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## Dietary linolenic and linoleic acid supplements could significantly promote the expression of *FADS2* and *ELOVL5* genes, HUFAs and growth performance of juvenile cobia (*Rachycentron canadum*)

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We hypothesized that dietary linolenic and linoleic acid supplements could promote the expression of the genes of key enzymes for biosynthesizing highly unsaturated fatty acids (HUFAs) and growth performance of cobia (*Rachycentron canadum*). An experiment was conducted to study the effect of different dietary Poly Unsaturated Fatty Acid (PUFA) supplements on the expression of  $\Delta 6$  Fatty Acid Desaturase (*FADS2*) and fatty acid elongase (*ELOVL5*) genes, survival, growth performance, and composition of juvenile cobia. Five groups of cobia juveniles in triplicate were fed for a period of 12 weeks using five different diets: Control diet (CO) contained only basic ingredients; Fish Oil diet (FO) was added fish oil (rich in n-3 HUFAs); Perilla Oil diet (PO) was added perilla oil (rich in n-3 PUFAs); Safflower Oil diet (SO) was added safflower oil (rich in n-6 PUFAs); Safflower-Fish Oil diet (SO+FO) was added a mixture of safflower and fish oils (rich in both n-6 PUFAs and n-3 HUFAs). The expression of *FADS2* and *ELOVL5* genes in the brain, liver and muscle of the juveniles fed SO was significantly higher ( $P < 0.05$ ) than that of the fish fed FO, SO+FO and CO. The highest Specific Growth Rate (SGR) and the lowest Feed Conversion Ratio (FCR) were found in the fish fed SO+FO and were significantly different ( $P < 0.05$ ) from those of the fish fed CO and SO, respectively. The Hepatosomatic Index (HSI) of all groups of fish fed PUFA supplements was significantly higher ( $P < 0.05$ ) than that of the fish fed CO. The highest HSI was found in the fish fed SO, which was significantly higher ( $P < 0.05$ ) than that of the fish fed other diets. The PUFAs in the organs/tissues of the juveniles varied with the content of PUFAs in the feed. The LNA in the brain, liver, muscle and serum of the juveniles fed PO was significantly higher ( $P < 0.05$ ) than that of the juveniles fed the other diets, whereas the LA in above organs/tissues of the juveniles fed SO was significantly higher ( $P < 0.05$ ) than that of the fish fed the other diets. The highest DHA and EPA were found in the brain, liver, muscle and serum of the juveniles fed FO. The crude fat of the juveniles fed PUFA supplements was significantly higher ( $P < 0.05$ ) than that of the fish fed CO. However, there was no significant difference ( $P > 0.05$ ) among the crude fat, protein, ash and moisture of the juveniles fed different dietary PUFA supplements. We concluded that dietary LNA and LA supplements could significantly promote the expression of *FADS2* and *ELOVL5* genes in the brain, liver and muscle of the juveniles; different dietary PUFA supplements could significantly promote the growth performance and increase the HUFAs in the tested organs/tissues of the juveniles; the optimum PUFA supplement was 3% of fish oil and 3% of safflower oil under our experimental conditions.

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