

Effects of Dietary Carbohydrate, Lipid and Energy on the Growth, Feed Efficiency, and Tissue Composition of Bighead Carp (*Aristichthys nobilis*) Fry

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The utilization of dietary carbohydrate and lipid as energy sources for bighead carp (*Aristichthys nobilis*) fry and various protein:energy ratios were investigated in a 2x3x3 factorial feeding experiment. Semi-purified diets containing two protein levels (28.9 and 37%) and three levels of lipid (4.26, 5.93 and 6.95%) and carbohydrate (42,48 and 53%) to give different total energy levels were fed to bighead carp fry (48.5 ± 3.5 mg) for 8 weeks.

Growth of fry fed diets with 37% protein was significantly higher ($P < 0.01$) than that of fry fed diets with 28.9% protein level. An increase in dietary lipid from 4.26 to 6.95% depressed growth ($P < 0.05$). There were no significant differences in feed conversion efficiency (FCE) at varying levels of protein and lipid, although their increments resulted in a decrease in FCE. Increase in dietary protein significantly decreased ($P < 0.01$) protein efficiency ratio (PER) while increase in dietary carbohydrate significantly decreased ($P < 0.05$) FCE and PER. Bighead carp fry fed diets containing 3131 and 3470 kcal metabolizable energy/kg and P:E ratio of 92 and 107 mg protein/kcal had the best overall performance. However, the 37% protein diet with approximately 4470 kcal metabolizable energy produced maximum growth. Growth was better with diets containing dietary lipid level of 4.26% and carbohydrate level of 42%. Tissue lipid increased significantly ($P < 0.01$) with an increase of dietary lipid and carbohydrate. However, inclusion of the highest level of both components in test diets decreased tissue lipid. Tissue protein was significantly higher ($P < 0.01$) in fry fed high protein diets and low levels of lipid and carbohydrate. Tissue protein, moisture and ash were inversely related to tissue lipid. Survival (%) increased ($P < 0.01$) with the increase of dietary protein and carbohydrate. Increase of dietary lipid did not significantly affect survival rates of bighead carp fry.