



Effects of canola meal substitution on mucosal innate immunity, hepatic oxidative status, liver and intestine histomorphopathology of juvenile Nile tilapia (*Oreochromis niloticus*)

Mohammadi M.^{1*}; Imani A.²; Farhangi M.³; Gharaei A.⁴; Hafeziyeh M.⁵; Alizadeh M.¹; Sarsangi Aliabad H¹.

1-National Research Center of Saline Water Aquatics, Iranian Fisheries Sciences Research Institute, Agricultural Research, Education and Extension Organization (AREEO), Tehran, Iran.

2-Department of Fisheries, Faculty of Natural Resources, Urmia University, Urmia, Iran.

3-Department of Fisheries and Environmental Sciences, Faculty of Natural Resources, University of Tehran, Karadj, Iran.

4-Department of Fisheries, Faculty of Natural Resources and Hamoun International Wetland Research Institute, University of Zabol, Zabol, Sisatan and Baluchestan, Iran

5-Iranian Fisheries Sciences Research Institute, Agricultural Research, Education and Extension Organization (AREEO), Tehran, Iran

* Corresponding author's email: mohammaditabasy@ifro.ir

Abstract

Considerable research has been done on finding reliably conventional plant proteins substitute of fish meal in aquafeed. The present study was carried out to evaluate the effect of dephytinized MAS-washed canola meal (CPM) as fish meal replacement in juvenile Nile tilapia diet on growth and feed indices (SGR and FCR), mucosal innate immunity (lysozyme, total protein, alkaline phosphatase, alkaline protease and total immunoglobulin content), hepatic antioxidant status (SOD, GPx, CAT activities and liver MDA content) and intestine and liver histomorphopathology. Five isonitrogenously isoenergetic experimental diets containing 0% (control), 12.5, 25, 37.5 and 50% CPM replacing graded levels of dietary fish meal (ca. 0, 14.3, 28.6, 42.9 and 57.1%) were formulated. Fish with average body weight of 3.5 ± 0.1 g were fed on the experimental diets for 36 days under 12 light to 12 dark photoperiod condition. Our results showed that those fish received control diet without fish meal replacement significantly showed the highest SGR ($P < 0.05$). In addition, those groups fed on diets containing up to 25 %



CPM did not significantly differ from the control group regarding SGR ($P>0.05$). Feed performance (FCR) did not show any differences amongst experimental groups ($P>0.05$). Results revealed graded dietary fish meal replacements with CPM did not significantly affect mucosal innate immunity, antioxidant enzymes activity and liver tissue MDA content of various experimental groups ($P>0.05$). However, in agreement with growth indices, histomorphopthaological observations revealed that those fish received higher levels of dietary CPM content (i.e. 37.5 and 50%) showed intensive intestinal and hepatic mononuclear immune cell infiltration and intestinal villus detachment and shortening ($P<0.05$). In conclusion, despite containing lower glucosinolate, phytic acid, phenolic compounds and tannins well within the recommended thresholds for aquatic animal's nutrition, diets containing CPM beyond 25% negatively affected the growth performance and intestine and liver tissue histoarchitecture of juvenile Nile tilapia.

Keywords: Antioxidant, processed canola meal, immunity, *Oreochromis niloticus*.