

FIRST EVALUATION OF AN ALGAL FERMENTATION BY-PRODUCT AS A FEED INGREDIENT FOR MARINE SHRIMP

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Introduction

Large-scale heterotrophic fermentation of phytoplankton for DHA oil extraction, produces algal biomass as a high-starch by-product, which contains residual DHA. The aim of this study was to evaluate its potential application in feeds for marine shrimp.

Methods

Digestibility

Three diets, containing (A) 0%, (B) 40% and (C) 72% algal biomass were prepared with 1% chromic oxide marker. Casein and wheat flour were used to balance protein and carbohydrate content between diets (A) and (B). The diets were fed to *Fenneropenaeus indicus*, weight 20-30g, which were acclimatised to the experimental diets over seven days. Thereafter, faeces were collected 2-4 hours after each feeding. The samples were frozen, pooled and freeze-fried prior to analysis.

Growth

Four diets, based on cod muscle powder, containing 0-30% algal biomass balanced with wheat flour, were fed to *F. indicus* postlarvae in a 40 day growth trial in a recirculating laboratory system. Groups of shrimp were acclimatised to the diets for several days prior to the experiment. 20 shrimp, initial length 15-17 mm, weight 17.1 ± 5.1 mg, were then stocked in each of three tanks for each treatment and fed three times daily.

Results

The diets containing the algal biomass were highly attractive and readily ingested by the shrimp. At the 40% inclusion level, apparent digestibility values for DHA (93%), total fatty acids (95.7%), dry matter (85.7%), protein (94.3%) and carbohydrate (93.5%) were in the upper range for published values for other marine meals. When the biomeal was included at 72%, digestibility values for dry matter, protein, total fatty acid and DHA were lower, while carbohydrate digestibility remained high. In the growth experiment, shrimp in all treatments gained 30-50 times initial weight. After 40 days, the animals fed the diets containing algal material were significantly heavier (50-60%, $p < 0.05$) than the control group. There was no difference in growth between animals fed the 10-30% levels.

It is concluded that the algal biomass is suitable for use in marine shrimp feeds, when included in a nutritionally balanced diet, with potential applications as a source of digestible carbohydrate/DHA in larval/postlarval feeds and reduced-protein or partial fishmeal replacement formulations.