

The effects of dietary fructooligosaccharide on growth, intestinal short chain fatty acids level and hepatopancreatic condition of the giant freshwater prawn (*Macrobrachium rosenbergii*) post-larvae

ABSTRACT

Prebiotics are one of the feed additives being studied to potentially enhance the growth of aquatic animals. The effects of dietary fructooligosaccharide (FOS) additives at 0.1%, 0.4%, 1% and 2% on the growth performance, superoxide dismutase (SOD), lipid peroxidation, intestinal short chain fatty acids (SCFA) and hepatopancreatic histopathology of the freshwater prawn *Macrobrachium rosenbergii* post-larvae (initial weight \pm SE of 22.8 ± 0.2 mg) were evaluated after 56 days of feeding. Each aquarium contained 80 post-larvae and each treatment was quadruplicated which yielded 320 prawns/treatment. The results showed that the specific growth rate for length and weight of the prawns was highest in the 0.4% dietary FOS treatment compared to all others. Prawns fed the 0.4% FOS diet had significantly higher ($P < 0.05$) intestinal acetic acid than the control or 0.1% FOS treatments as well as significantly higher propionic acid than all other treatments. The amount of butyric acid was similar among all the dietary FOS treatments ($P > 0.05$). Increasing dietary FOS significantly increased lipid peroxidation and decreased SOD inhibition rate (%), indicating oxidative stress to the prawns. On day 28, prawns fed 0.1 or 0.4% FOS had significantly more E-cells within their hepatopancreatic tubules compared to other treatments while after 56 days, the hepatopancreatic tubules of prawns in the 0.4% FOS treatment were more closely arranged with significantly more R- and E-cells. In some instances, prawns fed the 1 or 2% FOS diets had hypertrophied B-cells. The results demonstrate that the optimal tested FOS level to *M. rosenbergii* post-larvae was 0.4%, and higher levels of 1 or 2% dietary FOS induced oxidative stress and reduced their hepatopancreatic condition.

Keyword: Short chain fatty acids; Prebiotic; Lipid peroxidation; Histology; Oxidative stress; Freshwater prawn