**Table S1**

Ingredients composition and nutrient levels of basal diets (dry basis)

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| Ingredients (%) |  |
| Fish meal (Peru) | 28.00 |
| Soybean meal | 20.00 |
| Wheat flour | 23.70 |
| Soy protein concentrate | 5.00 |
| Peanut meal | 6.00 |
| Krill meal | 5.00 |
| Fish oil | 2.50 |
| Soy lecithin | 2.00 |
| Mineral premix1 | 1.00 |
| Vitamin premix2 | 1.00 |
| Ca (H2PO4)2 | 1.50 |
| Choline chloride | 0.30 |
| Sodium alginate | 2.00 |
| Cellulose | 2.00 |
| Total | 100.00 |
| Nutrient levels3 |  |
| Protein (%) | 45.71 |
| Lipid (%) | 7.36 |
| Ash (%) | 9.84 |
| Vitamin D3 4(measured, mg/kg） | 0.18 |

Mineral premix1: 3.51 g/kg Fe as C6H5O7Fe·5H2O; 6.62 g/kg Cu as CuSO4·5H2O; 0.01 g/kg I as KIO3; 238.96 g/kg Mg as MgSO4·7H2O; 298.58 g/kg K as K2SO4; 49.21 g/kg Na as NaCl; 34.01 g/kg Ca as C6H10O6Ca.5H2O; 1.60 g/kg Co as CoSO4·7H2O; 10.31 g/kg Zn as ZnSO4.7H2O ; 0.25 g/kg MnSO4·H2O. Mineral premix was purchased from Ningbo Tech-bank co., ltd.

Vitamin premix2: 20 g/kg nicotinamide; 6.5 g/kg biotin; 40 g/kg vitamin E (DL-αtocopherol acetate); 114.3 g/kg vitamin C phosphate; 124 g/kg vitamin B; 21 g/kg calcium pantothenate; 12 g/kg vitamin B1(thiamine); 1.1 g/kg Bl1 (folic acid); 40 g/kg vitamin B2(Riboflavin); 7g/kg vitamin K; 4 g/kg vitamin A; 20 g/kg pyridoxine B6; 80 g/kg inositol; 629.575 g/kg all bran. Vitamins was purchased from Guangzhou chengyi aquatic products technology co., ltd. The vitamins premix does supply vitamin D3.

Nutrient levels3 were measured values (dry matter basis).

Vitamin D3 4 (measured, mg/kg) content in the basal diet was 0.18 mg/kg.