

NOTICE OF PUBLICATION

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RESEARCH REPORTS

Sustainable Aquaculture for a Secure Future

Title: Bioenergetic Modelling of Effects of Fertilization, Stocking Density, and Spawning on growth of the Nile tilapia, *Oreochromis niloticus* (L.)

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Abstract: A bioenergetic growth model was developed to examine the integrated effects of fertilization, stocking density, and spawning on the growth of tilapia, *Oreochromis niloticus* (L.), in pond aquaculture. The analyses showed that growth rates increase with higher levels of organic fertilization up to 500 kg/ha/week. Growth rates increased with added food rations in ponds, reaching a maximum growth of 2.07g/day at about 44-48 days after stocking. Fish growth rates decreased with increased levels of stocking density. The stocking density for optimal growth is 1 fish/m²; the optimal density for total harvesting weight and fish size is 2 fish/m². Model sensitivity analysis indicated that tilapia growth is most sensitive to catabolism (metabolism) and anabolism (synthesis) coefficients, both of which are geometrically related to the fish body weight. Food assimilation efficiency (b) and the food consumption coefficient (h) have a modest effect on fish growth. Spawning in grow-out ponds can have a major effect on fish growth.

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