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# Effect of dietary lipid sources on growth, fatty acids composition and liver histology of juvenile flounder (*Paralichthys olivaceus*)

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## Introduction

Dietary lipids are important sources of energy and of essential fatty acids (EFA). Providing desired amounts of EFA is necessary for the normal growth and survival of juvenille fish. EFA requirements of fish are affected by fish species, water temperature and salinity, and different from those of terrestrial animals (Castell 1979). EFA affect the fluidity and permeability of membranes, enzymes activity and are known as the precursors of the eicosanoids. Especially, most marine fish require n-3 highly unsaturated fatty acids (HUFA) such as eicosapentaenoic acid and docosahexaenoic acid for the normal growth and development. It is important for aquaculture production that development of feed with satisfying a class and amount of EFA in culturing fish. Some studies were already reported for protein and energy requirements, possibility of other protein substitutes for fish meal and optimum feeding frequency for flounder. However, no informations on the EFA of juvenile flounder is available. The present study, therefore, was conducted to investigate the effect of dietary lipid sources on the growth performance, fatty acids composition and liver histology of juvenile flounder.

## Materials and Methods

Four experimental diets containing about 7% different lipids such as lauric acid ethyl ester in diet 1, soybean oil in diet 2, mixture of soybean and linseed oil in diet 3, and squid liver oil in diet 4, respectively, were prepared. White fish meal

as the only protein source was deffated by mixture of chloroform and methanol (2:1, v/v), dextrin was used as dietary carbohydrate. Three replicate groups of fish average weighing 3.0 g were fed diets twice a day for 13 weeks. Growth performance, liver fatty acids composition, hemochemical parameter and the liver histology of fish were determined. Data for each treatment were analyzed by ANOVA and Duncan's multiple range test using the SPSS program.

## Results and conclusion

No significant difference was observed in survival among all diet groups ($p>0.05$). However, weight gain (g/fish), feed efficiency and protein efficiency ratio of fish fed diet 4 containing 1.4% n-3 HUFA were significantly higher than those of fish fed the other experimental diets containing no n-3 HUFA ($p<0.05$). Feed intake, condition factor and hepatosomatic index of fish were not affected by dietary lipid sources ($p>0.05$). In the polar lipid fraction, significantly higher level of n-3 HUFA was observed in the liver from fish fed diet 4 than that of fish fed the other experimental diets ($p<0.05$). The fish fed diets 2 and 3, which contained high level of 18:2n-6 and 18:3n-3, respectively, were showed the highest levels of 18:2n-6 and 18:3n-3 in the liver. Fatty acids composition of neutral lipid fraction also showed a similar trend to that of polar lipid. Plasma levels of total cholesterol, glucose and glutamate oxaloacetate transaminase (GOT) corresponding to the experimental diets were significantly differences ($p<0.05$), plasma GOT level of fish fed diet 4 was lowest over all diet groups ($p<0.05$). Histologically, the liver of fish fed diet 4 has a clear distinction between nuclear and cytoplasm membrane. In fish fed diets 1 and 2, cytoplasm was shrunken, hepatic cell outline become indistinguishable. Based on the results of this study, it was showed that growth, fatty acids composition and the liver histology were affected by dietary lipid sources, and dietary n-3 HUFA is essential for the normal growth in juvenile flounder.

## References

Castell, J.D. 1979. Review of lipid requirements of finfish. In: Proc. World Symp. on Finfish Nutrition and Fishfeed Technology, Vol. I. Hamburg 20-23 June, 1978. pp. 59-84.