

Dietary protein requirement of juvenile giant croaker (*Nibea japonica*)

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Introduction

The giant croaker, *Nibea japonica* is a large, estuarine sciaenid distributed around southern Korea and Japan. In Republic of Korea, giant croaker is a highly desired commercial and recreational species and there is interest in development of techniques for production of fish for enhancement of wildstocks and aquaculture since the giant croaker possesses some desirable characteristics for aquaculture including tolerance to widely varying salinities and receptivity to induced spawning in captivity. The nutritional requirements of giant croaker are relatively unknown. Specific requirements must be known to maximize growth of giant croaker and to facilitate economic optimization of production; the dietary protein requirement of juvenile giant croaker is still unknown. It is well known that the dietary protein content should be optimized to minimize feed cost and excretion of ammonia nitrogen into the surrounding environment, thus reducing the water quality. A protein-deficient diet also results in reduced fish growth. Therefore, the objective of this study was to determine the specific dietary protein requirement of juvenile giant croaker in seawater.

Materials and Methods

A feeding trial was conducted using a completely randomized design. Semipurified diets were formulated, and white fishmeal was used as the dietary protein source. Squid liver oil was used as a supplemental lipid source to maintain 10% lipid in all diets. Diets were formulated on a dry-weight basis, and they contained protein levels that varied by 5% increments from 30 to 55% in feeding trial. Fish were cultured in FRP-aquaria containing approximately 150 liters of

seawater in flow through system with a flow rate of approximately 3l/min into each aquarium. Supplemental aeration was provided by a low-pressure blower. Each diet was fed to triplicate groups of juvenile giant croaker initially weighing 1.86g/fish in a flow-through seawater system. Giant croaker were raised in through aquaria with a water temperature of 16.4-20.0°C for six weeks. Weight gain, feed efficiency and protein efficiency ratio (PER) were measured as response criteria. Weight gain was expressed as a percent of initial weight, and feed efficiency was calculated based on the total wet body weight gain of fish and total dry feed given to fish in each group. PER was calculated as total weight gain divided by total protein fed. Weights and lengths of all fish in each were measured at termination to determine final condition factor ($CF = \text{body weight (g)} \times 100 / \text{total length (cm)}^3$). Five composite whole-body and muscle samples per treatment were analyzed for ash, crude protein, and moisture by standard methods (AOAC, 1984). Lipid was determined by the method of Folch et al. (1957).

Results and Summary

Weight gain and feed efficiency were best in fish fed diets containing 45% protein or more in the experiment. The protein efficiency ratio value was maximized in fish fed diets containing 45% crude protein. Survival was independent of all diets excluding 30% crude protein. At elevated dietary protein level, whole-body moisture decreased and lipid increased ($P < 0.05$); however, all diets containing different protein levels produced similar whole-body protein and ash, IPF. HIS and ISI were maximized in fish fed diets containing 50 and 40% crude protein, respectively. Diets containing higher protein levels (45-55%) produced significantly higher MR values compared to the diets containing lower protein levels (30-40%), whereas fish fed all diets containing different protein levels had similar muscle ash, lipid, moisture, and protein values. Based on these data, the dietary protein requirement of juvenile giant croaker for optimal growth was approximately 45% of dry diet in seawater.

Referneces

National Research Council, 1993. Nutrient Requirements of Fish. National Acad. Press, Washington, D.C. 114 pp.