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A Growth Experiment Evaluating *Moringa stenopetala* Leaves as an Alternative Protein Source for Farm Based Aqua-Feed in a Rural Semi-Intensive Culture System for *Oreochromis niloticus baringoensis L.*) in the Rift Valley, Kenya.

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Abstract

The worlds growing population demand has outstripped natural fish resources, spurring the recent growth of aquaculture to provide 50% of all fish consumed, simultaneously increasing demand for FM and fish oil for aqua-feed to unsustainable levels (Naylor *et al.*, 2009). Rural farm level aquaculture in Kenya which contributes to rural development has stagnated due to farmers' limited access to feed inputs. Providing cheap, sustainable protein for aqua-feed result in productive rural aquaculture contributing to food security and rural development. Lake Baringo fish stocks are declining, people need food aid and ethnic tensions destabilise conservation and development efforts by NRT. Aquaculture can be part of an economic, social and ecological solution. This research intends to provide a benchmark inclusion level in rural feed for the indigenous and highly nutritious *M. stenopetala*, demonstrating feed inclusion levels based on laboratory research are inadequate for rural aquaculture. The experiment was *in situ* to highlight the practical differences between laboratory and field studies. This study also pioneered aquaculture research using the endemic *Oreochromis niloticus baringoensis*.

Sixteen concrete tanks in a Latin square design with a recirculation system were built and stocked with 20 *Oreochromis niloticus baringoensis* per pond. Three farm based diet treatments, Diet C, Diet 1, Diet 2 and Diet 3 with 4 replicates were formulated to have equal protein contents (31%) with 20%, 30% and 40% *M. stenopetala* protein substitution respectively. The control was composed of maize meal and fish-meal. Diets were tested over an 8 week growth period. Diets were fed at 3% body weight per day, two times daily. Pond oxygen, temperature, pH, conductivity, phosphates and ammonia were tested on a daily basis.

All diets showed very poor growth rates, with *M. stenopetala* substitution showing a slower growth rate, and diet 3 being significantly lower than the control. Difference between diets was attributed to anti-nutrients and low energy contents. There was an overall lower growth performance shown by SGR, PER, PPV, ER. Attributed to poor ingredients quality, 10% lower protein content in feed due to sand contamination from FM, low lipid content, high fibre, insufficient feed ration, poor pond productivity and poor seed stock. The result don't prove to be economically viable, but removing problems thus shifting the FCR to values more similar to other pond studies, *M. stenopetala* becomes economically viable. Additionally aspects of feed: endogenous feed dynamics was proposed as an avenue for further research. Eventually *M. stenopetala* was paralleled to the innovation diffusion theory.

It was concluded that due to the following study NRT are implementing aquaculture, and if aquaculture is adopted within Baringo, *M. stenopetala* is a good candidate as a sustainable protein substitute.