

Dietary protein requirement of juvenile flounder (*Paralichthys olivaceus*) fed isocaloric diets

Sang-Min Lee, Chul Soo Park and Tae-Jun Lim

Faculty of Marine Bioscience & Technology, Kangnung National University,
Kangnung 210-702, Korea

Introduction

In nutrition studies of fish, determining the optimum dietary protein level for growth of fish is generally a primary consideration because protein is not only the major constituent of fish body, but also it has critical functions as enzymes and hormones. Many studies have been carried out to determine the protein requirements of fish, and the estimated protein requirements range from 30% to 55% of diet. Aquaculture production of flounder has been increased in the last decade in Korea because techniques for mass larval production of this species have been developed and it is a fast growing species compared to other species of marine fish. Although the effect of dietary protein level on growth of flounder was studied (Kikuchi et al., 1992), dietary protein requirement was not clearly determined in their study. The proper dietary protein and lipid levels for this species have been reported by Lee et al. (2000) and they suggested that high protein (50%) and low lipid (7%) levels in the diet were suitable for the growth of juvenile flounder from 3.1 g to 12.7 g. Continuously, this study was conducted to determine the optimum dietary protein level for growth of flounder (initial body weight, 23 g).

Materials and Methods

The six experimental diets containing 40%, 45%, 50%, 55%, 60% and 65% protein levels were prepared. The energy level of the diets was designed to be isocaloric by adjusting the levels of squid liver oil and dextrin. Dietary lipid level was maintained about 7% according to the results of previous study (Lee et al., 2000). Three replicate groups of fish (an average body weight of 22.7 g) were hand-fed

to visual satiety two times daily for 9 weeks. The water temperature was maintained at $19.2 \pm 1.18^\circ\text{C}$.

Results and conclusion

Survival was not significantly affected by dietary protein level ($P > 0.05$). Weight gain and feed efficiency of fish fed the diets containing 45% and 50% protein were significantly higher than those of fish fed the diets containing 40%, 55%, 60% and 65% protein ($P < 0.05$). Daily feed intake of fish fed the 60% and 65% protein diets was significantly higher than that of fish fed the other diets ($P < 0.05$). Protein efficiency ratio tended to decrease with increasing dietary protein level. Plasma total protein concentration increased with dietary protein level up to 50% and reached a plateau above this level. Plasma total glucose concentration of fish fed the 60% and 65% protein diets was lower than that of fish fed the 40 and 45% protein diets ($P < 0.05$). Plasma total cholesterol concentration was not affected by dietary protein level ($P > 0.05$). Proximate analysis of dorsal muscle of fish was not significantly affected by dietary protein level ($P > 0.05$). Moisture and crude protein contents of liver in fish fed the 60% and 65% protein diets were significantly higher than those of fish fed the other diets ($P < 0.05$). However, crude lipid contents of liver and HSI of fish fed the 60% and 65% protein diets were significantly lower than those of fish fed the other diets ($P < 0.05$). In considering these results, 45-50% dietary protein level with 7% lipid and 4.7 kcal gross energy/g diet could be recommended for the optimum growth and efficient protein utilization of juvenile flounder growing from 23 g to 110 g body weight.

References

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- Lee, S.M., S.H. Cho and K.D. Kim. 2000. Effects of dietary protein and energy levels on growth and body composition of juvenile flounder (*Paralichthys olivaceus*). *J. World Aquacult. Soc.* 31: 306-315.