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Partial replacement of fish meal by MBM and PFGPBM in diets for river catfish (*Pangasianodon hypophthalmus*)

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ABSTRACT

The objective of the present study was to measure the growth response of juvenile catfish when fed practical diet containing various levels of MBM and PBM in substitution of fish meal (0, 20, 40, 80%). The control diet contained 14% fish meal, which was replaced on an equal protein basis by MBM and PBM in test diets. Catfish were raised in outdoor cages (dirt pond) for 56 days. Results indicated that 1) both MBM and PBM can replace FM up to 80% without harming catfish growth, and 2) substitution with MBM and PBM reduced feed cost substantially.

Introduction

Vietnam has developed an extensive aquaculture in the past decade, especially in catfish (No. 1 exporter world wide) and shrimp (No. 4 producer in Asia). One of the key factor is determining the sustainability of the industries is the reliable supply of fishmeal (FM) or suitable FM substitutes, since both species are carnivorous in nature. Global supply of FM has been predicted to be stagnant, and would result in price increase and reduced availability in light the fact that Asian aquaculture is growing a rate over 10% per year. Meat and bone meal (MBM) and poultry byproduct meal (PBM) are nutritious and quality animal proteins, and are ideal substitutes for FM. Research work done in Western

countries indeed has shown that growth performance of many species of livestock, poultry

80%. However, Vietnamese feed industry has no knowledge and experience of using US PBM and MBM in catfish diet. The purpose of the present study is to demonstrate the feasibility and effectiveness of replacing FM with US MBM and PBM in catfish feed.

Materials and Methods

1. Diets

Seven practical isonitrogenous (25% crude protein) diets were formulated (Table 1) using several local energy ingredient (e.g. rice bran, cassava) but differed in the source and level of animal protein meals (FM, MBM or PBM). The control diet contained 14% FM, which was replaced stepwise at 20, 40 and 80% by MBM or PBM on an equal protein basis. All diets were palletized and fed to fish 2 times/day at feeding rates of 7-3% body weight adjusted by daily visual observation.

Table 1.

% FM ¹	MBM ²				PBM ³			
	Replacement rate	0	20	40	80	20	40	80
<u>Formulation</u>								
FM ¹	14	11.2	8.4	2.8	11.2	8.4	2.8	
MBM ²	0	3.53	7.06	14.11	0	0	0	
PBM ³	0	0	0	0	2.71	8.14	10.86	
<u>Crude protein %</u>		-	-	-	-	-	-	25

¹ Fish Meal

² Meat and Bone Meal

³ Pet food grade poultry byproduct meal

2. Animals

A total of 980 river catfish fingerlings with an average initial weight of 27 grams were randomly allocated to 28 nylon net cages (2x2x1M³). Four cages were randomly assigned to each treatment. All cages were constructed in a large outdoor dirt pond.

3. Performance measurements

difference.

Results

Growth performance data were given in Table 2. Protein source did not significantly ($P>.05$) affect the weight gain, feed conversion ratio, or mortality. Generally, the growth performance of catfish was considered normal.

Discussion

Growth data in Table 2 would suggest the maximum FM substitution rate with MBM and PBM under the present trial conditions is 80%. The FM level in the control diet is considered optimum by the catfish industry in Vietnam. Although nutritionally PBM is superior to MBM, modern formulation technology and perhaps the complementing effects among feed ingredients minimize the difference between PBM and MBM.

At 80% FM substitution rate, feed cost would be substantially (5-15%) reduced with MBM and PBM diets. This could be highly significant for Vietnam, the world largest catfish exporter.

Table 2.

% FM Replacement rate	MBM				PBM		
	0	20	40	80	20	40	80
<u>(56D) Performance</u>							
Initial Wt (g)	27	27	27	27	27	27	27
Final Wt (g)	149	146	155	142	155	148	141
Daily gain (g)	1.7	1.6	2	1.6	1.9	1.6	1.4
Feed/gain	1.5	1.2	1.2	1.3	1.1	1.2	1.7
Survival (%)	98	99	97	99	100	97	98

¹ Fish Meal

² Meat and Bone Meal

³ Pet food grade poultry byproduct meal