

SOURCES OF NATURAL PIGMENTS FOR DISCUS FISH (*Symphysodon aequifasciata*) DIETS

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The aim of this work was to evaluate the effects of different sources of natural pigments in the nutrition of Discus (*Symphysodon aequifasciata*) by providing diets enriched with oily annatto extract, canthaxanthin, freeze-dried aai pulp extract, dried tomato and a control diet. At the end of the trial period of 75 days in which the fish were fed diets enriched with pigments, characteristics of skin color and performance were measured. The results were subjected to analysis of variance and Dunnett test ($P < 0.05$) allowing to observe that all diets enriched with natural pigments showed effects on survival, the Fulton condition factor and reddened skin in discus fish. The use of enriched diets for discus fish with a mixture of those ingredients enhances its coloration.

Figure 1 - Discus ornamental fish skin color sampling scheme based on five areas means (25 square pixels each) in pictures of 150 x 200 pixels



Table 1 - Color mean values indexes in CMYK and Hunter coordinate (L^* a^* b^*) systems obtained by digital photography software Adobe Photoshop CS2[®] from Discus fish, depending on natural pigment source (aai, annatto, canthaxanthin, tomato) added to the diets and CV (%). Values in the same row marked with * differ from control (Dunnett, $P < 0.05$).

Color indexes	Natural pigment source ingredient					CV (%)
	Free	Aai	Annatto	Canthaxanthin	Tomato	
L	61.4	56.0*	55.3*	55.4*	52.5*	4.72
a	30.1	28.9	32.1	35.2*	36.4*	10.49
b	56.4	55.9	57.9	57.3	56.7	4.51
C	0.383	0.459*	0.452*	0.423*	0.440*	6.12
M	0.782	0.806	0.829*	0.846*	0.871*	3.81
Y	1.052	1.133*	1.171*	1.144*	1.188*	3.31
K	0.153	0.256*	0.252*	0.232*	0.267*	19.17

Table 2 - Experimental diets and pigment level proximate composition after enrichment with pigments sources ingredients used to feed red discus ornamental fish

Ingredients composition	Natural pigment source				
	Free	Aai	Urucum	Canthaxanthin	Tomato
Crude energy (kcal/kg)	4.613	4.375	4.672	4.568	4.679
Crude protein (%)	34,28	33,44	33,53	33,91	32,08
Carbohydrates (%)	28,71	27,30	28,50	27,62	28,39
Humidity (%)	11,47	15,34	11,35	12,36	12,45
Ether extract (%)	11,44	10,35	12,60	12,15	13,27
Crude fiber (%)	5,83	5,61	5,78	5,84	5,74
Minerals (%)	8,27	7,96	8,24	8,12	8,07
Ca (%)	1,17	1,24	1,18	1,24	1,24
P (%)	1,18	1,29	1,18	1,27	1,23
Main pigment level in the diets (mg/kg)	Without pigment	Anthocyanin 2500	Bixin 4.200	Canthaxanthin 500	Lycopene 60