

Title: Behavioral Assays Demonstrate How Krill Meal Enhances Attractability and Palatability of Feed Pellets in the Aquaculture of Pacific White Shrimp, *Litopenaeus vannamei*

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Abstract:

Pacific white shrimp, *Litopenaeus vannamei*, is the major species used in aquaculture of shrimp as of food for humans. Feed used in commercial cultivation of shrimp increasingly contains plant protein as a nutritional source, which has the advantage over animal protein in terms of both cost and sustainability. However, a problem with the use of plant protein, such as soybean meal, is that it lacks the attractability and palatability to shrimp of animal protein, such as fish meal. Thus, maintaining an acceptable growth rate for shrimp requires use of more feed if plant protein is the source, and this causes feed waste and thus lower profitability. Our project is to identify sources of feed additives that can increase the attractability of feed pellets, and to identify mechanisms underlying their effects. We tested krill meal as a chemoattractant to group-housed shrimp. In our first experiment, an aqueous extract of krill meal induced shrimp to move toward, probe, and grab the site of its release, in a concentration-dependent manner. In our second set of experiment, we tested the ability of krill meal to enhance the attractability of feed pellets into which the krill meal was incorporated. An aqueous extract of the feed pellets was significantly more attractive to shrimp if the pellets contained krill meal, and the effect of krill meal was concentration dependent. However, this effect did not occur for 5-min rinses of the feed pellets, but rather required longer extraction. Research by others in our laboratory on effects of krill meal on ingestion of pellets to which it has been added shows that krill enhances the rate of consumption, the number of pellets eaten, and the total amount of pellets eaten in a concentration-dependent fashion. Krill has this effect by keeping the shrimp eating longer, rather than altering the rate of feeding. Taken together, our results show that krill meal is a chemoattractant but its effect when added to feed pellets may be more in increasing the pellets' palatability than in increasing its

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