

Biofloc system improves protein utilization efficiency and growth performance of Nile tilapia, *Oreochromis niloticus* fry: Experimental evidence

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Abstract

This study evaluated the effect of biofloc technology (BFT) on protein utilization and growth performance of *Oreochromis niloticus* fry under greenhouse for 14 weeks under a 3×2 factorial design involving three crude protein (CP) levels (22, 27 and 35%) and two different carbon sources. Molasses and glucose were independently used as carbon sources in the BFT tanks with aeration using air stones. Mono-sex fish fry of mean weight 0.07 ± 0.01 g and total length 13.1 ± 0.01 mm were stocked at density of 1 fish per litre. The fishes were fed on the three commercial diets that were randomly assigned in triplicates, with the control treatment being 35% CP. Feeding was done twice daily at 5% body weight, while sludge was siphoned weekly. Calculations of specific growth rate (SGR), the protein efficiency ratio (PER), food conversion ratio (FCR), survival and measurement of water quality parameters were also performed. Protein levels and carbon sources had significant effects ($p < 0.05$) on dissolved oxygen (DO) and NH_3 protein levels and carbon sources had significant interaction ($p < 0.05$) on pH. There was a significantly higher FCR in the control treatment (0.89) than in glucose (0.56–0.57) and molasses (0.59–0.63) bioflocs; furthermore, it was significantly different between the carbon sources. The PER was significantly higher in the control (8.42) than in glucose (5.03–7.99) and molasses (4.81–7.23) bioflocs. No significant interactions ($p > 0.05$) of protein levels and carbon sources were recorded on PER. However, it was significantly affected ($p < 0.05$) by protein levels and carbon sources. No significant effects ($p > 0.05$) of dietary protein level, carbon source, or their interaction were observed on SGR and condition factor. The SGR was significantly lower in the control (2.91) than in glucose (3.52–3.59) and molasses (3.49–3.56) bioflocs. The condition factor was significantly lower in the control (0.81) than glucose (1.72–1.83) and molasses (1.82–1.84) bioflocs. Survival rates were significantly higher in glucose (>97%) and molasses (>94%) than the control with a lower value of 74.7%. The biofloc increased protein utilization efficiency, which improved FCR and enhanced fish growth rate even with a lower dietary protein level. Further studies should evaluate the applicability of BFT in outdoor cultures.

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