Why make hydrolysates instead of meals?

Everyone understands meals, but few people understand hydrolysates. This gives a big advantage to the companies who do understand them!

We are proposing that the suggested full name of the process is "**protein hydrolysis**". This refers to any process in which the flesh is broken down by protein-digesting enzymes. Those enzymes may be present naturally in the viscera of the material being digested, or they may be purchased commercially and added during the process.

In general terms, enzymes process co-products into valuable food ingredients such as fish and seafood protein extracts (FPEs), which consist of a good-quality flavored broth and a valuable fish oil fraction as well as a clean bone fraction that is suitable for gelatine processing.

The digestion can be stopped at different points, to get different end products. For example, the flavor of pickled or salt-cured herring comes partly from pickling or salting, but mostly from the enzymes in the herring flesh, which have softened the flesh and added new flavors. The herring has undergone a partial protein hydrolysis. The recommended digestion for krill, goes further, and turns the flesh of krill into a liquid. Some parts of the krill are not digestible, such as the shell, and these are screened out.

Proteins are composed of many amino acids linked together in chains. During digestion, those chains are broken so that the end product is composed of smaller chains (depending upon how many amino acids are in these chains, they may be called "**di-peptides**" or "**tri-peptides**" or **"polypeptides**") and some single "**free**" amino acids. By changing the enzymes used or the time allowed for digestion, one can manipulate the amounts of free amino acids.

Why should someone bother doing this?

What is the value of breaking down proteins into smaller pieces?

There are five reasons.

1. **Hydrolysis increases digestibility.** Enzyme hydrolysis mimics the process that occurs in an animal's stomach. For very young animals, who have immature digestive systems, there is a big advantage in foods that are partially pre-digested

2. **The smaller pieces produced by hydrolysis travel easily in the water.** They announce the presence of food to animals, especially young ones who may not recognize the visual pattern of manufactured feeds, and they stimulate appetites. They are the equivalent of aroma to those of us who live on land

3. **Hydrolysis changes and intensifies flavors.** The flavors in foods come from many sources, but one big source of flavor in natural foods is free amino acids. Intact proteins don't have a lot of flavor, but very small bits of protein and single amino acids have a lot of flavor. For example, shellfish have a naturally sweet and distinctive flavor. Much of this is due to one amino acid: glycine. "Meaty" flavors are largely due to a different amino acid: glutamine. MSG is a salt of glutamine that adds both saltiness and meat-type flavor to foods. Depending upon the degree of digestion, hydrolysis can make a food a little bit tastier (like herring) or it can make the flavors so intense that only very small amounts can be added (like MSG). In pet foods, very small amounts of hydrolysates (called "**digests**") are added to make dry foods palatable. Hydrolysates are used at low levels of inclusion to flavor human foods and animal feeds. Because the use level is low, and the value is great, the price can be high

4. **High prices!** Depending upon the target market, the degree of digestion and how well controlled the process was, the price of hydrolysates can be anywhere from two to twenty times the price of meals. We believe that the earliest manufactured feeds for baby fish are a very attractive market for hydrolysates. These young fish need help recognizing that pellets are food, since they are used to live organisms as feed, and the small molecules that hydrolysates release into the water tells them that this is food and stimulates their appetites. They benefit from the pre-digestion, as well as from the inherent nutritional benefits of the raw material. And, since very small fish require very small amounts of feed, the growers are willing to pay very high prices for this specialized feed – especially a feed which offers survival and growth benefits.

5. And finally, **the process of hydrolysis can be manipulated to manufacture a variety of products.** The duration of the process, the type of enzymes used, and the process itself (for example, which temperatures are used) offer possibilities for future diversification of products that can enter many markets **– synergy, variation, extrapolation. Hydrolysis therefore empowers other fraction yields' and quality such as high quality oils and clean shells.**