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Apparent Digestibility Coefficients for Common Major Feed Ingredients In Formulated Feed Diets For Tropical Sport Fish, *Tor tambroides* Fry.

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Abstract: Apparent digestion coefficient of dry matter in the feedstuffs used were above 70 per cent and there was no significant differences among themselves. The digestion coefficients of protein in the soybean meal were 95.63 per cent followed by fish meal 95.13 per cent, and wheat meal 84.70 per cent. The protein and fat digestion coefficients of fish meal and soybean meal didn't show any significant difference among ($P > 0.05$) themselves. While fish meal fat digestion coefficient was significantly higher ($P < 0.05$) than that of wheat meal. Fish meal and wheat meal showed significantly higher ash digestion coefficients ($P > 0.05$) compared to soybean meal.

Carbohydrates in fish meal and soybean meal were poorly digested by *T. tambroides* fry. While wheat meal was well digested and significantly higher ($P < 0.05$) than those of the fish meal and soybean meal feedstuff. Fish meal and wheat meal showed significantly higher energy digestion coefficients ($P < .05$) than that of soybean meal. As most of the feedstuffs were well digested, ingredient selection should, therefore, be based primarily on their protein content, amino acid composition and palatability.

Key words: Fish meal, soybean meal, wheat meal, digestibility

Introduction

Digestion includes the process by which the ingested food material is broken down into suitably absorbable nutrients across the gut wall into the blood system. Digestion has to be considered separately from the passage of food along the gut and their digestibility. The latter is a more quantitative prospect of ingestive process and refers essentially to the degree to which a food or its nutrient components are made absorbable by an individual; in other words it is a measure of nutritional usefulness of food (De Silva, 1989).

Digestibility of nutrients is among the most traits to determine feed evaluation research (Heken *et al.*, 1986). Studies on digestibility in fish pose greater technical problems by virtue of the fact that fish live in an aquatic medium, which brings about leaching of faecal material nutrients. Investigations of digestibility of feeds are relatively recent. Most of the investigations were based on the inert digestion marker, such as chromic acid in the feed (Austreng, 1978, De Silva, 1985b).

A knowledge of digestibility of basic dietary nutrients essential for the study of fish energetics and for evaluation of the dietary value of foodstuffs and feed ingredients; Apart from its use in aquaculture, digestibility studies of naturally ingested food material or natural or quasi-natural populations are proving to be useful to evaluate and understand the success or failure of a species (Bowen, 1981; De Silva, 1985a).

Other than looking at growth responses, the digestibility of nutrients contained in the feedstuffs could be used to assess the suitability of the feedstuffs as ingredients in fish feeds. Few studies had been carried out in tropics especially in Malaysia (Law, 1984, 1986; Law *et al.*, 1985, 1987; Khan, 1993) to determine the nutrient digestibility of local feedstuffs in several fish species commonly cultured. One of the constraints to the development of aquaculture is the formulation of nutritionally balanced diets to meet the requirements of the fish.

The growing demand for fish protein in Malaysia has motivated active development of aquaculture (Khan, 1993; Gopinath and Tarlochan, 1998). Successful aquaculture projects depend on several inputs and it is envisaged that many problems facing the aquaculture industry in Malaysia, as well as in Southeast Asia will

need urgent attention (Jalal *et al.*, 1998).

Tor tambroides, Malaysian Mahseer is one of the most important tropical sport as well as food fish in Malaysia, Thailand, Singapore and Indonesia (Ambak *et al.*, 1998). The recent study was the first attempt on the larval rearing of this fish indicated that it is easy to culture in hatchery reared conditions and readily accepts artificial feed (Jalal, *et al.*, 1999). Furthermore, it commands a high market price.

However, no study has been on its response to different food stuffs of a formulated feed. In intensive aquaculture nutritionally adequate or wholesome diets have to be presented and it is equally essential that such diets be effectively digested. With this in mind, the objective of this study was to determine the nutrient digestibility of several feedstuffs in Malaysian Mahseer *Tor tambroides* fry.

Materials and Methods

Malaysian Mahseer with a mean weight of 0.26 ± 0.03 g were acclimated to feed voluntarily on a reference diet containing (45 % protein diet) as observed optimum protein level in our previous study. The reference protein diet was also used for other omnivore fish. (EISayeed *et al.*, 1993) following the standard method given by Tacon (1990).

The test diet was composed of 30 per cent of the test ingredients and 70 per cent of the reference diet (Cho and Slinger, 1979, Kamaruddin *et al.*, 1983, Law 1986, Khan, 1993) in Table 1. The diets were processed by hatchery, pellet mill. The spaghetti-like strings were dried, powdered and handseived to size (< 1 mm). The ingredients are described in Table 1.

Groups of 20 fish each were held in 75-l funnel shaped digestibility tanks. The water in the tanks was aerated using air pump and changed periodically to maintain good quality. The fish were acclimatized to tanks and dietary regime for 2 weeks before collection was made. They were given ad libitum feeding in excess of 1-1.5 per cent of their live body weight and after about half an hour, the uneaten feed and other wastage were flushed out by opening the faecal collection tube (Khan, 1993).

Water quality parameters in the tank were monitored throughout the experimental period. Temperature and dissolved oxygen and pH were recorded thrice a week by oxygen meter (YS1, USA) and pH

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