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# Dietary vitamin E and citric acid supplementation could considerably promoted the expression of aconitase and PPARα genes, PUFAs, activity of antioxidant enzymes and growth by of juvenile cobia (*Rachycentron canadum*)

**Zhaokun Ding, Jinhua Huang, Weifeng Li, Jie Jiang and Youqing Xu**
Guangxi University, China

The experiment was performed to investigate the effect of various dietary Vitamin E (VE) or/and Citric Acid (CA) supplementation on the expression of peroxisome proliferator-activated receptor α (PPARα) and aconitase (ACO) genes, fatty acids, activity of antioxidant enzymes and growth of juvenile cobia (*Rachycentron canadum*). Seven groups of cobia juveniles in triplicate were cultured in experimental tanks using filtered and aerated seawater. The juveniles were fed twice a day using one of 7 specific diets: Control diet (D0) contained only basic ingredients; Diets 1 to 6 were added various doses supplementation of VE or/and CA based on per kg of dried feed. Diet 1 (D1) was added only VE 100 IU; Diet 2 (D2) was added only CA 12 g; Diet 3 (D3) was added VE 100 IU plus CA 12 g; Diet 4 (D4) was added VE 75 IU plus CA 6 g; Diet 5 (D5) was added VE 50 IU plus CA 3 g; Diet 6 (D6) was added VE 25 IU plus CA 1.5 g. The juveniles were fed for 12-week and sampled randomly for analysis in week 0 and week 12. The experimental results were: The expression of ACO and PPARα genes, PUFAs, n-3 highly unsaturated fatty acids (n-3 HUFAs), Superoxide Dismutase (SOD), Catalase (CAT), Glutathione Peroxidase (GPx), Glutathione-S Transferase (GST) in the analytical organs/tissues, the Body Weight (BW) and Daily Growth Index (DGI) of the juveniles fed various dietary VE or/and CA supplementation were considerably greater than those of the fish fed D0, respectively. These parameters of the fish fed the diets with both VE plus CA supplementation (D3 to D6) were significantly greater ($P<0.05$) than those of the fish fed the diets with a single VE (D1) or CA (D2) supplementation, respectively. The Feed Conversion Ratio (FCR) of the fish fed the diets with both VE plus CA supplementation was lower than that of the fish fed the diets with a single VE or CA supplementation and D0. The greatest expression of ACO and PPARα genes, PUFAs, n-3 HUFAs, SOD, CAT, GPx and GST were found in the muscle and liver of the D5 fish and greater significantly ($P<0.05$) from those of the fish fed other diets, respectively. The highest BW, DGI and the lowest FCR were found in the D5 fish and differed significantly ($P<0.05$) from those of the fish fed other diets, respectively. We concluded that various dietary VE or/and CA supplementation could considerably promote the expression of ACO and PPARα genes, PUFAs, n-3 HUFAs, activity of antioxidant enzymes, FCR and growth of juvenile cobia. The effect of both dietary VE plus CA supplementation was significantly greater ($P<0.05$) than that of a single VE (D1) or CA (D2) supplementation. The optimum diet was D5 with a VE of 50 IU and a CA of 3 g supplementation per kg of dried feed in the experiment.

zhaokun.ding@hotmail.com

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