

Cherd Kaewmanee 2009: Substitution of Fish Meal with Plant Protein in Diets on Nursing of Tilapia (*Oreochromis spp.*): Growth Performance, Ammonia Excretion and Disease Resistance after Transportation. Master of Science (Aquaculture), Major Field: Aquaculture, Department of Aquaculture. Thesis Advisor: Associate Professor Orapint Jintasatporn, Ph.D. 223 pages.

The effect of dietary plant protein, mung bean protein concentrate (MBP), substituted for fish meal (FM) in sex reversal diets on growth performance, ammonia excretion and disease resistance after transportation was conducted in red tilapia first swimming fry (*Oreochromis spp.*). Fish were fed with diets containing 55 % crude protein (CP) from 5 different proportions of MBP (T1: 0 % MBP; control diet, T2: 25 % MBP, T3: 50 % MBP, T4: 75 % MBP and T5: 100 % MBP) for 21 days. The results showed that replacing FM with MBP up to 25 % CP in the diet did not affect growth (0.231 ± 0.057 gram mean weight), protein efficiency ratio, net protein utilization and quality of mono-sex red tilapia fry. Before transportation, an ammonia toxicity test was conducted in terms of 24 hours lethal concentration (24 hr-LC_{50}) at 26.32°C and pH 7.78. The results showed that the 24 hr-LC_{50} was 40.66 ppm. Ammonia excretion after transportation was evaluated by stocking fry in aerated tanks of an open system for 12 hours. Total ammonia decreased by increasing proportion of MBP in the diet ($P < 0.01$). After transportation, total ammonia was higher than safety levels and increased by the proportion of FM in the diet causing increased mortality ($P < 0.01$). Disease resistance after transportation was assessed for 10 days by immersion challenge with *Streptococcus agalactiae* at $2.467 \pm 0.145 \times 10^6$ CFU/ml. The mortality rate of red tilapia fry after challenge increased by increasing proportion of MBP in the diet ($P < 0.01$).

The proportion of soy bean meal (SBM), MBP and FM in nursery diets was assessed in terms of growth performance, ammonia excretion and disease resistance after transportation in red tilapia fingerlings 0.231 ± 0.057 gram to 25.562 ± 1.315 gram mean weight. Fish were fed with floating pellet diets containing 32 % CP from 6 different protein sources (T1: commercial diet; Ref diet, T2: 70 % SBM, T3: 70 % MBP, T4: 0 % plant protein (PP), T5: 100 % SBM and T6: 100 % MBP) for 8 weeks. The results showed that feeding up to 30 % CP from SBM or MBP did not affect growth, survival rate, protein efficiency ratio and net protein utilization of red tilapia. An ammonia toxicity test before transportation in terms of 24 hr-LC_{50} at 26.32°C and pH 7.78 was 91.0 ppm showed that ammonia excreted after 12 hours was higher than safety levels in all treatments. Fish fed FM in the diets had higher ammonia excretion levels than those fed SBM and MBP. Furthermore, total ammonia in transport water and blood ammonia levels were higher in fish fed only a single protein source rather than a control treatment and groups of fish fed a diet containing plant protein and FM 30:70 ($P < 0.01$). Mortality rate during transportation was directly related to the rate of an ammonia excretion and thus closely mirrored the ammonia excretion levels for each diet. Fish immunity in term of Ig M, phagocytic activity and phagocytic index increased by the proportion of FM ($P < 0.01$). Disease resistance after transportation, determined by immersion with *Streptococcus agalactiae*, indicated higher mortality rate in groups of tilapia fed plant protein source diet ($P < 0.01$)

Student's signature

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