**Table S1. Primer pairs used for eIF2a-RACEprimer, cloning of cobia eIF2α and cobia COX1 gene recognition**

|  |  |  |
| --- | --- | --- |
| **Primer** | **Sequence (5'-3')** | **Tm** |
| **RceIF2α 5'GSP1** | CACACTTGATGGCCTCCTCT | 56.9 |
| **RceIF2α 5'NGSP1** | TACTCGGATGACGACCACGC | 59.1 |
| **RceIF2α 3'GSP2** | GGGTCTGTCTGTCCTCAACC | 57.3 |
| **RceIF2α 3'NGSP** | AGAGGCTAGAGCGGGAGAAC | 58.4 |
| **RceIF2α F1** | GAGGTGGAGGATGTGGTGAT | 56.4 |
| **RceIF2α F2** | GAGTACAACAACATCGAGGG | 52.9 |
| **RceIF2α R1** | YTCDGCTTTGGCCTCCAT | 55.7 |
| **RceIF2α R2** | TGACVGCCTGTGGDGTSAG | 59.7 |
| **RcBaF** | GATCCTGACAGAGCGTGG | 55.3 |
| **RcBaR** | AGCACAGTGTTGGCGTACAG | 57.9 |
| **RcFISHCOILBC\_ts** | CACGACGTTGTAAAACGACTCAACYAATCAYAAAGATATYGGCAC | 64.3 |
| **RcFISHCOIHBC\_ts** | GGATAACAATTTCACACAGGACTTCYGGGTGRCCRAARAATCA | 65.9 |
| **RcCOX1F** | TCAACCAACCACAAAGACATTGGCAC | 60.2 |
| **RcCOX1R** | TAGACTTCTGGGTGGCCAAAGAATCA | 59.8 |

Primers used to amplify the cobia eIF2α cDNAs were designed from the published coding sequences from five close related fish species, zebra fish (NM\_131800.2), catfish (GU588091.1), puffer fish (CR685632.2), Atlantic salmon (NM\_001140183) and rainbow trout (NM\_001124296.1), selected most conserved sequence as target region and we initially amplified a ~900 bp cDNA. The complete coding sequence was assembled by 5’ & 3’ RACE. The degenerate primers among the above oligonucleotides incorporate a statistical mix of monomers at the positions labeled V (A, C or G), S (C or G), R (A or G), Y (C or T) or D (A, G or T) [in accordance with IUPAC convention].

**Table S2: Dietary formulations for the fish meal versus plant protein diets**

|  |  |  |
| --- | --- | --- |
| **Ingredient (g kg-1)** | **FM (Diet 6)** | **PP (Diet 1)** |
| Menhaden fish meal | 345 | 0 |
| Soy Protein concentrate | 0 | 269 |
| Corn Protein concentrate | 44.3 | 193.4 |
| Poultry by-product meal | 118 | 0 |
| Wheat Flour | 237.7 | 175.5 |
| Soybean meal, solvent extracted | 90 | 90 |
| Wheat Gluten meal | 0 | 22 |
| Blood meal, spray | 39 | 0 |
| Menhaden fish oil | 90 | 120 |
| Vitamin pre-mix | 20 | 20 |
| Mono-Dical Phosphate | 0 | 42.5 |
| Lecithin | 0 | 20 |
| L-Lysine | 0 | 19.9 |
| Choline CL | 6 | 6 |
| Potassium Chloride | 0 | 5.6 |
| DL-methionine | 0 | 5 |
| Threonine | 0 | 2.8 |
| Sodium Chloride | 0 | 2.8 |
| Stay-C | 2 | 2 |
| Trace mineral pre-mix | 1 | 1 |
| Magnesium Oxid | 0 | 0.5 |
| Mycozorb | 2 | 2 |
| Taurine | 0 | 0.02 |
| **Performance characteristics** (extrapolated from two different experiments) |
| SGR | 4.72+/-0.02 | \*Either 0.57+/-0.12 (if 8.8 g start)or 2.54+/- (if 128 g start) |

**Table S3: Diet formulations and proximate compositions of reference and experimental diets**

|  |  |  |
| --- | --- | --- |
| **Ingredient (g 100g-1)** | **Reference diet** | **3010-50** |
| Menhaden meal | 45.5 | 22.9 |
| Poultry meal | 7.5 | 3.8 |
| Wheat Flour | 16 | 15.0 |
| Soy protein concentrate | 7.5 | 3.8 |
| NPFI-3010 | -- | 35.1\* |
| Corn | 17 | 9.4 |
| Menhaden oil | 3.9 | 6.4\* |
| Vitamin pre-mix | 1.0 | 1.0 |
| Trace mineral pre-mix | 0.1 | 0.1 |
| Taurine | 1.5 | 1.5 |
| Lysine HCL | -- | 0.1\* |
| DL-Methionine | -- | 0.8\* |
| **Proximate Composition (g 100g-1)a** |  |  |
| Moisture (g 100g-1) | 7.2 | 11.1 |
| Protein (g 100g-1 dm) | 46.3 | 42.6 |
| Protein on dry matter basis | 49.9 | 47.9 |
| Fat (g 100g-1 dm) | 10.8 | 11.4 |
| Fiber (g 100g-1 dm) | 1.2 | 1.0 |
| Ash (g 100g-1 dm) | 9.1 | 8.8 |
| Carbohydrateb (g 100g-1 dm) | 28.72 | 29.01 |
| Energy (mJ kg-1) | 18.56 | 18.97 |
| **Performance characteristics** |  |  |
| SGR | 3.29+/-0.08 | 3.45+/-0.08 |
| PER | 1.74+/-0.04 | 1.74+/-0.04 |
| CF | 0.637+/-0.04 | 0.715+/-0.04 |

a New Jersey Feeds Labs analysis, Trenton, NJ.

b Calculated by difference (100-Moisture-Protein-Ash-Fat-Fiber).

3010-50 formulated to replace 50 % protein from fish meal with NPF1-3010. Diets ~identical in levels of protein, fat, fiber, carbohydrate, taurine. \*higher in 3010-50