

FeedKind Protein Applications in Whiteleg Shrimp

Originally developed in Norway for the Atlantic salmon industry, FeedKind Aqua is an ideal high-protein feed ingredient for shrimp. FeedKind has a similar amino acid profile to fishmeal, is highly digestible, and can be incorporated into diets across all life stages. A proximate analysis of FeedKind Aqua protein is shown in table 1.

FeedKind Aqua is a non-GMO single cell protein produced via natural fermentation from a state-of-the-art production facility. The product will be available year round, independent of weather events, protecting the feed supply chain from volatility and risk.

FeedKind Aqua protein is also traceable from the factory to the plate. Containing a unique elemental profile that persists in the feed and the final product, a FeedKind-fed shrimp can be differentiated from shrimp fed on other diets. A simple test can guarantee that the shrimp in the freezer at the local grocer is the same one that came out of the pond.

FeedKind protein is approved for use in a wide range of fish and livestock in multiple regulatory jurisdictions around the world.

Nutritional Value of Single Cell Protein in Whiteleg Shrimp

To assess the beneficial effects of FeedKind protein in shrimp specifically, a trial in Pacific whiteleg shrimp (*Litopenaeus vannamei*) was conducted in partnership with Texas A&M University-Corpus Christi and Auburn University. Growth response and survival in juvenile shrimp fed graded levels of FeedKind was evaluated relative to a fishmeal-containing reference diet.

Nutritionally complete diets were prepared at Texas A&M AgriLife Research and compared in an indoor, eight week growth trial, at the E.W. Shell Fisheries Research Station, Auburn University, Alabama. Juvenile shrimp were stocked into replicate treatment tanks of ten juveniles per tank at an average weight of approximately 0.1 grams. Treatment tanks were connected to a recirculating aquaculture system to maintain water quality factors.

Shrimp were fed seven variant control feeds in treatment diets according to a standard feeding curve based upon a Feed Conversion Ratio (FCR) of 1.8, doubling of weight every week until week five. Feeds comprised of a basal control diet of 15% fishmeal and five diets of increasing concentrations of FeedKind to replace fishmeal, at 1.5%, 3.8%, 7.5%, 11.3%, and 15% of total feed. Diets also included marine-based attractants that were kept constant in all diets. The duration of the trial was eight weeks and the average weight at termination was 8-10 grams per animal.

Table 1

Proximate Analysis	
Crude Protein	>71%
Crude Fat	8%
Crude Fiber	<1%
Ash	9%
Moisture	5%
NFE	7%

The mean survival of all diets was 93.5% over the eight week period, indicating conditions were adequate for shrimp growth. Survival rates varied from 84% for the control diet to 97% for the diet with 100% fishmeal replaced by FeedKind protein with all test groups, except the 3.8% group, showing statistically significant ($p < 0.05$) improvement relative to the control (Fig. 1).

This improvement in survival demonstrates that FeedKind protein is well-tolerated in shrimp relative to fishmeal and can improve the health of the animals under research conditions. Additional farm-scale trials will be conducted to assess the magnitude of this benefit at commercial scale.

Fig. 1

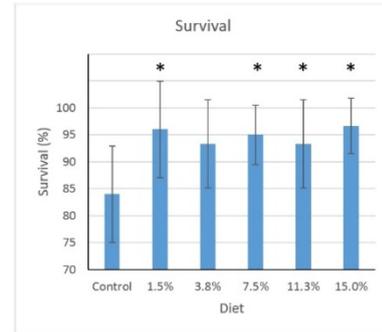
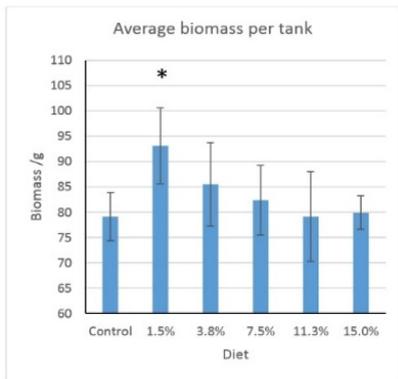


Fig. 2



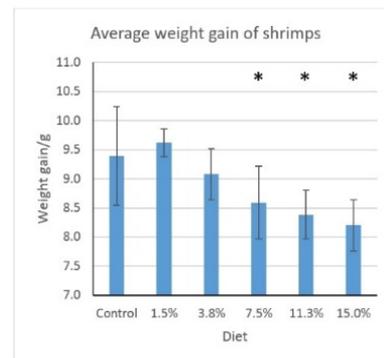
FeedKind protein inclusion resulted in statistically significant increases in aggregate shrimp weight in the 1.5% and 3.8% FeedKind diet groups (Fig. 2). The largest increase was an improvement from 80 grams per tank up to 93 grams per tank in the 1.5% FeedKind protein diet, representing an 18% increase in total productivity. The treatment with no fishmeal performed equivalently to the control on this metric, indicating a 100% replacement of fishmeal with FeedKind can be achieved without a loss of productivity.

Average weight gain per shrimp was also assessed (Fig. 3). Unfortunately, the significant differences in survival between the groups cause the interpretation of this metric to not be straightforward. The 7.5%, 11.3%, and 15% FeedKind diets all showed a statistically significant decrease in average shrimp weight relative to the control. This is likely due to the fact that the feed amounts were held constant for all tanks, even though there were more live shrimp in the test diet tanks than the control tanks. Therefore, it is likely that individual shrimp in the control diet tanks were able to grow larger due to having more food available. An inverse correlation was observed between survival and average weight gain in individual control tank diets, supporting this hypothesis.

However, the 1.5% and 3.8% FeedKind groups showed no significant difference in average weight relative to the control even though survival was improved relative to the control in both groups.

These data support the ability of FeedKind to successfully replace fishmeal in diets for whiteleg shrimp. The improved growth and survival of shrimp with low levels of FeedKind protein inclusion indicate that performance of FeedKind diets may even be superior to fishmeal under certain conditions. Additionally, as a reliable and traceable feed ingredient, FeedKind protein stands to dramatically improve consumer confidence in the supply chain.

Fig. 3



Please contact Calysta at feedkind@calysta.com or +1(650)492-6880 to request samples or get more information.

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