

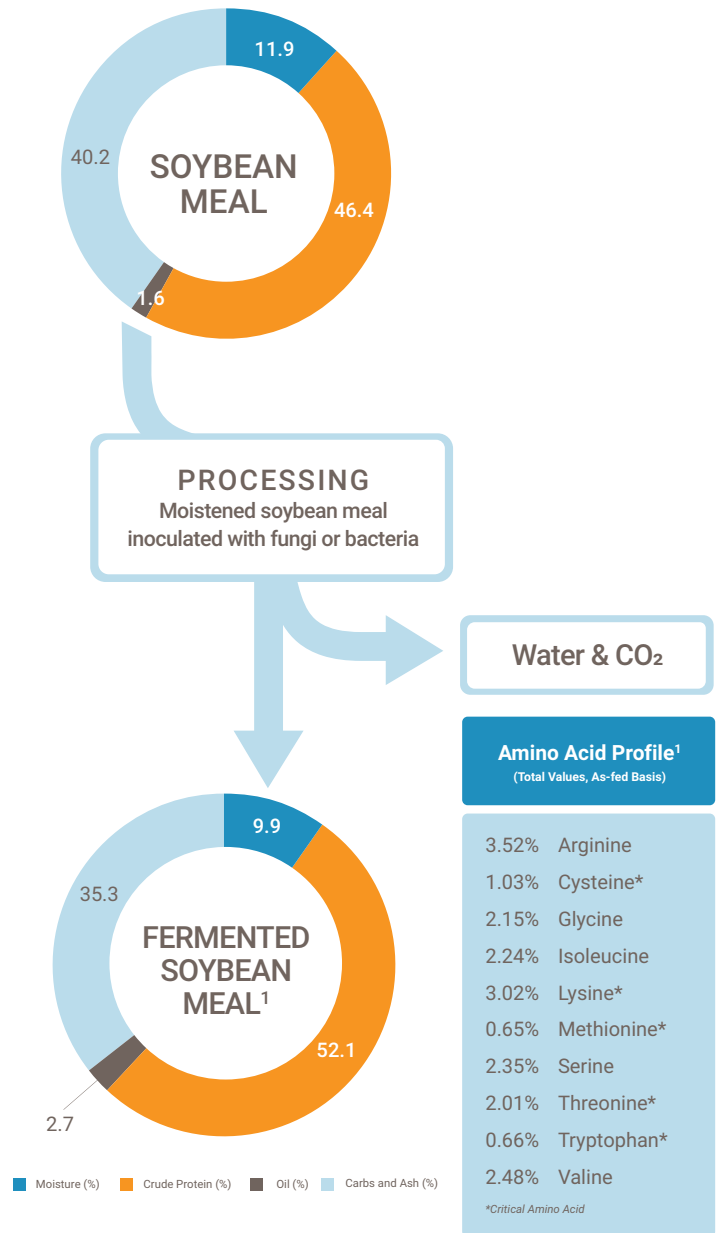
SOY PRODUCT FACT SHEET: FERMENTED SOYBEAN MEAL

Overview

Fermented soybean meal (FSBM) is produced by inoculating standard soybean meal (SBM) with beneficial species of fungi and bacteria, primarily *Aspergillus oryzae* and *Lactobacillus subtilis*. This additional treatment improves the nutritional value of the resulting product. Fermentation may reduce or eliminate key anti-nutritional factors, such as lectins, trypsin inhibitors, allergens and non-digestible oligosaccharides, present in even heat-processed SBM, increase the concentration of protein, and improve digestibility and gut health. FSBM is produced in batches by submerging SBM in water or, more commonly, through a process known as solid-state fermentation, which inoculates a moistened SBM substrate containing between 45 and 50% moisture. While the nutritional effects of fermentation vary by inoculant and production conditions, the general effects include the conversion of the oligosaccharides into carbon dioxide and water and the hydrolysis of SBM protein. Fermentation converts some carbohydrates into lactic acid, increases amino acid availability, and results in the degradation of antigenic proteins like glycinin and β -conglycinin.

Form & Functional Properties


Similar to SBM, FSBM is most commonly available in dry granulated or powdered forms or sold as an ingredient in premixed diets.



Nutritional Attributes




Fermentation enhances the nutritional value of standard soybean meal in two distinct ways. First, sugars are consumed by the fungi and bacteria used as inoculants. This reduces the anti-nutritional factors raffinose and stachyose and increases concentration of the remaining protein as these sugars are converted to carbon dioxide and water. Next, the inoculants release digestive enzymes that help hydrolyze proteins into free amino acids and peptides. This improves protein digestibility and further deactivates or degrades remaining anti-nutritional factors. Moreover, fermentation with bacterial strains results in higher antioxidant activity, and fermentation with *Aspergilli* significantly reduces phytate, resulting in an ingredient with highly available phosphorus and zinc, which benefits animal health.

Fermented Soybean Meal Nutritional Properties¹

 Gross Energy 4700 kcal/kg

 Oligosaccharides < 3.0%

 Trypsin Inhibitors < 4.5 mg/g

| Species | Metabolizable Energy (kcal/kg) ² | Σ5 Critical AAs (SID Values) ² | Maximum Recommended Inclusion Rate ¹ | Feeding Advantage |
|---|---|---|---|--|
|  Poultry | 2490 | 6.59 | 10% | Improved gut health when used as starter feed for chicks Reduced anti-nutritional factors ideal for weaning pig diets Capable fishmeal replacement for certain species |
|  Swine | 4210 | 6.96 | 10% | |
|  Aquaculture | 3071 | 7.01 | 10% | |

Product Market

FSBM is available globally but it is predominantly used in North America, Europe and Asia. FSBM can partially replace conventional SBM in poultry diets, eliciting positive effects of birds' microbiota. FSBM is also highly recommended for young animals, like piglets, as they show low or insufficient levels of endogenous proteases such as pepsin and trypsin. Therefore, they need sources of highly digestible protein. Further replacement of fish meal in aquaculture diets may continue to spur demand for value-added soy protein products like FSBM.

¹Van Eys, J. E. and Ruiz, Nelson. 2021. *Quality Manual and Analysis for Soybean Products in the Feed Industry. Third Edition, U.S. Soybean Export Council, Chesterfield, Missouri, pages 23, 26-27, 31.*

²The International Aquaculture Feed Formulation Database, Feed Ingredient Composition Database (FICD), has composition information for two commercially available FSBMs and four generic FSBMs. While there are slight differences in composition between the FSBMs provided by this database, the composition of the generic FSBM with 53% crude protein is reported. The database containing this composition data can be accessed at <https://www.iaffd.com/home.html?v=4.1.2>.

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