

Bundit Yuangsoi 2009: The Use of Tea (*Camellia sinensis*), Mulberry (*Morus alba*) and Cassava (*Manihot esculenta*) Leaves as a Natural Carotenoid Source in Fancy Carp (*Cyprinus carpio*). Doctor of Philosophy (Aquaculture), Major Field: Aquaculture, Department of Aquaculture. Thesis Advisor: Associate Professor Orapint Jintasataporn, Ph.D. 247 pages.

The carotenoids composition in tea, mulberry and cassava leaves consisted mainly of lutein and β -carotene, and indicate that tea and mulberry leaves have similarly proportion of lutein and β -carotene about 1:1. In contrast, cassava leaf has a proportion about 2:1. The toxic substance of tannin in tea leaf was $4.60 \pm 0.07\%$ and HCN in cassava leaf was 921.37 ± 29.23 mg HCN equivalent/kg. Hence, tea and cassava leaves were readily consumed providing no more than 10 and 60 % in dietary which was considered safe for animal consumption. The developed TLC-densitometric analysis for quantitative determination of serum carotenoid was validated by determination of linearity, % recovery, %RSD_r, LOD, LOQ and HORRAT(r) value. The data indicated that this method can be successfully used for the analysis of serum carotenoids in fancy carp with good recovery and precision. It is possible to use the established method for the routine analysis of serum carotenoids. The bioavailability of carotenoids were studied in fancy carp after fed single dose oral administration. The results showed that, astaxanthin was absorbed more readily than lutein and β -carotene. Fish fed a diet containing lutein or β -carotene including raw materials of tea, mulberry and cassava leaves can increase astaxanthin concentration in serum similarly to fish fed directly with astaxanthin diet. Therefore, fancy carp can convert lutein and β -carotene to astaxanthin. The impact of dietary carotenoid on skin pigmentation in fancy carp found that fish fed diets supplemented with either a combination of lutein and β -carotene at 25:25 and 50:50 mg/kg diets, as well as lutein alone at 50 mg/kg had serum TC higher than other groups and fish fed diets of them had serum astaxanthin concentrations similar to fish fed with astaxanthin. Pigmentation response of skin redness of three groups of fish were higher than other treatments and the same group still retained their redness skin after discontinued carotenoid diets. Overall fancy carp fed with carotenoid diets are tendency to improve skin pigmentation. The effect of feed processing on stability of total carotenoid (TC) in formulated carotenoids diets found that TC content in diets remained quite stable, without significant loss during processes. As a result, should be added 10 percents of TC from the needed amount to natural carotenoids or natural raw materials source to achieve the target level TC content. The best storage temperature for formulated carotenoids diet were keep under low temperature at 4 °C, storage at this temperature is an important factor in slowing down oxidation metabolism which helps reducing the loss of TC quantities and rancidity value. Additional of BHT at 250 mg/kg helps reducing of oxidation during feed process and storage period at room temperature. In additional, stored carotenoid diets away from sunlight, air and heat can prolong shelf life of diets. The effects of various dietary carotenoid source of carotenoid extraction from tea, mulberry and cassava leaf and their raw materials on the growth, skin pigmentation and immune response in fancy carp, for a rearing period of six weeks. In this study, neither growth nor feed conversion efficiency were affected significantly by dietary treatment for all treatments diets. Fancy carp fed with dietary supplementation of tea leaf at TC 25 mg/kg tends to increase slightly higher serum TC and astaxanthin content. Pigmentation response of skin redness of this group showed the best effects on skin coloration and profound influence on immune response in term phagocytic activity. Therefore, tea leaf is suggested to be an effective alternative natural carotenoid source to synthetic carotenoid and could be reducing costs related to pellet production and adding value to byproduct from agricultural which will therefore promote increased profit for fish farmers.

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