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Growth and survival of *Penaeus monodon* postlarvae fed shrimp head meal and fish meal as primary animal source of protein

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The growing interest in the culture of the *Penaeus monodon* Fabricuis had led to the need for formulated supplementary or complete diets that are economical and viable for the industry. Though there are several formulations reported in literature and have been found to support and provide for growth, these diets are oftentimes not practical for use under Philippine conditions. Furthermore, many of the artificial diets are for species other than the *P. monodon.* In many instances the feed ingredients are not available, or are too expensive. Thus, the need for a practical ration.

Several factors are considered in the development of artificial feeds: 1) availability and cost of ingredients, 2) ease of preparation, 3) acceptability to the prawn, and, 4) effectiveness of the diet.

In 1976 and 1977, several potential protein sources were screened in the Nutrition Laboratory. Results showed shrimp head meal and fish meal to be the most promising sources.

This study was carried out to compare the effect of feeding various combinations of shrimp head meal and fish meal to *Penaeus monodon* postlarvae and to screen for potential formulated feeds in the laboratory prior to experimentation on supplemental feeding in rearing ponds.

Penaeus monodon postlarvae with weights of 2.5 g were fed as primary sources of protein, shrimp head meal (Diet B), fish meal (Diet C), mussel, (Diet E), a combination of equal amounts of shrimp head meal and fish meal (Diet A) or one part shrimp head meal and two parts fish meal. The larvae were reared for 30 days in cylindrical fiberglass tanks containing 150 liters aerated seawater. Mean weight gains were significantly highest ($P<0.05$) among those fed combinations of fish meal and shrimp head meal, Diets A and D, 0.88 g and 0.59 g, respectively. Mean weight gains among those fed one main source of protein, Diets B, C, and E were not significantly different from each other and were very low. Highest survival rate was observed among those fed Diet C (85%) and the lowest recorded (45%) was obtained from those fed mussel. Those fed Diet B grew the slowest and had the lowest survival rate of the groups given formulated diets. Shrimp head meal alone does not provide for good growth and survival, but fish meal can provide for high survival rate. The

addition of shrimp head improves the diet. Cholesterol which is present in shrimp could have caused the difference.

Table 1. Composition of diets (g)

	Diets			
Ingredients	A	B	C	D
Shrimp head	27.5	60	–	15
Fish meal	27.5	–	50	30
Rice bran	20	15	20	15
Soy sauce residue				15
Bread flour	15	15	20	15
Corn oil	4	4	4	4
Sago palm starch	5	5	5	5
Vitamin-mineral mix[a/]	2	2	2	2
Water	20	20	20	20

Vit C, -0.2g; Vit A 34,320 USP; Vit D_3 12,870 I.U.; Vit E, 15,015 IU; Vit K, 2.34 mg; Vit B_1, 8.58 mg; Vit B_2, 17.16 mg; Vit B_6, 2.145 mg; Niacin, 117 mg; Ca-Pantothenate, 23.4 mg; Iodide, 8.58 mg; Ca, 2340 mg; Cuprous Sulphate, 0.858 mg; Magnesium sulphate, 128.7 mg; Zinc sulphate, 343.2 mg; Manganese sulphate, 234 mg; L-lysine hydrochloride, 128.7 mg; Methionine, 171.6 mg; and Vit B_{12}, 85.8 m.

[a/]An excess of 1 g was added to allow for losses.

Table 2. Proximate chemical analysis of the diets.

Diets	Crude protein	Crude fat	Crude[a] fiber	Ash	Moisture	NFE	D. E.[b] kcal/kg
A	35.7	7.4	8.0	16.9	18.8	20.2	2553
B	37.0	4.2	12.0	23.5	10.7	12.6	2250
C	40.2	8.8	4.6	13.2	10.3	22.9	30.87
D	34.1	10.8	12.9	19.2	9.2	13.8	2697
E[c]	61.37	8.25	12.3	11.2	5.7	11.1	

a — Includes chitin

b — Computed values from D. E. of channel catfish; Prot, 2.5; CHO, 3.5; and Fat, 8.1.

c — Average values obtained from chemical analyses of male and female mussels obtained from Himamaylan, Neg. Occ. in May, 1977.

Table 3. **Mean initial weights, final weights, weight gain, survival rate, feed consumed, protein consumed, of *P. monodon* postlarvae, feed conversion and protein efficiency ratio.**

	A	B	C	D	E
Mean initial wt (g)	2.10	2.05	2.22	2.28	2.48
Mean final wt (g)	2.98	2.09	2.57	2.87	2.69
Mean wt. gain (g)	0.88^{a}	0.05^{b}	$0.35^{b,c}$	$0.59^{a,c}$	$0.21^{c,b}$
Survival rate (%)	69^{b}	60^{c}	85^{a}	67^{b}	45^{d}
Feed consumed (g/day)	10.7	10.9	7.8	12.0	14.9
Protein consumed/day	0.84	0.95	0.78	0.82	3.3
Feed conversion	12.2	273	22.2	20.3	71.1
Protein efficiency ratio	1.04	.05	.45	.72	.06

A – equal amounts fish meal and shrimp head meal
B – shrimp head meal only
C – fish meal only
D – one part shrimp/meal, two parts fish meal
E – mussel

Figures with the same superscripts are not significantly different from each other ($P<0.05$).

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