

## GENE EXPRESSION PROFILE OF THE MAIN DIGESTIVE ENZYMES IN *Arapaima gigas* EARLY JUVENILES REARED IN A RECIRCULATION SYSTEM

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*Arapaima gigas*, native to the Amazon basin in South America, is one of the world's largest scaled freshwater fish species and shows the highest growth rate among Amazonian cultured fish. Primarily cultivated in Peru and Brazil, there is still little information about its biology during early development. The present study aimed to analyze the gene expression profile of the main digestive enzymes of early juveniles of *A. gigas*. The offspring were obtained from natural spawning of a pond-reared pair of *A. gigas* and transferred at 3 cm TL to 30 L tanks connected to a clear water recirculating system ( $n = 6$ ; initial density 1 ind/l;  $29.0 \pm 0.03$  °C; 12L:12D photoperiod). Fish were sampled throughout 17 days of culture for molecular analyses and tissues were stored in RNAlater until analyzed. Results from quantitative PCR showed that the expression of amylase and trypsin was higher in the anterior intestine, followed by the liver and to a lesser extent in the middle intestine and the stomach. No expression of these genes was detected in the posterior intestine. Chymotrypsin was expressed mainly in the anterior intestine, followed by the liver, the posterior intestine, the middle intestine and the stomach. The expression of lipase was higher in the anterior intestine and the stomach, followed by the rest of the analyzed tissues. The highest level of phospholipase expression was found in the stomach and the posterior intestine, followed by the anterior intestine, the middle intestine and the liver. Pepsin was mostly expressed in the stomach, followed by the anterior intestine with a 15-fold lower level of expression. The expression of neuropeptide Y was mainly located in the posterior intestine, followed by the stomach, the middle and anterior intestine and the liver. The level of expression of amylase, trypsin, chymotrypsin and pepsin at day 1 of culture (D1) was 67, 60, 25 and 1000 times higher than at D3. From D3, the level of expression of these genes was stabilized, which suggests a response to the change in the diet when juveniles were transferred from the pond to the rearing tanks. The expression of amylase fluctuated throughout the period, being higher at D3 and D10 than at D5 and D15, while the expression of trypsin remained constant. The expression of chymotrypsin was highest at D3, followed by D10, D15 and D5. The expression of trypsin showed a similar pattern to that of chymotrypsin, although differences were not significant throughout development. The expression of lipase increased from D3 to D5 and then remained constant. The expression of pepsin increased significantly from D5 onwards. Both the expression of phospholipase and neuropeptide Y remained constant throughout the studied period. The gene expression profile of the digestive enzymes analyzed in different tissues as well as during development followed the common pattern of expression of carnivorous fish, characterized by a high level of expression of pepsin in the stomach, responsible for the acidic digestion of complex proteins. Taking into account these results, it can be concluded that the digestive system of *A. gigas* is functionally developed from D3 (3.3 cm TL), although the considerable increase in pepsin expression detected between D10 and D15 indicates an improvement in the efficiency of protein digestion during this time.



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