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Effect of dietary protein and energy levels on the growth of juvenile snail (*Semisulcospira gottschei*)

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Introduction

The freshwater snail genus *Semisulcospora* is widespread in Korea, Japan, Taiwan and China (Davis, 1969). *Semisulcospira gottschei* is becoming a candidate shellfish species for aquaculture in Korea. Although amino and fatty acids composition of *S. gottschei* has been reported by Sim et al. (1994), no information on nutrient requirements for this species is available. Dietary protein is most important factor affecting growth performance of fish and feed cost. Generally, increasing protein level in diets can lead to improve fish production. Protein utilization may be improved by partially replacing dietary protein with lipid and/or carbohydrate to produce a protein-sparing. However, excessive energy in diets can lead to increase body lipid deposition and growth reduction. On the contrary, insufficient energy in diets causes protein waste as the increase of dietary protein proportion used for energy, and produced ammonia can reduce the water quality. Therefore, it is important to improve the dietary protein utilization for body protein synthesis rather than energy purposes. This study, therefore, was conducted to evaluate the effect of dietary protein and energy levels on the growth and fatty acid composition of juvenile *S. gottschei*.

Materials and method

Juvenile *S. gottschei* were obtained from private hatchery (Kangwon, Korea). After the conditioning period, *S. gottschei* were weighed and 100 *S. gottschei* (initial

mean weight: 37 mg) were distributed into each tank. Freshwater was supplied at a flow rate of 300 ml/min into each tank in a recirculation system. During the feeding trial, fish were exposed to natural photoperiod and water temperature was increased from 15°C to 22°C by heater and/or cooler. Three replicate groups of *S. gottschei* were fed to satiety once in 2 days for 12 weeks. Ten experimental diets were formulated to contain 5 levels of protein (12, 23, 33, 43 and 52%) with different P/E ratios (ranging from 29 to 110). Casein and dextrin were used as protein and carbohydrate sources, respectively. Dietary energy levels were controlled by adding different ratios of dextrin and lipid. Crude protein, crude lipid, crude ash and moisture contents were determined according to AOAC (1990). Fatty acid methyl esters were analyzed using a gas chromatography. One-way ANOVA were applied to determine the significance of measurements. Where significant differences ($P < 0.05$) were found, Duncan's multiple range test was used to rank groups using SPSS Version 7.5.

Results and discussion

Survival (80-87%) was not affected by dietary protein and energy levels. Weight gain of *S. gottschei* was improved with increasing dietary protein level up to 23% and then there was no additional response above these levels regardless of dietary lipid level. Crude lipid content of whole body tended to increase with increasing dietary lipid level. Fatty acid composition (% of total fatty acids) of whole body had no trend according to dietary lipid levels. The results of this study indicate that an increase of dietary energy level has no protein-sparing effect and the diet containing 23% protein with 4.3-4.5 kcal/g diet (P/E ratios of 51-53 mg/kcal) is optimal for growth of juvenile *S. gottschei*.

Reference

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- Sim, T.H, Han, K.S., Lee, T.J., Cheong, E.H. and Lee, H.K. 1994. Composition of lipid and amino acid in *Semisulcospira gottschei* tissues. *J. Fd Hyg. Safety*, 9, 81-87.