

## The effect of the dietary ratio of n-3 to n-6 fatty acids on the growth of the prawn, *Penaeus monodon*

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Certain dietary fatty acids have been deemed essential for growth in prawns, these being linoleic (LOA, 18:2n-6), linolenic (LNA, 18:3n-3), arachidonic (ARA, 20:4n-6), eicosapentaenoic (EPA, 20:5n-3) and docosahexaenoic acids (DHA, 22:6n-3) (1). The requirements for LOA and LNA ( $\Delta$ ), then EPA and DHA ( $\circ$ ) were examined in separate 5 x 5 factorial design, 50 day growth experiments. The requirements for ARA ( $\bullet$ ) were examined at seven incremented levels, with it being the sole variable factor in the experiment. This work has resulted in 57 separate treatments, with 45 of them having a different n-3 to n-6 fatty acid ratio. The effect of this ratio on the growth of prawns was examined by standardising across experiments via a common reference diet.

$$y = -2.27x^3 + 16.99x^2 - 15.79x + 207.01 \quad r^2 = 0.40$$

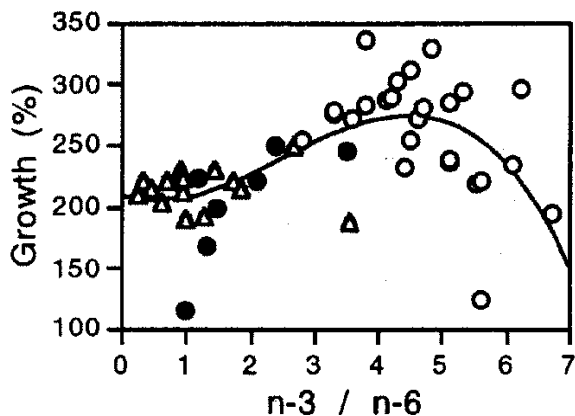


Figure. The effect of the dietary ratio of n-3 to n-6 fatty acids on prawn growth

The results show a 3rd order quadratic effect of the dietary n-3 to n-6 fatty acid ratio on the growth of prawns, with an optimum ratio of 4.5 : 1 (Figure). This effect of n-3 to n-6 fatty acid ratio appears to be additional to the growth promoting effects of specific fatty acids. This is notably demonstrated by the effect on growth of adding ARA to the diet. In these ARA experimental treatments, which had been optimised in all other essential fatty acid requirements, a negative effect on growth occurred with increasing levels of ARA. This effect was consistent with the ARA decreasing the n-3 to n-6 ratio. It has been suggested that the dietary ratio of n-3 and n-6 fatty acids is important because there is competition between the fatty acid classes as substrates for the delta-6-desaturase enzyme system (2).

This work suggests that the ratio of n-3 to n-6 fatty acids in the diet also has considerable effect on the growth of prawns.

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2. Garg, ML. and Clandinin, MT.  $\alpha$ -Linolenic acid and metabolism of cholesterol and long-chain fatty acids. Nutrition 1992; 8(3): 208-210.