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Effect of dietary protein, lipid and carbohydrate levels on growth and body composition of juvenile flounder (*Paralichthys olivaceus*)

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Introduction

Dietary protein is the most expensive component in flounder feed because of the high protein requirement of this species. The non-protein energy sources may also influence the protein utilization of fish. The inclusion of adequate levels of non-protein energy sources in diets can minimize use of protein as an energy source. Protein sparing effect by fat and carbohydrate has been studied in other fish. Carbohydrate is the cheapest energy source, so the establishment of its optimal inclusion in diet is important for the development of economical feed. Therefore, the present study was performed to investigate the effects of lipid and carbohydrate levels in the different dietary protein level on growth and body composition of juvenile flounder.

Materials and Methods

A 3 × 3 factorial design with three replicates was used in the present study. Nine experimental diets were formulated and prepared to contain three protein levels (41, 46 and 51%) at three lipid levels (6, 13 and 19%) with different dextrin levels (25, 15 and 5%). Fish meal served as a protein source. Pollock liver oil and dextrin were used as lipid and carbohydrate sources, respectively. Three replicate groups of fish (mean initial weight 8.9 g) were hand-fed to apparent satiation three times a day for 7 weeks. Growth performance and body composition of fish were determined. Results were analyzed by ANOVA and Duncan's multiple range test.

Results and conclusion

Survival of each group was over 97%, and there was no significant difference among treatments. Weight gain of fish was improved by elevated dietary protein and reduced by increased dietary lipid at each protein level. The best weight gain was obtained from fish fed 51 and 46% protein diets with 6% lipid (25% dextrin). The highest feed efficiency of fish fed 51% protein diets was not significantly ($P>0.05$) different from that of 46% protein diet with 6% lipid. Daily feed intake and protein intake of fish fed 6% lipid diets was significantly ($P<0.05$) higher than that of 13 and 19% lipids at 46 and 51% protein levels. Moisture content decreased, however, crude lipid content of the liver, viscera and whole body in fish increased with increasing dietary lipid at all protein levels ($P<0.05$). No significant differences ($P>0.05$) were observed in moisture, crude protein and lipid contents of the dorsal muscle in fish. These results suggest that the diet containing 46% protein, 6% lipid and 25% dextrin was suitable for optimum growth of juvenile flounder.

References

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