

**Effects of dietary organic acids and nature identical compounds on growth, immune parameters and gut microbiota of European sea bass**

Serena Busti<sup>1</sup>, Barbara Rossi<sup>2</sup>, Enrico Volpe<sup>1</sup>, Sara Ciulli<sup>1</sup>, Andrea Piva<sup>1,2</sup>, Federica D'Amico<sup>3</sup>, Matteo Soverini<sup>3</sup>, Marco Candela<sup>3</sup>, Pier Paolo Gatta<sup>1</sup>, Alessio Bonaldo<sup>1\*</sup>, Ester Grilli<sup>1</sup>, Luca Parma<sup>1</sup>

<sup>1</sup>Department of Veterinary Medical Sciences, University of Bologna, Via Tolara di Sopra 50, 40064 Ozzano Emilia, Bologna, Italy;

<sup>2</sup>Vetagro S.p.A., Via Porro 2, 42124, Reggio Emilia, Italy;

<sup>3</sup>Unit of Microbial Ecology of Health, Department of Pharmacy and Biotechnology, University of Bologna, Via Belmeloro 6, 40126 Bologna, Italy

\*Corresponding author: [alessio.bonaldo@unibo.it](mailto:alessio.bonaldo@unibo.it)

## SUPPLEMENTARY INFORMATION

**Supplementary Table S1.** Mean relative abundance (%)  $\pm$  SD (n=3) of bacterial phyla and genera detected in the hindgut content of European sea bass fed different diets at 71 days (pre-suboptimal rearing condition), and at 81 days (post-suboptimal rearing condition). D0= 0 mg Kg<sup>-1</sup> organic acids and nature-identical compounds (OA, NIC) ; D250 = 250 mg Kg<sup>-1</sup>OA, NIC; D500 = 500 mg Kg<sup>-1</sup> OA, NIC; D1000 = 1000 mg Kg<sup>-1</sup> OA, NIC. Only taxa with relative abundance >0.05% in at least 1 samples were included. Taxa which represent <0.05% abundance were grouped “Other”.

Diet	Pre- suboptimal rearing condition								Post-suboptimal rearing condition				
	D0		D250		D500		D1000		D0		D1000		
Phylum	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
<i>Firmicutes</i>	<b>69.4</b>	3.6	<b>78</b>	10.8	<b>78.4</b>	3.9	<b>77.7</b>	4.5	<i>Firmicutes</i>	<b>54.6</b>	3.2	<b>54.2</b>	1.4
<i>Actinobacteria</i>	<b>12.3</b>	1.9	<b>9.1</b>	1.6	<b>10.8</b>	0.5	<b>10.5</b>	1.3	<i>Proteobacteria</i>	<b>13.5</b>	3.8	<b>18.4</b>	0.8
<i>Cyanobacteria</i>	<b>12.2</b>	2.8	<b>7.3</b>	8.2	<b>6.3</b>	4.6	<b>3.4</b>	1.2	<i>Fusobacteria</i>	<b>7.7</b>	6.0	<b>9.9</b>	2.2
<i>Proteobacteria</i>	<b>5</b>	0.8	<b>4.7</b>	1.7	<b>3.5</b>	1.4	<b>6</b>	4.0	<i>Bacteroidetes</i>	<b>13</b>	3.7	<b>8.3</b>	1.3
<i>Acidobacteria</i>	<b>0.4</b>	0.2	<b>0.2</b>	0.2	<b>0.3</b>	0.3	<b>0.8</b>	1.1	<i>Actinobacteria</i>	<b>6.5</b>	1.5	<b>5.6</b>	0.3
<i>Bacteroidetes</i>	<b>0.4</b>	0.2	<b>0.4</b>	0.3	<b>0.3</b>	0.1	<b>0.4</b>	0.3	<i>Cyanobacteria</i>	<b>0.3</b>	0.2	<b>0.9</b>	0.8
<i>Chloroflexi</i>	<b>0</b>	0.0	<b>0</b>	0.0	<b>0</b>	0.0	<b>0.4</b>	0.6	<i>Verrucomicrobia</i>	<b>2.4</b>	1.2	<b>0.6</b>	0.5
<i>TM7</i>	<b>0.1</b>	0.1	<b>0.1</b>	0.1	<b>0.2</b>	0.1	<b>0.3</b>	0.3	<i>Chlamydiae</i>	<b>0.1</b>	0.1	<b>0.3</b>	0.3
<i>Planctomycetes</i>	<b>0</b>	0.0	<b>0</b>	0.0	<b>0</b>	0.0	<b>0.1</b>	0.2	<i>Acidobacteria</i>	<b>0.1</b>	0.1	<b>0.2</b>	0.1
<i>WPS-2</i>	<b>0</b>	0.0	<b>0</b>	0.0	<b>0</b>	0.0	<b>0.1</b>	0.2	<i>Chloroflexi</i>	<b>0.1</b>	0.2	<b>0.1</b>	0.2
<i>Verrucomicrobia</i>	<b>0.1</b>	0.0	<b>0</b>	0.0	<b>0</b>	0.0	<b>0.1</b>	0.1	<i>Planctomycetes</i>	<b>0.1</b>	0.1	<b>0.1</b>	0.1
<i>Other</i>	<b>0.1</b>	0.1	<b>0.1</b>	0.0	<b>0.1</b>	0.0	<b>0.2</b>	0.2	<i>Other</i>	<b>1.3</b>	1.2	<b>1.2</b>	1.3
Diet	D0		D250		D500		D1000		D0		D1000		
Genus	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
<i>Lactobacillus</i>	<b>25.2</b>	0.8	<b>23.1</b>	3.4	<b>27.6</b>	1.5	<b>23.2</b>	4.6	<i>Enterobacteriaceae</i>	<b>8.3</b>	5.4	<b>11.5</b>	2.0
<i>Leuconostocaceae</i>	<b>12.4</b>	3.2	<b>21.3</b>	4.2	<b>17.7</b>	0.9	<b>14.5</b>	7.0	<i>Eubacterium</i>	<b>7.9</b>	5.9	<b>10.5</b>	3.3
<i>Streptococcus</i>	<b>16.3</b>	3.9	<b>16.1</b>	3.1	<b>14.7</b>	4.0	<b>13.2</b>	7.0	<i>Cetobacterium</i>	<b>7.7</b>	5.9	<b>9.8</b>	2.2
<i>Streptophyta</i>	<b>12.2</b>	2.8	<b>7.3</b>	8.2	<b>6.3</b>	4.6	<b>3.2</b>	1.6	<i>Bacillus</i>	<b>3.7</b>	2.5	<b>5.5</b>	1.7
<i>Bacillus</i>	<b>3.0</b>	2.4	<b>3.4</b>	1.9	<b>4.4</b>	3.2	<b>7.4</b>	6.8	<i>Clostridium</i>	<b>3.4</b>	1.2	<b>4.4</b>	0.2
<i>Corynebacterium</i>	<b>8.8</b>	1.2	<b>5.6</b>	1.2	<b>7.2</b>	0.5	<b>6.6</b>	0.8	<i>Erysipelotrichaceae</i>	<b>3.0</b>	1.7	<b>4.2</b>	0.9

<i>Leuconostoc</i>	<b>4.5</b>	0.3	<b>5.3</b>	0.6	<b>4.9</b>	1.2	<b>4.6</b>	2.6	<i>Bacteroidaceae</i>	<b>3.1</b>	2.6	<b>3.8</b>	1.3
<i>Bacillaceae</i>	<b>1.3</b>	0.6	<b>1.8</b>	1.0	<b>1.9</b>	0.8	<b>3.7</b>	3.5	<i>Coriobacteriaceae</i>	<b>3.0</b>	1.7	<b>3.8</b>	0.6
<i>Geobacillus</i>	<b>0.6</b>	0.5	<b>0.9</b>	0.4	<b>1.2</b>	0.6	<b>2.1</b>	2.4	<i>Lachnospiraceae</i>	<b>3.8</b>	0.1	<b>3.1</b>	0.0
<i>mitochondria</i>	<b>2.9</b>	1.2	<b>2.6</b>	2.6	<b>1.9</b>	0.9	<b>1.8</b>	0.7	<i>Mogibacteriaceae</i>	<b>2.0</b>	1.6	<b>3.0</b>	0.8
<i>Lactococcus</i>	<b>1.3</b>	0.2	<b>1.7</b>	0.4	<b>1.6</b>	0.3	<b>1.5</b>	0.6	<i>Bacillaceae</i>	<b>2.2</b>	1.6	<b>2.7</b>	1.0
<i>Bifidobacteriaceae</i>	<b>1.4</b>	0.9	<b>1.5</b>	0.3	<b>1.5</b>	0.1	<b>1.5</b>	1.0	<i>Peptostreptococcaceae</i>	<b>1.7</b>	1.1	<b>2.4</b>	0.5
<i>Clostridium</i>	<b>0.4</b>	0.2	<b>0.5</b>	0.5	<b>0.8</b>	0.6	<b>0.9</b>	0.7	<i>Ruminococcaceae</i>	<b>6.2</b>	3.7	<b>1.8</b>	1.1
<i>Bifidobacterium</i>	<b>0.6</b>	0.3	<b>0.6</b>	0.0	<b>0.6</b>	0.2	<b>0.7</b>	0.2	<i>Geobacillus</i>	<b>1.4</b>	1.0	<b>1.8</b>	0.1
<i>Bradyrhizobium</i>	<b>0.1</b>	0.1	<b>0.2</b>	0.1	<b>0.2</b>	0.2	<b>0.7</b>	0.9	<i>Dorea</i>	<b>1.4</b>	0.4	<b>1.7</b>	0.6
<i>Delftia</i>	<b>0.2</b>	0.2	<b>0.6</b>	0.4	<b>0.2</b>	0.2	<b>0.6</b>	0.6	<i>Sediminibacterium</i>	<b>1.1</b>	0.9	<b>1.5</b>	0.7
<i>Peptostreptococcaceae</i>	<b>0.2</b>	0.1	<b>0.3</b>	0.4	<b>0.1</b>	0.1	<b>0.5</b>	0.6	<i>Caloramator</i>	<b>1.1</b>	0.8	<b>1.4</b>	0.3
<i>Caulobacteraceae</i>	<b>0.1</b>	0.0	<b>0.1</b>	0.1	<b>0.1</b>	0.1	<b>0.5</b>	0.7	<i>Carnobacterium</i>	<b>0.9</b>	0.8	<b>1.3</b>	0.8
<i>Faecalibacterium</i>	<b>0.1</b>	0.1	<b>0.0</b>	0.1	<b>0.1</b>	0.1	<b>0.4</b>	0.5	<i>Clostridiales</i>	<b>1.5</b>	1.0	<b>1.2</b>	0.9
<i>Sphingobium</i>	<b>0.0</b>	0.0	<b>0.2</b>	0.2	<b>0.2</b>	0.1	<b>0.4</b>	0.6	<i>Bacteroides</i>	<b>5.4</b>	3.8	<b>1.2</b>	0.9
<i>Rhodococcus</i>	<b>0.2</b>	0.1	<b>0.2</b>	0.1	<b>0.3</b>	0.1	<b>0.4</b>	0.2	<i>Delftia</i>	<b>0.6</b>	0.5	<b>1.0</b>	0.6
<i>Lactobacillales</i>	<b>0.6</b>	0.1	<b>0.4</b>	0.0	<b>0.3</b>	0.1	<b>0.4</b>	0.3	<i>Sphingobium</i>	<b>0.7</b>	0.6	<b>1.0</b>	0.5
<i>Sporanaerobacter</i>	<b>0.2</b>	0.1	<b>0.2</b>	0.1	<b>0.2</b>	0.2	<b>0.4</b>	0.4	<i>Anaerobacillus</i>	<b>0.6</b>	0.6	<b>0.8</b>	0.3
<i>Blautia</i>	<b>0.2</b>	0.2	<b>0.1</b>	0.1	<b>0.1</b>	0.1	<b>0.4</b>	0.4	<i>Lachnospira</i>	<b>1.0</b>	0.8	<b>0.8</b>	1.0
<i>Solibacterales</i>	<b>0.2</b>	0.1	<b>0.1</b>	0.1	<b>0.2</b>	0.2	<b>0.4</b>	0.5	<i>Streptophyta</i>	<b>0.2</b>	0.1	<b>0.7</b>	0.8
<i>Sphingomonas</i>	<b>0.1</b>	0.1	<b>0.2</b>	0.2	<b>0.1</b>	0.1	<b>0.4</b>	0.5	<i>Faecalibacterium</i>	<b>2.1</b>	2.6	<b>0.7</b>	0.5
<i>Ellin6513</i>	<b>0.1</b>	0.1	<b>0.1</b>	0.1	<b>0.1</b>	0.0	<b>0.4</b>	0.6	<i>Caulobacteraceae</i>	<b>0.5</b>	0.4	<b>0.6</b>	0.2
<i>Ruminococcus</i>	<b>0.1</b>	0.0	<b>0.2</b>	0.1	<b>0.1</b>	0.0	<b>0.4</b>	0.0	<i>Akkermansia</i>	<b>2.3</b>	1.2	<b>0.6</b>	0.5
<i>Lachnospiraceae</i>	<b>0.2</b>	0.1	<b>0.2</b>	0.2	<b>0.2</b>	0.1	<b>0.3</b>	0.3	<i>Methylobacterium</i>	<b>0.4</b>	0.3	<b>0.5</b>	0.3
<i>Lactobacillaceae</i>	<b>0.3</b>	0.1	<b>0.2</b>	0.1	<b>0.3</b>	0.2	<b>0.3</b>	0.3	<i>Eubacteriaceae; Other</i>	<b>0.4</b>	0.2	<b>0.5</b>	0.3
<i>Clostridiaceae</i>	<b>0.0</b>	0.1	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.3</b>	0.3	<i>Vagococcus</i>	<b>0.4</b>	0.3	<b>0.5</b>	0.4
<i>Conexibacteraceae</i>	<b>0.0</b>	0.1	<b>0.1</b>	0.1	<b>0.0</b>	0.0	<b>0.3</b>	0.2	<i>Epulopiscium</i>	<b>0.3</b>	0.2	<b>0.5</b>	0.2
<i>MLE1-12</i>	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.2</b>	0.4	<i>Lactobacillus</i>	<b>0.8</b>	0.6	<b>0.4</b>	0.5
<i>Bacillales</i>	<b>0.1</b>	0.0	<b>0.1</b>	0.2	<b>0.2</b>	0.1	<b>0.2</b>	0.3	<i>Ralstonia</i>	<b>0.2</b>	0.2	<b>0.4</b>	0.5
<i>Sporosarcina</i>	<b>0.1</b>	0.1	<b>0.1</b>	0.0	<b>0.2</b>	0.1	<b>0.2</b>	0.2	<i>Rikenellaceae</i>	<b>1.7</b>	0.5	<b>0.4</b>	0.6
<i>Thermogemmatissporaceae</i>	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.2</b>	0.3	<i>Myroides</i>	<b>0.2</b>	0.2	<b>0.4</b>	0.1
<i>Solibacillus</i>	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.2</b>	0.4	<i>Streptococcus</i>	<b>0.7</b>	0.6	<b>0.4</b>	0.4

<i>Ruminococcaceae</i>	<b>0.1</b>	0.1	<b>0.1</b>	0.1	<b>0.3</b>	0.0	<b>0.2</b>	0.2	<i>Blautia</i>	<b>1.3</b>	1.7	<b>0.4</b>	0.2
<i>Curtobacterium</i>	<b>0.3</b>	0.2	<b>0.3</b>	0.1	<b>0.2</b>	0.1	<b>0.2</b>	0.1	<i>Ruminococcus</i>	<b>1.1</b>	0.5	<b>0.4</b>	0.0
<i>Virgibacillus</i>	<b>0.1</b>	0.1	<b>0.1</b>	0.0	<b>0.0</b>	0.0	<b>0.2</b>	0.2	<i>Roseburia</i>	<b>0.5</b>	0.4	<b>0.4</b>	0.1
<i>TM7-1</i>	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.2</b>	0.3	<i>Bifidobacterium</i>	<b>1.8</b>	2.8	<b>0.3</b>	0.1
<i>Enterococcus</i>	<b>0.1</b>	0.1	<b>0.1</b>	0.1	<b>0.2</b>	0.1	<b>0.2</b>	0.2	<i>Clostridiaceae</i>	<b>0.3</b>	0.1	<b>0.3</b>	0.1
<i>Anaerobacillus</i>	<b>0.0</b>	0.0	<b>0.1</b>	0.1	<b>0.1</b>	0.1	<b>0.2</b>	0.3	<i>Eggerthella</i>	<b>0.3</b>	0.2	<b>0.3</b>	0.0
<i>Ellin329</i>	<b>0.0</b>	0.1	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.2</b>	0.3	<i>Collinsella</i>	<b>0.5</b>	0.5	<b>0.3</b>	0.2
<i>Sediminibacterium</i>	<b>0.2</b>	0.1	<b>0.1</b>	0.2	<b>0.1</b>	0.1	<b>0.1</b>	0.2	<i>Enhydrobacter</i>	<b>0.1</b>	0.1	<b>0.3</b>	0.4
<i>Carnobacterium</i>	<b>0.1</b>	0.1	<b>0.1</b>	0.1	<b>0.1</b>	0.0	<b>0.1</b>	0.0	<i>Prevotella</i>	<b>0.2</b>	0.2	<b>0.3</b>	0.4
<i>Methylobacterium</i>	<b>0.0</b>	0.0	<b>0.1</b>	0.1	<b>0.0</b>	0.0	<b>0.1</b>	0.2	<i>Parabacteroides</i>	<b>0.7</b>	0.5	<b>0.3</b>	0.5
<i>Ralstonia</i>	<b>0.1</b>	0.0	<b>0.1</b>	0.1	<b>0.0</b>	0.0	<b>0.1</b>	0.2	<i>Bradyrhizobium</i>	<b>0.2</b>	0.2	<b>0.3</b>	0.0
<i>WPS-2</i>	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.1</b>	0.2	<i>Corynebacterium</i>	<b>0.3</b>	0.4	<b>0.3</b>	0.4
<i>Tissierella_Soehngenia</i>	<b>0.1</b>	0.1	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.1</b>	0.2	<i>Bacillales</i>	<b>0.2</b>	0.2	<b>0.3</b>	0.1
<i>Collinsella</i>	<b>0.1</b>	0.1	<b>0.0</b>	0.0	<b>0.2</b>	0.3	<b>0.1</b>	0.1	<i>Lysinibacillus</i>	<b>0.2</b>	0.2	<b>0.2</b>	0.1
<i>Bacteroides</i>	<b>0.1</b>	0.1	<b>0.1</b>	0.0	<b>0.1</b>	0.1	<b>0.1</b>	0.1	<i>Phascolarctobacterium</i>	<b>0.4</b>	0.4	<b>0.2</b>	0.2
<i>Planctomyces</i>	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.1</b>	0.2	<i>Paenibacillus</i>	<b>0.1</b>	0.2	<b>0.2</b>	0.1
<i>Ochrobactrum</i>	<b>0.0</b>	0.0	<b>0.1</b>	0.1	<b>0.1</b>	0.0	<b>0.1</b>	0.1	<i>Coproccoccus</i>	<b>0.5</b>	0.4	<b>0.2</b>	0.2
<i>Staphylococcus</i>	<b>0.2</b>	0.1	<b>0.3</b>	0.2	<b>0.1</b>	0.0	<b>0.1</b>	0.1	<i>MLE1-12</i>	<b>0.1</b>	0.1	<b>0.2</b>	0.1
<i>Pediococcus</i>	<b>0.3</b>	0.1	<b>0.2</b>	0.0	<b>0.0</b>	0.0	<b>0.1</b>	0.1	<i>Oscillospira</i>	<b>0.3</b>	0.3	<b>0.2</b>	0.2
<i>Peptostreptococcus</i>	<b>0.1</b>	0.2	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.1</b>	0.1	<i>Anaerostipes</i>	<b>0.1</b>	0.2	<b>0.2</b>	0.2
<i>Ureibacillus</i>	<b>0.0</b>	0.0	<b>0.0</b>	0.1	<b>0.1</b>	0.1	<b>0.1</b>	0.0	<i>Sphingomonas</i>	<b>0.1</b>	0.1	<b>0.2</b>	0.2
<i>Enterobacteriaceae</i>	<b>0.1</b>	0.2	<b>0.1</b>	0.1	<b>0.0</b>	0.0	<b>0.1</b>	0.2	<i>Acinetobacter</i>	<b>0.1</b>	0.1	<b>0.2</b>	0.0
<i>JG30-KF-CM45</i>	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.1</b>	0.2	<i>Serratia</i>	<b>0.1</b>	0.1	<b>0.2</b>	0.2
<i>Thermicanaceae</i>	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.1</b>	0.2	<i>mitochondria</i>	<b>0.1</b>	0.0	<b>0.2</b>	0.1
<i>Rs-045</i>	<b>0.1</b>	0.1	<b>0.1</b>	0.1	<b>0.2</b>	0.1	<b>0.1</b>	0.1	<i>Anaerovorax</i>	<b>0.1</b>	0.1	<b>0.2</b>	0.1
<i>Sinobacteraceae</i>	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.1</b>	0.1	<b>0.1</b>	0.1	<i>Staphylococcus</i>	<b>0.1</b>	0.2	<b>0.2</b>	0.2
<i>Brevibacillus</i>	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.1</b>	0.1	<i>Ochrobactrum</i>	<b>0.0</b>	0.0	<b>0.2</b>	0.1
<i>Erysipelotrichaceae</i>	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.1</b>	0.1	<i>Parachlamydia</i>	<b>0.1</b>	0.0	<b>0.1</b>	0.1
<i>Pseudomonas</i>	<b>0.0</b>	0.0	<b>0.0</b>	0.1	<b>0.0</b>	0.0	<b>0.1</b>	0.1	<i>Thermogemmatissporaceae</i>	<b>0.1</b>	0.2	<b>0.1</b>	0.2
<i>Acinetobacter</i>	<b>0.0</b>	0.0	<b>0.1</b>	0.1	<b>0.0</b>	0.0	<b>0.1</b>	0.1	<i>Morganella</i>	<b>0.0</b>	0.0	<b>0.1</b>	0.1
<i>Clostridiales</i>	<b>0.1</b>	0.0	<b>0.0</b>	0.0	<b>0.2</b>	0.1	<b>0.1</b>	0.1	<i>Halomonas</i>	<b>0.0</b>	0.1	<b>0.1</b>	0.1
<i>Bradyrhizobiaceae</i>	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.1</b>	0.1	<i>Ellin329</i>	<b>0.1</b>	0.1	<b>0.1</b>	0.1

<i>Lysinibacillus</i>	<b>0.0</b>	0.1	<b>0.1</b>	0.1	<b>0.1</b>	0.1	<b>0.1</b>	0.0	<i>Stenotrophomonas</i>	<b>0.1</b>	0.1	<b>0.1</b>	0.1
<i>Saccharopolyspora</i>	<b>0.0</b>	0.0	<b>0.1</b>	0.1	<b>0.1</b>	0.0	<b>0.1</b>	0.1	<i>Jeotgalicoccus</i>	<b>0.1</b>	0.1	<b>0.1</b>	0.2
<i>Megamonas</i>	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.1</b>	0.1	<i>Allobaculum</i>	<b>0.1</b>	0.1	<b>0.1</b>	0.1
<i>Aneurinibacillus</i>	<b>0.1</b>	0.1	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.1</b>	0.0	<i>Ureibacillus</i>	<b>0.1</b>	0.1	<b>0.1</b>	0.0
<i>Oxalobacteraceae</i>	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.1</b>	0.1	<i>Pseudomonas</i>	<b>0.1</b>	0.2	<b>0.1</b>	0.1
<i>Akkermansia</i>	<b>0.0</b>	0.1	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.1</b>	0.1	<i>Leuconostocaceae</i>	<b>0.1</b>	0.0	<b>0.1</b>	0.1
<i>Agrobacterium</i>	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.1</b>	0.1	<i>Fusobacterium</i>	<b>0.1</b>	0.1	<b>0.1</b>	0.0
<i>Kurthia</i>	<b>0.3</b>	0.1	<b>0.1</b>	0.1	<b>0.2</b>	0.1	<b>0.1</b>	0.1	<i>Parachlamydiaceae</i>	<b>0.0</b>	0.0	<b>0.1</b>	0.1
<i>Myroides</i>	<b>0.0</b>	0.0	<b>0.1</b>	0.0	<b>0.1</b>	0.1	<b>0.1</b>	0.0	<i>Christensenellaceae</i>	<b>0.3</b>	0.0	<b>0.1</b>	0.1
<i>Microbacterium</i>	<b>0.1</b>	0.0	<b>0.0</b>	0.0	<b>0.1</b>	0.0	<b>0.1</b>	0.1	<i>Solibacterales</i>	<b>0.1</b>	0.1	<b>0.1</b>	0.1
<i>Micrococcaceae</i>	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.1</b>	0.1	<i>Sutterella</i>	<b>0.4</b>	0.4	<b>0.1</b>	0.1
<i>Micrococcus</i>	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.1</b>	0.1	<i>Natronobacillus</i>	<b>0.0</b>	0.0	<b>0.1</b>	0.1
<i>Mycetocola</i>	<b>0.1</b>	0.1	<b>0.1</b>	0.1	<b>0.1</b>	0.0	<b>0.1</b>	0.0	<i>Sinobacteraceae</i>	<b>0.0</b>	0.0	<b>0.1</b>	0.1
<i>Halomonas</i>	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.1</b>	0.1	<i>Dietzia</i>	<b>0.1</b>	0.1	<b>0.1</b>	0.1
<i>Coriobacteriaceae</i>	<b>0.1</b>	0.1	<b>0.1</b>	0.2	<b>0.1</b>	0.0	<b>0.1</b>	0.1	<i>Paracoccus</i>	<b>0.0</b>	0.1	<b>0.1</b>	0.1
<i>Ruminococcus</i>	<b>0.0</b>	0.0	<b>0.1</b>	0.1	<b>0.0</b>	0.0	<b>0.1</b>	0.0	<i>Rhodococcus</i>	<b>0.1</b>	0.1	<b>0.1</b>	0.0
<i>Frigoribacterium</i>	<b>0.1</b>	0.0	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.0</b>	0.1	<i>Lachnospiraceae;Other</i>	<b>0.0</b>	0.1	<b>0.1</b>	0.0
<i>Streptomyces</i>	<b>0.1</b>	0.1	<b>0.0</b>	0.1	<b>0.0</b>	0.0	<b>0.0</b>	0.1	<i>Dechloromonas</i>	<b>0.0</b>	0.0	<b>0.1</b>	0.1
<i>Tepidimicrobium</i>	<b>0.0</b>	0.0	<b>0.1</b>	0.0	<b>0.0</b>	0.0	<b>0.0</b>	0.1	<i>Aneurinibacillus</i>	<b>0.1</b>	0.1	<b>0.1</b>	0.1
<i>Peptoniphilus</i>	<b>0.1</b>	0.2	<b>0.0</b>	0.1	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<i>RF32</i>	<b>0.1</b>	0.1	<b>0.1</b>	0.1
<i>Vagococcus</i>	<b>0.1</b>	0.0	<b>0.1</b>	0.1	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<i>Enterococcus</i>	<b>0.0</b>	0.0	<b>0.1</b>	0.0
<i>Brevibacterium</i>	<b>0.0</b>	0.0	<b>0.0</b>	0.1	<b>0.1</b>	0.1	<b>0.0</b>	0.0	<i>Prevotella</i>	<b>0.0</b>	0.2	<b>0.1</b>	0.4
<i>Tissierellaceae</i>	<b>0.1</b>	0.1	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<i>MND1</i>	<b>0.0</b>	0.0	<b>0.1</b>	0.1
<i>Paracoccus</i>	<b>0.3</b>	0.4	<b>0.1</b>	0.1	<b>0.0</b>	0.1	<b>0.0</b>	0.0	<i>Barnesiellaceae</i>	<b>0.2</b>	0.2	<b>0.1</b>	0.1
<i>Enhydrobacter</i>	<b>0.3</b>	0.5	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<i>Sporanaerobacter</i>	<b>0.1</b>	0.2	<b>0.1</b>	0.1
<i>Planococcaceae</i>	<b>0.0</b>	0.0	<b>0.1</b>	0.0	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<i>Actinomyces</i>	<b>0.1</b>	0.1	<b>0.1</b>	0.1
<i>Paraprevotella</i>	<b>0.0</b>	0.0	<b>0.1</b>	0.2	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<i>Ellin6513</i>	<b>0.0</b>	0.0	<b>0.1</b>	0.0
<i>Roseomonas</i>	<b>0.2</b>	0.3	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<b>0.0</b>	0.0	<i>AF12</i>	<b>0.0</b>	0.0	<b>0.1</b>	0.1
<i>Unassigned</i>	<b>0.1</b>	0.1	<b>0.1</b>	0.0	<b>0.1</b>	0.0	<b>0.2</b>	0.2	<i>Rubellimicrobium</i>	<b>0.0</b>	0.0	<b>0.1</b>	0.1
									<i>Chryseobacterium</i>	<b>0.0</b>	0.1	<b>0.1</b>	0.1
									<i>Rhodocyclaceae</i>	<b>0.0</b>	0.0	<b>0.1</b>	0.1
									<i>Tepidimicrobium</i>	<b>0.1</b>	0.1	<b>0.1</b>	0.1

<i>Pseudoramibacter_Eubacterium</i>	<b>0.1</b>	0.0	<b>0.1</b>	0.0
<i>Pseudomonadaceae</i>	<b>0.0</b>	0.0	<b>0.1</b>	0.0
<i>Conexibacteraceae</i>	<b>0.0</b>	0.0	<b>0.1</b>	0.1
<i>Pirellulaceae</i>	<b>0.0</b>	0.0	<b>0.1</b>	0.1
<i>Butyricimonas</i>	<b>0.0</b>	0.0	<b>0.1</b>	0.0
<i>Mycobacterium</i>	<b>0.0</b>	0.0	<b>0.1</b>	0.1
<i>Paludibacter</i>	<b>0.1</b>	0.0	<b>0.0</b>	0.0
<i>Thermoactinomyces</i>	<b>0.1</b>	0.1	<b>0.0</b>	0.0
<i>Ruminococcus</i>	<b>0.3</b>	0.5	<b>0.0</b>	0.0
<i>Anaerotruncus</i>	<b>0.1</b>	0.1	<b>0.0</b>	0.1
<i>Luteimonas</i>	<b>0.1</b>	0.1	<b>0.0</b>	0.1
<i>Dialister</i>	<b>0.5</b>	0.8	<b>0.0</b>	0.0
<i>Acidaminococcus</i>	<b>0.1</b>	0.1	<b>0.0</b>	0.0
<i>Tissierellaceae</i>	<b>0.1</b>	0.0	<b>0.0</b>	0.0
<i>Turcibacter</i>	<b>0.1</b>	0.1	<b>0.0</b>	0.0
<i>Odoribacter</i>	<b>0.1</b>	0.1	<b>0.0</b>	0.0
<i>Bilophila</i>	<b>0.3</b>	0.5	<b>0.0</b>	0.0
<i>Catenibacterium</i>	<b>0.1</b>	0.2	<b>0.0</b>	0.0
<i>Anaerobiospirillum</i>	<b>0.2</b>	0.3	<b>0.0</b>	0.0
<i>Slackia</i>	<b>0.1</b>	0.2	<b>0.0</b>	0.0
<i>Megamonas</i>	<b>0.1</b>	0.1	<b>0.0</b>	0.0
<i>Other</i>	<b>1.3</b>	1.2	<b>1.2</b>	1.3

---

**Supplementary Table S2.** Statistical analysis on gut microbiota detected in the hindgut content of European sea bass fed different diets at 71 days (pre-suboptimal rearing condition), and at 81 days (post-suboptimal rearing condition). All the *P* values were appropriately corrected for multiple comparisons using the Benjamini-Hochberg method. False discovery rate (FDR)  $\leq 0.05$  was considered as statistically significant. D0= 0 mg Kg<sup>-1</sup> organic acids and nature-identical compounds (OA, NIC) ; D250 = 250 mg Kg<sup>-1</sup>OA, NIC; D500 = 500 mg Kg<sup>-1</sup> OA, NIC; D1000 = 1000mg Kg<sup>-1</sup> OA, NIC. D0vsD250=comparisons between D0 and D250 genera under pre-suboptimal rearing condition; D0vsD500=comparisons between D0 and D500 genera under pre-suboptimal rearing condition; D0vsD1000=comparisons between D0 and D1000 genera under pre-suboptimal rearing condition and post-suboptimal rearing condition; D0vsD0=comparisons between pre-suboptimal rearing condition and post- suboptimal rearing condition D0 genera; D1000vsD1000=comparisons between pre- suboptimal rearing condition and post- suboptimal rearing condition D1000 genera.

Diet	Pre-suboptimal rearing condition			Post-suboptimal rearing condition		Pre-Post suboptimal rearing condition	
	D0 vs D250	D0 vs D500	D0 vs D1000	D0 vs D1000		D0 vs D0	D1000 vs D1000
Genus	P- value			P-value		P-value	
<i>Lactobacillus</i>	0.66	0.08	0.66	<i>Enterobacteriaceae</i>	1.0	<i>Rikenellaceae</i>	0.06 0.08
<i>Leuconostocaceae</i>	0.08	0.08	0.66	<i>Eubacterium</i>	0.7	<i>Myroides</i>	0.18 0.1
<i>Streptococcus</i>	1.0	0.66	1.0	<i>Bacillus</i>	0.7	<i>Acinetobacter</i>	0.06 0.7
<i>Bacillus</i>	1.0	1.0	0.38	<i>Clostridium</i>	0.7	<i>Enterococcus</i>	0.08 0.7
<i>Corynebacterium</i>	0.08	0.19	0.08	<i>Erysipelotrichaceae</i>	0.4	<i>Planctomyces</i>	0.2 0.5
<i>Leuconostoc</i>	0.12	0.66	1.0	<i>Bacteroides</i>	0.2	<i>Paraprevotella</i>	0.64 NA
<i>Bacillaceae</i>	0.66	0.38	0.38	<i>Coriobacteriaceae</i>	1.0	<i>Christensenellaceae</i>	0.08 0.06
<i>Streptophyta</i>	0.66	0.19	0.08	<i>Lachnospiraceae</i>	1.0	<i>Morganella</i>	0.18 0.06
<i>Geobacillus</i>	0.38	0.38	0.38	<i>Mogibacteriaceae</i>	0.4	<i>Akkermansia</i>	0.08 0.08
<i>mitochondria</i>	0.66	0.19	0.38	<i>Bacillaceae</i>	0.4	<i>Ruminococcaceae</i>	0.08 0.1
<i>Lactococcus</i>	0.19	0.38	0.66	<i>Peptostreptococcaceae</i>	0.4	<i>Bacteroides</i>	0.1 0.1
<i>Bifidobacteriaceae</i>	0.82	0.66	1.0	<i>Ruminococcaceae</i>	0.2	<i>Streptophyta</i>	0.1 0.2
<i>Clostridium</i>	1.0	0.38	0.27	<i>Geobacillus</i>	1.0	<i>Sinobacteraceae</i>	0.38 1.0
<i>Bifidobacterium</i>	1.0	1.0	0.66	<i>Dorea</i>	1.0	<i>Propionibacteriaceae</i>	0.08 0.38
<i>Bradyrhizobium</i>	1.0	0.82	0.38	<i>Sediminibacterium</i>	1.0	<i>Lactobacillales</i>	0.08 0.08
<i>Delftia</i>	0.66	1.0	0.38	<i>Caloramator</i>	1.0	<i>Leuconostoc</i>	0.08 0.08
<i>Peptostreptococcaceae</i>	1.0	0.26	0.66	<i>Carnobacterium</i>	0.7	<i>Legionellaceae</i>	1.0 0.5
<i>Caulobacteraceae</i>	0.66	0.82	0.66	<i>Clostridiales</i>	0.7	<i>Natronobacillus</i>	1.0 0.51

<i>Faecalibacterium</i>	0.37	0.64	0.66	<i>Bacteroides</i>	0.2	<i>mitochondria</i>	0.08	0.1
<i>Sphingobium</i>	0.64	0.2	0.06	<i>Delftia</i>	1.0	<i>Ellin6513</i>	0.07	1.0
<i>Rhodococcus</i>	1.0	0.66	0.19	<i>Sphingobium</i>	0.7	<i>Coproccoccus</i>	0.1	0.06
<i>Lactobacillales</i>	0.08	0.08	0.82	<i>Anaerobacillus</i>	0.4	<i>Mogibacteriaceae</i>	0.08	0.06
<i>Sporanaerobacter</i>	0.66	1.0	0.38	<i>Lachnospira</i>	0.4	<i>Parachlamydia</i>	0.06	0.06
<i>Blautia</i>	1.0	0.38	0.66	<i>Streptophyta</i>	0.2	<i>Lachnospira</i>	0.06	0.06
<i>Solibacterales</i>	0.38	1.0	1.0	<i>Faecalibacterium</i>	1.0	<i>Anaerobacillus</i>	0.08	0.08
<i>Sphingomonas</i>	1.0	0.82	1.0	<i>Caulobacteraceae</i>	0.5	<i>Erysipelotrichaceae</i>	0.1	0.1
<i>Ellin6513</i>	1.0	0.38	0.66	<i>Akkermansia</i>	0.2	<i>Lactobacillus</i>	0.1	0.1
<i>Ruminococcus</i>	0.38	0.66	0.08	<i>Methylobacterium</i>	0.7	<i>Peptostreptococcaceae</i>	0.1	0.1
<i>Lachnospiraceae</i>	1.0	1.0	0.66	<i>Vagococcus</i>	1.0	<i>Parabacteroides</i>	0.08	0.2
<i>Lactobacillaceae</i>	0.38	1.0	1.0	<i>Lactobacillus</i>	0.4	<i>Ochrobactrum</i>	1.0	0.7
<i>Clostridiaceae</i>	1.0	0.66	0.18	<i>Ralstonia</i>	1.0	<i>Ruminococcus</i>	0.1	1.0
<i>Conexibacteraceae</i>	0.64	0.64	0.08	<i>Rikenellaceae</i>	0.1	<i>Ruminococcus</i>	0.08	1.0
<i>Bacillales</i>	1.0	0.27	0.38	<i>Myroides</i>	0.1	<i>Virgibacillus</i>	0.07	0.08
<i>Sporosarcina</i>	0.66	0.65	0.38	<i>Streptococcus</i>	0.5	<i>Curtobacterium</i>	0.1	0.08
<i>Ruminococcaceae</i>	1.0	0.08	1.0	<i>Blautia</i>	0.7	<i>Comamonadaceae</i>	1.0	0.82
<i>Curtobacterium</i>	1.0	0.38	0.66	<i>Ruminococcus</i>	0.4	<i>Adlercreutzia</i>	0.2	1.0
<i>Enterococcus</i>	1.0	0.19	0.82	<i>Roseburia</i>	0.7	<i>Solibacillus</i>	0.2	1.0
<i>Anaerobacillus</i>	0.5	0.08	1.0	<i>Bifidobacterium</i>	1.0	<i>Janthinobacterium</i>	0.64	1.0
<i>Sediminibacterium</i>	1.0	0.51	1.0	<i>Clostridiaceae</i>	0.7	<i>Rubellimicrobium</i>	0.19	0.35
<i>Carnobacterium</i>	0.51	0.82	1.0	<i>Eggerthella</i>	0.7	<i>Dechloromonas</i>	0.65	0.38
<i>Ralstonia</i>	0.82	0.51	1.0	<i>Collinsella</i>	1.0	<i>Megamonas</i>	0.5	0.2
<i>Collinsella</i>	0.5	1.0	0.38	<i>Enhydrobacter</i>	1.0	<i>Brevibacillus</i>	0.65	0.2
<i>Bacteroides</i>	0.38	0.27	1.0	<i>Prevotella</i>	0.2	<i>Peptostreptococcus</i>	0.35	0.2
<i>Ochrobactrum</i>	0.66	0.27	0.66	<i>Parabacteroides</i>	0.4	<i>Pediococcus</i>	0.06	0.35
<i>Staphylococcus</i>	0.38	0.51	0.66	<i>Bradyrhizobium</i>	0.7	<i>Tissierella_Soehngenia</i>	0.06	0.35
<i>Pediococcus</i>	0.35	0.08	0.08	<i>Corynebacterium</i>	1.0	<i>Lactobacillaceae</i>	0.06	0.35
<i>Ureibacillus</i>	0.66	0.66	0.12	<i>Bacillales</i>	0.16	<i>Myxococcales</i>	0.2	0.35
<i>Enterobacteriaceae</i>	1.0	1.0	1.0	<i>Lysinibacillus</i>	1.0	<i>Jonesiaceae</i>	0.5	0.5
<i>Rs-045</i>	0.65	0.19	0.65	<i>Phascolarctobacterium</i>	0.0	<i>Slackia</i>	0.5	0.5
<i>Sinobacteraceae</i>	0.81	0.66	0.35	<i>Paenibacillus</i>	0.66	<i>Trichococcus</i>	0.5	0.5



<i>Clostridiales</i>	1.0	0.19	0.66	<i>Coprococcus</i>	0.4	<i>Roseomonas</i>	0.5	0.5
<i>Bradyrhizobiaceae</i>	1.0	0.82	0.38	<i>MLE1-12</i>	0.7	<i>Shewanella</i>	0.5	0.5
<i>Lysinibacillus</i>	0.35	0.48	0.5	<i>Oscillospira</i>	1.0	<i>TM7-1</i>	0.5	0.5
<i>Saccharopolyspora</i>	0.82	0.81	0.66	<i>Anaerostipes</i>	0.82	<i>Arthrobacter</i>	0.64	0.5
<i>Oxalobacteraceae</i>	0.82	0.51	1.0	<i>Sphingomonas</i>	0.82	<i>Planococcaceae</i>	NA	0.5
<i>Kurthia</i>	0.08	0.38	0.08	<i>Acinetobacter</i>	0.1	<i>ZB2</i>	NA	0.5
<i>Coriobacteriaceae</i>	0.66	0.65	0.38	<i>mitochondria</i>	0.38	<i>Brevundimonas</i>	NA	0.5
<i>Streptomyces</i>	0.27	0.27	0.27	<i>Staphylococcus</i>	0.66	<i>Rhodoplanes</i>	NA	0.5
<i>Vagococcus</i>	0.82	0.18	0.12	<i>Ochrobactrum</i>	0.4	<i>Phyllobacterium</i>	NA	0.5
<i>Tissierellaceae</i>	0.66	1.0	0.38	<i>Parachlamydia</i>	0.4	<i>Edaphobacter</i>	NA	1.0
<i>Unassigned</i>	0.18	0.26	1.0	<i>Thermogemmatisporaceae</i>	1.0	<i>Devosia</i>	NA	1.0
				<i>Morganella</i>	0.2	<i>Acetobacteraceae</i>	NA	1.0
				<i>Halomonas</i>	0.51	<i>Nocardioideaceae</i>	0.5	1.0
				<i>Ellin329</i>	1.0	<i>Anaerococcus</i>	0.5	1.0
				<i>Stenotrophomonas</i>	0.51	<i>Agrobacterium</i>	0.5	1.0
				<i>Jeotgalicoccus</i>	1.0	<i>0319-6G20</i>	0.5	1.0
				<i>Ureibacillus</i>	0.51	<i>Rummeliibacillus</i>	0.08	NA
				<i>Pseudomonas</i>	1.0	<i>Solirubrobacterales</i>	0.5	NA
				<i>Leuconostocaceae</i>	1.0	<i>Gemmata</i>	0.5	NA
				<i>Parachlamydiaceae</i>	0.4	<i>Gluconacetobacter</i>	0.5	NA
				<i>Christensenellaceae</i>	0.2	<i>Stenotrophomonas</i>	0.35	0.08
				<i>Solibacterales</i>	1.0	<i>Halomonas</i>	0.35	0.38
				<i>Natronobacillus</i>	0.35	<i>Tissierellaceae</i>	1.0	0.64
				<i>Sinobacteraceae</i>	0.2	<i>Ureibacillus</i>	0.7	1.0
				<i>Dietzia</i>	0.82	<i>Caldicoprobacter</i>	0.35	0.19
				<i>Paracoccus</i>	0.7	<i>Conexibacteraceae</i>	0.37	0.1
				<i>Rhodococcus</i>	0.66	<i>Lactococcus</i>	0.08	0.1
				<i>Lachnospiraceae; Other</i>	0.65	<i>SJA-4</i>	0.2	0.5
				<i>Dechloromonas</i>	0.5	<i>Barnesiellaceae</i>	0.2	1.0
				<i>Aneurinibacillus</i>	1.0	<i>Turicibacter</i>	1.0	1.0
				<i>Enterococcus</i>	0.16	<i>Lachnospiraceae; Other</i>	0.5	0.07
				<i>Prevotella</i>	0.2	<i>Sporosarcina</i>	0.38	0.1

<i>Barnesiellaceae</i>	0.64	<i>Bacillaceae;Other</i>	0.64	0.82
<i>Sporanaerobacter</i>	1.0	<i>Anoxybacillus</i>	1.0	0.06
<i>Actinomyces</i>	1.0	<i>Rhodococcus</i>	0.1	0.08
<i>Ellin6513</i>	0.38	<i>Paenibacillus</i>	1.0	0.08
<i>Rubellimicrobium</i>	0.5	<i>Bradyrhizobium</i>	1.0	0.66
<i>Chryseobacterium</i>	1.0	<i>Staphylococcus</i>	0.66	1.0
<i>Rhodocyclaceae</i>	0.5	<i>Paracoccus</i>	0.82	0.06
<i>Tepidimicrobium</i>	1.0	<i>Eggerthella</i>	0.2	0.06
<i>Pseudoramibacter_Eubacterium</i>	1.0	<i>Roseburia</i>	0.06	0.08
<i>Pseudomonadaceae</i>	1.0	<i>Eubacterium</i>	0.08	0.08
<i>Conexibacteraceae</i>	0.64	<i>Clostridium</i>	0.1	0.1
<i>Pirellulaceae</i>	1.0	<i>Clostridiales</i>	0.1	0.1
<i>Ruminococcus</i>	0.4	<i>Carnobacterium</i>	0.1	0.1
<i>Acidaminococcus</i>	1.0	<i>Methylobacterium</i>	0.2	0.2
<i>Tissierellaceae</i>	0.51	<i>Sphingobium</i>	0.06	0.4
<i>Turcibacter</i>	0.64	<i>Bacillus</i>	1.0	0.7
<i>Bilophila</i>	1.0	<i>MLE1-12</i>	0.18	0.7
<i>Slackia</i>	0.5	<i>Blautia</i>	0.4	0.7
<i>Megamonas</i>	0.5	<i>Novosphingobium</i>	0.35	0.19
		<i>Erwinia</i>	0.5	0.2
		<i>Peptoniphilus</i>	0.5	1.0
		<i>Phascolarctobacterium</i>	0.35	0.06
		<i>Anaerostipes</i>	0.35	0.2
		<i>Dietzia</i>	0.18	0.64
		<i>Sphingomonas</i>	0.7	1.0
		<i>Enhydrobacter</i>	1.0	0.06
		<i>Pseudoramibacter_Eubacterium</i>	0.06	0.06
		<i>Oscillospira</i>	0.06	0.06
		<i>Vagococcus</i>	0.1	0.08
		<i>Lysinibacillus</i>	0.18	0.08
		<i>Caloramator</i>	0.06	0.08
		<i>Dorea</i>	0.1	0.08

<i>Bifidobacteriaceae</i>	0.08	0.08
<i>Corynebacterium</i>	0.1	0.1
<i>Sporanaerobacter</i>	0.37	0.1
<i>Coriobacteriaceae</i>	0.1	0.1
<i>Lachnospiraceae</i>	0.08	0.1
<i>Leuconostocaceae</i>	0.1	0.1
<i>Bifidobacterium</i>	1.0	0.1
<i>Enterobacteriaceae</i>	0.08	0.1
<i>Streptococcus</i>	0.1	0.1
<i>Sediminibacterium</i>	0.4	0.1
<i>Alkaliphilus</i>	0.64	0.2
<i>Other</i>	0.08	0.2
WPS-2	1.0	0.35
<i>Prevotella</i>	0.06	0.35
<i>Micrococcaceae</i>	0.64	0.35
<i>Leucobacter</i>	0.35	0.35
<i>Microbacterium</i>	0.07	0.35
<i>Microbacteriaceae</i>	0.18	0.35
<i>Collinsella</i>	0.4	0.4
<i>Delftia</i>	0.7	0.4
<i>Solibacterales</i>	0.4	0.4
<i>Ralstonia</i>	0.7	0.4
<i>Veillonella</i>	0.64	0.5
<i>Rothia</i>	1.0	0.5
<i>Propionibacterium</i>	1.0	0.5
<i>Actinomycetales</i>	0.5	0.5
<i>Chryseobacterium</i>	0.5	0.5
<i>Pirellulaceae</i>	0.5	0.5
<i>Kurthia</i>	0.1	0.51
<i>Rhizobiales</i>	1.0	0.51
<i>Tepidimicrobium</i>	0.7	0.64
Ellin329	0.35	0.66

<i>Clostridiaceae</i>	0.08	0.7
<i>Bacillales</i>	0.7	0.7
<i>Geobacillus</i>	0.7	0.7
<i>Faecalibacterium</i>	0.18	0.7
<i>Caulobacteraceae</i>	0.7	0.7
<i>Pseudomonas</i>	1.0	1.0
<i>Bacillaceae</i>	0.7	1.0
<i>Kocuria</i>	0.35	1.0
<i>Oxalobacteraceae</i>	0.49	1.0
<i>Acidaminococcus</i>	0.5	1.0
<i>Bradyrhizobiaceae</i>	0.5	1.0
<i>Phyllobacteriaceae</i>	0.5	1.0
<i>Bilophila</i>	0.5	1.0
<i>Thermogemmatissporaceae</i>	0.82	1.0
<i>Aneurinibacillus</i>	0.7	1.0
<i>Actinomyces</i>	1.0	1.0
<i>Brevibacterium</i>	1.0	1.0
<i>Cloacibacterium</i>	1.0	1.0
<i>Jeotgalicoccus</i>	1.0	1.0
<i>Gemmataceae</i>	1.0	1.0
<i>Mycetocola</i>	0.06	0.06
<i>Rs-045</i>	0.06	0.06
<i>Streptomyces</i>	0.06	0.2
<i>Facklamia</i>	0.5	0.2
<i>Rathayibacter</i>	0.06	0.2
<i>Saccharopolyspora</i>	0.06	0.2
<i>Frigoribacterium</i>	0.06	0.2
<i>Sanguibacter</i>	0.2	0.5
<i>Agrococcus</i>	NA	0.5
<i>JG30-KF-CM45</i>	NA	0.5
<i>Paenibacillaceae</i>	NA	0.5
<i>Erysipelothrix</i>	NA	0.5

---

<i>Isosphaeraceae</i>	NA	0.5
<i>Macrococcus</i>	0.2	0.5
<i>Williamsia</i>	0.5	0.5
<i>Photobacterium</i>	0.5	0.5
<i>Weissella</i>	0.19	NA
<i>Cellulomonas</i>	0.5	NA
<i>Proteiniclasticum</i>	0.5	NA
<i>Peptococcus</i>	0.5	NA

---