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Effect of pigments extracted from shrimp wastes in diets on skin and flesh coloration of *Oreochromis niloticus*

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Colour of fish fillet is one of the most important sensory properties and the bright red colour associates with higher consumer acceptance and a market value. The present study evaluated the effect of diet supplemented with carotenoids extracted from shrimp waste on flesh coloration of the *Oreochromis niloticus*. Fish with an initial total length of 8-9 cm were fed with Prima commercial diet (PD – control) and Prima diet supplemented with 8 mg/kg of carotenoid extracted from the shrimp waste (PD+As - test diet). Experimental design included three controls and three treatment tanks, randomly stocked with 10 fish per tank. After 42 days of feeding, the colour of flesh and skin of males and females were separately evaluated, through visual and spectrophotometric methods. Average Daily Gain (% ADG), Specific Growth Rate (% SGR), Feed Conversion Ratio (FCR), Hepatosomatic Index (HIS), Gonado Somatic Index (GSI) and % survival of the fish in the two experimental groups were compared to study the impacts of feed. At the commencement of the experiment total carotenoid content of PD and PD+As diets and of skin and flesh randomly selected females and males from experimental fish were determined and at the end of the experiment carotenoid content of the skin and flesh of males and females from both experimental groups were determined. Total carotenoid content in skin and flesh of fish of both sexes fed with PD+As was significantly higher than that of those fed with PD ($P<0.05$). Total carotenoid content of the skin of both sexes in PD and PD+As fed fish were higher than that of flesh. The skin of males in both groups had a higher total carotenoid content than flesh. Diet supplemented with the pigment produced a red tint in the fillets and an overall pink colouration in the skin, which suggests that shrimp exoskeleton is a suitable source for carotenoids, that produces an attractive overall colouration to body and flesh of *Oreochromis niloticus.* PD+As fed fish had significantly higher final total body weight [49.78 ± 0.19 (30) g]; %SGR [3.79 ± 0.05 (30)], % ADG [9.14 ± 0.11 (30)] and significantly lower FCR [0.74 ± 0.02(30) when compared to PD fed fish [total body weight, 46.34 ± 0.43 (30) g; % SGR 3.65 ± 0.03 (30); % ADG, 8.67 ± 0.12 (30); FCR, 0.81 ± 0.01 (30)] ($P<0.05$),which indicates that carotenoid supplemented feed positively influences the growth performance. The higher carotenoid content in males than in females indicates sex related variations in the pigmentation.

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