

The Importance of Amino Acids in Fish Farming



Good nutrition in animal production systems is essential to economically produce a healthy, high quality product. In fish farming, nutrition is critical because feed represents 40-50% of the production costs.

Fish nutrition has advanced in recent years due to the development of new, balanced commercial diets that promote fish growth and health. Fish reared in high-densities, require a high-quality, nutritionally complete, balanced diet to grow rapidly and remain healthy.

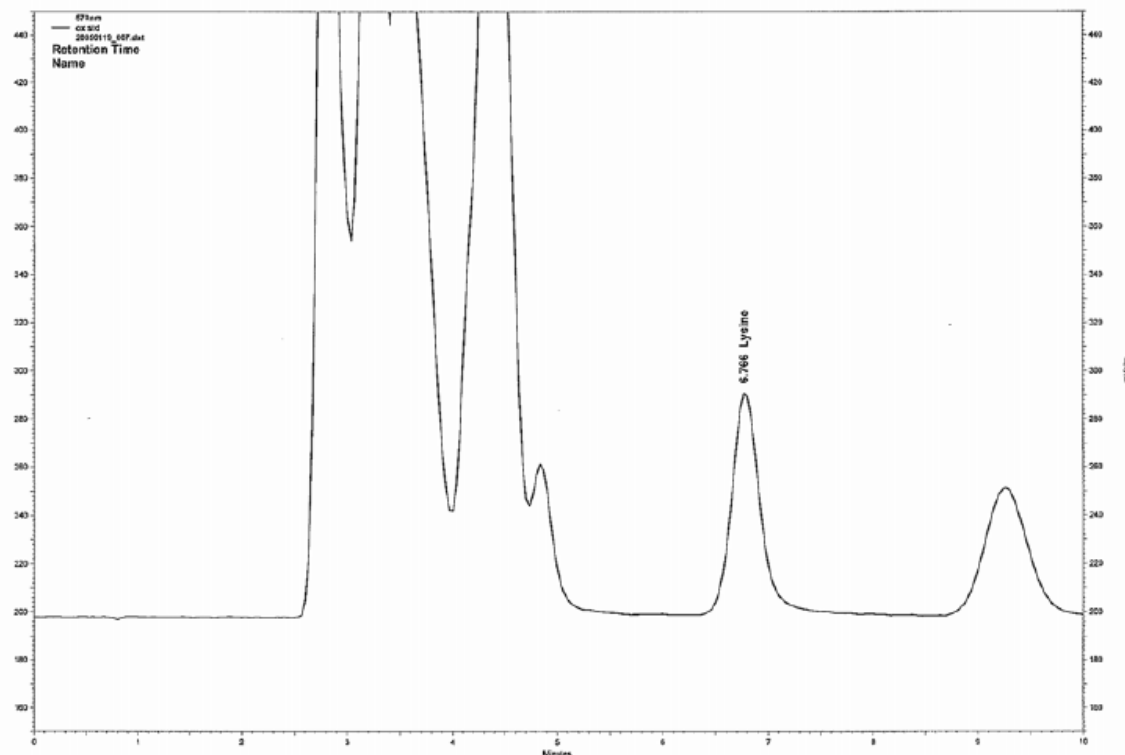
Protein is the most expensive part of fish feed, so therefore it is important to accurately determine the protein requirements for each species and size of cultured fish.

Over 200 amino acids occur in nature, however only about 20 of these are considered common. Fish cannot themselves synthesize the 10 indispensable amino acids, so these amino acids must be supplied by the diet.

These amino acids are:

- Methionine
- Arginine
- Threonine
- Tryptophan
- Histidine
- Isoleucine
- Lysine
- Leucine
- Valine
- Phenylalanine

Lysine and methionine are often the first limiting amino acids. Manufacturers need to adjust the protein level to meet the requirements of the first limiting amino acid(s).



Standard chromatogram obtained with short program (Lysine retention time: 6.766 min)

Fish feeds prepared with plant (soybean) protein typically are low in methionine, therefore extra methionine must be added to soy-bean meal based diets in order to promote optimal growth and health. A chromatogram of a Soybean Meal amino acid profile is shown in Figure 2.

It is important for fish farming that protein and amino acid requirements are known and matched for each of the fish species reared to maximise growth and health of the fish.

Protein levels in aquaculture feeds generally average 18-20% for marine shrimp, 28-32% for catfish, 32-28% for tilapia, and 38-42% for hybrid striped bass.

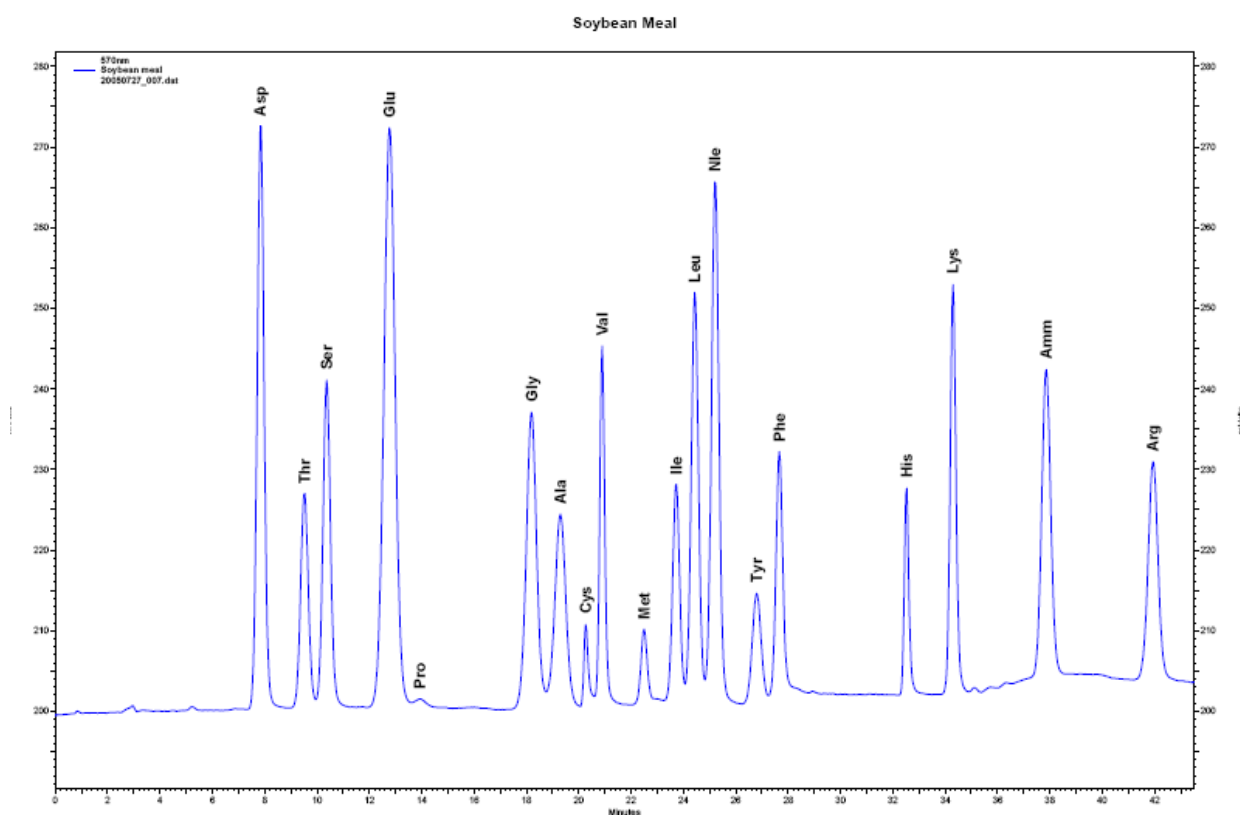
Protein requirements are usually less for plant-eating fish and omnivorous fish than they are for fleshing-eat fish, and are higher for fish reared in high density than low density systems.

Protein requirements also vary with:

- Age of fish (requirements decrease with increasing age), rearing environment, water temperature, water quality, genetic composition of fish, and feeding rates of fish.

Less protein can be used if farmers meet the minimum requirement for the first limiting amino acid(s) instead of meeting a minimum protein requirement. High protein prices is an obvious incentive for feed manufacturer to use synthetic supplemental amino acids in fish feeds.

Studies on amino acid requirements of fish are needed so that amino acid analysis of fish feed commodities and of finished feeds will supply the exact knowledge necessary for formulating diets which will support maximum growth of the fish under each husbandry technique.



Sample kindly provided by N-P Laboratories

Figure 2. Amino acid profile of soybean meal