

**Table S1. Primer pairs used for eIF2 $\alpha$ -RACE primer, cloning of cobia eIF2 $\alpha$  and cobia COX1 gene recognition.**

Primer	Sequence (5'-3')	Tm
RceIF2 $\alpha$ 5'GSP1	CACACTTGATGGCCTCCTCT	56.9
RceIF2 $\alpha$ 5'NGSP1	TACTCGGATGACGACCACGC	59.1
RceIF2 $\alpha$ 3'GSP2	GGGTCTGTCTGTCCTCAACC	57.3
RceIF2 $\alpha$ 3'NGSP	AGAGGCTAGAGCGGGAGAAC	58.4
RceIF2 $\alpha$ F1	GAGGTGGAGGATGTGGTGAT	56.4
RceIF2 $\alpha$ F2	GAGTACAACAACATCGAGGG	52.9
RceIF2 $\alpha$ R1	YTCDGCTTTGGCCTCCAT	55.7
RceIF2 $\alpha$ R2	TGACVGCCTGTGGDGTSAG	59.7
RcBaF	GATCCTGACAGAGCGTGG	55.3
RcBaR	AGCACAGTGTTGGCGTACAG	57.9
RcFISHCOILBC_ts	CACGACGTTGTAAAACGACTCAACYAATCAYAAAGATATYGGCAC	64.3
RcFISHCOIHBC_ts	GGATAACAATTTACACAGGACTTCYGGGTGRCCRAARAATCA	65.9
RcCOX1F	TCAACCAACCACAAAGACATTGGCAC	60.2
RcCOX1R	TAGACTTCTGGGTGGCCAAAGAATCA	59.8

Primers used to amplify the cobia eIF2 $\alpha$  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.**

<b>Ingredient (g kg<sup>-1</sup>)</b>	<b>FM (Diet 6)</b>	<b>PP (Diet 1)</b>
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
<b>Performance characteristics</b> (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.**

<b>Ingredient (g 100g<sup>-1</sup>)</b>	<b>Reference diet</b>	<b>3010-50</b>
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*
<b>Proximate Composition (g 100g<sup>-1</sup>)<sup>a</sup></b>		
Moisture (g 100g <sup>-1</sup> )	7.2	11.1
Protein (g 100g <sup>-1</sup> dm)	46.3	42.6
Protein on dry matter basis	49.9	47.9
Fat (g 100g <sup>-1</sup> dm)	10.8	11.4
Fiber (g 100g <sup>-1</sup> dm)	1.2	1.0
Ash (g 100g <sup>-1</sup> dm)	9.1	8.8
Carbohydrate <sup>b</sup> (g 100g <sup>-1</sup> dm)	28.72	29.01
Energy (mJ kg <sup>-1</sup> )	18.56	18.97
<b>Performance characteristics</b>		
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

<sup>a</sup> New Jersey Feeds Labs analysis, Trenton, NJ.

<sup>b</sup> 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