Table S1. Formulation and proximate composition of the experimental diets

|  |  |
| --- | --- |
| Ingredients(g/kg) | Diets  |
| HF | HF/L-LC | HF/H-LC |
| White fish meala | 360 | 360 | 360 |
| Wheat glutena | 150 | 150 | 150 |
| Soy protein concentratea | 110 | 110 | 110 |
| Fish oila | 135 | 135 | 135 |
| Soybean lecithina | 15 | 15 | 15 |
| Tapioca starcha | 190 | 190 | 190 |
| Vitamin premixb | 4 | 4 | 4 |
| Vitamin C phosphatea | 1 | 1 | 1 |
| Mineral premixb | 5 | 5 | 5 |
| Monocalcium phosphatea | 9 | 9 | 9 |
| Ethoxyquin | 1 | 1 | 1 |
| Cellulosea | 19.2 | 18 | 16.8 |
| Choline chloridec | 0.8 | 0.8 | 0.8 |
| L-carnitinec | 0 | 1.2 | 2.4 |
| Total | 1000 | 1000 | 1000 |
| Proximate composition (%) |  |  |  |
| Crude protein | 42.74 | 42.61 | 42.69 |
| Crude lipid | 17.66 | 17.54 | 17.81 |

aAll of these ingredients were supplied by Guangdong Yuehai Feeds Group, China.

bThe two premix were purchased from Great Seven Biotechnology Co., Ltd., China.

Vitamin premix (mg or g kg-1diet): vitamin D, 5 mg; vitamin K, 10 mg; vitaminB12, 10 mg; vitamin B6, 20 mg; folic acid, 20 mg; vitamin B1, 25 mg; vitamin A,32 mg; vitamin B2, 45 mg; pantothenic acid, 60 mg; biotin, 60 mg; niacin acid,200 mg; a-tocopherol, 240 mg; inositol, 800 mg; ascorbic acid, 2,000 mg; microcrystalline cellulose, 16.47 g.

Mineral premix (mg or g kg-1diet): CuSO4.5H2O, 10 mg; Na2SeO3 (1%), 25 mg; ZnSO4.H2O, 50 mg; CoCl2.6H2O (1%), 50 mg; MnSO4.H2O, 60 mg; FeSO4.H2O,80 mg; Ca(IO3)2, 180 mg; MgSO4.7H2O, 1,200 mg; zeolite, 18.35 g.

cCholine chloride (99%) and L-carnitine (99%) were bought from Shanghai Aladdin Bio-Chem Technology Co.LTD, China.

Table S2 The primers used in the experiment

|  |  |  |  |
| --- | --- | --- | --- |
| Target genes | Forward (5'–3') | Reverse (5'–3') | GenBank NO. |
| *pgc1α* | CTGCTCAGTATGGCAACGA | GGTCACTGGCATTGGTCAC | KM593914 |
| *pparα* | GTCAAGCAGATCCACGAAGCC | TGGTCTTTCCAGTGAGTATGAGCC | KF998577 |
| *cpt1* | GCTGAGCCTGGTGAAGATGTTC | TCCATTTGGTTGAATTGTTTACTGTCC | JX434612 |
| *nrf1* | GTGCCGTCTCAAACTGTGG | GTGCCAACCTGGATGAGC | KM593916 |
| *aco* | AGTGCCCAGATGATCTTGAAGC | CTGCCAGAGGTAACCATTTCCT | JX456348 |
| *abcd4* | GGAGGAAGACGCTAACCGAG | CTTACACAACCTCTCCGCGT | XM\_010745354.3 |
| *hsd17b4* | GCTGAAAGAGGTGCTTCGGT | GCCTCCCTTCGCTCTTATCTC | XM\_010733193.3 |
| *ehhadh* | CTGAAGCCGTACCTCGAACA | CCTCCAACGCTCCATCTACC | XM\_019270582.2 |
| *scp2* | GACGGGAAAGTTGAACGCAC | GCCTTGCCTGGTGTGATTTG | XM\_010753092.3 |
| *acaa1* | AACGTCGCAGAGAGATTCGG | ACCTCACGCTCTTTACCGTC | XM\_027283707.1 |
| *pex5* | CAGTCGGAGGAGAAGTTGTGG | GTCCACTGACACCTCTGTGTT | XM\_010747785.3 |
| *pex7* | TTGTTGGCGTCCTGTTCGTA | ACGGTGCCCTTCCTCATTAC | XM\_027279527.1 |
| *mff* | CAACGATTCCGCACTTGCAC | GCTTTGCTCGCTCCTTGTTC | XM\_010751973.3 |
| *pex11α* | CGGCACAGAATGCAAGGAAC | GTCTTGGAACCGCACCATCT | XM\_027272650 |
| *pex11β* | CTGCGATAACGTCCTGTGGG | CTTGGAGGCTCTGTAACGCT | XM\_027287520  |
| *pex11γ* | GCTGAGTGAAAGGATGTGTAGG | GTCTACATGCTTCTCCGCTGT | XM\_010742664 |
| *srebp1* | TCTCCTTGCAGTCTGAGCCAAC | TCAGCCCTTGGATATGAGCCT | KP342262 |
| *fas* | CAGCCACAGTGAGGTCATCC | TGAGGACATTGAGCCAGACAC | JX456351 |
| *scd1* | AAAGGACGCAAGCTGGAACT | CTGGGACGAAGTACGACACC | KP202156 |
| *dgat2* | TTCGGTGCTTTCTGCAACTTCG | AAGGATGGGGAAGCGGAAGT | KJ563922 |
| *β-actin* | CTACGAGGGTTATGCCCTGCC | TGAAGGAGTAACCGCGCTCTGT | GU584189 |
| Mitochondrial DNA |
| *D-loop* | CTGAGGTTGGTGGAGTGC | GGGTTGCTCCCACTTATGT | EU339149 |
| *cyt b* | GCCTCTACTATGGCTCCTATCTT | AGGCACTGCTGACAAGAGGT | EU339149 |
| *16S rRNA* | TATGAATGGCAAGACGAGG | TAGGACAGGGCTCAGTTAGTT | EU339149 |
| Nuclear DNA |
| *nβ-actin* | CCCAACTTGAGCCTAACAT | TACCTCCAGACAGCACGG | GQ168793 |

Peroxisome proliferator-activated receptor γ coactivator 1α (pgc1α), Peroxisome proliferator activated receptorα (pparα), Carnitine palmitoyltransferase 1 (cpt1); nuclear respiratory factor 1 (nrf1); Acyl-CoA oxidase (aco); ATP binding cassette subfamily D member 4 (abcd4); hydroxysteroid 17-beta dehydrogenase 4 (hsd17b4); enoyl-CoA hydratase and 3-hydroxyacyl CoA dehydrogenase (ehhadh); sterol carrier protein 2 (scp2); acetyl-CoA acyltransferase 1 (acaa1); peroxisomal biogenesis factor 5 (pex5); peroxisomal biogenesis factor 7 (pex7); mitochondrial fission factor (mff); peroxisomal biogenesis factor 11 alpha (pex11a); peroxisomal biogenesis factor 11 beta (pex11β); peroxisomal biogenesis factor 11 gamma (pex11γ); Sterol-regulatory element binding protein 1(srebp1); Fatty acid synthase (fas); Stearoyl-CoA desaturase I (scd1); acyl-CoA: diacylglycerol acyltransferase 2 (dgat2); cytochrome b (cyt b); 16S ribosomal RNA (16S rRNA);Nuclear β-actin DNA (nβ-actin).



Figure S1 Effect of dietary L-carnitine (LC) on the survival, growth performance and feed utilization of large yellow croaker. Data are expressed as the means±SEM (n=3). Survival rate (SR), Weight gain (WG), specific growth rate (SGR) and feed efficiency ratio (FER).