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WPTRC

Shrimp On A Diet

Researchers at the Guam Aquaculture Development and Training Center (GADTC) are getting shrimp to eat their vegetables: soybeans to be precise. Results of the first nutritional studies to be conducted at GADTC have shown that different dietary protein sources have a noticeable effect on the growth rate of *Penaeus vannamei*, the most popular species of shrimp currently cultured worldwide.

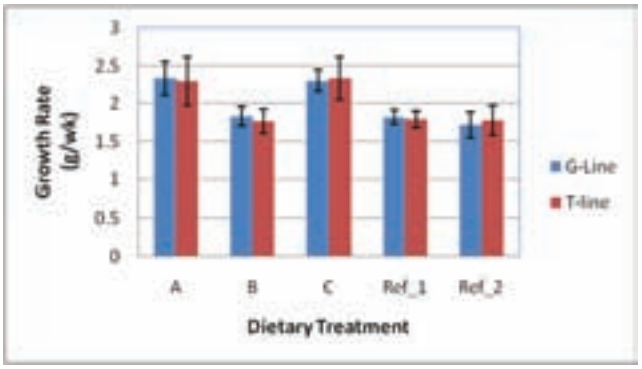
Ingredients	Diet A	Diet B	Diet C
010-Alginate	2.00	2.00	2.00
081-Ca Carbonate	2.00	1.61	2.08
105-Cellulose	2.50	2.76	2.73
106-Cholesterol	0.20	0.20	0.20
156-Chromic Oxide	1.00	1.00	1.00
179-Diatomaceous Eth	2.00	1.77	2.20
249-Fish,Menhaden	15.00	11.30	11.30
303-KCl	2.00	2.17	2.13
316-Krill Meal	10.00	5.70	5.70
370-MgO	1.50	1.55	1.54
421-NaCl	0.50	1.02	0.43
435-Oil,FishMenhaden		0.80	0.80
437-Oil,Soybean	0.30	0.52	0.35
462-Phospholipid,97%	4.00	4.00	4.00
470-PO4CaH,diCaPO4	3.00	4.38	3.72
480-NaHexaMetaPO4	1.00	1.00	1.00
518-PM Min/Vit LMCI	0.25	0.25	0.25
519-PM Min/Vit LMCI	0.21	0.21	0.21
698_Soybean-90%	7.90	0.00	16.65
706-Squid,Muscle	15.00	11.30	11.30
717-Vit C,Staple35%	0.04	0.04	0.04
940-Wheat Starch	29.60	46.42	30.37
TOTAL PERCENT	100.00	100.00	100.00

Shrimp feed is a significant production cost for farmers accounting for 60-80% of total cost, and marine protein (i.e. fishmeal) is an expensive component of shrimp feed, production of which is static or slightly declining due over fishing. The use of plant-based protein sources will help reduce feed cost allowing a higher profit margin for farmers in the industry, and alleviate the dependency on the marine resource for the sake of ocean conservation.

Dr. Hui Gong designed her preliminary study to explore the potential of genetic selection for efficient utilization of soy-based plant protein. With her team at GADTC she investigated the performance of two different shrimp lines under high-density conditions fed with semi-purified diets containing different protein levels and different ratios of marine protein and plant protein. Two distinct *P. vannamei* shrimp lines were selected from the same population: the G line was bred for fast growth and high production yield and the T line was bred for fast growth and resistance to a common virus (TSV). A total of five dietary treatments were used with 3 semi-purified diets and 2 commercial diets. The formulation of the 3 semi-purified diets is detailed in the chart above.

Diets A and C had higher percentages of soy protein which resulted in 25% faster growth than shrimp fed Diet B or the two commercial diets. This study suggests that soybean meal can serve as a good protein source partially replacing fish and/or squid meal in shrimp feed and that the experimental shrimp were efficiently utilizing soy-based protein.

The formulation of semi-purified base diets is worthy of additional nutritional studies. In conducting further studies Dr. Gong believes there are several factors to consider. "In this preliminary study the shrimp used were over 10 grams, it would be interesting to use younger shrimp," says Dr. Gong, "as well as families with more diversified genetic backgrounds using microsatellite genetic markers to identify the genetic distance between the families." Dr. Hui Gong is the first aquaculture research faculty to be employed by UOG and her research will have an important impact on island and regional shrimp aquaculture.



Above right: Diets A and C, high in soy protein, resulted in 25% faster growth.