

# Practical application of scientific advancements for improving sustainable shrimp feed

By Scott Snyder, Ph.D., Manager – Aquaculture Technical Service, Animal Health and Nutrition Division, H.J. Baker & Bros., Inc., USA.

## The fishmeal trap

The use of marine proteins in aquafeeds designed to supply essential nutrients and yield rapid growth in shrimp continues to be scrutinized by the general public. The influence of the public's perception on aquaculture is becoming more important as the relative amount of food fish supplied to the public from aquaculture continues to grow. Currently, over 50% of all fish consumption now comes from aquaculture and the purchaser of this product is more concerned with sustainable food production practices now than even just two – three years prior. One of the most cited concerns relative to aquaculture is the perceived over-exploitation of marine fisheries. While the dietary inclusion level of fishmeal in aquafeeds has declined significantly over the last decade, its use in feeds for marine shrimp remains elevated relative to feeds for other species. Globally, the fishmeal supply is stable at 6.0-6.5 million metric tons; however, over the last decade, aquaculture feed production has increased by over 50% and aquaculture feeds currently utilize roughly 70-75% of the fishmeal supply every year. Therefore, despite great successes in reducing

dietary fishmeal inclusion levels there is still an ever increasing demand for fishmeal in aquaculture. This is often referred to as the “fishmeal trap”. Basically the industry's growth rate is perceived as outpacing the supply of one of its most fundamental resources, fishmeal.

## Current aquaculture feed strategies: alternative ingredients and improved formulation

Currently, fishmeal levels in commercial shrimp feeds can range from 15 – 20% of the total dietary formula, while fishmeal content in all aquaculture feeds combined averages about 13% of the total dietary formula. Feed manufacturers continually strive to demonstrate continuous improvement in feed formulations from the standpoint of achieving an overall reduction in the content of fishmeal in their formulations. However, their efforts have been less successful than for other species. For example, the fishmeal inclusion level in diets for Atlantic salmon changed from an average of 35% to 15% between 2005 and 2015, an annual fishmeal reduction of roughly 2% per year while fishmeal inclusion in diets for

shrimp have remained relatively static.

Fishmeal reduction strategies include the use of an array of alternative protein ingredients, both novel and traditional. However, the use of these ingredients is limited due to overall cost and limited essential nutrient profile. For nearly 30 years, research has been conducted in university, government and commercial labs towards finding a suitable replacement for fishmeal in aquaculture diets. Research on single ingredient substitutions with ingredients like poultry meal, blood meal or soybean meal taught us that while an ingredient may have similar proximate composition, it was often deficient in one or more limiting essential amino acids or contained anti-nutrients; resulting in reduced digestibility, lower nutrient availability or intestinal enteritis.

While precision formulating diets with supplemental essential nutrients, mainly the amino acids methionine and lysine, and more recently threonine, tryptophan and even taurine has contributed to increased use of alternative ingredients in aquaculture feeds, fishmeal, for many species including shrimp, continues to be one of the primary protein sources used in feeds. The primary factor affecting the

use of supplemental essential amino acids in shrimp feeds is that shrimp consume feed after external mastication. This is a slow process that results in a high degree of leaching of supplemental amino acids. Currently, there is no solution for how shrimp eat, but there are alternatives that can assist with leaching.

### A new, full fishmeal replacer for shrimp

H.J. Baker's Aqua-Pak Pro-Cision is a precision formulated protein concentrate made from high quality animal and vegetable proteins. It contains no marine proteins yet it is designed to reflect the essential amino acid profile of high-quality #1 fishmeal. H.J. Baker uses precision formulation to ensure nutrient consistency and we use a patent-pending anti-leaching technology to ensure that the supplemented essential amino acids have greatly reduced leaching yet are still

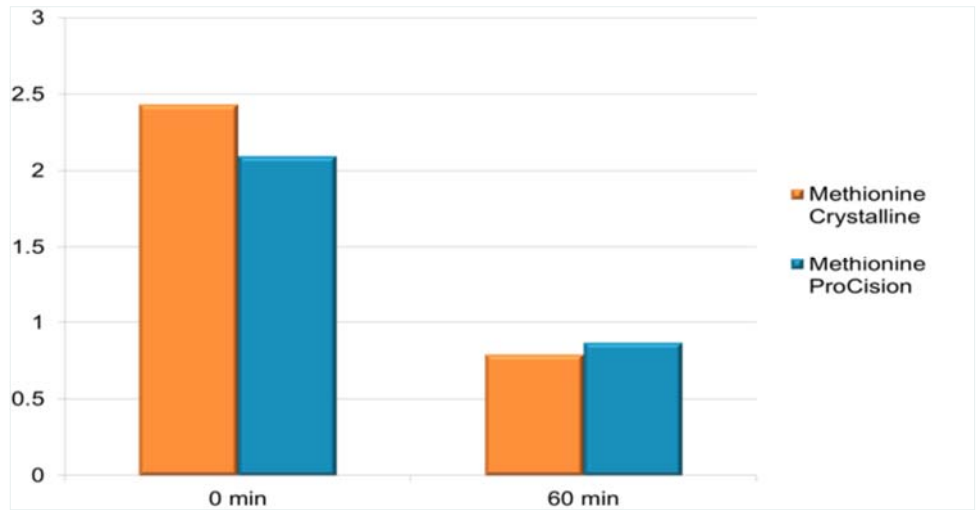


Figure 1. Methionine leaching.

digestible and available for shrimp. Aqua-Pak Pro-Cision is a water-stable advanced amino acid delivery system. Our research has demonstrated that leaching of the supplemental nutrients methionine and lysine in Aqua-Pak Pro-Cision is reduced by over 40% and 60% respectively compared to crystalline amino acids. This technology helps improve shrimp feeds two ways.

First, amino acid leaching is reduced which results in a more efficient delivery of nutrients to the shrimp. Second, the reduced leaching allows for a 14% reduction in dietary methionine supplementation and an 8% lower dietary lysine supplementation, which is formulation cost savings that apply directly to your bottom line (Figures 1 and 2). Lastly and most importantly, fish fed Aqua-Pak Pro-



[www.nutriad.com](http://www.nutriad.com)



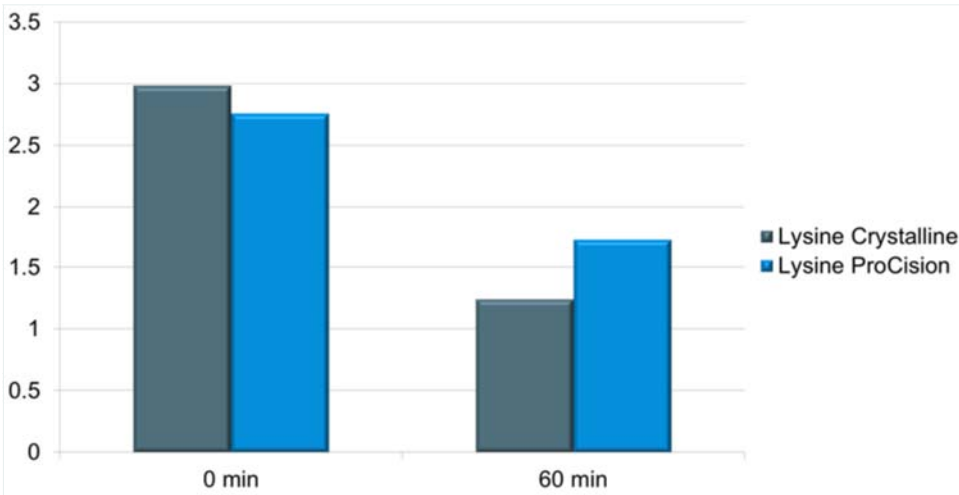


Figure 2. Lysine leaching.

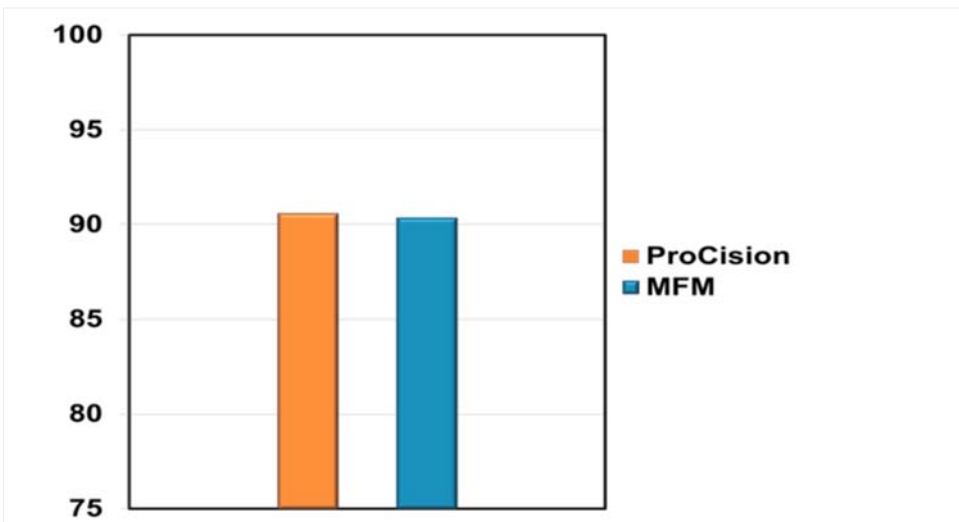


Figure 3. Methionine digestibility.

Cision exhibited methionine digestibility equivalent to fish fed a fishmeal control diet (Figure 3).

## Conclusion

Through the use of precision formulation, high-quality ingredients and new technology, H.J. Baker is working to bring viable fishmeal replacement solutions to the shrimp industry. Aqua-Pak Pro-Cision can be a part of the solution to reducing fishmeal in shrimp feeds while maintaining or improving animal performance, making a positive example of the sustainability of shrimp farming.

AFQ

*The primary factor affecting the use of supplemental essential amino acids in shrimp feeds is that shrimp consume feed after external mastication. This is a slow process that results in a high degree of leaching of supplemental amino acids. Currently, there is no solution for how shrimp eat, but there are alternatives that can assist with leaching.*

### More information

For more information, Alissa Smith, Corporate Communications, H.J. Baker & Bros., Inc., Little Rock, AR, USA.

E: [asmith@hjbaker.com](mailto:asmith@hjbaker.com)