

Interactive effect of replacing *Dunaliella salina* algae by agricultural by-products and probiotic *Lactobacillus rhamnosus* on digestive enzymes activity of *Artemia franciscana*

Eshghi S.¹; Imani A.^{1*}; Noori F.², Agh N.²

* a.imani@urmia.ac.ir

1-Department of Fisheries, Faculty of Natural Resources, Urmia University

2- Department of Aquaculture, Urmia Lake Research Institute, Urmia University

Abstract

This study was carried out to evaluate the effect of replacing *Dunaliella salina* algae by agricultural by-products (wheat bran, rice bran and wheat/rice bran) and probiotic bacteria *Lactobacillus rhamnosus* on digestive enzymes activity of *Artemia franciscana* in a 17-day period post hatch. The study was a 4×2 factorial experiment carried out as a completely randomized design trial consisting of different dietary treatments (combinations of various substitution levels of *Dunaliella salina* by wheat bran, rice bran and wheat/rice bran along with probiotic *Lactobacillus rhamnosus*). All treatments were performed in triplicates. At the end of the trial, digestive enzymes activity was assayed. The results revealed that *Artemia* fed wheat bran without any dietary probiotic supplementation showed significantly higher amylase activity ($2.06 \pm 0.3 \mu\text{mol maltose mg protein}^{-1} \text{ min}^{-1}$) ($p < 0.05$). Treatment fed *Dunaliella salina* algae and probiotic showed significantly higher alkaline protease activity ($7.11 \pm 0.87 \text{ U mg protein}^{-1} \text{ min}^{-1}$) and those fed wheat/rice bran with probiotic had significantly higher lipase activity ($0.09 \pm 0.005 \text{ mmol p-nitrophenol mg protein}^{-1} \text{ min}^{-1}$) ($p < 0.05$). It was revealed that dietary probiotic inclusion resulted in decreased amylase activity whilst its effect on the alkaline protease and lipase activities were totally dependent upon the feed ingredients (e.g., simultaneous feeding of artemia by *Dunaliella salina* algae and probiotic led to higher alkaline protease activity, while receiving probiotic resulted in higher lipase activity in group fed wheat/rice bran). Our results also showed that digestive enzyme profile of *Artemia franciscana* was responsive to dietary treatment. Conclusively, using wheat/rice bran in artemia pond culture would result in inferior digestive enzymes activity especially alkaline protease and lipase with subsequent effects on nutrient digestion/absorption efficiency and undesirable effects on pond productivity and final product quality.

Keywords: Probiotic, Digestive enzyme, Agriculture by-product, *Artemia franciscana*

*Corresponding author