**Supplementary**

**Table 1.**

Formulations and proximate compositions of the experimental diets

|  |  |  |  |
| --- | --- | --- | --- |
| Ingredient (%) | Dietary lipid levels | | |
| 5.8% | 9.9% | 15.1% |
| White fish meal\* | 25.00 | 25.00 | 25.00 |
| Wheat gluten meal\* | 12.00 | 12.00 | 12.00 |
| Soybean protein concentrate\* | 19.00 | 19.00 | 19.00 |
| Krill meal\* | 5.00 | 5.00 | 5.00 |
| Dextrin\* | 19.70 | 19.70 | 19.70 |
| Fish oil\* | 2.00 | 7.00 | 12.00 |
| Soy lecithin | 1.00 | 1.00 | 1.00 |
| Vitamin premix† | 1.00 | 1.00 | 1.00 |
| Mineral premix‡ | 1.50 | 1.50 | 1.50 |
| Choline chloride | 0.30 | 0.30 | 0.30 |
| Ca(H2PO4)2 | 1.50 | 1.50 | 1.50 |
| Cellulose | 10.00 | 5.00 | 0.00 |
| Sodium alginate | 2.00 | 2.00 | 2.00 |
| Proximate composition (dry matter %) |  |  |  |
| Dry matter (%) | 90.81 | 91.47 | 91.55 |
| Crude protein (%) | 47.28 | 47.33 | 47.64 |
| Crude lipid (%) | 5.83 | 9.91 | 15.07 |
| Ash (%) | 9.49 | 9.53 | 9.51 |
| Gross energy (MJ Kg-1) | 1632.21 | 1829.92 | 2027.61 |

\* Ingredients were bought from Ningbo Tech-Bank Corp., Ningbo, China.

† Same as Jin et al. (2015) (14)

‡ Same as Jin et al. (2015) (14)

**Supplementary**

**Table 2.**

Fatty acid composition of the experimental diets and fish oil used in the formulation

(% of total fatty acids).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Fatty acids | Dietary lipid levels | | |  |
| 5.8% | 9.9% | 15.1% | Fish oil |
| 14:0 | 4.61 | 6.12 | 6.97 | 5.46 |
| 16:0 | 23.74 | 24.56 | 24.14 | 12.46 |
| 18:0 | 4.69 | 4.98 | 4.62 | 5.44 |
| 20:0 | 0.30 | 0.59 | 0.71 | 1.28 |
| 22:0 | 0.22 | 0.22 | 0.24 | 0.36 |
| ∑SFA\* | 33.56 | 36.47 | 36.68 | 25.00 |
| 16:1n-7 | 5.26 | 6.69 | 7.46 | 6.90 |
| 18:1n-9 | 17.23 | 16.93 | 15.99 | 16.14 |
| 20:1n-9 | 4.36 | 4.14 | 3.83 | 5.15 |
| 22:1n-9 | 0.91 | 0.90 | 0.77 | 6.77 |
| ∑MUFA† | 27.76 | 28.66 | 28.05 | 34.96 |
| 18:3n-3 | 1.64 | 1.40 | 1.37 | 1.62 |
| 20:5n-3 (EPA) | 7.34 | 8.21 | 9.48 | 10.46 |
| 22:6n-3 (DHA) | 10.07 | 10.66 | 11.53 | 13.08 |
| ∑n-3PUFA‡ | 19.05 | 20.27 | 22.38 | 25.16 |
| 18:2n-6 | 16.47 | 10.23 | 7.90 | 2.46 |
| 20:4n-6 (ARA) | 0.63 | 0.86 | 0.83 | 1.44 |
| ∑n-6PUFA§ | 17.10 | 11.09 | 8.73 | 3.90 |
| DHA/EPA | 1.37 | 1.30 | 1.22 | 1.25 |
| n-3/n-6PUFA | 1.11 | 1.83 | 2.56 | 6.45 |
| ∑LC-PUFA‖ | 18.92 | 20.69 | 22.95 | 24.98 |

\* ∑SFA, saturated fatty acids: 14:0, 16:0, 18:0, 20:0, 22:0.

† ∑MUFA, monounsaturated fatty acids: 16:1n-7, 18:1n-9, 20:1n-9, 22:1n-9.

‡ ∑n-3PUFA, n-3 poly unsaturated fatty acid: 18:3n-3, 20:5n-3, 22:6n-3.

§ ∑n-6PUFA, n-6 poly unsaturated fatty acid: 18:2n-6, 20:4n-6.

‖ ∑LC-PUFA, long chain polyunsaturated fatty acid: 20:4n-6, 20:5n-3, 22:6n-3.

**Supplementary**

**Table 3.**

Primers sequences and amplicon size for fat related genes and reference genes used for real-time PCR of swimming crab (*P. trituberculatus*)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Gene** | **Forward (5’ - 3’)** | **Reverse (5’ - 3’)** | **Size (bp)** | **GenBank reference or Publication** |
| Target genes |  |  |  |  |
| *fad* | GCAGTGAGAGACAGGACGGA | CTGGATGGTTAGGGTTTGGG | 241 | KP288227.1 |
| *elovl4* | AGCTACACAGGATGAAGGACC | GAGCAGCATAATGGCAAGG | 215 | MH370813 |
| *elovl* | TGTATCTGTACTACCTGCTGG | GCTGTGAACTGTATCATCTGA | 100 | MH370814 |
| *apod* | CGAGCGTTACTTCGTGTCC | CTGGTTCCTCCTCGTCAAA | 167 | PRJNA432636 |
| *lrp2* | GGAACTGCTGGCAAGATTTAC | CAGTCCAATACAGCATTTCCTC | 124 | PRJNA432636 |
| *lpr1* | CCAACACAGACACCGACAC | CCCCAGTCAGTCCAGAACA | 139 | PRJNA432636 |
| *lpr2* | ACATTCGCATCCTGAGACTG | TCTTGTCCTTGTTGTCGCAC | 126 | PRJNA432636 |
| *srb* | GGAGTGAAGGACCCTCTGCT | CAAACTCAGCCACTGCGGT | 109 | PRJNA432636 |
| *fabp1* | CACTCGCCAGTAGTCAATAGG | TCACTTAGAGAGCAAAGGTCAC | 219 | KU950355 |
| *fabp3* | GAAGGCACTTGGTGTTGGA | TCTTGAGGGTGGAGATGGT | 119 | PRJNA432636 |
| *fabp9* | TACCTTCAAGACCACCGAGA | TTCTCCTTGTCTCCCACCTG | 138 | PRJNA432636 |
| *fatp4* | AAGAATGACCCAATGCGTG | GCCAGCGAAAGGTGTCTC | 178 | PRJNA432636 |
| *cpt1* | GCTTGCCTACTACCGACAC | CCTTGGACATCTTACTGCTC | 155 | MF537407 |
| *cpt2* | TGGGACAAGGTTTTGATAGGC | TGGAGATGATGATGTGGTTGA | 123 | PRJNA432636 |
| *acox1* | TGGCAGACCTACAACGACG | TGGTGTAGATGCGAGGGAG | 193 | PRJNA432636 |
| *acox2* | ACCAACCACGGCATTCAC | TTGTCCACCCCATTCAGC | 116 | PRJNA432636 |
| *acox3* | CTGAGGCACGCTATGACC | GGGCAAACACGAGACCAT | 120 | PRJNA432636 |
| *fas* | CTTCAATACCCACCAAACC | CCTCAATGATGCCAGACAC | 229 | MF537400 |
| *acc* | TCTCAGGGCAACCTTACGCT | CGGGAGGCAGTAACCATTCA | 293 | MF537401 |
| *g6pd* | TGAAAAGGTGAAGGTGCTGA | CGGTGGAGTCATCAAGGTAAC | 125 | MF537402 |
| *6pgd* | GGGTGGAACCTCAACTATGG | CGATAGCCATCATAGAAAGCC | 254 | MF537403 |
| *dgat1* | TGGCGTCTCTGGAACCTACC | CATCAAGTTACCAATGCGGG | 258 | MF537404 |
| *gpat1* | TCATTGAAGGAGGACGAAC | GCTTTGTCCCATCTGTTCC | 179 | PRJNA432636 |
| *gpat3* | GGGACCGAGCACAAGTTATT | GCGATGGGGTAGATGACTGT | 160 | PRJNA432636 |
| *hsl* | GTTCCCATTCTCTCCATTG | ACCACCAGCACTGTCACCT | 159 | MF537408 |
| *lpl* | ACAAGACAGACGCAGAGTT | CCTCTCCTAACAAACACCC | 147 | MF537406 |
| *il* | CTAAGGAGGCGGAGGTGT | TGTTCAAACCGCTCGTGT | 112 | PRJNA432636 |
| *tgl* | ATGGATTACCTCGCTGAAAC | GGCGAAATGATTGATGGTG | 177 | PRJNA432636 |
| *pl* | ATTCTTGGCTTCCCTCTTAG | ACAGTTGAGTGCCCCATTAT | 108 | PRJNA432636 |
| *srebp1* | GTGATGTGTGCCTTGCGAGT | CCAGGGTTCACCAGTGTAGT | 284 | MF537405 |
| *hnf4ɑ* | CCTGTATCAAAGCCATCGT | CGCTGGAAGGGTTAGAAGA | 170 | PRJNA432636 |
| *rxr* | CTCAAGGCTGGCTGGAATG | CCTTTGGCATCTGGGTTGA | 245 | PRJNA432636 |
| Reference genes |  |  |  |  |
| *β-actin* | GAAGTAGCCGCCCTGGTTGTG | GGGTCAGAATACCTCGCTTGCTC | 190 | Pan *et al.* (2010) (55) |
| *RpL8* | GCGTACCACAAGTATCGCGT | AGACCGACCTTCCTACCAGC | 158 | Xu *et al.* (2011) (56) |
| *RpL18* | GCACTGTCACCGATGACCTC | CCTTGCACCAGCAGAGTGTT | 172 | Xu *et al.* (2011) (56) |
| *18s rRNA* | GGTAACCCGTTGAAATCCTT | GGTAGTAGCGACGGGCGGTGTG | 142 | Xu *et al.* (2011) (56) |

*fad*, fatty acyl desaturase; *elovl*, elongation of very long chain fatty acid protein; *elovl4*, elongation of very long chain fatty acid protein 4; *apod*: apolipoprotein D; *lrp2*: low-density lipoprotein receptor-related protein 2; *lpr*: lipoprotein receptor; *srb*: scavenger receptor class B; *fabp*: fatty acid binding protein; *fatp4*: fatty acid transport protein 4; *cpt*: carnitine palmitoyltransferase; *acox*: acyl-CoA oxidase; *fas*: fatty acid synthase; *acc*: acetyl-CoA carboxylase; *g6pd*: glucose 6-phosphate dehydrogenase; *6pgd*: 6-phosphogluconate dehydrogenase; *dgat1*: acyl CoA diacylglycerol acyltransferase 1; *gpat*: glycerol-3-phosphate acyltransferase; *hsl*: hormone-sensitive lipase; *lpl*: lipoprotein lipase; *il*: intracellular lipase; *tgl*: triacylglycerol lipase; *pl*: pancreatic lipase; *srebp1*: sterol regulator element-binding protein1; *hnf4ɑ*: hepatocyte nuclear factor 4-alpha; *rxr*: retinoid X receptor; *RpL8*: ribosomal protein L8; *RpL18*: ribosomal protein L18.