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Title: Activity-Guided Fractionation of Phytochemicals of Maca Meal, Their Antioxidant Activities and Effects on Growth, Feed Utilization, and Survival in Rainbow Trout (*Oncorhynchus mykiss*) Juveniles

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Abstract: A feeding trial was conducted to examine the supplemental effects of maca (*Lepidium meyenii*, Walper) meal and its components extracted by four different solvents on growth performance, feed utilization, and survival in rainbow trout fry. Eight casein-based semipurified diets were formulated to be isonitrogenous and isocaloric to contain the maca meal, its four extracts, mixture of the four extracts, and maca meal after extraction. The eight diets were each supplemented with 15% wheat flour (control diet, diet 1), 15% maca meal (diet 2), 12.5% maca meal after the extraction (diet 3), a mixture of four maca meal extracts (diet 4), a hexane extract (diet 5), a dichloromethane extract (diet 6), an ethyl acetate extract (diet 7), and a methanol extract (diet 8). In vitro 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical inhibition indices were observed to increase in a dose-dependent manner as the concentration of methanolic extracts of maca meal increased. For the antioxidant activities of the four extracts, only the methanolic extract showed a higher inhibition rate against DPPH radical compared to other extracts by hexane, ethyl acetate, and dichloromethane. After a 14-week feeding trial, fish fed diet 2 exhibited the highest ($P < 0.05$) growth among all the dietary treatments. Fish fed diets 2, 3, and 8 had significantly higher growth than the fish fed the control and the other diets. Feed intake was significantly higher in fish fed diets 2, 3, and 8 than fish fed the control diet and diet 5. Feed conversion ratio (FCR) and protein efficiency ratio (PER) were also significantly improved in the fish fed diets 2 and 3 than in fish fed the diets 1 (control), 5, 6, and 7. Survival was significantly higher in fish fed diet 2 than the control diet, diet 5, and diet 6. The results indicate that certain compounds in maca

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meal have growth enhancing effects in rainbow trout juveniles. The compounds of interest have high polarity and can be extracted by methanol. This compound has an antioxidant capacity that might increase resistance against stress and/or diseases.

This abstract is excerpted from the original paper, which was in *Aquaculture*, 244:293–301.