RELATIVE CONTRIBUTION OF RICE BRAN AND INORGANIC FERTILISERS IN SEMI-INTENSIVE TILAPIA (*Oreochromis niloticus*) AND CATFISH (*Clarias gariepinus*) POLYCULTURE IN KENYA

BY

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A THESIS SUBMITTED TO THE UNIVERSITY OF NAIROBI FOR PARTIAL FULFILMENT OF MASTER OF SCIENCE DEGREE IN ZOOLOGY (HYDROBIOLOGY)

NAIROBI - KENYA
30-10-1999.

DECLARATION

I, Gichuri, Wilson Maina, hereby declare that this is my original work and has not been presented for a degree in any other university.

Date: 30th October, 1999.

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This thesis has been submitted for examination for the degree of Master of Science of the University of Nairobi with our approval as the university supervisors.

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ABSTRACT

Aquaculture development in Kenya has been hampered by lack of appropriate feeds. Available chemical fertilisers can enhance natural food production and thus indirectly provide protein to complement energy-rich rice bran. Consequently, a 20 week experiment was conducted at Sagana Fish Farm, Kenya to realise least-cost combinations of rice bran and fertiliser. Twelve 800m^2 ponds were stocked with juvenile (32g) *Oreochromis niloticus* at 2 m^{-2} and *Clarias gariepinus* fingerlings (4.6g) at 0.2m^{-2}. Four treatments were applied in triplicates as follows: 1. Urea and DAP to provide 16KgNha^{-1}week^{-1} and 4KgPha^{-1}week^{-1}; 2. Urea and DAP applied to give 8KgNha^{-1}week^{-1} and 2KgPha^{-1}week^{-1}, plus rice bran fed at 60Kgha^{-1}day^{-1}; 3. Rice bran fed at 120Kgha^{-1}day^{-1}; 4. Rice bran as in treatment 3 and fertiliser as in treatment 2. Dissolved oxygen, temperature and pH were measured weekly in the morning and the afternoon while total alkalinity and total ammonia nitrogen were measured fortnightly. Ponds were sampled monthly to measure fish growth, and drained completely after 20 weeks. At harvest, average weight of tilapia was 89, 106, 106 and 131g while that of *Clarias* was 110, 217, 236 and 295g for treatments 1 through 4 respectively. Specific growth rate (SGR%d^{-1}) for tilapia was 0.6, 0.8, 1.0 and 1.0 while that for *Clarias* was 2.26, 2.69, 2.72 and 2.90 for treatments 1 through 4 respectively. Combined Net fish yield (NFY Kgha^{-1}) was 1,127, 1,582, 1,607 and 2,098 for treatments 1 through 4 respectively. The tilapia Net fish yield (NFY Kgha^{-1}) was 894.0, 1200.5, 1241.8 and 1576.5 while that of *Clarias* was 232, 365, 382 and 522 for treatments 1 through 4 respectively. Combined Annual production (AP. Kgha^{-1}yr^{-1}.) was 2930 4113, 4179 and 5455 for treatments 1 through 4 respectively. The tilapia Annual production (AP Kgha^{-1}yr^{-1}.) was 2,324.5, 3,121.1, 3,228.7 and 4,098.7 while that of *Clarias* was 605, 950, 993, and 1,357 for treatments 1 through 4 respectively. Apparent feed conversion ratio (AFCR) was 5.3, 10.3 and 8.0 for treatments 2 through 4 respectively. Feeding efficiency (FE) was 0.19, 0.10 and 0.13 for treatment 2 through 4 respectively. The Relative Condition Factor (Kn) for tilapia was 1.03, 1.11, 1.13 and 1.15 while that for *Clarias* was 1.20, 1.34, 1.38 and 1.38 for treatments 1 through 4 respectively. A partial economics analysis indicated a Net profit (KSh) of 18,851, 9,895, 3,299 and 7,015 for treatments 1 through 4 respectively. Although treatment 4 had the highest SGR, NFY and AP and the second highest AFCR and FE, its high net expenditure was a

serious setback since not many rural fish farmers can afford such an amount of recurrent costs. Even if they could, high unit production costs could jeopardise sales. Treatment 3 had the lowest net profit and was thus the worst treatment in terms of profit margins. This was due to high amount of rice bran inputs. Treatment 2 had the third highest SGR, NFY, AP and AFCR and the second highest Net profit. It had the highest FE while its figures for SGR, NFY and AP compare favourably and closely with those of treatment 3. Probable reasons are that its high FE gives it a higher output (fish production). Feeding efficiency (FE) increases with better diet and we can conclude that treatment 2 was the best diet. Treatment 1 had the highest Net profit but its growth rate began to level off at days 63 and 30 for both tilapia and *Clarias* which means that fish in treatment 1 may not have reached market sizes of 250-300g for tilapia and 500-1000g for *Clarias*. A combination of fertiliser as in treatment 1 and rice bran as in treatment 2 could possibly have produced better results where N and P could have been similar to those of treatment 4 but at much lower recurrent costs.