Title: Artificial Flavorings Enhance Attractability and Palatability of plant protein sources for *Litopenaeus vannamei*

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Abstract: Aquaculture provides a sustainable source of food for human and animal consumption. Pacific white shrimp, *Litopenaeus vannamei,* is a major species in aquaculture as a food source for humans. Shrimp feed used in commercial cultivation contains increasingly more amounts of plant protein, such as soybean meal. Compared to a traditional protein source of fish meal, plant protein is not as palatable and lacks attractability to shrimp. Developing an economical and nutritious feed that decreases feed waste, increases profitability, and promotes growth is necessary and desirable in this expanding industry. Previous experiments show that krill meal is a chemoattractant that increases the palatability of feed pellets to shrimp. In this project, krill meal was tested against several mixtures of different chemoattractants that were infused into the feed pellets. In the second part of the project, lecithin, a source of phospholipids that are important in maintaining cellular structure, was added to the pellets containing either krill meal or mixture, M3. It was tested for possible effects on attractability and palatabilty of the feed pellets.

Method: The behavioral assays performed measured the attractability of chemoattractants and palatability of food pellets containing either krill meal or an infusion of chemoattractant mixtures. Pellets were crushed, and the chemoattractants were extracted for one hour into solution. During the attractability assays, a peristaltic pump delivered the aqueous extracts through tubing into each tank. The number of times the shrimp grabbed the airstones attached to the tubing were counted and recorded. For the palatability assays, 13 grams of whole pellets were put into each tank for three hours each trial. The uneaten pellets were removed from the tanks, dried, and weighed. Analysis was done with 1-way and 2-way Anova.

Results: In Attractability assays of krill meal and infused pellets without lecithin, we observed comparable amounts of attraction between pellets containing krill meal and pellets containing either mixture M3 or M8. Higher concentrations of krill meal or mixtures yielded higher responses from the shrimp. The same observations were made with the Palatability assays. The shrimp consumed more pellets with the M3 mixture than the krill meal pellets. M3 pellets with lecithin had higher responses than the krill meal pellets with lecithin in both the attractability and palatability assays. We observed that the 1% M3 pellets garnered more responses than the 5% M3 pellets.

Discussion: The infused artificial mixtures enhanced the attractability and palatability of the plant protein shrimp feed showing that the artificial mixtures could replace fish meal and krill meal. When lecithin was added to the pellets, it effectively enhanced M3's effect on attractability and palatability of the feed pellets, especially at lower concentrations. Less of the chemoattractant mixtures could possibly be used to get the same results. These mixtures could be effectual sources of feed additives that would benefit shrimp aquaculture. Future experiments could focus on testing effectiveness of individual chemoattractants rather than mixtures.