

Studies into the Utilization of Pig Manure for Aquaculture in Central Vietnam

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Abstract

Two experiments were conducted in Thua Thien Hue province, Central Vietnam, from March to November 2004 to evaluate pig manure as fertilizer input for fish ponds and to produce earthworms as a protein source for growing fish.

Experiment I was a Completely Randomized Design with two treatments and 3 replicates carried out to evaluate the effect on water quality and fish growth rate of processing pig manure through a biodigester as fertilizer for fish ponds. Three fish species were stocked: Tilapia (*Oreochromis niloticus*), Silver Carp (*Hypophthalmichthys molitrix*), and Hybrid Catfish (*Clarias macrocephalus* x *C. gariepinus*) in the proportions 50, 30 and 20%, respectively. The ponds were fertilized at three day intervals at the rate of 2 kg N/ha/day. Fermented manure (biodigester effluent - EF) compared with raw manure (RM) increased the dissolved oxygen in the pond water ($P < 0.05$). However, there was no effect on water temperature or pH, COD, ammonia, or BOD. The growth rates of Tilapia and Hybrid Catfish were lower in the effluent treatment compared to raw manure ($P < 0.05$) but there was no effect on the growth of Silver Carp. The total net fish yield was somewhat higher in RM ponds than in EF ponds (2.1 and 1.7 ton/ha, respectively) but the difference was not significant ($P > 0.05$).

In Experiment II, earthworms were cultured on manure from pigs fed a balanced concentrate feed. Their proximate and amino acid composition was determined. Growing Catfish were fed a diet containing 30% crude protein (CP) from trash fish (TF) as control diet and with the CP from TF replaced by earthworms (EW) at levels of 25, 50, 75, and 100%, giving the five isonitrogenous dietary treatments EW0, EW25, EW50, EW75, and EW100, respectively. EW contained 57.2% crude protein on a dry matter basis. Specific growth rate (SGR) was 3.6, 3.9, 4.1, 4.5, and 4.4 %/day for EW0, EW25, EW50, EW75, and EW100 ($P = 0.05$) and food conversion ratio (FCR) was 1.61, 1.56, 1.56, 1.53, and 1.58 kg DM/kg gain for EW0, EW25, EW50, EW75, and EW100, respectively ($P < 0.05$). No significant difference ($P > 0.05$) was found in water quality when earthworms replaced trash fish in the diet. Fish fed the diet without earthworm inclusion had the lowest growth rate, and while the best growth and feed conversion were found when 75% of the trash fish was replaced by earthworms. Survival rate was not affected by dietary treatment. The results from this study indicate that earthworms are a valuable source of nutrients for growing Catfish.

Keywords: Biodigester, Earthworms *Perionyx excavatus*, Effluent, Glass-tank, Hybrid Catfish (*Clarias macrocephalus* x *C. gariepinus*), Manure, Pond, Silver Carp (*Hypophthalmichthys molitri*), Tilapia (*Oreochromis niloticus*), Trash fish, Water quality.
