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**Development of lobster feeds by
NutrKol Pty Ltd**

From: Judith Kolkovski

During the past four years my partner and I, who

are the founders of NutraKol Pty Ltd, a West Australian based company, have been developing new nutritional additives and feeds for rock lobsters. Our company utilising my skills as nutritionist and naturopath and my partner Dr Sagiv Kolkovski as an expert in marine fish larvae physiology and nutrition. Our joint expertise has resulted in several products that are 'tailor-made' to species and requirements. These products currently include, *Artemia* enrichments both for lobsters phyllosoma and marine finfish larvae, broodstock nutritional additives and boosters, as well as, algae paste (*Dunaliella salina*) boosts with nutrients such as vitamins and immune stimulants.

We found that there is no product available in the market for nutritional experiments - designed to determine the effect of specific nutrient or nutritional requirements. If a scientist or hatchery manager does not know, or cannot manufacture enrichments or additives, the only other option is to compare commercial available products, effectively comparing 'apples to oranges'. Moreover, when working with new species, it might be that specific ingredient or different ration of ingredients is needed, these specific requirements are not usually cater or available in of-the-shelf products. I, therefore, put my expertise as naturopath and chef into practise and developed several liposome-based enrichments and additives. These were initially used as a tool to determined nutritional requirements in different marine organisms (Ritar *et al.* 2005; Bransden *et al.* 2004; Kolkovski *et al.* 2000, 2005) including western rock lobster, *Panulirus cygnus*, phyllosoma. For example, in an experiment conducted by Liddy *et al.* (2005) western rock lobster, *P. cygnus*, phyllosoma were grown from hatching to stage IV. Larvae were fed with *Artemia* enriched with a (i) base enrichment (Base) containing squid oil or enrichments in which oils high in polyunsaturated fatty acid (PUFA) have been added at the expense of squid oil (ii) base enrichment supplemented with docosahexaenoic acid (DHA) rich oil, (iii) base enrichment supplemented with arachidonic acid (AA) rich oil, or (iv) base enrichment supplemented with DHA and AA (D + A) rich oils. The authors found that

by stage IV, the larvae fed the DHA or AA enriched *Artemia* were significantly larger than larvae fed the Base or D + A enriched *Artemia* (Fig. 1). It was found that the addition of AA, and to a lesser extent DHA, to enrichments resulted in increased levels of those FA in *Artemia* and phyllosoma compared with the Base enrichment.

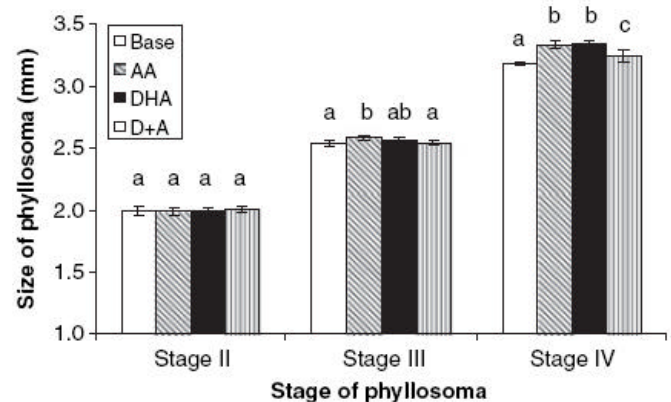


Figure 1 Size of western rock lobster (*Panulirus cygnus*) phyllosoma (mm) after moulting to stage II, III and IV fed the different enrichments (10 larvae from each tub counted, three tubs per enrichment).

NutraKol has been developing nutritional additives, boosting and enrichments formulas for several research organisations such as the Queensland Department of Primary Industry (QDPI) and Tasmanian Aquaculture and Fisheries Institute (TAFI) and NIWA, New Zealand, as well as commercial companies involved in the development of techniques to propagate *P. edwardsii* and *ornatus* spiny rock lobster. The nutritional additives are incorporated in live diets to improve egg quality, larval quality and to enhance the stress resistance of phyllosoma. During the past three years, collaboration links have also been established with commercial companies and R&D centres in U.S, Mexico, Chile, Spain and Portugal.

NutraKol has also been concentrating on the development of semi-moist diet for lobster puerulus and juveniles. The diet is already stable in the water for 24 hr and juveniles have been found to be extremely attracted by it, resulting in high ingestion rates. However, growth rates are yet to be determined.



Judith in the lab, preparing new remedies.

Another area that we are dipping our fingers in is natural remedies and natural antibacterial and anti-fungal. With the understanding that antibiotics are not sustainable practice and my knowledge as naturopath, we developed several products that can be used during the Artemia enrichment and directly in the phyllosoma rearing tanks. These products are currently been tested and would be soon registered with the Therapeutic Goods Administration in Australia (TGA) for aquatic animal use.

NutraKol is seeking collaboration with other R&D centres as well as companies to test the products and collaborate on nutrition and health issues related to lobsters.

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