**Supplemental Table 1.** Summary of fish performance, experimental conditions and design of the experiments included in the data set to estimate the energy efficiency of digestible nutrients for Nile tilapia

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Experiment\* | 1† | 2 | 3 | 4 | 5 | 6 | 7 | 8 |  |
|  |  |  |  |  |  |  |  |  |  |
| Length experiment, d | 42 | 42 | 42 | 50 | 36 | 48 | 56 | 56 |  |
| Number of diets | 2 | 2 | 4 | 6 | 1 | 4 | 2 | 2 |  |
| Feeding method  | R/1M† | R/2M | S/2M | R/4M | R/1M | S/2M | R/24B | R/24B |  |
| Number of tanks | 12 | 4 | 16 | 12 | 6 | 12 | 3 | 3 |  |
| Number of fish per tank | 34 | 30 | 20 | 40 | 25 | 20 | 30 | 30 |  |
| Number of RAS‡  | 1 | 4 | 1 | 1 | 1 | 1 | 3 | 3 |  |
| Temperature, ºC | 27.7 | 27.9 | 27.9 | 26.9 | 27.7 | 27.7 | 28.1 | 28.3 |  |
| Faeces collection method | ST | ST | CC | ST | ST | ST | ST | ST |  |
| Initial body weight, g | 75 | 94 | 52 | 56 | 138 | 41 | 86 | 77 |  |
| Feed intake, g DM/(kg0.8**·**d) | 7.6† | 10.0 | 16.3 | 12.0 | 11.3 | 23.2 | 10.7 | 10.7 |  |
| Growth, g/(kg0.8**·**d) | 8.6 | 8.5 | 16.4 | 12.8 | 11.0 | 25.7 | 9.3 | 10.7 |  |

R, restrictive feeding; 1M, 2M and 4M, meal feeding one, two or four times per day, respectively; S, feeding to apparent satiation; 24B, 24 hours per day feeding using a feeding belt; RAS, recirculating aquaculture system; ST, faeces collection was done by settling tanks; CC, faeces collection was done by Choubert collectors; DM, dry matter.

\* Experiment number refers to the following sources: 1(10); 2(29); 3(30); 4(31); 5(32); 6(33); 7(34); 8(35).

† In the study of Schrama *et al.*(10) the two diets were fed at two levels: one close to maintenance and one at about 70% of the maximal feeding level.

‡If number of RAS systems is 1, all tanks (i.e., experimental units) were connected to the same RAS; and if >1 than each tank (i.e., experimental unit) was connected to a separate RAS system.

**Supplemental Table 2.** Summary of fish performance, experimental conditions and design of the experiments included in the data set to estimate the energy efficiency of digestible nutrients for rainbow

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Experiment\* | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|  |  |  |  |  |  |  |  |  |  |
| Length experiment, d | 83 | 84 | 70 | 70 | 56 | 64 | 81 | 78 | 85 |
| Number of diets | 6 | 4 | 4 | 4 | 3 | 12 | 4 | 4 | 4 |
| Feeding method  | S/2M | S/2M | S/2M | S/2M | S/2M | S/2M | S/2M | S/2M | S/2M |
| Temperature, ºC | 18 | 18 | 19 | 8 | 17 | 17 | 18 | 18 | 18 |
| Number of tanks | 18 | 12 | 12 | 12 | 26 | 36 | 12 | 16 | 12 |
| Number of fish per tank | 100 | 100 | 55 | 55 | 45 | 55 | 75 | 75 | 50 |
| Faeces collection method  | CC | CC | CC | CC | CC | CC | CC | CC | CC |
| Initial body weight, g | 73 | 75 | 76 | 86 | 268 | 53 | 14 | 19 | 421 |
| Feed intake, g DM/(kg0.8**·**d) | 14.6 | 14.3 | 15.2 | 7.8 | 10.1 | 12.6 | 15.1 | 12.6 | 7.9 |
| Growth, g/(kg0.8**·**d) | 12.2 | 11.6 | 11.5 | 5.4 | 11.7 | 12.2 | 15.3 | 16.0 | 8.9 |

S, feeding to apparent satiation; 2M, meal feeding two times per day; CC, faeces collection was done by Choubert collectors; DM, dry matter.

\*Experiment number refers to the following sources: 1(22); 2(22); 3(23); 4(23); 5, I. Geurden, INRA (unpublished data); 6, I. Geurden, INRA(unpublished data); 7(24); 8, different aspects of this experiment have been published by Vilhelmsson, *et al.*(25), de Francesco *et al* (26) and Parisi *et al.*(27); 9(28).

**Supplemental Table 3.** Ingredient inclusion levels in Nile tilapia (*n*=23) and rainbow trout (*n*=45) diets of the experiments included in the data set to estimate the energy efficiency of digestible nutrients

|  |  |  |  |
| --- | --- | --- | --- |
|  | Nile tilapia |  | Rainbow trout |
| Ingredient | Number of diets\* | Mean†, % | Maximum, % |  | Number of diets\* | Mean†, %  | Maximum, % |
| Fish meal | 22 | 31.2 | 50.0 |  | 45 | 44.5 | 80.3 |
| Fish oil | 14 | 3.8 | 12.5 |  | 42 | 11.1 | 22.7 |
| Wheat | 9 | 21.0 | 43.0 |  | 15 | 15.3 | 35.0 |
| Wheat gluten | 10 | 12.6 | 22.0 |  | 6 | 11.2 | 20.0 |
| Wheat bran | 8 | 8.6 | 9.5 |  | 4 | 10.5 | 12.0 |
| Maize | 10 | 25.2 | 27.6 |  | --- | --- | --- |
| Maize gluten | -- | --- | --- |  | 14 | 14.9 | 42.0 |
| Maize starch gelatinized | 4 | 24.5 | 49.3 |  | 20 | 24.2 | 37.7 |
| Maize starch native | -- | --- | --- |  | 2 | 23.5 | 28.0 |
| Maize flour gelatinized | 4 | 23.8 | 40.0 |  | -- | --- | --- |
| Soybean meal | 12 | 21.4 | 30.3 |  | 14 | 13.3 | 33.1 |
| Soy protein concentrate | 6 | 13.1 | 30.0 |  | 2 | 45.0 | 45.0 |
| Soy oil | 7 | 3.2 | 7.6 |  | -- | --- | --- |
| Rapeseed meal | -- | --- | --- |  | 3 | 10.5 | 12.0 |
| Rapeseed oil | 4 | 7.6 | 14.1 |  | 1 | 22.7 | 22.7 |
| Palm oil | 4 | 4.8 | 7.6 |  | -- | --- | --- |
| Linseed oil | -- | --- | --- |  | 1 | 22.7 | 22.7 |
| Olive oil | -- | --- | --- |  | 1 | 22.7 | 22.7 |
| Pea protein concentrate | 5 | 9.7 | 15.0 |  | -- | --- | --- |
| Extruded peas (dehulled) | -- | --- | --- |  | 15 | 22.2 | 36.4 |
| Single cell protein | 1 | 15.0 | 15.0 |  | -- | --- | --- |
| Cellulose | 6 | 12.8 | 17.5 |  | 3 | 20 | 20 |
| Zeolite | -- | --- | --- |  | 3 | 20 | 20 |
| Guar gum | 1 | 8.0 | 8.0 |  | -- | --- | --- |
| Pellet binder | 10 | 1.2 | 2.0 |  | 39 | 1.5 | 5.0 |
| Diamol (inert marker) | 23 | 2.0 | 2.4 |  | --- | --- | --- |
| Synthetic amino acids  | 6 | 0.6 | 2.4 |  | 9 | 3.4 | 7.6 |
| Minerals, vitamins and trace elements | 23 | 2.2 | 6.1 |  | 46 | 2.7 | 6.0 |

**\*** The number of diets in which the ingredient was included.

† The mean inclusion level averaged over diets in which the ingredient was included.

**Supplemental Fig. 1.** Relationship between dFat and NE (A, Nile tilapia; B, Rainbow trout) and between dCP and NE (C, Nile tilapia; D, Rainbow trout). The NE values were corrected for variation in other digestible nutrient similarly as was done in Fig. 1 for the relation between NE and dCarb. dCarb, digestible carbohydrate intake; dCP, digestible protein intake; dFat, digestible fat intake; NE, net energy NE.

 