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Growth and biochemical responses to dietary starch and protein levels in Nile tilapia (*Oreochromis niloticus*)

Jidan Ye
Jimei University, China

A factorial experiment was designed to examine the effects of dietary protein and carbohydrate levels on growth and biochemical responses of Nile tilapia. Six diets were formulated to contain 24% or 36% protein, and 0, 20% or 40% starch. Triplicate replicates of each treatment were assigned across 18 tanks (20 fish per tank). Fish in each treatment were then fed one of the diets to satiation twice daily over a period of 56 days. Fish receiving non-starch diets had lower weight gain, feed efficiency (FE), protein efficiency rate (PER), hepatosomatic index, and whole-body protein and lipid contents, but had higher whole-body moisture and ash contents compared to fish receiving starch-containing diets. 36% dietary protein promoted FE, PER and condition factor and whole-body protein content, but lowered whole-body moisture content versus 24% dietary protein. Feeding starch-containing diets resulted in increased plasma GLU and TG concentrations and liver lipid and glycogen contents compared to feeding non-starch diets. Liver GK activity was enhanced as dietary starch level was raised, whereas similar trend with liver PK activity was found only in fish fed 36% protein. Inversely, liver G6Pase and PEPCK activities were declined as dietary starch level increased. A greater increase in plasma concentrations of GLU and TG and liver contents of lipid and glycogen and liver GK activity, while a greater decline in liver G6Pase and PEPCK activities were observed in fish fed 36% dietary protein. Plasma levels of insulin, T_3 and T_4 were lower in non-starch fed fish than that in starch fed fish. However, similar result with plasma IGF-I was observed only in fish receiving 24% dietary protein. There was no alteration in plasma glucagon level among treatments. The results indicate that starch as carbohydrate is indispensable for the growth and metabolism of Nile tilapia. Protein-sparing effect of carbohydrate was also observed in this study.

Biography

Jidan Ye is currently a Professor in Fish Nutrition and Feed at Fisheries College of Jimei University, China.

yjdwk@sina.com