

Apparent Digestibility of Some Commercial Feeds for Snubnose Pompano, *Trachinotus blochii*

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ABSTRACT

The study was conducted at the National Broodstock Center for Mariculture Species in Northern Vietnam (Center), Cat Ba, Hai Phong province, to evaluate the digestibility of protein (ADP), lipid (ADL) and energy (ADE) of some available commercial feeds for snubnose pompano, *Trachinotus blochii*, using indirect method with chromic oxidize (Cr_2O_3) 1% as inert marker. Experimental fish of 400 g/individual size were held in marine cags (cage size, 3 x 3 x 3 m) at a density of 10 fish/m³. The digestibility of three commercial aquafeed brands (protein contents of 46, 50 and 51% abbreviated as D46, D50 and D51, respectively, with three replicates). Fish were fed by hand to apparent satiety in the morning at 0900 hrs for 2 weeks to acclimate with experimental conditions. The faeces were then collected by manual stripping method for four weeks. Faeces after sampling were pooled in sealed bottles and stored at -20°C until analysed. The results showed that ADP significantly differed among feeds ($P<0.05$), with the highest value recorded for D51 (82.25%), followed by D50 at 75.17%, and D46 at 68.76%. ADE of D51 feed (82.32%) was statistically higher than that of D46 (66.63%) and D50 (68.20%) ($P<0.05$), while that of two latter feeds did not differ ($P>0.05$). The ADL values were relatively high and had no significant variation between D46 and D51 ($P>0.05$).

Keywords: Snubnose pompano, *Trachinotus blochii*, Digestibility, Commercial feeds

INTRODUCTION

Snubnose pompano (*Trachinotus blochii*), a commonly farmed fish species in the Asia-Pacific region, was initially introduced to Vietnam in 2003 for marine cage culture by the Research Institute of Aquaculture No.1 (RIA-1). In 2006, artificial reproduction of *Trachinotus blochii* was successfully performed (Xan, 2007; Ma

et al., 2014). Currently, snubnose pompano is considered a potential marine fish species for aquaculture because of its superior growth performance, good flavored meat, lack of bones, and suitability for cage culture (Ma et al., 2014).

In Vietnam, pompano is widely cultured in Cat Ba, Nha Trang, Ba Ria – Vung Tau in marine net cage systems or

in ponds, and mainly fed with various commercial feeds formulated for other marine fish species (Xan, 2007; Hung *et al.*, 2013; Manh *et al.*, 2013; Hung *et al.*, 2014). The success of commercial aquaculture operations depends on a variety of factors within the fields of biology, engineering and economics. One key biological component is the availability of suitable diets that are efficiently digested to support good growth and health (Lazo *et al.*, 1998). Pompano aquaculture is projecting to increase in the coming years and many commercial feed brands have been introduced to farmers. In order to recommend a suitable feed with high digestibility which may provide a way to improve feed utilization and to reduce impacts of feed on water environment, evaluation for digestibility of feeds for snubnose pompano remains a high priority. This study determined the nutrient digestibility of some common aquafeeds for pompano farmed in marine cages in Cat Ba Island, Vietnam.

MATERIALS AND METHODS

Fish and fish culture facilities

Snubnose pompano with a size of 400g /individual were purchased from the National Broodstock Center for Mariculture Species in Northern Vietnam and held at a density of 10 individuals/m³ in floating marine cage-culture system (3 x 3 x 3 m) in Xuan Dam, Cat Ba, Hai Phong province, Vietnam.

During the experimental period, dissolved oxygen content was approximately 6.7 mgL⁻¹; pH 7.6-8.6, and water temperature at 25.9 - 29.7°C.

Feeds

Three feed brands with 46, 50 and 51% protein content were purchased from commercial sources. Each brand was then ground finely and mixed with chromium oxide (Cr₂O₃) 1%, binder to produce diet for digestibility trial (abbreviated as D46, D50 and D51) by using a pellet mill (5 mm in diameter) and stored at 4°C until use. The digestibility experiment was carried out with three replicates per treatment.

Feeding and faeces collection

Fish were fed by hand to apparent satiety at 0900 hrs for 2 weeks to acclimate them with the experimental feeds. Faeces were then collected by manual stripping for four weeks. Three hours after feeding, a sample from the 20 fish from each cage was selected to collect faeces by manual stripping of the lower intestine (Austreng, 1978). The faeces samples were lyophilized with a Freezone Freeze Dry System and stored at -18°C for chemical analyses. All diets and faeces were analyzed for dry matter, protein, lipid, gross energy and chromic oxide contents.

Calculations

The ADCs of diets were calculated according to the following formulae:

$$\text{ADC of DM of diet (\%)} = 100 \times [1 - (\text{dietary Cr}_2\text{O}_3/\text{faecal Cr}_2\text{O}_3)]$$

$$\text{ADC of nutrients of diet (\%)} = 100 \times [1 - (\text{dietary Cr}_2\text{O}_3/\text{faecal Cr}_2\text{O}_3) \times (\text{faecal nutrient concentration}/\text{dietary nutrient})]$$

Chemical analyses

Proximate analyses of dry matter, crude protein, crude lipid and gross energy of the feed samples were conducted using the following conventional procedures (AOAC, 1995): dry matter by drying at 105°C for 24 h, crude protein (N x 6.25) by the Kjeldhal method after acid digestion, crude lipid by the Soxhlet method and gross energy was determined using an adiabatic calorimetric bomb with benzoic acid as the standard. The determination of chromium III (trivalent) that involved digestion of organic matter, solubilisation of chromium and determination of chromium were conducted by photometry (Czarnocki *et al.*, 1961; Fenton and Fenton, 1979).

Data analysis

Data was analyzed by one-way ANOVA using SPSS version 16 software. Levels of significance were determined using the Duncan test, with critical limits being set at $P < 0.05$.

RESULTS AND DISCUSSION

Chemical composition of experimental diets

Three diets for the digestibility trial were analyzed for dry matter (DM), crude protein (CP), crude lipid (CL), and gross energy (Kcal/kg) at the Central Laboratory, Faculty of Animal Science, Vietnam National University of Agriculture. The results are presented in Table 1.

In this study, experimental diets were formulated mainly from feeds which

are commercially and widely available in Vietnam. Therefore, nutrients and gross energy composition met the requirements of *Trachinotus blochii* (NRC, 1993; Wilson, 2002; Hung *et al.*, 2013)

Apparent digestibility of experimental diets

Results of the digestibility of nutrients and gross energy of the diets (D46, D50 and D51) are presented in Table 2.

Overall, protein, lipid and gross energy were well digested by snubnose pompano as ADCs values were relatively high (more than 50%). Protein digestibility (ADP) significantly differed among diets ($P < 0.05$), with the highest value recorded at D51 (82.25%), while D46 showed the lowest value of 68.76%, while that of D50 was 75.17%. The ADE of D51 diet was significantly higher than that of D46 and D50 ($P < 0.05$), while the two latter diets were not significantly different ($P > 0.05$) from each other. The most visible phenomenon was seen in ADL values which were relatively high, at more than 84%, and had no significant variation between D46 and D51 ($P > 0.05$), with the ADL of D50 (84.07%) the lowest compared to that of other experimental feeds ($P < 0.05$). These data indicated that commercial feeds in Vietnam used in this experiment were well digested by pompano.

Protein (ADP) and energy digestibility (ADE) of diets

Protein and energy digestibility in this study ranged from 68.76 to 82.25%, and 66.63 to 82.32%, respectively, slightly lower than those reported for other marine fish species (Peres and Oliva-Teles, 1999; Santinha *et al.*,

Table 1. Nutrient composition (%) and gross energy (kcal/kg dry matter) of the three experimental diets

Diets	Dry matter	Crude protein	Crude lipid	Gross energy
D46	89.5	45.8	9.4	4671
D50	91.6	49.7	11.8	4902
D51	91.8	50.9	16.4	5006

Table 2. Apparent digestibility of protein (ADP), lipid (ADL) and gross energy (ADE) (%) of the three diets

Diets	ADP	ADL	ADE
D46	68.76 ± 1.44 ^b	95.83 ± 0.22 ^a	66.63 ± 0.17 ^b
D50	75.17 ± 2.23 ^b	84.07 ± 9.78 ^b	68.20 ± 1.46 ^b
D51	82.25 ± 0.09 ^a	97.84 ± 0.97 ^a	82.32 ± 0.01 ^a

Data represent mean ± S.D. Means with different superscript letters within columns are significantly different (P<0.05).

1999; Sa *et al.*, 2006). The reasons could be due to feed source, inert marker, fecal collection method, and gastric evacuation rates (Riche, 2009). In this study, commercial feeds were used in combination with chromium oxide. In addition, manual stripping was employed instead of having faecal settling columns which could have led to either potentially underestimation or overestimation of apparent digestibility (Glencross *et al.*, 2007).

Lipid digestibility (ADL) of diets

The ADL of the three diets were relatively high (> 84.07%). These results supported findings of Cho, *et al.* (1995) who reported that lipids are almost completely digestible by fish. In the present study, 11.8% lipid in D50 diets showed numerically lower ADL values than the 9.4% (D46) and 16.4% (D51). The low lipid digestibility could be explained by the per-oxidation of lipid during high temperature processing and subsequent storage of diets (Yu *et al.*, 2013).

CONCLUSION

Protein, lipid and energy were well digested by snubnose pompano (*Trachinotus blochii*) fed with commercial feeds containing 51% protein. Different commercial feed sources had relatively high lipid digestibility value by pompano.

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