ABSTRACT

BAMBANG GUNADI. Minimization of the nitrogenous waste of the catfish, (*Clarias gariepinus*) culture by application of the trophic level based aquaculture system. Under direction of ENANG HARRIS, EDDY SUPRIYONO, SUKENDA, and TATAG BUDIARDI.

A serial experiment was carried out to analyze feed digestibility, protein digestibility and ammonia excretion of catfish (*Clarias gariepinus*), ammonia level dynamics in relation to bacteria and alga population in catfish culture, and to analyze the increment of nitrogen absorption efficiency in the trophic level based aquaculture of intensive catfish. Nine concrete tanks of 25 m$^2$ were used in this experiment for three treatments with three replicates. Each tank was divided into two sections. The first section of 10 m$^2$ was stocked with catfish, and the second part of 15 m$^2$ was run as heterotrophic partition and stocked with tilapia or tilapia and molluscs (mussels and snails), according to the respective treatments. The water was recirculated from catfish part to the heterotrophic section, and vice versa, by water pump with a flow rate of 0.3 L/s. An aeration system was installed in the heterotrophic section to ensure that dissolved oxygen level did not drop below the critical point. The catfish with initial size of 42.5 g were stocked in the first part at a density of 100 fish/m$^2$, whereas tilapia (4.83 g initial size) were stocked in the heterotrophic section. In the relevant treatment, the molluscs (mussels and snails, 5.0 kg each) were also stocked in the heterotrophic section. Commercial floating fish feed with 29.77% protein level was applied to catfish only at a daily rate of 3% of catfish biomass and was given three times per day. The inoculation of commercial *Bacillus* sp. isolate was applied in the first day of the experiment to obtain bacteria density in water of 10$^6$ cfu/L. Molasses was supplemented to the tanks daily in order to adjust water C/N ratio at a rate of about 91.31% of daily feed ratio. Three treatments were applied in this experiment, i.e.: (a) One trophic level (Catfish only), (b) Two trophic level (Catfish-Tilapia), and (c) Three trophic level (Catfish-Tilapia-Molluscs). Each treatment had three replicates. The experiment was conducted for 6 weeks. The results showed that the total production of catfish culture systems were 81.71±22.39, 67.51±20.63, dan 101.45±19.71, respectively, for one, two and three trophic levels. The nitrogen absorption efficiency (NAE) in the catfish culture was relatively increased as the trophic level was expanded. The calculated NAE for catfish culture with one, two and three trophic levels were 31.84±12.47, 33.95±11.63, and 36.48±11.96, respectively. Consecutively, longer trophic level contributed to the lower nitrogenous waste in the heterotrophic intensive catfish culture. Based on the feed nitrogen level, the nitrogenous waste of the catfish culture decreased from 68.16%, in the single trophic level to 63.52% in the three trophic levels. There were potential feed in the form of bacteria and algae biomass in the wastewater of catfish culture.

Keywords: trophic level based aquaculture, catfish, nitrogenous waste