



A UNIQUE PROTEASE COMPLEX LEADING THE WAY FOR MORE THAN 15 YEARS

Feed represents 50-90% of the operational costs in any aquaculture enterprise. Reducing feed cost while improving or maintaining productive potential is a wise, much desired strategy.

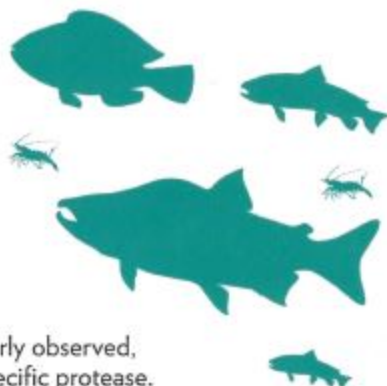
Today, protease usage in animal nutrition is gaining popularity because of the high cost of available protein and energy sources, increasing environmental concerns and above all, a better affordability of these feed additives.

Proteases increase feed protein digestibility by hydrolyzing the peptide bonds and hence resulting in more available peptides and amino acids. Specific proteases can also play a role in other digestive physiological parameters. They allow feed formulators to use low-cost ingredients in the feed-matrix, reducing or completely replacing more expensive protein sources, while maintaining or increasing the digestible nutrient content in the feed.

The objective of using a protease in aquaculture is to complement the natural physiology of the fish and crustacean in order to improve and/or to maintain performance while significantly lowering the feed cost.

AQUACULTURE SPECIFIC

Fishes and crustaceans respond well to exogenous protease. Moreover, exogenous protease can contribute to improving digestion by making more proteins available and by increasing the mucosal surface area for nutrient absorption. This also results in a significant decrease in overall waste output.



A LOT MORE THAN JUST A THEORY CONCLUSIVE TEST RESULTS IN VARIOUS SPECIES

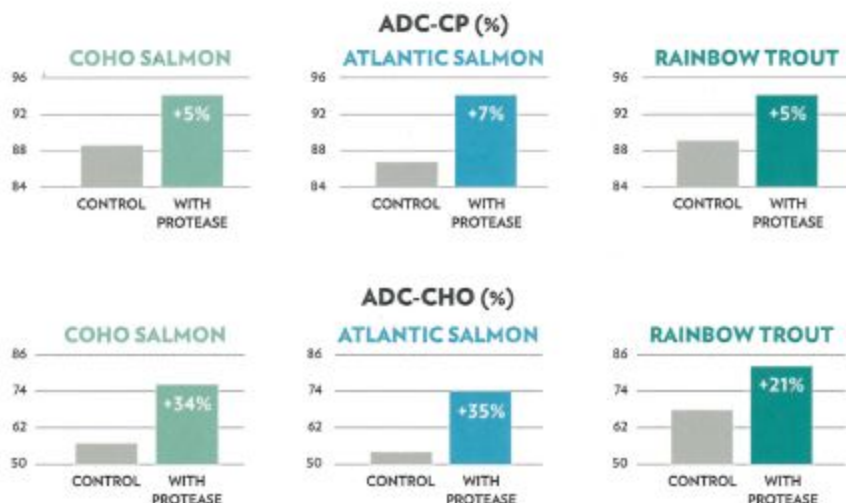
Increased growth performance and additional physiological responses are regularly observed, irrespective of extrusion temperatures and feed formulations when fed with a specific protease.

- Exceptional **Heat Stability**
- Improved **Growth and Digestibility of Nutrients**

SALMONIDS

The trial demonstrated significantly improved apparent digestibility coefficients (ADC) of crude protein (ADC-CP), carbohydrate (ADC-CHO) and energy in three salmonid species. The diets were extruded at 120°C for -30 seconds.

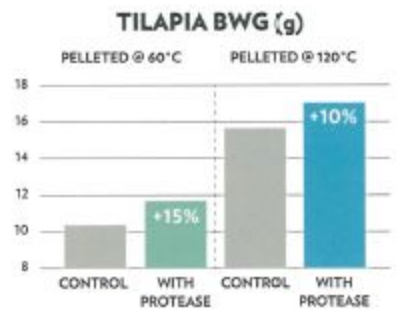
Ref.: Universidad Catolica de Temuco, Temuco, Chile, 2012.



TILAPIA

The results demonstrated the heat resistance of the enzyme; 10% improvement in growth with diets extruded at 120°C for -1 minute.

Ref.: Shanghai Fisheries University, Shanghai, China, 2006.



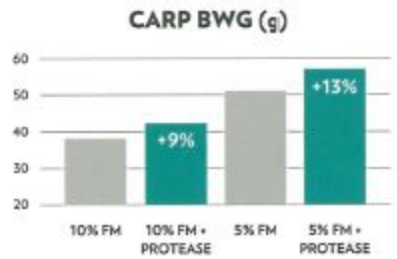
IMPROVED GROWTH AND FCR IN OTHER SPECIES

CARP

The trial performed highlighted greater endogenous enzymes activities when receiving the specific protease in a diet where fish meal (FM) was progressively replaced by soybean meal.

Improved growth performance (body weight gain - BWG) was observed in fish receiving a low fish meal diet with the protease. Feed conversion ratio (FCR) was significantly improved as well as the protease activity in proximal intestine.

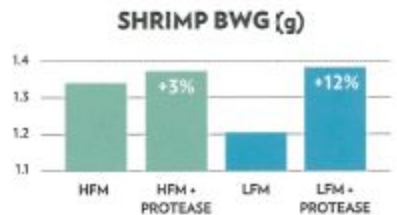
Ref.: Shanghai Fisheries University, Shanghai, China, 2006.



SHRIMP

The trial demonstrated an increased growth (body weight gain - BWG) in shrimps receiving the specific protease. A marked improvement in feed conversion ratio (FCR) was observed (2% and 10%) in shrimps fed protease with both high fish meal (HFM) and low fish meal (LFM) diets respectively.

Ref.: Shanghai Fisheries University, Shanghai, China, 2005.



INTESTINAL PHYSIOLOGY

A good protease will increase the solubility and digestibility of proteins in feed ingredients, will contribute to the inactivation of some anti-nutritional factors generally associated with plant proteins, will complement the activity of endogenous proteolytic enzymes, and will have positive physiological and structural effects on the small intestine, namely a regulation of mucus producing goblet cells coupled with an increase in villi size and number (figure 1). These changes increase the overall mucosal surface area that result in a higher nutrient absorption capacity.

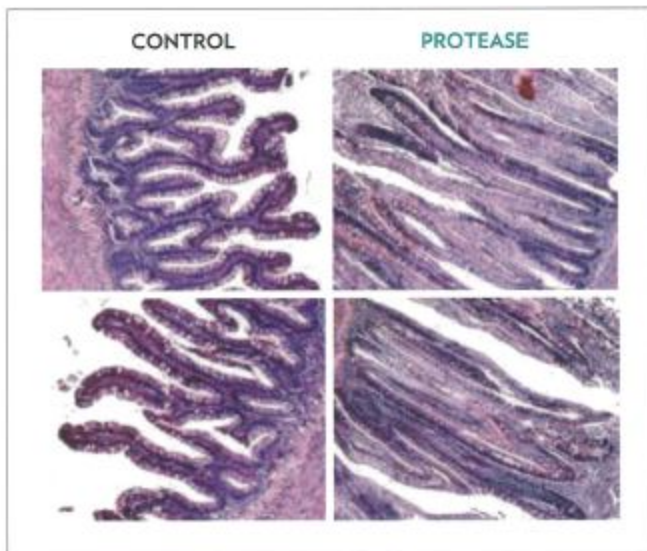


Figure 1: Effect of a specific protease on size and structure of intestinal villi of trout (Dr. Guajardo & Dr. Cárdenas Villarroel, Chile - Jefe internal data, 2006).

FOR OPTIMAL RESULTS UTILIZE THE SPECIFIC PROTEASE

- Remarkable thermal stability
- Extra benefits on gut physiology and development
- Wide pH optima (6.5-8.5)
- Low inclusion rate (175 g/metric ton of feed or 6.2 oz/ton)
- Worldwide proven results in a large variety of feed formulations.

