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Sustainable Aquaculture for a Secure Future

Title: Nitrate and Ammonia Depletion in Indonesian Aquaculture Ponds Fertilize with Chicken Manure

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Abstract: Twelve 0.2 ha aquaculture ponds for Nile Tilapia production in West Java were fertilized weekly with 4 levels of chicken manure: 12.5, 25, 50, and 100g m^{-2}. During a 150 day grow out period, weekly ammonia-N and nitrate-N concentrations often exceeded 0.05 mg L^{-1} in ponds fertilized with 12.5 and 25 g m^{-2} wk^{-1}, but were usually less than 0.05 mg L^{-1} in ponds fertilized with 50 and 100g m^{-2} wk^{-1}. These differences between treatments in dissolved inorganic nitrogen (DIN), and apparent nitrogen limitation of algal productivity at higher loading rates, were examined through daily and diurnal measurements of ammonia-N and nitrate-N. Data suggest that algal production was limited by a shortage of DIN at higher fertilization rates. At higher fertilization rates, CO_2 at lower fertilization rates and by a shortage of DIN at higher fertilization rates. At higher fertilization rates, CO_2 for algae was additionally supplied through microbial respiration of organic carbon in chicken manure. Laboratory experiments measuring the release of ammonia-N and nitrate-N for chicken manure and urea were conducted to evaluate nitrogen transfer rates from these materials. An economic analysis is presented which relates appropriate application rates to fish yields and the cost of fertilizers in West Java.

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