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Aquafeeds

Leaching impacts amino acid profiles of commercial shrimp feeds

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Study evaluates performance of commercial feeds available in Mexico

Due to leaching, the amino acid profile of a balanced aquafeed can change before ingestion. The loss of amino acids depends on the solubility and binding properties of the ingredients, the pellet-manufacturing process, and the rate at which the feeds are consumed. The consequences of amino acid leaching on yield can be substantial, as the content of essential amino acids can limit protein deposition.

The authors recently conducted a study at the Mariculture Program of the Universidad Autónoma de Nuevo León in Mexico with the help of Degussa to determine the amino acids content of several commercial shrimp feeds used in Mexico. In addition, they determined the effects of leaching for six of the feeds.

Feed study

The feed samples were collected from shrimp farms in the state of Sinaloa between January and August of 2004. The feeds were analyzed for dry matter, protein and amino acids. The samples were leached for one hour by immersion in sea water at 28 degrees-C and analyzed again. Freeze-dried Pacific white shrimp were also analyzed to use the results as a model for actual amino acid requirements.

Results

The feeds displayed very similar amino acid profiles, with higher amino acid content corresponding to higher dietary protein levels. After leaching, several essential amino acid contents in feeds, particularly for arginine, lysine and methionine, were lower compared to the shrimp amino acid profile (Fig. 1). Those deficiencies are important in shrimp nutrition.

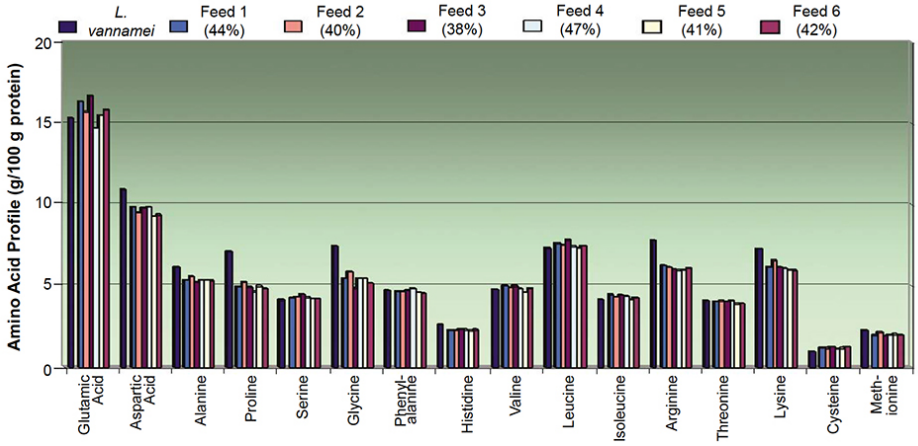

Fig. 1: Amino acid profiles of shrimp and leached commercial feeds with reported 40 percent protein content. Analyzed content in parentheses.

The percentage of amino acids lost to leaching varied among feeds. Methionine and lysine displayed the highest losses, with mean values of 13.8 and 13.0 percent respectively (Table 1). The mean loss for other amino acids was 8.0 percent, including 7.1 percent for threonine, 9.8 percent for arginine, 5.3 percent for isoleucine, 4.9 percent for valine, 12.3 percent for histidine, and 5.0 percent for phenylalanine.

Cruz-Sanchez, Nutrient losses from commercial feeds, Table 1

	Dry Matter Loss (%)	Crude Protein Loss (%)	Methionine Loss (%)	Lysine Loss (%)	Loss of Other Amino Acids (%) Mean	Loss of Other Amino Acids (%) Minimum-Maximum
Feed 6	12.6	13.2	16.2	16.5	10.3	7.5-13.6
Feed 5	9.6	5.8	6.5	10.2	5.7	1.4-7.7
Feed 4	10.1	9.1	14.9	13.6	7.9	3.7-12.8
Feed 3	8.5	8.2	13.1	12.2	7.4	3.0-14.8
Feed 2	4.8	11.5	15.4	11.9	9.4	2.6-17.4
Feed 1	8.9	12.4	17.0	13.6	7.0	4.1-12.8
Mean value	9.1	10.0	13.8	13.0	8.0	

Table 1. Nutrient losses from commercial feeds after one-hour immersion in sea water.

Nutritionists should consider leaching losses as well as the digestibility of essential amino acids when setting the dietary amino acid content of shrimp feed. In this study, lower-than-expected dietary levels for methionine and lysine may have been related to the use of soluble supplements. In this context, the use of insoluble amino acids could be beneficial.

Although the arginine was as stable as the other amino acids, its content was low in the leached diet because it was low in the original feed – a common feature of those formulations recommended by Akiyama, Dominy, and Lawrence in 1991. Their suggestions on arginine are not necessarily incorrect, but do not reflect the shrimp body amino acid profile which the authors suggest is an ideal reference for setting recommendations on arginine and other required dietary compounds.

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