

EFFECT OF ARTEMIA AND COMPOUND DIET DHA ENRICHMENT ON GROWTH, SURVIVAL AND DIGESTIVE GENE EXPRESSION IN PSEUDOPLATYSTOMA PUNCTIFER LARVAE AND EARLY JUVENILES

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Abstract

Pseudoplatystoma punctifer is an Amazonian native catfish highly appreciated for the texture of its flesh, the absence of intramuscular spines and its pleasant taste. As a result, this species is heavily fished in the Amazon basin. Therefore, the development of its aquaculture is of high interest to both respond to the consumers' demands and to help alleviating the fishing pressure of natural populations. Several studies have been performed to improve the culture of this species, the main bottleneck limiting its large-scale culture being the cannibalistic behavior occurring during early life stages. Previous studies have demonstrated that cannibalism can be reduced in this species by adapting the feeding protocol to its digestive capacities and nutritional needs, and that *Artemia* spp. do not meet the nutritional requirements of *P. punctifer* larvae. The aim of this study was to analyze whether enriching *Artemia* and compound diets with DHA could improve growth and survival of developing *P. punctifer*. Larvae and early juveniles were fed *Artemia* from 4 to 18 days post fertilization (dpf) and weaned onto a compound diet from 15 to 26 dpf. A commercial enrichment with high DHA content (4% of total fatty acids in *Artemia* and in compound diet) was used to generate four dietary treatments: C (control group) - non-enriched *Artemia* and compound diet, T1 - enriched *Artemia* and non-enriched compound diet, T2 - non-enriched *Artemia* and enriched compound diet, and T3 - enriched *Artemia* and compound diet. This experimental design aimed at determining whether the nutritional needs of this species change throughout development. The gene expression of amylase, trypsinogen, chymotrypsin, pepsinogen, lipoprotein lipase and phospholipase was analyzed in order to better understand the influence of the tested dietary regimes on the digestive function of *P. punctifer* larvae and early juveniles. Results at the end of the trial showed that all enriched diets (T1-T3) improved growth and reduced the incidence of cannibalism by a half. Enrichment during the *Artemia* feeding period (T1, T3) improved survival whereas enrichment during the compound diet feeding period (T2, T3) seemed more relevant for growth. Likewise, the gene expression of the analyzed digestive enzymes was differentially modulated between both dietary treatments and feeding periods. During the *Artemia* feeding period, all enriched groups displayed higher amylase, trypsinogen and chymotrypsin expression than the control group, whereas only T2 group showed higher phospholipase and pepsinogen expression than the rest of the groups. During the compound diet feeding period, amylase, trypsinogen, chymotrypsin, pepsinogen and phospholipase expression was highest in T1 group. However, the expression of these genes was lower in T3 group, despite being also fed enriched *Artemia* as T1 group. Continuing the enrichment during the compound diet feeding period in T3 seemed to account for a different regulation of the expression of these digestive genes. In conclusion, this study showed that the nutritional needs of *P. punctifer* varied during the studied period and that a regime based on its specific nutritional needs is key for an efficient regulation of the digestive enzymes' gene expression and, therefore, for improving its performance.