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Assessing the feasibility of particle size reduction and fermentation as pre-processing techniques to utilize enzyme-treated feather meal in zero fish meal diets for Nile tilapia (*Oreochromis niloticus*)

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ABSTRACT

In this study, a growth trial and digestibility assays were conducted to evaluate the applicability of particle size reduction and fermentation as pre-processing techniques to treat enzyme-treated feather meal (ETF) for zero fish meal diet of Nile tilapia (*Oreochromis niloticus*). According to particle size, ETF was mechanically sieved and separated into three different categories (un-sieved (EFM), particles < 850 μ (EFM850), particles < 425 μ (EFM425)) while a portion of each category was separately fermented for 24 h using Baker's yeast to produce fermented ingredients, un-sieved (FEFM), fermented 850 μ (FEFM850) and fermented 425 μ (FEFM425). Seven isoproteic and isoenergetic diets were prepared including a control diet with 10 % fishmeal. The fishmeal component of the control diet was completely replaced by one of the six types of EFM in test diets. Sex-reversed male Nile tilapia (~ 6 g initial weight) fingerlings were stocked (20 fish per tank) in circular concrete tanks (200 L). Each treatment with three replicates was randomly allocated into 21 tanks using a complete randomized design. Fish were hand-fed twice a day to near satiety for 56 days. *In-vivo* digestibility study and *in-vitro* protein hydrolysis assays of six EFM types were evaluated by mixing 30 % of test ingredients and 70 % of reference diet having 0.5 % of chromic oxide. *In vitro* assay was performed by using crude enzymes extracted from Nile tilapia. Results of the growth trial revealed that the final mean weight, daily weight gain, and % specific growth rate of fish fed EFM425 and FEFM were significantly higher than that of other treatments ($p < 0.05$) while FEFM425 showed significantly lowest growth performances. Feed intake of fish in FEFM treatment was significantly higher than that of control. The effects of different dietary treatments on survival rate and feed utilization efficiency were not statistically different ($p > 0.05$). The highest protein (77 %) and dry matter (68 %) digestibility were observed for EFM425 and FEFM while the dry matter digestibility positively correlated to the daily weight gain ($R^2 = 0.80$). Based on growth performance, feed utilization efficiencies, and digestibility, EFM425 and FEFM were best among tested treatments. But in practice, particle size reduction is more convenient than fermentation. It was concluded that fish meal components of Nile tilapia diets can be replaced by EFM by reducing their particle size up to 425 μ.

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