

## **Evaluation of silkworm pupae and tannery waste as dietary protein sources for Thai koi, *Anabas testudineus* (Bloch)**

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### **Abstract**

Fish meal (FM) was partially replaced by silkworm pupae meal (SWPM) and tannery waste meal (TWM) as dietary protein sources in diets for Thai koi, *Anabas testudineus* (Bloch). Four different diets were prepared using SWPM and TWM replacing half the fish meal as the sole source of protein. Growth performance was observed for 10 weeks using these four different diets on the basis of feed utilization and digestibility. Growth responses in terms of weight gain (%) and feed utilization (specific growth rate, feed conversion ratio, protein efficiency ratio and apparent protein digestibility) in fish fed diet containing 20% FM, 15% SWPM and 5% TWM (Diet 3) was found to be similar to that of control diet containing 100% FM (Diet 1); both were significantly ( $p < 0.05$ ) higher than those of diet 2 (20% FM, 10% SWPM and 10% TWM) and Diet 4 (20% FM, 5% SWPM and 15% TWM). Diet 3 was found to be the most economical among the four diets and cost the least to produce a unit of biomass. The survival of fish fed Diet 1 (Control) and Diet 3 was higher (83-88%) than those fed Diet 2 and Diet 4. Biosyntheses of crude protein and crude lipids in fish fed diets 1 and 3 were significantly greater than in the fish fed the other two diets and initial fry. There was no difference ( $p < 0.05$ ) between treatments or the control in relation to bioaccumulation of minerals (ash). It was found that the diet containing low levels of TWM (5%) and a moderate amount of SWPM (15%), replacing half the Fish Meal gave best growth performances for Thai koi, *A. testudineus*. Crude protein, crude lipids, ash and nitrogen free extract had a significant ( $p < 0.01$ ) combined effect on percent weight gain ( $R = 0.895$ ), specific growth rate ( $R = 0.920$ ), feed conversion ratio ( $R = 0.908$ ) and protein efficiency ratio ( $R = 0.869$ ), contributing 80.10%, 84.64%, 42.45% and 75.52% to the total, respectively. This study showed that tannery waste, before adding chromium oxide (Cr<sub>2</sub>O<sub>7</sub>), may be used as a dietary ingredient to replace fish protein to a limited extent, reducing the cost of fish diets as well as the pollution of the environment from tannery waste disposal.

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