**Supplementary Table S1**

Fatty acid composition (mg/g) of the diets.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Sardine Low | Herring Low | Sardine High | Herring High |
| 14:0 | 3.2 | 7.5 | 3.4 | 11.2 |
| 16:0  | 18.8 | 17.5 | 17.7 | 22.1 |
| 18:0 | 4.8 | 2.8 | 4.5 | 3.0 |
| 20:0 | 1.2 | 0.7 | 1.1 | 0.7 |
| ∑SFA1 | 30.7 | 30.0 | 29.0 | 38.8 |
| 16:1n-7 | 3.7 | 4.0 | 3.5 | 5.6 |
| 18:1n-9 | 114.9 | 64.0 | 97.3 | 53.1 |
| 20:1n-11 | 0.9 | 2.8 | 1.3 | 4.2 |
| 20:1n-9  | 5.2 | 12.2 | 4.7 | 18.2 |
| 22:1n-11 | 3.7 | 20.7 | 2.8 | 31.5 |
| 24:1n-9 | 0.9 | 1.0 | 0.7 | 1.3 |
| ∑MUFA2 | 131.0 | 107.9 | 112.2 | 118.0 |
| 18:2n-6 | 40.7 | 24.6 | 34.1 | 21.2 |
| 20:4n-6 | 0.5 | 0.3 | 0.6 | 0.4 |
| ∑n-63 | 42.7 | 26.1 | 36.4 | 23.2 |
| 18:3n-3 | 18.8 | 11.1 | 15.5 | 9.1 |
| 20:5n-3 | 7.3 | 5.5 | 8.5 | 8.0 |
| 22:5n-3 | 1.2 | 0.7 | 1.5 | 1.1 |
| 22:6n-3 | 11.3 | 8.4 | 13.0 | 12.3 |
| ∑n-34 | 39.8 | 26.5 | 38.9 | 31.1 |
| ∑EPA+DHA | 18.6 | 13.9 | 21.4 | 20.3 |

1Include 15:0, 17:0, 22:0, 24:0; 2Include 14:1n-5, 16:1n-9, 17:1n-7, 18:1n-7, 20:1n-7, 22:1n-9, 22:1n-7; 3Include 16:2n-6, 18:3n-6, 20:2n-6, 20:3n-6, 22:4n-6; 4Include 16:2n-3, 18:4n-3, 20:4n-3, 20:3n-3

**Supplementary Table S2**

Total activity (nmol) and 14C-labelled fatty acids (% of total fatty acids) of the omega-3 synthesis pathway in human HepG2 cells and salmon hepatocytes. The cells were incubated with different doses of cetoleic acid (0-80 μM) for 20 h, then added 14C-18:3n-3 (7 μM) and cultured further for 48 h. Data are shown as mean ± standard error (n=4). Significant differences (p≤0.05) are indicated by different letters and were determined using one-way ANOVA test followed by Tukey-Kramer test.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|   | Control (0 μM) | 20 μM | 40 μM | 60 μM | 80 μM | p-value |
| Human hepatocytes  |  |
| *Total nmol* | *11.6* | *±* | *0.3* | *b* | 12.0 | *±* | 0.4 | *ab* | 13.0 | *±* | 0.4 | *a* | 12.2 | *±* | 0.2 | *ab* | 12.4 | *±* | 0.2 | *ab* | 0.0012 |
| 14C-18:3n-3 | 38.4 | ± | 2.2 | a | 29.6 | ± | 0.9 | c | 28.2 | ± | 0.4 | bc | 31.1 | ± | 0.3 | abc | 35.8 | ± | 1.8 | ab | <0.0001 |
| 14C-18:4n-3 | 0.5 | ± | 0.2 | d | 0.7 | ± | 0.1 | d | 1.0 | ± | 0.1 | c | 1.5 | ± | 0.2 | b | 2.0 | ± | 0.1 | a | <0.0001 |
| 14C-20:3n-3 | 2.4 | ± | 0.5 | b | 4.0 | ± | 0.5 | a | 4.4 | ± | 0.1 | a | 4.4 | ± | 0.2 | a | 4.0 | ± | 0.2 | a | <0.0001 |
| 14C-20:4n-3 | 11.1 | ± | 0.3 | a | 10.1 | ± | 0.5 | a | 8.0 | ± | 0.3 | b | 6.1 | ± | 0.1 | c | 5.0 | ± | 0.3 | c | 0.0009 |
| 14C-20:5n-3 | 25.2 | ± | 1.0 | c | 29.7 | ± | 0.5 | ab | 32.7 | ± | 0.6 | a | 31.6 | ± | 0.3 | ab | 27.9 | ± | 3.9 | bc | <0.0001 |
| 14C-22:5n-3 | 6.4 | ± | 0.1 | a | 6.1 | ± | 0.4 | a | 4.9 | ± | 0.1 | b | 3.9 | ± | 0.2 | c | 3.5 | ± | 0.2 | c | 0.11 |
| 14C-24:5n-3 | 1.7 | ± | 0.7 |   | 2.1 | ± | 0.1 |   | 2.0 | ± | 0.1 |   | 1.8 | ± | 0.1 |   | 1.6 | ± | 0.2 |   | 0.02 |
| 14C-24:6n-3 | 2.2 | ± | 0.7 | a | 2.2 | ± | 0.2 | ab | 1.7 | ± | 0.1 | ab | 1.5 | ± | 0.1 | ab | 1.3 | ± | 0.3 | b | <0.0001 |
| 14C-22:6n-3 | 8.9 | ± | 0.7 | b | 13.0 | ± | 0.2 | a | 15.2 | ± | 0.2 | a | 16.3 | ± | 0.2 | a | 17.3 | ± | 1.3 | a | 0.05 |
| Salmon hepatocytes |  |
| *Total nmol* | *10.0* | *±* | *0.0* |  | 11.1 | *±* | 0.0 |  | 10.3 | *±* | 0.0 |  | 10.0 | *±* | 0.2 |  | 10.4 | *±* | 0.1 |  | *0.0004* |
| 14C-18:3n-3 | 55.7 | ± | 0.8 | a | 52.7 | ± | 0.7 | b | 51.3 | ± | 0.9 | b | 53.0 | ± | 1.4 | b | 52.6 | ± | 1.3 | b | <0.0001 |
| 14C-18:4n-3 | 1.7 | ± | 0.2 | c | 2.6 | ± | 0.2 | bc | 3.5 | ± | 0.2 | b | 4.7 | ± | 0.5 | a | 4.9 | ± | 0.7 | a | 0.01 |
| 14C-20:3n-3 | 6.3 | ± | 0.5 | a | 5.6 | ± | 0.9 | ab | 4.9 | ± | 0.4 | ab | 3.9 | ± | 0.3 | b | 4.6 | ± | 1.5 | ab | 0.07 |
| 14C-20:4n-3 | 3.6 | ± | 0.3 |  | 4.7 | ± | 0.5 |  | 4.6 | ± | 0.5 |  | 4.7 | ± | 0.5 |  | 4.5 | ± | 1.0 |  |  |
| 14C-20:5n-3 | 15.9 | ± | 0.5 | b | 16.9 | ± | 0.4 | ab | 17.8 | ± | 0.4 | a | 17.0 | ± | 0.3 | a | 16.7 | ± | 0.7 | ab | 0.002 |
| 14C-22:6n-3 | 16.7 | ± | 0.3 |   | 17.5 | ± | 0.4 |   | 17.9 | ± | 0.3 |   | 16.7 | ± | 1.2 |   | 16.7 | ± | 1.2 |   |  |

**Supplementary Table S3**

Fat (%) and fatty acid composition (mg/g) in the liver of salmon fed diets based on two different levels (Low and High) of sardine or herring oil, respectively. Data (n=3; 3 tanks per dietary group, 5 fish per tank to a total of 15 fish per dietary group) are shown as mean with standard deviation. Significant differences (p<0.05) were ranked according to t-test.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Sardine Low | Herring Low | p-value |  | Sardine High | Herring High | p-value |
| Fat  | 11.6 | ± | 1.9 | 8.4 | ± | 1.8 | 0.108 |  | 9.5 | ± | 2.8 | 6.6 | ± | 0.9 | 0.166 |
| 14:0 | 1.6 | ± | 0.2 | 2.6 | ± | 0.7 | 0.072 |  | 1.4 | ± | 0.5 | 2.3 | ± | 0.1 | 0.035 |
| 16:0  | 7.2 | ± | 1.4 | 7.1 | ± | 1.4 | 0.926 |  | 6.4 | ± | 1.9 | 6.4 | ± | 0.4 | 0.975 |
| 18:0 | 5.0 | ± | 1.4 | 3.1 | ± | 0.7 | 0.096 |  | 4.1 | ± | 1.7 | 2.5 | ± | 0.2 | 0.189 |
| ∑SFA | 14.4 | ± | 3.2 | 13.3 | ± | 2.9 | 0.658 |  | 12.3 | ± | 4.2 | 11.5 | ± | 0.4 | 0.772 |
| 18:1n-11 | 0.0 | ± | 0.0 | 3.5 | ± | 0.3 | 0.000 |  | 0.2 | ± | 0.4 | 4.2 | ± | 0.3 | 0.000 |
| 18:1n-9 | 68.1 | ± | 10.8 | 43.4 | ± | 11.4 | 0.053 |  | 51.0 | ± | 19.9 | 26.4 | ± | 1.5 | 0.099 |
| 18:1n-7 | 4.8 | ± | 0.7 | 3.4 | ± | 0.7 | 0.063 |  | 3.9 | ± | 1.4 | 2.5 | ± | 0.1 | 0.145 |
| 20:1n-9  | 8.7 | ± | 1.4 | 7.6 | ± | 1.6 | 0.450 |  | 6.6 | ± | 2.6 | 6.0 | ± | 0.4 | 0.694 |
| 22:1n-7 | 0.9 | ± | 0.3 | 0.7 | ± | 0.2 | 0.431 |  | 0.7 | ± | 0.3 | 0.6 | ± | 0.0 | 0.662 |
| 22:1n-11 | 0.6 | ± | 0.1 | 2.7 | ± | 0.5 | 0.002 |  | 0.6 | ± | 0.2 | 2.7 | ± | 0.2 | 0.000 |
| ∑MUFA | 1.5 | ± | 0.3 | 1.5 | ± | 0.4 | 0.986 |  | 1.4 | ± | 0.6 | 1.4 | ± | 0.5 | 0.891 |
| 18:2n-6 | 17.1 | ± | 2.2 | 9.9 | ± | 2.4 | 0.020 |  | 12.8 | ± | 4.7 | 5.9 | ± | 0.2 | 0.063 |
| 20:2n-6 | 4.0 | ± | 0.7 | 2.3 | ± | 0.5 | 0.022 |  | 3.0 | ± | 1.2 | 1.3 | ± | 0.1 | 0.077 |
| 20:3n-6 | 1.3 | ± | 0.2 | 0.9 | ± | 0.1 | 0.035 |  | 0.9 | ± | 0.3 | 0.5 | ± | 0.1 | 0.058 |
| 20:4n-6 | 0.9 | ± | 0.0 | 0.7 | ± | 0.0 | 0.001 |  | 0.8 | ± | 0.1 | 0.5 | ± | 0.0 | 0.003 |
| ∑n-6 | 6.3 | ± | 0.9 | 3.8 | ± | 0.6 | 0.019 |  | 4.7 | ± | 1.6 | 2.3 | ± | 0.1 | 0.055 |
| 18:3n-3 | 4.7 | ± | 0.8 | 2.6 | ± | 0.7 | 0.028 |  | 3.6 | ± | 1.4 | 1.6 | ± | 0.1 | 0.067 |
| 20:3n-3 | 0.3 | ± | 0.5 | 0.1 | ± | 0.2 | 0.646 |  | 0.5 | ± | 0.4 | 0.1 | ± | 0.2 | 0.281 |
| 20:5n-3 | 2.1 | ± | 0.3 | 2.0 | ± | 0.3 | 0.797 |  | 2.2 | ± | 0.6 | 1.9 | ± | 0.1 | 0.475 |
| 22:5n-3 | 0.7 | ± | 0.1 | 0.6 | ± | 0.1 | 0.331 |  | 0.7 | ± | 0.1 | 0.6 | ± | 0.1 | 0.237 |
| 22:6n-3 | 5.7 | ± | 0.7 | 6.2 | ± | 0.3 | 0.372 |  | 6.0 | ± | 0.2 | 6.4 | ± | 0.1 | 0.034 |
| ∑n-3 | 13.5 | ± | 1.6 | 11.6 | ± | 1.2 | 0.163 |  | 12.9 | ± | 2.1 | 10.6 | ± | 0.3 | 0.121 |
| ∑EPA+DHA | 7.8 | ± | 1.0 | 8.2 | ± | 0.6 | 0.573 |  | 8.2 | ± | 0.7 | 8.3 | ± | 0.2 | 0.790 |

1Include 17:0, 20:0, 22:0; 2Include 14:1n-5, 15:1, 16:1n-9, 16:1n-7, 16:1n-5, 17:1n-7, 18:1n-9T, 20:1n-11, 20:1n-7,24:1n-9; 3Include 16:2n-6, 18:3n-6; 4Include 20:4n-3, 18:4n-3

**Supplementary Table S4**

Fatty acid composition (g/100g) in the whole body of salmon fed diets based on two different levels (Low and High) of sardine or herring oil, respectively. Data (n=3; 3 tanks per dietary group, 5 fish per tank to a total of 15 fish per dietary group) are shown as mean with standard deviation. Significant differences (p<0.05) were ranked according to t-test.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Sardine Low | Herring Low | p-value |  | Sardine High | Herring High | p-value |
| Fat (%) | 15.2 | ± | 0.5 | 15.1 | ± | 0.1 | 0.925 |  | 15.0 | ± | 0.8 | 14.9 | ± | 0.4 | 0.752 |
| 14:0 | 0.4 | ± | 0.2 | 0.5 | ± | 0.0 | 0.418 |  | 0.3 | ± | 0.0 | 0.4 | ± | 0.1 | 0.129 |
| 16:0  | 1.4 | ± | 0.1 | 1.5 | ± | 0.0 | 0.720 |  | 1.4 | ± | 0.1 | 1.5 | ± | 0.0 | 0.301 |
| 18:0 | 0.3 | ± | 0.0 | 0.3 | ± | 0.0 | 0.232 |  | 0.4 | ± | 0.1 | 0.3 | ± | 0.0 | 0.205 |
| ∑SFA | 2.2 | ± | 0.3 | 2.3 | ± | 0.0 | 0.590 |  | 2.2 | ± | 0.2 | 2.3 | ± | 0.1 | 0.293 |
| 16:1n-7 | 0.3 | ± | 0.1 | 0.4 | ± | 0.0 | 0.625 |  | 0.3 | ± | 0.0 | 0.3 | ± | 0.1 | 0.475 |
| 18:1n-9 | 4.4 | ± | 0.8 | 4.2 | ± | 0.0 | 0.636 |  | 4.7 | ± | 0.3 | 4.0 | ± | 1.0 | 0.349 |
| 20:1n-9  | 0.7 | ± | 0.2 | 0.8 | ± | 0.0 | 0.327 |  | 0.6 | ± | 0.0 | 0.8 | ± | 0.2 | 0.104 |
| 22:1n-7 | 0.1 | ± | 0.0 | 0.1 | ± | 0.0 | 0.395 |  | 0.1 | ± | 0.0 | 0.1 | ± | 0.0 | 0.093 |
| 22:1n-11 | 0.7 | ± | 0.5 | 1.0 | ± | 0.0 | 0.356 |  | 0.4 | ± | 0.0 | 0.9 | ± | 0.5 | 0.120 |
| 24:1n-9 | 0.1 | ± | 0.0 | 0.1 | ± | 0.0 | 0.290 |  | 0.1 | ± | 0.0 | 0.1 | ± | 0.0 | 0.064 |
| ∑MUFA | 6.6 | ± | 0.1 | 6.9 | ± | 0.1 | 0.025 |  | 6.4 | ± | 0.4 | 6.6 | ± | 0.3 | 0.459 |
| 18:2n-6 | 1.5 | ± | 0.3 | 1.4 | ± | 0.0 | 0.563 |  | 1.6 | ± | 0.1 | 1.4 | ± | 0.3 | 0.330 |
| 20:2n-6 | 0.1 | ± | 0.0 | 0.1 | ± | 0.0 | 0.501 |  | 0.2 | ± | 0.0 | 0.1 | ± | 0.0 | 0.365 |
| ∑n-6 | 1.8 | ± | 0.3 | 1.7 | ± | 0.0 | 0.565 |  | 1.9 | ± | 0.1 | 1.7 | ± | 0.4 | 0.354 |
| 18:3n-3 | 0.5 | ± | 0.1 | 0.5 | ± | 0.0 | 0.503 |  | 0.6 | ± | 0.0 | 0.5 | ± | 0.1 | 0.235 |
| 20:5n-3 | 0.4 | ± | 0.1 | 0.4 | ± | 0.0 | 0.757 |  | 0.4 | ± | 0.0 | 0.4 | ± | 0.0 | 0.557 |
| 22:5n-3 | 0.1 | ± | 0.0 | 0.1 | ± | 0.0 | 0.415 |  | 0.1 | ± | 0.0 | 0.1 | ± | 0.0 | 0.939 |
| 22:6n-3 | 1.1 | ± | 0.1 | 1.1 | ± | 0.0 | 0.433 |  | 1.1 | ± | 0.0 | 1.1 | ± | 0.0 | 0.637 |
| ∑n-3 | 2.2 | ± | 0.0 | 2.1 | ± | 0.0 | 0.004 |  | 2.3 | ± | 0.1 | 2.2 | ± | 0.1 | 0.077 |
| ∑EPA+DHA | 1.5 | ± | 0.1 | 1.4 | ± | 0.0 | 0.545 |  | 1.5 | ± | 0.1 | 1.5 | ± | 0.1 | 0.906 |

1Include 15:0, 17:0, 20:0, 22:0; 2Include 14:1n-5, 16:1n-9, 16:1n-5, 17:1n-7, 18:1n-11, 20:1n-11, 20:1n-7; 3Include 16:2n-6, 18:3n-6, 20:3n-6, 20:4n-6, 22:4n-6; 4Include 16:2n-3, 20:4n-3, 20:3n-3