Nutritional Composition

Nutritional composition determines the potential for a new feed ingredient to be included in aquafeeds. Ingredients can be classified into two general groups. One group is protein and carbohydrate sources and the proximate composition (crude protein, lipid, moisture and ash), energy, amino acids and minerals. The second group is energy sources, which are primarily lipid or oil products for which a complete fatty acid profile is needed. Extruded aquafeeds need a carbohydrate source to hold the pellet together.

Nutritional composition is a first step since it determines the appropriate test design. Ingredients that are suspected to contain anti-nutrients should have these measured (i.e. soy, guar, or canola meals). The anti-nutrient testing should target the suspected compounds and testing differs among ingredients.

These tests are best run by an AOAC (Association of Official Analytical Chemists) Methods Certified Lab.

For all the analyses listed, 0.5 kg of product is suggested but the ingredient provider should check with the laboratory that will be running the tests for the precise quantity they will require. Suggested facilities are listed here: https://f3fin.org/resources/testing-facilities/ under type 'Compositional Analysis'.

Protein and carbohydrate sources;
Crude Protein
Lipid
Moisture
Ash
Gross energy
Amino acids; alanine, arginine, glutamic acid, glycine histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, serine, tyrosine, valine
Minerals; calcium, copper, iron, magnesium, manganese, phosphorus, potassium, sodium, sulphur, zinc

Energy sources;
Different analytical laboratories provide different packages of fatty acid analyses but it should include at least: linoleic, linolenic, arachidonic, eicosapentaenoic, docosahexaenoic, omega 3, and omega 6 content.
A typical report should contain the below list. Fatty acids below in bold are the most important in terms of nutritional and economic value for this analysis.

C12:0 Lauric acid
C14:0 Myristic acid
C14:1 Myristoleic acid
C15:0 Pentadecanoic acid
C16:0 Palmitic acid
C16:1 Paltmitoleic acid
C16:2 Hexadecadienoic acid
C16:3 Hexadecatrienoic acid
C16:4 Hexadecatetraenoic acid
C17:0 Heptadecanooic acid
C:18:0 Stearic acid
C18:1w7 Oleic acid
C18:2w6 Linoleic acid
C18:2w4 Linoleic acid
C18:3w6 Linolenic acid
C18:3w3 Linolenic acid
C18:4w3 Octadecatertraenoic acid
C20:0   Arachidic acid
C20:1w9 Eicosanoic acid
C20:3w6 Eicoatrienoic acid
C20:4w6 Arachidonic acid (ARA)
C20:4w3 Arachidonic acid
C20:5w3 Eicosapentaenoic (EPA)
C22:0   Behenic acid
C22:1w9 Erucic acid
C21:5w3 Uncosapentaenoic acid
C22:4w6 Docosatetraenoic acid
C22:5w6 Docosapentaenoic acid
C22:5w3 Docosapentaenoic acid
C22:6w3 Docosahexaenoic acid (DHA)
C24:0   Lignoceric acid
C24:1   Nervonic acid
Total Omega 3
Total Omega 6
Omega 3/Omega 6 ratio