ve	-ve	*L. fermentum*
24	0.8mm, irregular, white, dim, flat, smooth	Short, rod shaped, biclavate, partially curved	+ve	-ve	*L. fermentum*
25	0.9mm, irregular, white, dim, flat, smooth	Short, rod shaped, biclavate, partially curved	+ve	-ve	*L. fermentum*
26	1.2mm, irregular, off-white, dim, flat, smooth	Short, rod shaped, biclavate, partially curved	+ve	-ve	*L. fermentum*
27	1.0mm, irregular, white, dim, flat, smooth	Short, rod shaped, biclavate, partially curved	+ve	-ve	*L. fermentum*
28	0.8mm, irregular, off-white, translucent, flat, smooth	Short, rod shaped, biclavate, partially curved	+ve	-ve	*L. fermentum*
29	0.8mm, irregular, white, dim, flat, smooth	Short, rod shaped, biclavate, partially curved	+ve	-ve	*L. fermentum*
30	0.5mm, round, off-white, dim, convex, rough	Short, rod shaped, biclavate	+ve	-ve	*L. casei*
31	0.4mm, round, off-white, dim, convex, rough	Short, rod shaped, biclavate	+ve	-ve	*L. casei*
32	0.4mm, round, off-white, dim, convex, rough	Short, rod shaped, biclavate	+ve	-ve	*L. casei*
33	0.5mm, irregular, off-white, dim, convex, rough	Short, rod shaped, biclavate	+ve	-ve	*L. casei*
34	0.5mm, irregular, off-white, dim, convex, rough	Short, rod shaped, biclavate	+ve	-ve	*L. casei*
35	0.3mm, round, off-white, dim, convex, rough	Short, rod shaped, biclavate	+ve	-ve	*L. casei*
36	0.5mm, round, off-white, dim, convex, rough	Short, rod shaped, biclavate	+ve	-ve	*L. paracasei*
37	0.3mm, round, off-white, dim, convex, rough	Short, rod shaped, biclavate	+ve	-ve	*L. paracasei*
38	0.3mm, round, off-white, dim, convex, rough	Short, rod shaped, biclavate	+ve	-ve	*L. paracasei*
39	0.5mm, round, off-white, dim, convex, rough	Short, rod shaped, biclavate	+ve	-ve	*L. paracasei*
40	1.0mm, round, off-white, glossy, flat, smooth	Sphere, short chain-typed	+ve	-ve	*Lc. lactis*
41	0.6mm, round, off-white, glossy, flat, smooth	Sphere, short chain-typed	+ve	-ve	*Lc. lactis*
42	0.5mm, round, off-white, glossy, flat, smooth	Sphere, short chain-typed	+ve	-ve	*Lc. lactis*
43	2 mm, round, white, glossy, convex, rough	Short, rod shaped, biclavate	+ve	-ve	*L. rhamnosus*
44	2 mm, round, white, glossy, convex, rough	Short, rod shaped, biclavate	+ve	-ve	*L. rhamnosus*
45	2 mm, round, white, glossy, convex, rough	Short, rod shaped, biclavate	+ve	-ve	*L. rhamnosus*
46	2.5mm, round, white, glossy, convex, rough	Short, rod shaped, biclavate	+ve	-ve	*L. rhamnosus*
47	2.5 mm, round, white, glossy, convex, rough	Short, rod shaped, biclavate	+ve	-ve	*L. rhamnosus*
48	2.5 mm, round, white, glossy, flat, smooth	Short, rod shaped, biclavate	+ve	-ve	*L. salivarius*
49	3.0 mm, round, white, glossy, flat, smooth	Short, rod shaped, biclavate	+ve	-ve	*L. salivarius*
50	3.0 mm, round, milky white, glossy, flat, smooth	Short, rod shaped, biclavate	+ve	-ve	*L. salivarius*

[a] LAB were identified by morphological observation, gram staining, catalase test and 16S rDNA identification.

Table S 3 Transit tolerance, urease inhibition rate and cell surface hydrophobicity of LAB strains

Strain	Transit tolerance[a] (%)	Urease inhibition rate[b] (%)	Cell surface hydrophobicity[c] (%)
L. plantarum 1	10.84 ± 0.33^{f}	80.22 ± 0.06^{a}	46.28 ± 0.38^{bc}
L. plantarum 2	11.36 ± 0.66^{f}	81.32 ± 0.23^{a}	52.34 ± 0.22^{b}
L. plantarum 3	10.58 ± 0.02^{f}	83.99 ± 1.96^{a}	49.20 ± 0.24^{b}
L. plantarum 4	11.34 ± 0.31^{f}	80.91 ± 1.02^{a}	53.22 ± 0.53^{b}
L. plantarum 5	11.32 ± 0.21^{f}	82.36 ± 0.99^{a}	41.08 ± 0.13^{c}
L. plantarum 6	19.77 ± 1.21^{e}	84.77 ± 0.68^{a}	52.49 ± 0.22^{b}
L. plantarum 7	6.90 ± 0.23^{fg}	81.02 ± 2.22^{a}	38.23 ± 0.32^{c}
L. plantarum 8	10.99 ± 0.98^{f}	80.02 ± 0.19^{a}	39.96 ± 0.09^{c}

L. plantarum 9	11.21 ± 0.11^{f}	80.69 ± 0.64^{a}	43.22 ± 0.06^{c}
L. plantarum 10	11.33 ± 0.14^{f}	81.69 ± 0.99^{a}	47.44 ± 0.03^{bc}
L. plantarum 11	9.70 ± 0.16^{f}	79.23 ± 0.64^{a}	41.22 ± 0.07^{c}
L. plantarum 12	11.84 ± 0.32^{f}	78.66 ± 0.78^{a}	37.37 ± 0.64^{c}
L. fermentum 13	25.66 ± 0.91^{de}	81.87 ± 1.3^{a}	36.26 ± 0.13^{c}
L. fermentum 14	29.78 ± 0.51^{de}	69.46 ± 1.94^{ab}	45.22 ± 0.05^{bc}
L. fermentum 15	34.39 ± 0.71^{d}	65.00 ± 2.89^{b}	44.66 ± 0.19^{bc}
L. fermentum 16	40.27 ± 0.73^{cd}	58.89 ± 1.92^{b}	48.22 ± 0.45^{b}
L. fermentum 17	42.42 ± 0.76^{cd}	61.70 ± 0.22^{b}	41.33 ± 0.34^{c}
L. fermentum 18	46.96 ± 0.91^{c}	62.36 ± 0.66^{b}	38.33 ± 0.12^{c}
L. fermentum 19	48.28 ± 0.34^{c}	62.50 ± 0.97^{b}	37.22 ± 0.71^{c}
L. fermentum 20	48.35 ± 0.62^{c}	57.56 ± 0.58^{b}	46.36 ± 0.30^{bc}
L. fermentum 21	8.37 ± 0.52^{f}	58.87 ± 1.61^{b}	39.91 ± 0.16^{c}
L. fermentum 22	24.7 ± 0.16^{de}	64.76 ± 1.94^{b}	21.22 ± 0.82^{d}
L. fermentum 23	65.53 ± 0.42^{b}	61.32 ± 2.91^{b}	36.31 ± 0.19^{c}
L. fermentum 24	80.85 ± 0.32^{a}	64.15 ± 0.71^{b}	34.27 ± 0.13^{cd}
L. fermentum 25	40.91 ± 0.52^{cd}	60.39 ± 0.36^{b}	53.47 ± 0.08^{b}
L. fermentum 26	45.01 ± 0.85^{c}	59.45 ± 0.60^{b}	29.22 ± 0.02^{d}
L. fermentum 27	9.40 ± 0.81^{f}	58.92 ± 0.97^{b}	42.34 ± 0.09^{c}
L. fermentum 28	19.43 ± 0.64^{e}	64.36 ± 1.09^{b}	38.23 ± 0.09^{c}
L. fermentum 29	6.04 ± 0.31^{fg}	57.46 ± 1.34^{b}	40.69 ± 0.31^{c}
L. casei 30	17.51 ± 0.16^{e}	55.36 ± 1.88^{bc}	43.56 ± 0.62^{c}
L. casei 31	11.39 ± 0.19^{f}	61.29 ± 0.72^{b}	43.66 ± 0.22^{c}
L. casei 32	13.41 ± 0.44^{ef}	73.33 ± 0.96^{ab}	49.27 ± 0.94^{b}
L. casei 33	43.55 ± 0.99^{cd}	50.13 ± 0.82^{c}	41.26 ± 0.03^{c}
L. casei 34	19.19 ± 0.61^{e}	56.22 ± 0.14^{bc}	26.94 ± 0.31^{d}
L. casei 35	52.65 ± 0.19^{c}	52.33 ± 0.42^{c}	35.13 ± 0.43^{cd}
L. paracasei 36	37.61 ± 0.45^{d}	66.32 ± 0.27^{b}	43.29 ± 0.49^{c}
L. paracasei 37	15.44 ± 0.64^{ef}	51.97 ± 0.51^{c}	44.95 ± 0.27^{c}
L. paracasei 38	11.84 ± 0.19^{f}	50.63 ± 0.17^{c}	44.04 ± 0.52^{c}
L. paracasei 39	52.86 ± 0.34^{c}	54.23 ± 0.05^{c}	64.08 ± 0.81^{a}
Lc. lactis 40	37.68 ± 0.56^{d}	39.32 ± 0.63^{d}	59.26 ± 0.29^{ab}
Lc. lactis 41	1.92 ± 0.95^{g}	37.46 ± 1.97^{d}	51.32 ± 0.16^{b}
Lc. lactis 42	1.85 ± 0.81^{g}	29.44 ± 1.63^{e}	50.32 ± 0.14^{b}
L. rhamnosus 43	15.43 ± 0.45^{ef}	88.93 ± 1.68^{a}	54.74 ± 0.61^{b}
L. rhamnosus 44	33.87 ± 0.79^{d}	82.13 ± 1.33^{a}	66.88 ± 0.15^{a}
L. rhamnosus 45	7.07 ± 0.76^{fg}	80.32 ± 0.18^{a}	73.91 ± 0.20^{a}
L. rhamnosus 46	5.50 ± 0.82^{fg}	83.46 ± 1.18^{a}	52.26 ± 0.25^{b}
L. rhamnosus 47	9.63 ± 0.34^{f}	83.94 ± 1.56^{a}	63.55 ± 0.17^{ab}
L. salivarius 48	5.50 ± 0.48^{fg}	80.22 ± 1.53^{a}	67.91 ± 0.52^{a}
L. salivarius 49	5.88 ± 0.19^{fg}	80.97 ± 1.67^{a}	69.91 ± 0.51^{a}
L. salivarius 50	10.90 ± 0.67^{f}	87.49 ± 1.19^{a}	70.47 ± 0.11^{a}
CICC 20261	11.54 ± 0.52^{f}	58.09 ± 1.92^{b}	43.25 ± 0.13^{c}
Amoxicillin	-	95.55 ± 3.34^{a}	-
Metronidazole	-	90.00 ± 2.62^{a}	-
Amoxicillin & metronidazole	-	97.18 ± 1.88^{a}	-

[a] Transit tolerance of LAB to artificial gastrointestinal tracts was determined by survival rate through the artificial gastric fluid (pH 2.5) containing pepsin (0.3% w/v) and artificial pancreatic fluid (pH 8.0) containing trypsin (0.1% w/v). [b] Urease inhibition rate was analyzed using a modified phenol red method. [c] Cell surface hydrophobicity of LAB was determined by bacterial adhesion to hydrocarbons (BATH) method. Results are expressed as mean of triplicate values ± standard deviation. Different lowercase letters mean significant ($P < 0.05$) differences in a column.

51 Table S 4 The pH value, acid concentration and inhibition zone diameter of LAB strains

Strain name	pH[a]	Acid concentration[b] (mmol L^{-1})		Inhibition zone diameter[c] (mm)		
		Lactic acid	Acetic acid	*H. pylori* 26695	*H. pylori* 43504	*H. pylori* SS1
L. plantarum 1	3.63^{a}	125.72 ± 0.09^{a}	8.38 ± 0.29^{a}	23.66 ± 0.41^{b}	28.18 ± 0.35^{bc}	21.23 ± 1.10^{b}
L. plantarum 2	3.63^{a}	125.26 ± 0.75^{a}	8.25 ± 0.08^{a}	22.61 ± 0.12^{bc}	29.38 ± 0.20^{bc}	19.48 ± 0.14^{c}
L. plantarum 3	3.63^{a}	134.55 ± 3.15^{a}	9.18 ± 0.24^{a}	25.54 ± 1.46^{ab}	30.99 ± 0.73^{b}	22.11 ± 0.05^{b}
L. plantarum 4	3.60^{a}	136.16 ± 1.05^{a}	8.36 ± 0.15^{a}	25.64 ± 0.58^{ab}	28.01 ± 0.43^{bc}	21.21 ± 2.05^{b}
L. plantarum 5	3.60^{a}	129.55 ± 1.52^{a}	8.65 ± 0.30^{a}	25.54 ± 0.22^{ab}	33.43 ± 0.41^{ab}	22.55 ± 0.21^{ab}
L. plantarum 6	3.63^{a}	124.93 ± 0.86^{a}	7.90 ± 0.37^{a}	22.57 ± 0.24^{bc}	27.75 ± 0.55^{bc}	20.38 ± 0.05^{c}
L. plantarum 7	3.66^{a}	118.36 ± 1.95^{a}	8.06 ± 0.30^{a}	22.02 ± 0.14^{bc}	27.87 ± 1.01^{bc}	20.68 ± 0.31^{c}
L. plantarum 8	3.63^{a}	122.50 ± 0.17^{a}	8.38 ± 0.13^{a}	21.26 ± 0.16^{c}	28.64 ± 0.15^{bc}	20.31 ± 1.14^{c}
L. plantarum 9	3.61^{a}	123.60 ± 0.80^{a}	8.39 ± 0.28^{a}	22.46 ± 1.01^{bc}	28.06 ± 0.09^{bc}	20.36 ± 0.16^{c}
L. plantarum 10	3.61^{a}	128.12 ± 0.46^{a}	8.24 ± 0.16^{a}	22.74 ± 0.14^{bc}	28.22 ± 1.22^{bc}	21.18 ± 0.05^{b}
L. plantarum 11	3.63^{a}	126.61 ± 0.48^{a}	8.32 ± 0.17^{a}	22.61 ± 0.24^{bc}	28.11 ± 0.45^{bc}	19.41 ± 1.21^{c}
L. plantarum 12	3.67^{a}	112.49 ± 0.23^{ab}	7.93 ± 0.01^{a}	21.40 ± 0.02^{c}	28.62 ± 0.02^{bc}	19.69 ± 0.34^{c}
L. fermentum 13	4.61^{c}	42.68 ± 1.05^{e}	6.65 ± 0.65^{a}	12.22 ± 0.39^{e}	17.87 ± 0.73^{de}	10.93 ± 0.05^{e}
L. fermentum 14	4.06^{b}	83.78 ± 1.56^{c}	9.33 ± 0.11^{a}	16.85 ± 0.40^{d}	19.35 ± 1.01^{d}	17.56 ± 0.32^{cd}
L. fermentum 15	4.27^{b}	59.06 ± 1.08^{d}	9.14 ± 0.21^{a}	14.08 ± 1.29^{de}	14.49 ± 0.42^{e}	11.16 ± 1.09^{e}
L. fermentum 16	4.25^{b}	58.21 ± 0.35^{d}	8.39 ± 0.07^{a}	15.44 ± 0.05^{d}	15.64 ± 2.21^{e}	10.94 ± 1.05^{e}
L. fermentum 17	4.27^{b}	65.56 ± 0.40^{d}	9.26 ± 0.15^{a}	16.47 ± 0.24^{d}	19.88 ± 0.28^{d}	10.30 ± 0.97^{e}
L. fermentum 18	4.26^{b}	63.85 ± 0.54^{d}	8.43 ± 0.11^{a}	16.01 ± 0.16^{d}	18.59 ± 1.12^{d}	9.37 ± 0.49^{e}
L. fermentum 19	4.24^{b}	68.33 ± 0.40^{cd}	8.65 ± 0.15^{a}	15.88 ± 0.04^{d}	15.96 ± 0.30^{e}	13.66 ± 0.72^{d}
L. fermentum 20	4.18^{b}	79.46 ± 0.76^{c}	8.76 ± 0.10^{a}	16.10 ± 0.13^{d}	16.44 ± 0.05^{e}	16.33 ± 0.27^{cd}
L. fermentum 21	4.20^{b}	78.85 ± 0.64^{c}	10.16 ± 0.11^{a}	15.78 ± 2.10^{d}	16.25 ± 1.15^{e}	14.25 ± 0.23^{d}
L. fermentum 22	4.25^{b}	58.06 ± 0.97^{d}	9.18 ± 0.18^{a}	15.03 ± 0.31^{de}	17.36 ± 0.40^{de}	9.35 ± 1.35^{e}
L. fermentum 23	4.32^{b}	63.77 ± 0.57^{d}	10.10 ± 0.93^{a}	16.07 ± 0.04^{d}	19.17 ± 0.19^{d}	11.92 ± 0.84^{de}
L. fermentum 24	4.29^{b}	57.37 ± 0.3^{d}	8.32 ± 0.16^{a}	14.87 ± 0.44^{de}	16.77 ± 2.05^{de}	10.55 ± 0.22^{e}
L. fermentum 25	4.25^{b}	66.81 ± 0.39^{d}	10.49 ± 0.42^{a}	14.58 ± 1.23^{de}	15.25 ± 0.54^{e}	11.33 ± 0.69^{de}
L. fermentum 26	4.24^{b}	60.62 ± 0.95^{d}	9.17 ± 0.24^{a}	15.42 ± 0.05^{d}	14.74 ± 0.79^{e}	12.33 ± 0.29^{de}
L. fermentum 27	4.28^{b}	59.26 ± 0.08^{d}	9.08 ± 0.24^{a}	15.53 ± 0.23^{d}	17.99 ± 0.88^{d}	11.46 ± 0.27^{de}
L. fermentum 28	4.17^{b}	58.43 ± 0.02^{d}	9.08 ± 0.29^{a}	14.58 ± 1.01^{de}	13.63 ± 1.15^{e}	11.03 ± 1.31^{e}
L. fermentum 29	4.35^{b}	63.25 ± 0.42^{d}	8.26 ± 0.19^{a}	13.66 ± 0.35^{de}	19.37 ± 0.31^{d}	11.49 ± 0.28^{de}
L. casei 30	4.25^{b}	60.56 ± 0.81^{d}	8.47 ± 0.54^{a}	16.66 ± 0.16^{d}	14.74 ± 0.74^{e}	11.55 ± 0.32^{de}
L. casei 31	3.85^{ab}	99.34 ± 0.39^{b}	7.56 ± 0.20^{a}	18.85 ± 0.21^{cd}	22.95 ± 0.31^{cd}	14.09 ± 0.15^{d}
L. casei 32	3.90^{ab}	99.39 ± 0.37^{b}	8.45 ± 0.05^{a}	19.67 ± 0.05^{cd}	16.14 ± 1.28^{e}	15.58 ± 0.37^{d}
Lc. casei 33	3.66^{a}	115.05 ± 0.74^{ab}	8.53 ± 0.06^{a}	21.26 ± 0.32^{c}	28.51 ± 0.15^{b}	19.79 ± 1.11^{c}
Lc. casei 34	4.33^{b}	61.65 ± 0.45^{d}	8.83 ± 0.14^{a}	15.45 ± 0.50^{d}	15.11 ± 2.00^{e}	14.02 ± 0.30^{d}
Lc. casei 35	4.32^{b}	68.03 ± 0.33^{cd}	8.25 ± 0.35^{a}	15.97 ± 1.37^{d}	17.31 ± 0.04^{de}	13.63 ± 2.21^{d}
L. paracasei 36	3.85^{ab}	66.42 ± 0.36^{cd}	8.11 ± 0.22^{a}	16.74 ± 0.37^{d}	15.39 ± 0.09^{e}	10.85 ± 0.60^{e}
L. paracasei 37	3.86^{ab}	78.03 ± 0.39^{c}	7.65 ± 0.45^{a}	15.80 ± 0.22^{d}	16.80 ± 0.29^{de}	17.15 ± 0.04^{cd}
L. paracasei 38	3.80^{ab}	82.05 ± 1.85^{c}	7.95 ± 0.12^{a}	16.65 ± 0.16^{d}	16.97 ± 0.38^{de}	16.71 ± 0.09^{cd}
L. paracasei 39	3.80^{ab}	80.93 ± 0.34^{c}	7.65 ± 0.28^{a}	16.23 ± 0.00^{d}	16.91 ± 0.35^{de}	16.69 ± 2.10^{cd}
L. lactis 40	3.88^{ab}	55.35 ± 1.45^{d}	9.32 ± 0.18^{a}	12.14 ± 0.26^{e}	15.86 ± 0.18^{e}	10.16 ± 0.01^{e}
L. lactis 41	4.25^{b}	54.74 ± 0.75^{d}	7.60 ± 0.23^{a}	12.45 ± 0.29^{e}	14.35 ± 1.01^{e}	10.15 ± 2.02^{e}
L. lactis 42	4.31^{b}	67.92 ± 0.64^{cd}	7.64 ± 0.45^{a}	15.00 ± 0.50^{de}	15.38 ± 0.03^{e}	12.47 ± 0.19^{de}
L. rhamnosus 43	3.63^{a}	98.31 ± 3.23^{b}	7.97 ± 0.34^{a}	23.73 ± 0.72^{b}	25.65 ± 0.05^{c}	19.46 ± 0.23^{c}
L. rhamnosus 44	3.63^{a}	106.56 ± 0.52^{b}	8.54 ± 0.00^{a}	24.08 ± 0.55^{b}	30.83 ± 0.65^{b}	20.41 ± 2.14^{c}
L. rhamnosus 45	3.64^{a}	106.46 ± 1.51^{b}	8.76 ± 0.05^{a}	23.65 ± 0.10^{b}	25.27 ± 1.32^{c}	19.44 ± 0.12^{c}
L. rhamnosus 46	3.62^{a}	94.85 ± 0.22^{b}	8.38 ± 0.04^{a}	24.12 ± 1.25^{b}	29.70 ± 0.16^{b}	22.26 ± 0.58^{b}

L. rhamnosus 47	3.94^{ab}	95.18 ± 1.23^{b}	7.56 ± 0.50^{a}	17.55 ± 0.24^{d}	21.33 ± 0.67^{d}	17.38 ± 0.06^{cd}
L. salivarius 48	3.68^{a}	102.65 ± 1.22^{b}	7.55 ± 0.55^{a}	22.25 ± 0.05^{c}	27.50 ± 0.16^{bc}	18.13 ± 0.41^{cd}
L. salivarius 49	3.66^{a}	107.45 ± 0.82^{b}	8.15 ± 0.15^{a}	24.00 ± 0.25^{b}	28.62 ± 0.15^{bc}	19.50 ± 0.25^{c}
L. salivarius 50	3.62^{a}	107.11 ± 2.70^{b}	8.35 ± 0.05^{a}	25.47 ± 1.24^{ab}	32.27 ± 0.01^{b}	20.00 ± 1.21^{c}
CICC 20261	4.22^{b}	81.56 ± 0.85^{c}	8.39 ± 0.03^{a}	15.02 ± 0.33^{de}	15.04 ± 0.31^{e}	13.20 ± 0.22^{d}
Amoxicillin				26.54 ± 0.67^{ab}	34.91 ± 0.67^{ab}	22.21± 1.05^{b}
Metronidazole				25.92 ± 1.32^{ab}	34.56 ± 0.98^{ab}	21.45± 1.65^{b}
Mixed antibiotics^{a}				28.24 ± 1.16^{a}	37.06 ± 0.91^{a}	25.21± 1.43^{a}
MRS				6.00 ± 0.00^{f}	6.00 ± 0.00^{f}	6.00 ± 0.00^{f}

^{a} pH value of the LAB supernatant was measured by a pH meter. ^{b} Acid concentration of the LAB supernatant was determined using a high-performance liquid chromatograph. ^{c} Inhibition zone diameter of LAB strain against *H. pylori* was determined by agar-well diffusion assay. Results are expressed as mean of triplicate values ± standard deviation. Different lowercase letters mean significant ($P < 0.05$) differences in a column.

Table S 5 Pearson correlation coefficient between lactic concentration and inhibition zones of 51 LAB strains

Indicator bacteria	Pearson's r^{a}
H. pylori 26695	0.91
H. pylori 43504	0.88
H. pylori SS1	0.91

^{a} Pearson's correlation coefficients (r) were calculated by software SPSS.

Table S 6 Rates of autoaggregation and coaggregation of LAB strains with *H. pylori*

	Autoaggregation^{a} (%)				Coaggregation^{b} (%)			
Strain	2h	4h	8h	24 h	2h	4h	8h	24 h
L. plantarum 1	9.79 ± 0.55^{a}	14.24 ± 0.91^{a}	62.65 ± 1.41^{b}	92.18 ± 0.38^{c}	18.42 ± 2.46^{a}	33.95 ± 2.35^{b}	35.42 ± 0.78^{b}	69.90 ± 0.22^{c}
L. plantarum 2	4.17 ± 0.30^{a}	13.29 ± 0.86^{a}	65.08 ± 3.25^{b}	90.17 ± 0.74^{c}	16.50 ± 1.68^{a}	37.73 ± 3.18^{b}	32.73 ± 0.78^{b}	68.75 ± 1.21^{c}
L. plantarum 3	5.31 ± 0.38^{a}	13.97 ± 1.75^{a}	54.06 ± 4.95^{b}	95.41 ± 0.10^{c}	14.35 ± 0.18^{a}	35.57 ± 0.27^{b}	45.70 ± 1.43^{c}	72.26 ± 0.44^{d}
L. plantarum 4	11.61 ± 1.24^{a}	11.27 ± 1.08^{a}	60.53 ± 1.84^{b}	91.49 ± 0.58^{c}	22.43 ± 1.60^{a}	38.54 ± 0.68^{b}	58.86 ± 1.42^{c}	58.83 ± 1.14^{c}
L. plantarum 5	6.31 ± 0.22^{a}	11.82 ± 0.56^{a}	53.11 ± 5.02^{b}	86.54 ± 0.70^{c}	16.57 ± 1.67^{a}	30.42 ± 0.72^{b}	30.96 ± 0.33^{b}	64.40 ± 0.07^{c}
L. plantarum 6	4.62 ± 0.26^{a}	12.19 ± 0.61^{a}	43.45 ± 1.23^{b}	92.54 ± 0.34^{c}	14.41 ± 0.50^{a}	33.88 ± 0.51^{b}	33.15 ± 0.40^{b}	53.68 ± 0.21^{c}
L. plantarum 7	8.86 ± 1.00^{a}	25.44 ± 0.09^{b}	71.45 ± 2.43^{c}	86.08 ± 0.44^{d}	15.67 ± 1.58^{a}	32.97 ± 0.44^{b}	37.38 ± 1.14^{b}	60.01 ± 0.68^{c}
L. plantarum 8	6.59 ± 0.34^{a}	16.72 ± 1.17^{b}	64.62 ± 3.62^{c}	85.28 ± 1.15^{d}	20.98 ± 2.16^{a}	49.88 ± 2.19^{c}	37.27 ± 1.92^{b}	65.52 ± 0.17^{d}
L. plantarum 9	5.16 ± 0.18^{a}	12.64 ± 1.04^{a}	30.71 ± 1.80^{c}	78.27 ± 0.29^{d}	24.56 ± 0.84^{a}	26.54 ± 1.16^{a}	26.74 ± 1.15^{a}	68.97 ± 0.12^{b}
L. plantarum 10	5.52 ± 0.08^{a}	11.22 ± 1.02^{a}	52.99 ± 2.25^{b}	88.60 ± 0.61^{c}	21.77 ± 0.95^{a}	36.26 ± 0.30^{b}	39.84 ± 0.48^{b}	70.36 ± 0.70^{c}
L. plantarum 11	6.44 ± 0.12^{a}	12.91 ± 0.61^{a}	54.46 ± 3.43^{b}	91.82 ± 0.30^{c}	19.44 ± 1.06^{a}	33.13 ± 0.10^{b}	42.30 ± 0.10^{c}	69.33 ± 0.08^{d}
L. plantarum 12	11.33 ± 0.68^{a}	21.06 ± 0.45^{a}	58.48 ± 0.29^{b}	86.23 ± 0.16^{c}	41.73 ± 1.53^{a}	51.71 ± 0.75^{b}	59.20 ± 1.45^{c}	68.22 ± 0.08^{d}
L. fermentum 13	5.92 ± 0.06^{a}	16.99 ± 0.44^{b}	52.15 ± 1.43^{c}	80.16 ± 1.05^{d}	38.07 ± 0.65^{a}	41.33 ± 0.07^{a}	44.42 ± 0.15^{a}	59.51 ± 0.23^{b}
L. fermentum 14	5.57 ± 0.13^{a}	5.17 ± 0.23^{a}	32.01 ± 6.94^{b}	75.88 ± 0.34^{c}	28.18 ± 0.09^{a}	32.20 ± 0.61^{a}	44.68 ± 0.27^{b}	57.74 ± 0.82^{c}
L. fermentum 15	7.52 ± 0.05^{a}	12.19 ± 0.06^{a}	41.91 ± 2.12^{b}	69.52 ± 0.60^{c}	17.88 ± 0.43^{a}	30.74 ± 0.60^{b}	43.77 ± 1.47^{c}	58.55 ± 0.32^{d}
L. fermentum 16	5.26 ± 0.03^{a}	11.66 ± 0.25^{a}	37.62 ± 1.20^{b}	69.52 ± 0.54^{c}	18.65 ± 2.96^{a}	37.46 ± 2.87^{b}	35.51 ± 0.21^{b}	61.22 ± 0.78^{c}
L. fermentum 17	6.95 ± 0.33^{a}	12.66 ± 0.17^{a}	34.76 ± 0.05^{b}	66.82 ± 4.23^{c}	16.08 ± 1.31^{a}	29.04 ± 0.94^{b}	36.95 ± 0.20^{c}	53.42 ± 0.22^{d}
L. fermentum 18	0.00 ± 0.00^{a}	0.00 ± 0.00^{a}	17.24 ± 2.30^{b}	70.05 ± 1.55^{c}	14.90 ± 0.32^{a}	35.37 ± 1.58^{b}	32.69 ± 0.18^{b}	58.08 ± 2.12^{c}
L. fermentum 19	5.61 ± 0.44^{a}	9.44 ± 0.79^{a}	31.18 ± 0.52^{b}	67.17 ± 0.35^{c}	26.23 ± 0.08^{a}	28.36 ± 2.07^{a}	35.96 ± 0.13^{b}	68.16 ± 1.60^{c}
L. fermentum 20	4.75 ± 0.22^{a}	12.05 ± 1.30^{a}	32.21 ± 0.20^{b}	62.66 ± 2.13^{c}	19.46 ± 0.87^{a}	26.90 ± 0.70^{b}	30.12 ± 0.09^{c}	52.42 ± 0.16^{d}
L. fermentum 21	8.80 ± 0.07^{a}	12.00 ± 0.04^{a}	36.06 ± 1.74^{b}	81.39 ± 1.31^{c}	13.90 ± 1.56^{a}	46.70 ± 9.37^{c}	34.02 ± 0.06^{b}	58.25 ± 0.63^{d}
L. fermentum 22	0.00 ± 0.00^{a}	2.77 ± 0.42^{a}	16.81 ± 1.14^{b}	54.19 ± 1.49^{c}	20.59 ± 0.82^{a}	43.07 ± 0.02^{b}	47.71 ± 4.54^{b}	70.42 ± 0.32^{c}
L. fermentum 23	3.78 ± 0.15^{a}	11.64 ± 1.28^{a}	36.58 ± 0.47^{b}	74.96 ± 3.25^{c}	31.77 ± 1.07^{a}	39.54 ± 0.11^{b}	44.81 ± 0.81^{c}	70.01 ± 0.35^{d}
L. fermentum 24	5.54 ± 0.44^{a}	9.02 ± 1.55^{a}	36.94 ± 0.65^{b}	83.76 ± 0.16^{c}	31.01 ± 2.97^{a}	37.44 ± 0.76^{b}	43.51 ± 0.53^{c}	70.03 ± 0.56^{d}

L. fermentum 25	5.90 ± 0.05[a]	8.70 ± 0.68[a]	29.72 ± 1.30[b]	66.16 ± 0.12[c]	22.36 ± 1.77[a]	26.97 ± 0.12[b]	36.48 ± 0.91[c]	53.69 ± 1.33[d]
L. fermentum 26	6.10 ± 0.51[a]	8.13 ± 0.83[a]	21.87 ± 0.08[b]	60.74 ± 3.60[c]	20.47 ± 0.66[a]	30.42 ± 0.37[b]	38.08 ± 1.68[c]	62.62 ± 0.87[d]
L. fermentum 27	4.64 ± 0.08[a]	5.88 ± 0.46[a]	26.61 ± 1.44[b]	70.51 ± 1.95[c]	12.70 ± 1.25[a]	28.19 ± 0.55[b]	32.97 ± 0.76[c]	57.59 ± 2.18[d]
L. fermentum 28	6.50 ± 0.19[a]	9.04 ± 0.13[a]	26.21 ± 0.45[b]	71.77 ± 0.28[c]	21.62 ± 0.28[a]	32.53 ± 0.90[b]	42.90 ± 0.92[c]	69.25 ± 1.06[d]
L. fermentum 29	5.61 ± 0.04[a]	8.68 ± 0.45[a]	29.80 ± 0.82[b]	74.74 ± 0.18[c]	19.00 ± 0.82[a]	23.20 ± 1.72[b]	33.35 ± 0.64[c]	65.07 ± 0.13[d]
L. casei 30	4.64 ± 1.21[a]	9.56 ± 0.19[a]	25.29 ± 1.33[b]	79.04 ± 0.93[c]	29.16 ± 3.25[a]	43.27 ± 3.20[b]	40.27 ± 0.88[b]	67.62 ± 1.31[c]
L. casei 31	6.45 ± 0.20[a]	11.72 ± 0.67[a]	27.99 ± 0.78[b]	55.69 ± 1.52[c]	12.89 ± 0.71[a]	35.68 ± 2.21[c]	29.68 ± 0.81[b]	63.15 ± 1.32[d]
L. casei 32	3.15 ± 0.29[a]	5.41 ± 0.09[a]	14.68 ± 0.32[b]	51.28 ± 1.53[c]	22.64 ± 0.45[a]	38.52 ± 0.71[b]	39.55 ± 1.22[b]	52.43 ± 0.68[c]
L. casei 33	3.83 ± 0.31[a]	12.89 ± 0.82[b]	26.94 ± 0.68[c]	63.42 ± 1.66[d]	19.92 ± 1.99[a]	30.48 ± 0.12[b]	42.48 ± 0.29[c]	58.93 ± 0.67[d]
L. casei 34	5.51 ± 0.64[a]	17.95 ± 0.66[b]	53.99 ± 0.58[c]	87.53 ± 0.41[d]	22.27 ± 2.41[a]	36.13 ± 1.50[b]	38.02 ± 0.15[b]	61.20 ± 1.32[c]
L. casei 35	2.81 ± 0.39[a]	4.72 ± 0.44[a]	12.31 ± 1.47[b]	41.30 ± 0.13[c]	17.48 ± 0.89[a]	30.22 ± 0.79[b]	33.93 ± 0.77[b]	47.94 ± 0.30[c]
L. paracasei 36	3.50 ± 0.55[a]	4.89 ± 0.22[a]	21.50 ± 1.30[b]	75.67 ± 1.34[c]	34.23 ± 0.78[a]	39.36 ± 0.73[b]	46.74 ± 0.26[c]	64.93 ± 1.44[d]
L. paracasei 37	3.51 ± 0.19[a]	9.05 ± 0.25[a]	28.02 ± 1.48[b]	80.51 ± 2.51[c]	17.40 ± 0.76[a]	26.85 ± 0.17[b]	35.44 ± 1.49[c]	43.73 ± 0.66[d]
L. paracasei 38	8.13 ± 0.03[a]	12.96 ± 0.71[a]	26.58 ± 0.71[b]	45.42 ± 1.53[c]	20.30 ± 0.22[a]	36.60 ± 0.01[b]	39.44 ± 0.29[b]	56.16 ± 0.98[c]
L. paracasei 39	7.73 ± 0.40[a]	13.61 ± 1.23[a]	34.03 ± 3.56[b]	93.32 ± 0.32[c]	17.90 ± 0.40[a]	33.24 ± 1.51[b]	33.41 ± 0.09[b]	73.28 ± 0.05[c]
Lc. lactis 40	5.11 ± 0.09[a]	6.95 ± 0.09[a]	15.33 ± 0.13[b]	51.37 ± 0.86[c]	19.18 ± 0.34[a]	30.69 ± 0.87[b]	33.44 ± 0.19[b]	48.53 ± 0.23[c]
Lc. lactis 41	5.04 ± 0.22[a]	12.84 ± 0.44[b]	44.93 ± 0.84[c]	87.95 ± 2.25[d]	17.61 ± 0.26[a]	27.73 ± 1.40[b]	31.83 ± 1.41[b]	62.42 ± 0.36[c]
Lc. lactis 42	3.65 ± 1.17[a]	7.16 ± 0.40[a]	34.66 ± 0.91[b]	79.63 ± 2.18[c]	14.61 ± 0.40[a]	32.86 ± 1.28[b]	37.72 ± 0.27[b]	62.15 ± 1.56[c]
L. rhamnosus 43	64.12 ± 0.12[a]	71.75 ± 1.10[b]	86.09 ± 0.08[c]	94.56 ± 1.25[d]	54.94 ± 0.04[a]	67.59 ± 0.77[b]	71.85 ± 0.52[c]	89.66 ± 0.18[d]
L. rhamnosus 44	49.77 ± 0.60[a]	55.25 ± 0.87[a]	85.49 ± 1.75[b]	91.86 ± 1.40[c]	37.56 ± 0.07[a]	49.31 ± 0.09[b]	57.50 ± 0.27[c]	77.14 ± 0.30[d]
L. rhamnosus 45	32.76 ± 0.19[a]	47.19 ± 1.15[b]	63.43 ± 2.09[c]	90.78 ± 0.34[d]	50.46 ± 1.23[a]	54.03 ± 0.27[b]	58.86 ± 0.40[c]	73.46 ± 0.44[d]
L. rhamnosus 46	38.64 ± 0.11[a]	44.90 ± 1.25[a]	61.82 ± 2.84[b]	91.44 ± 1.43[c]	40.54 ± 1.30[a]	46.16 ± 1.26[b]	51.53 ± 0.04[c]	73.26 ± 0.59[d]
L. rhamnosus 47	51.24 ± 0.49[a]	73.88 ± 0.59[b]	76.12 ± 1.65[b]	90.83 ± 0.52[c]	44.50 ± 1.05[a]	58.20 ± 0.57[b]	66.13 ± 1.75[c]	77.32 ± 0.20[d]
L. salivarius 48	48.65 ± 0.37[a]	54.53 ± 0.32[a]	74.05 ± 0.27[b]	90.90 ± 0.89[c]	40.96 ± 1.74[a]	54.89 ± 0.24[b]	66.66 ± 0.08[c]	75.97 ± 0.70[d]
L. salivarius 49	40.11 ± 0.47[a]	61.11 ± 0.77[b]	84.66 ± 0.98[c]	88.53 ± 1.10[c]	39.92 ± 1.02[a]	46.35 ± 1.22[b]	49.89 ± 0.23[c]	69.21 ± 2.05[d]
L. salivarius 50	64.49 ± 0.09[a]	79.35 ± 0.34[b]	93.03 ± 0.25[c]	97.27 ± 0.05[c]	44.01 ± 1.29[a]	69.29 ± 0.62[b]	73.77 ± 0.52[b]	95.65 ± 0.01[c]
CICC 20261	4.47 ± 0.39[a]	8.24 ± 1.10[a]	28.23 ± 0.23[b]	49.37 ± 0.22[c]	13.46 ± 0.55[a]	24.29 ± 1.01[b]	37.96 ± 1.23[c]	55.83 ± 5.25[d]

[a] Autoaggregation of LAB was determined based on sedimentation characteristics by measuring the absorbance of upper solution at 600 nm using a Varioskan LUX microplate reader. [b] Coaggregation of LAB with *H. pylori* was determined by measuring the absorbance of the upper solution at 600 nm after mixed incubation of LAB and *H. pylori* suspension at 37°C for 24 h. Results are expressed as mean of triplicate values ± standard deviation. Different lowercase letters mean significant ($P < 0.05$) differences in a line.

Table S 7 Correlation matrix (Pearson (n-1))[a]

Variables	LA producing[b]	AcOH producing[c]	Inhibition zone	Autoaggregation	Coaggregation	Hydrophobicity	Urease inhibition	Transit tolerance
LA-producing capacity[b]	1	-0.177	0.936	0.336	0.346	0.364	0.722	-0.498
AcOH-producing capacity[c]	-0.177	1	-0.189	-0.258	-0.141	-0.207	-0.147	0.311
Inhibition zone	0.936	-0.189	1	0.482	0.450	0.409	0.756	-0.439
Autoaggregation	0.336	-0.258	0.482	1	0.793	0.680	0.548	-0.315
Coaggregation	0.346	-0.141	0.450	0.793	1	0.497	0.573	-0.259
Hydrophobicity	0.364	-0.207	0.409	0.680	0.497	1	0.285	-0.281
Urease inhibition	0.722	-0.147	0.756	0.548	0.573	0.285	1	-0.308
Transit tolerance	-0.498	0.311	-0.439	-0.315	-0.259	-0.281	-0.308	1

[a] Correlation coefficient matrix (8*8) was calculated by Pearson formula based on the standardized unification of eight characteristics of the 51 LAB isolates. [b] LA-producing capacity: lactic acid producing capacity. [c] AcOH-producing capacity: acetic acid producing capacity.

Table S 8 Total variance explained[a]

Principal component	Eigenvalue	Variability	Cumulative

number		(%)	(%)
PC1	4.085	51.058	51.058
PC2	1.253	15.656	66.714
PC3	1.050	13.128	79.843
PC4	0.655	8.186	88.029
PC5	0.552	6.895	94.924
PC6	0.211	2.635	97.558
PC7	0.155	1.936	99.494
PC8	0.040	0.506	100.000

[a] Eigenvalues, variability and cumulative contribution of eight eigenvectors were calculated based on matrix and ranked from largest to smallest.

Table S 9 Eigenvector matrix[a]

Variables	Component matrix			Eigenvector matrix		
	PC1	PC2	PC3	PC1	PC2	PC3
LA-producing capacity[b]	0.808	-0.524	0.068	0.400	-0.469	0.067
AcOH-producing capacity[c]	-0.339	-0.084	0.817	-0.168	-0.075	0.798
Inhibition zone	0.863	-0.395	0.126	0.427	-0.353	0.123
Autoaggregation	0.787	0.530	0.055	0.389	0.473	0.054
Coaggregation	0.738	0.453	0.219	0.365	0.405	0.213
Hydrophobicity	0.652	0.469	-0.062	0.322	0.419	-0.061
Urease inhibition	0.811	-0.224	0.276	0.401	-0.200	0.269
Transit tolerance	-0.570	0.242	0.481	-0.282	0.217	0.469

[a] Projections of each variable on PC1, PC2 and PC3 were calculated. [b] LA-producing capacity: lactic acid producing capacity. [c] AcOH-producing capacity: acetic acid producing capacity.

Table S 10 Composite score of lactic acid bacteria calculated by principal component analysis[a]

Strain name	Factor score			Composite score	Ranking
	PC1	PC2	PC3		
L. plantarum 1	0.696	-1.499	-0.028	0.565	15
L. plantarum 2	0.837	-1.140	-0.111	0.812	11
L. plantarum 3	1.311	-1.129	1.436	1.689	8
L. plantarum 4	1.184	-1.225	0.248	1.303	10
L. plantarum 5	0.685	-2.142	0.351	0.475	17
L. plantarum 6	0.773	-1.192	-0.309	0.685	12
L. plantarum 7	0.663	-1.408	-0.448	0.472	18
L. plantarum 8	0.698	-1.262	0.138	0.648	13
L. plantarum 9	0.462	-1.814	-0.159	0.173	20
L. plantarum 10	0.759	-1.462	-0.112	0.641	14
L. plantarum 11	0.561	-1.667	-0.156	0.333	19
L. plantarum 12	0.648	-1.026	-0.365	0.550	16
L. fermentum 13	-0.264	0.780	-1.787	-0.471	25
L. fermentum 14	-0.440	-0.468	0.970	-0.507	26
L. fermentum 15	-0.869	0.433	0.610	-0.925	34
L. fermentum 16	-0.721	0.944	-0.047	-0.732	31
L. fermentum 17	-0.911	0.133	0.940	-0.989	37
L. fermentum 18	-0.952	0.183	0.235	-1.149	42
L. fermentum 19	-0.972	-0.005	0.428	-1.185	44

L. fermentum 20	-0.792	0.111	0.444	-0.925	35
L. fermentum 21	-0.426	0.078	1.412	-0.295	23
L. fermentum 22	-0.993	-0.257	0.766	-1.210	46
L. fermentum 23	-1.095	0.494	2.663	-0.858	32
L. fermentum 24	-1.177	0.800	1.050	-1.168	43
L. fermentum 25	-1.037	0.367	2.067	-0.911	33
L. fermentum 26	-1.243	-0.087	0.896	-1.474	51
L. fermentum 27	-0.816	-0.172	-0.203	-1.126	41
L. fermentum 28	-0.860	0.089	0.214	-1.055	39
L. fermentum 29	-0.775	-0.330	-1.290	-1.291	48
L. casei 30	-0.562	0.684	-0.444	-0.650	28
L. casei 31	0.042	-0.469	-1.429	-0.290	22
L. casei 32	0.090	-0.436	-0.209	-0.015	21
L. casei 33	-0.536	-0.293	0.208	-0.721	30
L. casei 34	-0.849	-0.014	-0.008	-1.101	40
L. casei 35	-1.126	0.071	-0.042	-1.446	50
L. paracasei 36	-0.594	0.455	-0.210	-0.703	29
L. paracasei 37	-0.538	-0.173	-1.694	-1.019	38
L. paracasei 38	-0.332	0.095	-1.255	-0.619	27
L. paracasei 39	-0.342	1.104	-0.672	-0.313	24
Lc. lactis 40	-1.169	1.235	0.302	-1.189	45
Lc. lactis 41	-0.850	0.841	-2.524	-1.339	49
Lc. lactis 42	-0.763	0.624	-2.456	-1.263	47
L. rhamnosus 43	1.906	1.559	0.501	2.889	2
L. rhamnosus 44	1.388	1.062	1.040	2.201	7
L. rhamnosus 45	1.537	1.161	0.556	2.334	4
L. rhamnosus 46	1.024	0.398	0.055	1.419	9
L. rhamnosus 47	1.636	2.081	-0.549	2.477	3
L. salivarius 48	1.657	1.319	-0.757	2.302	6
L. salivarius 49	1.639	1.002	-0.191	2.304	5
L. salivarius 50	2.336	2.046	0.824	3.605	1
CICC 20261	-0.528	-0.480	-0.897	-0.939	36

[a] Composite score is equal to the sum of the product of the variance contributions of each PC and the principal component scores of each strain, which is calculated from the product of the factor scores and the square root of the eigenvalues for each strain.

Table S 11 Sequence information of three strains uploaded to the NCBI Genbank database

Isolate code	Scientific Name	Sequence length (bp)	Accession
NCUH061004	*Lacticaseibacillus rhamnosus*	1418	OQ363660.1
NCUH062003	*Ligilactobacillus salivarius*	1438	OQ363661.1
NCUH001003	*Lactiplantibacillus plantarum*	1403	OQ363662.1

Table S 12 Information on RiPPs synthesis genes in the NCUH062003 gene cluster T3PKS[a]

Genes	Locations		Strands	Annotations
chr_457	502059	502956	-	protein
chr_469	511868	512846	+	protein
chr_470	513231	513918	+	protein
chr_472	515571	516816	+	protein

[a] Secondary metabolites were sought using antiSMASH (https://antismash.secondarymetabolites.org).

Table S 13 MIBiG database comparison of RiPPs synthesis genes in NCUH062003

Genes	MIBiG Protein	Description	MIBiG Cluster	MiBiG Product	% ID	% Coverage	BLAST Score	E-value
chr_457_mibig_hits	AIU53932.1	putative_transposase	BGC0000607	RiPP: Thiopeptide	35	57.4	88	2.1E-17
chr_469_mibig_hits	ABA00873.1	NsuR	BGC0000537	RiPP: Lanthipeptide	32	98.2	134	2.6E-31
chr_470_mibig_hits	ADJ56358.1	NisR	BGC0000535	RiPP: Lanthipeptide	33	101.3	119	1.1E-26
chr_472_mibig_hits	CAC33839.1	putative_protein	BGC0000523	RiPP: Lanthipeptide	33	64.7	152	1.7E-36

[a] Secondary metabolites were sought using antiSMASH (https://antismash.secondarymetabolites.org).

Table S 14 Effect of heat on the antibacterial activity of Salivaricin S3[a]

Temperatures (℃)	Inhibition zone (mm)
Control	21.25 ± 0.18[a]
50	19.13 ± 1.21[a]
70	20.63 ± 0.12[a]
90	19.49 ± 0.95[a]
105	20.97 ± 0.75[a]
121	18.91 ± 0.66[a]

[a] Salivaricin S3 were placed in tubes at different temperature (37℃, 50℃, 70℃, 90℃, 105℃, 121℃) for 2 h, respectively, then tested their anti-*H. pylori* activity by agar-well diffusion assay. Results are expressed as mean of triplicate values ± standard deviation. Different lowercase letters mean significant ($P < 0.05$) differences in a column.

Table S 15 Effect of proteases on the antibacterial activity of Salivaricin S3

	Inhibition zone (mm)[a]					
Times (h)	Control	α-chymotrypsin	Proteinase K	Papain	Pepsin	Trypsin
3	18.43 ± 0.58[a]	17.80 ± 0.78[a]	18.73 ± 0.78[a]	17.82 ± 0.92[a]	17.43 ± 0.23[a]	16.96 ± 0.23[a]
15	17.10 ± 1.28[a]	15.70 ± 1.63[a]	16.51 ± 1.17[a]	15.33 ± 0.57[a]	16.62 ± 0.42[a]	11.42 ± 0.88[b]

[a] Inhibition zone diameter reflects the effect of proteases on the antibacterial activity of Salivaricin S3, as determined by agar-well diffusion assay after treatment of Salivaricin S3 with various proteases for 3 and 15 h. Results are expressed as mean of triplicate values ± standard deviation. Different lowercase letters mean significant ($P < 0.05$) differences in a column.

Table S 16 Antibiotic susceptibility of the three LAB strains tested by the K-B method[a]

	Antibiotic susceptibility		
Name	NCUH061004	NCUH062003	NCUH001003
Group 1-Inhibitors of cell wall synthesis			
Penicillin	S	S	S
Cephalosporin	S	S	S
Teicoplanin	S	S	S
Group 2-Inhibitors of protein synthesis			
Aminoglycoside	R	R	R
Tetracycline	S	S	S
Erythromycin	S	S	S
clindamycin	S	S	S
Group 3-Inhibitors of nucleic acid synthesis			
Sulfamethoxazole	R	R	R
Ciprofloxacin	S	MS	MS
Norfloxacin	MS	R	R

Rifampin	MS	S	S

[a] Transparent anti-bacterial zone formed around the paper sheet explained according to CLSI guidelines "Implementation Standard for Antimicrobial Sensitivity Test". Results are expressed as R (resistant), MS (moderately susceptible), or S (susceptible).