

Supplementation of duckweed diet and citric acid on growth performance, feed utilization, digestibility and phosphorus utilization of hybrid grouper TGGG

Abstract

A feeding trial was conducted in juvenile TGGG hybrid grouper to investigate the growth performance, feed utilization, and digestibility after citric acid supplementation in a diet that was partially composed of duckweed. Five isoproteic and isolipidic diets (50% protein, 16% lipid levels) were formulated using *Lemna minor* and *Spirodela polyrrhiza* at 5% of fishmeal protein replacement level with or without 3% of citric acid supplementation. A diet without duckweed and citric acid was used as the control diet. Triplicate groups of fish (10.30 ± 0.05 g) were randomly distributed in tanks with a flow through system at a stocking density of 20 fish per tank. The fish were fed twice daily with each experimental diet until apparent satiation for 10 weeks. As a result, the fish fed a diet with duckweed *S. polyrrhiza* and citric acid (DSC) achieved significantly higher growth, body weight gain (BWG) and specific growth rate (SGR) compared to the control group ($P < 0.05$); however, it was not significantly different with other treatments ($P > 0.05$). The growth, BWG and SGR in fish fed duckweed diets only (*L. minor* and *S. polyrrhiza*) were almost similar with the control without significant differences ($P > 0.05$). Similarly in feed utilization, fish fed the DSC diet had a better feed conversion ratio, protein efficiency ratio, and net protein utilization without significant differences ($P > 0.05$) compared to the control. The apparent digestibility coefficient for crude protein and crude lipid, and phosphorus

absorption of DSC and the diet with duckweed L. minor and citric acid were comparable to the control without any significant differences ($P>0.05$). Survival was not affected by the experimental diets. This study showed that TGGG can utilize a diet partially composed of duckweed and better performance was observed with the aid of citric acid.