Supplementatoin

Dietary supplementation of bile acid attenuate adverse effects of high-fat diet on growth performance, antioxidant ability, lipid accumulation and intestinal health in juvenile largemouth bass (Micropterus salmoides)

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Abstract

Bile acid (BA) has been reported to improve growth performance and play an important role in lipid metabolism of fish. Five diets were formulated to investigate the effects of dietary bile acid (chenodeoxycholic acid) supplementation on growth performance, antioxidant capacity, lipid metabolism and intestinal health of juvenile largemouth bass (Micropterus salmoides). Fish (18.35 +/- 0.05 g) were randomly fed five diets: the positive control diet (10.87% lipid, C), high fat diet (18.08% lipid, HF), and HF diets supplemented with 300, 600 and 900 mg/kg chenodeoxycholic acid (HFC1, HFC2 and HFC3, respectively). After 9 weeks of feeding experiment, the weight gain (WG) and special growth rate (SGR) were significantly lower in the fish fed diet HF compared with those fed diet C ($P < 0.05$). Compared with the group C, there were no significant differences in WG and SGR of fish fed high fat diet with 900 mg/kg chenodeoxycholic acid ($P > 0.05$). The crude lipid and protein contents in muscle showed no significant differences among fish fed diets with high dietary lipid ($P > 0.05$), while the crude lipid of muscle significantly decreased in HFC2 group ($P < 0.05$). Triglyceride (TG), malondialdehyde (MDA) in plasma and MDA in liver were higher in HF group than control group, addition of BA could decrease those contents effectively and increase the gene expression of SOD and GSH-Px. Lipidprotein transport and cholesterol synthesis related mRNA levels were significantly increased in fish fed high fat diets containing BA. The supplementation of 900 mg/kg BA significantly increased the gene expression of apolipoprotein B (ApoB-100), sterol 26-hydroxylase (CYP27 alpha) and liver X receptor (LXR) ($P < 0.05$). High-fat diet significantly

increased the pro-apoptotic gene expression, while anti-apoptotic gene B cell lymphoma-2 (Bcl-2) and B-cell lymphoma-xl (Bcl-xl) mRNA levels were significantly increased with the increasing dietary BA ($P < 0.05$). In addition, supplemental BA in high-fat diet increased the height of intestinal fold and decreased lipid accumulation in liver. These results suggested that dietary BA supplementation could improve the digestion and absorption of lipids, antioxidant capacity and intestinal health, thereby attenuating the adverse effect induced by high fat diet of largemouth bass.

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