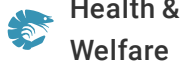




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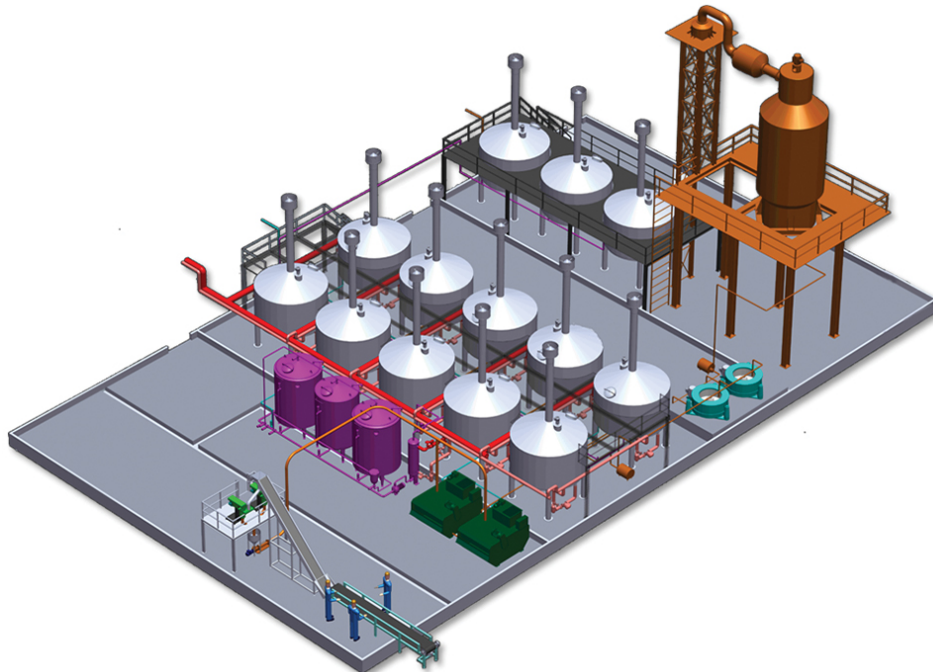
Health &
Welfare

The efficacy of shrimp soluble extract

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By Prof. Le Thanh Hung

Novel feed attractant for aquaculture



The shrimp soluble extract could be produced in large quantities at a facility with components set up similar to this design schematic.

Aquatic animals have stronger smell and taste senses than land animals do. Therefore, in feed formulation for fish and shrimp, feed attractant is always an important additive. The most effective attractant compounds for aquatic animals are free amino acids that are quite abundant in squid and shrimp extracts. Squid liver meal, squid meal, fish solubles, shrimp solubles and other mixtures are often used as feed attractants in the aquafeed industry.

In chitin production from shrimp head waste, the main commercial process is based upon demineralization by acid treatment and deproteinization by alkali treatment. These treatments generate a source of polluted water of high acidity and alkalinity.

In recent years, researchers including Nellie Gagné, Jozef Synowiecki and Asbjørn Gildberg have introduced several enzymatic deproteinization processes as alternative treatments for alkali digestion to reduce the environmental impacts and also produce a protein hydrolysate with a well-balanced amino acid composition.

Producing shrimp soluble extract

Vietnam Organic, a company based in Ca Mau province, applied the enzymatic hydrolysis process on shrimp head waste to produce a shrimp soluble extract (SSE) that contains a mixture of free amino acids and peptide. The product is a soluble of 20 percent crude protein with protein digestibility of 90 to 95 percent and 11.45 ppm astaxanthin.

The product also contains 1.47 percent aspartic acid, 0.71 percent serine, 2.33 percent glutamic acid, 1.43 percent glycine, 0.56 percent histidine, 1.22 percent arginine, 0.83 percent threonine, 2.17 percent alanine, 1.01 percent proline, 0.23 percent cystine, 0.64 percent tyrosine, 1.14 percent valine, 0.46 percent methionine, 0.95 percent lysine, 0.90 percent isoleucine, 1.43 percent leucine and 1.04 percent phenyl alanine.

Study with tilapia

A study using the SSE product in tilapia feed was carried out in fifteen 500-L composite tanks. Five diets containing fishmeal, soybean meal, rice bran, cassava meal, fish oil and premix were formulated to have 32 percent crude protein and 6 percent lipid.

Diet 1, the control, included 5 percent fishmeal in its composition. Diet 2 was free of fishmeal, while diet 3 had no fishmeal but was supplemented with 2 percent SSE top dressing after pelleting. Diet 4 was free of fishmeal and mixed with 1 percent SSE. Also free of fishmeal, diet 5 was mixed with 2 percent SSE. The formulations of the five diets are presented in Table 1.

Hung, Feed formulation of the five diets, Table 1

Ingredient	Diet 1	Diet 2	Diet 3	Diet 4	Diet 5
Defatted rice bran	5.00	5.00	5.00	5.00	5.00
Dried rice bran	31.40	29.50	28.40	28.90	28.40

Soybean meal	48.80	55.20	54.30	54.70	54.30
Fishmeal	5.00	0	0	0	0
Cassava meal	8.00	8.00	8.00	8.00	8.00
DCP	0.20	0.20	0.20	0.20	0.20
Methionine	1.00	1.50	1.50	1.50	1.50
Choline chloride	0.20	0.20	0.20	0.20	0.20
Premix	0.25	0.25	0.25	0.25	0.25
Mycotoxin binder	0.15	0.15	0.15	0.15	0.15
Vitamin C	0	0	0	0	0
SSE product	0	0	2.00	1.00	2.00

Table 1. Feed formulation of the five diets.

Tilapia fingerlings weighing 10 g each were fed the five diets. The fish were stocked at a density of 30/tank and fed three replicates for each diet for eight weeks.

Results

As shown in Table 2, fish that received diet 2 had the lowest growth rate and the highest feed-conversion ratio (FCR). The treatments mixing SSE in the pelleted diet or spraying SSE as a top dressing at 2 percent dosage gave the same growth performance and FCRs as those in the 5percent-fishmeal diet treatment. The survival rates were lowest using the fishmeal-free diet 2 and highest with diet 5.

Hung, Growth and feed utilization of tilapia, Table 2

Parameter	Diet 1	Diet 2	Diet 3	Diet 4	Diet 5
Initial weight (g)	10.21	10.19	10.11	10.18	10.19
Final weight (g)	62.69	53.06	61.15	55.73	58.59
Weight gain (g)	52.48	42.87	51.04	45.56	48.40
Feed-conversion ratio	1.41	1.48	1.39	1.46	1.41
Survival (%)	72.22	62.22	71.11	74.44	80.00

Table 2. Growth and feed utilization of tilapia fed five diets for eight weeks.

It seemed that mixing 2 percent SSE in tilapia feed improved the survival rates. That indicated the SSE product helped to reduce fishmeal in the diet without affecting growth and feed utilization. Adding the SSE product in the pelleting process could help reduce the feed cost to about \$15/metric ton. Other studies to evaluate SSE use in shrimp feed are ongoing.

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