



Preliminary study on the activity of protease enzymes in Persian sturgeon (*Acipenser persicus* Borodin, 1897) larvae in response to different diets: effects on growth and survival

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Abstract

The specific activity of alkaline protease, trypsin and pepsin-like enzymes was measured in yolk sac stage *Acipenser persicus* larvae and over a 1-month feeding experiment using live *Artemia* nauplii (ND), formulated feed (FD) or mixed food (MD). *Artemia* nauplii group larvae showed significantly higher growth and survival during the first 15 days while FD larvae showed the lowest growth and survival. At day 30, MD larvae exhibited significantly higher growth than the ND group. Alkaline protease activity showed the lowest activity on day 15; the highest activity was observed in the MD group larvae. Pepsin-like activity showed a drastic increase from day 1 to 5 in all treatments, but remained stable throughout the next 25 days, with the lowest and the highest activity in the FD treatment on day 10 and in the MD treatment on day 30 post-feeding respectively. Trypsin-like activity in group ND remained almost the same from day 5 to 30, whereas in groups MD and FD, it decreased significantly from day 10 to 30. The contribution of the naupliar proteases was moderate but effective. Additionally, better performance in *Artemia* fed sturgeon larvae may also be due to the structure and digestibility of proteins and the food intake stimulation by the nauplii.

Keywords: *Acipenser persicus*, *Artemia* nauplii, enzymes, growth, survival

Introduction

The digestion of food into subunits appropriate for absorption in the digestive tract of the animal depends largely on the available enzymes (Cho 1987). Studies on digestive secretions in fish can elucidate certain aspects of its nutritive physiology and help resolve nutritional problems, such as matching of an artificial diet to the nutritive capabilities of fish (Furné, Hidalgo, López, Garcia-Gallego, Morales, Domezain, Domezainé & Sanz 2005).

One of the most basic problems to be solved in the farming of a new species is its nutritional requirements. Hofer and Köck (1989) suggested that, from the profile of digestive enzymes, it is possible to predict the ability of a species to use different nutrients. An understanding of the functioning of the digestive enzyme helps to explain nutrient digestibility (Glass, McDonald, Moran & Stark 1989; Kolkovski 2001).

Acipenser persicus Borodin 1897 is one of the most important and endangered species of fish living in the Caspian Sea, but despite its value, there is a lack of research on its nutritional aspects to develop appropriate micropellets for intensive culture.

The process of raising *A. persicus* larvae to the juvenile stage is the most critical period. The main problems are associated with larval nutritional requirements. *Artemia* and rotifer usage are often hampered by the high cost and labour for mass production. Early weaning of larvae to dry diets resulted in higher mortality and decreased growth as