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Aquafeeds

Study finds krill meal cost-effective ingredient in shrimp feed

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By Maja Baevre-Jensen and Dr. Alberto J.P. Nunes

Krill-derived oil and meal have bioactive ingredients like omega-3s, astaxanthin

With continually rising aquafeed ingredient prices, the search is on for new, alternative ingredients that can be cost-effectively incorporated into commercial diets to replace more traditional ingredients like fishmeal and fish oil.

Qrill, a commercial product derived from Antarctic krill (*Euphausia superba)* – small, shrimp-like crustaceans that constitute one of the world's most abundant sources of marine nutrients – has been reported to act as a feeding effector and growth promoter in shrimp diets. However, as a relatively new ingredient, little is known about its potential to replace key protein and lipid sources in shrimp diets.

A study was recently performed by scientists at the Marine Biology Laboratory (LABOMAR) at the Federal University of Ceará in Fortaleza, Brazil, to evaluate the growth and economic performance of juvenile Pacific white shrimp (*Litopenaeus vannamei)* when traditional ingredients like fishmeal, fish oil, soy lecithin and cholesterol were partially or fully replaced by the krill meal in their diets.

Krill-derived ingredients

Krill-derived oil and meal have a high content of bioactive ingredients like omega-3 bound phospholipids and astaxanthin, which have documented positive effects on both humans and animals.

Omega-3 fatty acids are known to contribute to cell membrane functioning through elasticity and permeability, and thus the transport of key components into and out of cells. Phospholipids are a type of fat that plays a key role in the absorption and metabolism of nutrients. Phospholipids are also important building blocks for all cells in the body. Because the omega-3 docosahexaenoic acid (DHA) is of particular importance in the first few months after hatching, DHA bound to phospholipids seems to increase survival rates and decrease malformation in fish and shrimp larvae.

Study setup

The study was conducted in 25 indoor and 25 outdoor tanks with five replicates for each control and treatment feed. Diets tested included a basal diet designed to fully meet *L. vannamei* nutritional requirements. From the basal diet, three formulas were developed to progressively replace fishmeal, fish oil, soy lecitin and cholesterol with krill meal.

Diets N1, N2 and N3 contained krill meal at 11, 5 and 1 percent, respectively, with reduced levels of fishmeal (0, 6.25 and 12.50 percent, respectively), fish oil (0.80, 2.00 and 1.58 percent), soy lecitin (0, 0 and 1.55 percent) and cholesterol (0, 0.08 and 0.15 percent). As these ingredients were replaced by krill meal, formula costs in the N1, N2 and N3 reduced 18.0, 15.9 and 7.5 percent, respectively, compared to the basal diet.

Results

After 72 days, shrimp reared under both systems showed no significant ($P > 0.05$) differences in performance among treatments. Economic analysis indicated that gross profit margin was mainly driven by formula costs, so greater profits were obtained with savings in formula costs. In this study, the formulas containing krill meal were more cost-competitive than the basal diet (Figs. 1 and 2).

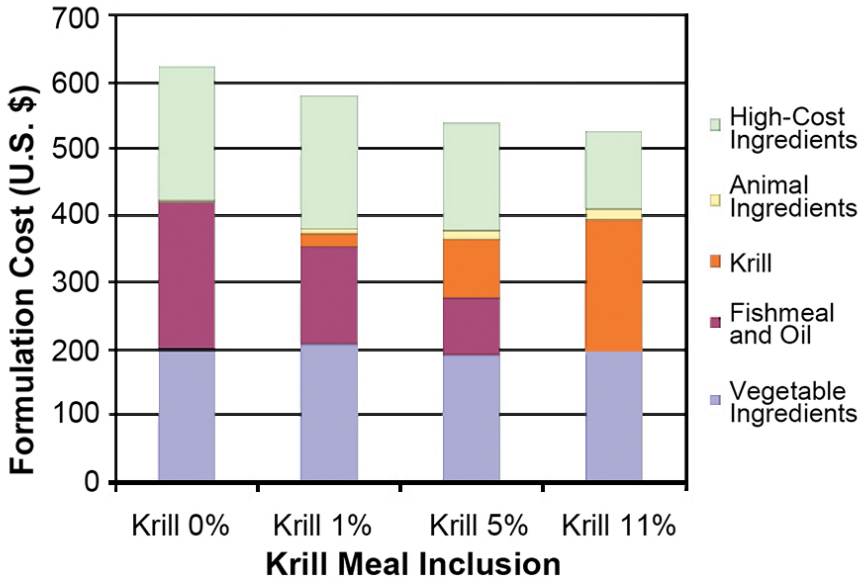

Fig. 1: Relative formulation costs of *L. vannamei* experimental diets tested.

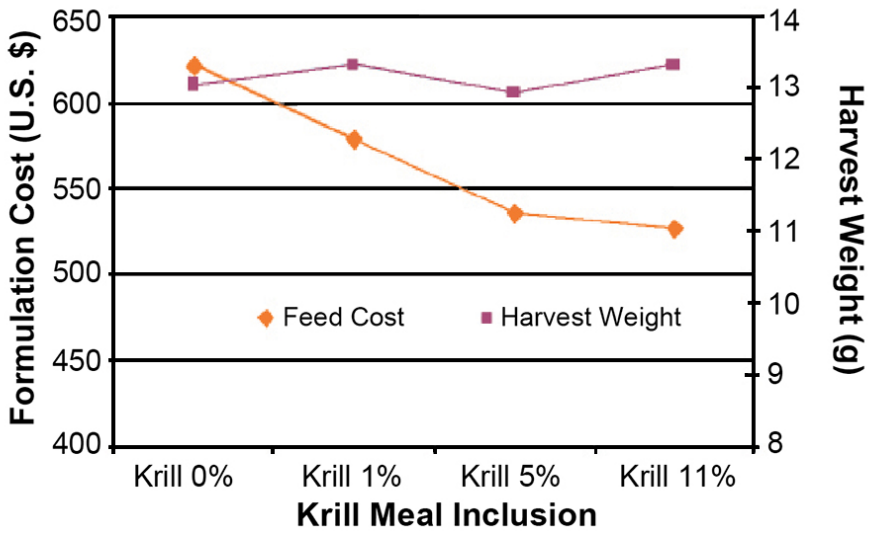

Fig. 2: Relationship of krill meal inclusion levels and shrimp harvest weights obtained with experimental diets.

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Authors

MAJA BAEVRE-JENSEN

Aker BioMarine ASA
Fjordallèen 16
P.O. Box 1423 Vika – 0115 Oslo, Norway

maja.baevre-jensen@akerbiomarine.com (mailto:maja.baevre-jensen@akerbiomarine.com)

DR. ALBERTO J.P. NUNES

LABOMAR/LRNCM
Av. da Abolição, 3207, Meireles
Fortaleza, Ceará, 60.165-081, Brazil