

**THE EFFECT OF ASTAXANTHIN ON COLOUR ENRICHMENT AND
GROWTH RATE OF SELECTED ORNAMENTAL FISH**

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BY

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With METTA

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ABSTRACT

Diets supplemented with artificial astaxanthin at different concentration were fed to groups of selected ornamental fishes, comprising of angelfish (*Pterophyllum scalare*), japanese carp (*Cyprinus carpio*) and goldfish (*Carassius auratus*) for six weeks. This feeding trial was conducted to determine the effect of carotenoid on colour enhancement, growth rate and pigmentation efficiency.

The initial mean body weight of angelfish, japanese carp and goldfish were 658.33 ± 16.29 mg, 1207.41 ± 30.94 mg and 381.92 ± 12.19 mg respectively. Angelfish and japanese carp were fed diets supplemented with 0, 12.5, 25.0, 50.0, 100.0 and 200.0mg-astaxanthin/kg diet. Goldfish was fed diets supplemented with 0, 25, 50 and 200mg-astaxanthin/kg diet. All the fish of each group were weighed once in two weeks. The fish flesh was analysed at the beginning and the end of the experiment. Similarly, proximate composition and astaxanthin level of the diets were also analysed accordingly. Thin Layer Chromatography (TLC) technique was used to determine the presence of astaxanthin in flesh and diets.

Astaxanthin concentration in the flesh of goldfish and angelfish increased with the increasing dietary astaxanthin in the diet up to 6.65 ± 0.04 and 20.46 ± 0.24 mg/l respectively. Diet D4 had the highest final flesh astaxanthin concentration (8.83 ± 0.36 mg/l) and pigmentation efficiency (6.62) for japanese carp. Astaxanthin had a greater influence on the final flesh astaxanthin concentration in all of the experimental fish. There was no difference ($P > 0.05$) of growth rate observed in angelfish and goldfish. Duration and percentage of fry goldfish turned coloured were strongly effected by astaxanthin levels in the diet.

Accepted correlation was observed between final flesh and diet astaxanthin concentration for angelfish ($R^2 = 0.69$). High correlation ($R^2 = 0.73$) between diet astaxanthin concentration and amount of astaxanthin retained (mg) in flesh per kg body weight was also observed. Weight gain and flesh astaxanthin levels in goldfish was also high correlated ($R^2 = 0.78$).

Nevertheless, it can be concluded that the addition of astaxanthin in a diet would enhance the colour of the fish flesh as well as to improve the pigment efficiency and growth rate of ornamental fish.

ABSTRAK

Makanan yang ditambahkan astaxanthin buatan pada kepekatan yang berbeza diberi kepada ikan-ikan hiasan terpilih termasuklah ikan angel (*Pterophyllum scalare*), karp jepun (*Cyprinus carpio*) dan ikan emas (*Carassius auratus*) selama enam minggu. Pemberian makanan ini adalah untuk menentukan kesan karotenoid ke atas pertambahan warna, tumbesaran dan kecekapan pigmen ke atas ikan tersebut.

Purata berat badan permulaan ikan angel, karp jepun dan ikan emas dalam kajian ini adalah 658.33 ± 16.29 mg, 1207.41 ± 30.94 mg dan 381.92 ± 12.19 mg masing-masing. Ikan angel dan karp jepun diberi makanan yang ditambah dengan 0, 12.5, 25.0, 50.0, 100.0 and 200.0mg-astaxantin/kg makanan. Ikan emas pula diberi makanan yang ditambah dengan 0, 25, 50, dan 200mg astaxantin/kg makanan. Berat badan ikan ditimbang dua minggu sekali dan tisu badan ikan diguna dalam analisis astaxantin pada permulaan dan akhir kajian. Manakala, makanan dianalisis untuk menentukan komposisi kandungan dan kepekatan astaxantin dalam makanan. Kaedah TLC diguna untuk menentukan kehadiran astaxantin dalam makanan dan tisu ikan.

Kepekatan astaxantin dalam tisu ikan emas dan angel telah bertambah dengan pertambahan astaxantin dalam makanan setinggi 6.6534 ± 0.0416 and 20.4624 ± 0.2494 mg/l masing-masing. Makanan D4 telah didapati memberi kesan kepekatan astaxantin dalam tisu (8.8390 ± 0.3604 mg/l) dan kecekapan pigmen (6.6289) yang paling tinggi ke atas ikan karp jepun. Astaxantin juga didapati memberi kesan yang kuat ke atas kepekatan astaxantin dalam tisu dalam kesemua eksperimen. Namun, astaxantin tidak memberi perbezaan kesan ($P > 0.05$) ke atas kadar tumbesaran dalam ikan angel dan emas. Jangkamasa dan peratus ikan emas bertukar warna dipengaruhi kuat oleh kepekatan astaxantin dalam makanan.

Terdapat korelasi antara kepekatan astaxantin dalam tisu dan makanan untuk ikan angel ($R^2 = 0.6896$). Keputusan yang sama didapati antara kepekatan astaxantin dalam makanan dan jumlah astaxantin simpanan (mg) dalam tisu per kg tambahan berat badan ($R^2 = 0.7305$). Di samping itu, terdapat juga hubungan antara pertambahan berat dan kepekatan astaxantin dalam tisu ikan emas ($R^2 = 0.7806$).

Namun demikian, dapat disimpulkan bahawa pertambahan astaxanthin dalam makanan akan meningkatkan warna ikan, memperbaiki kecekapan pigmen dan kadar tumbesaran ikan hiasan.