

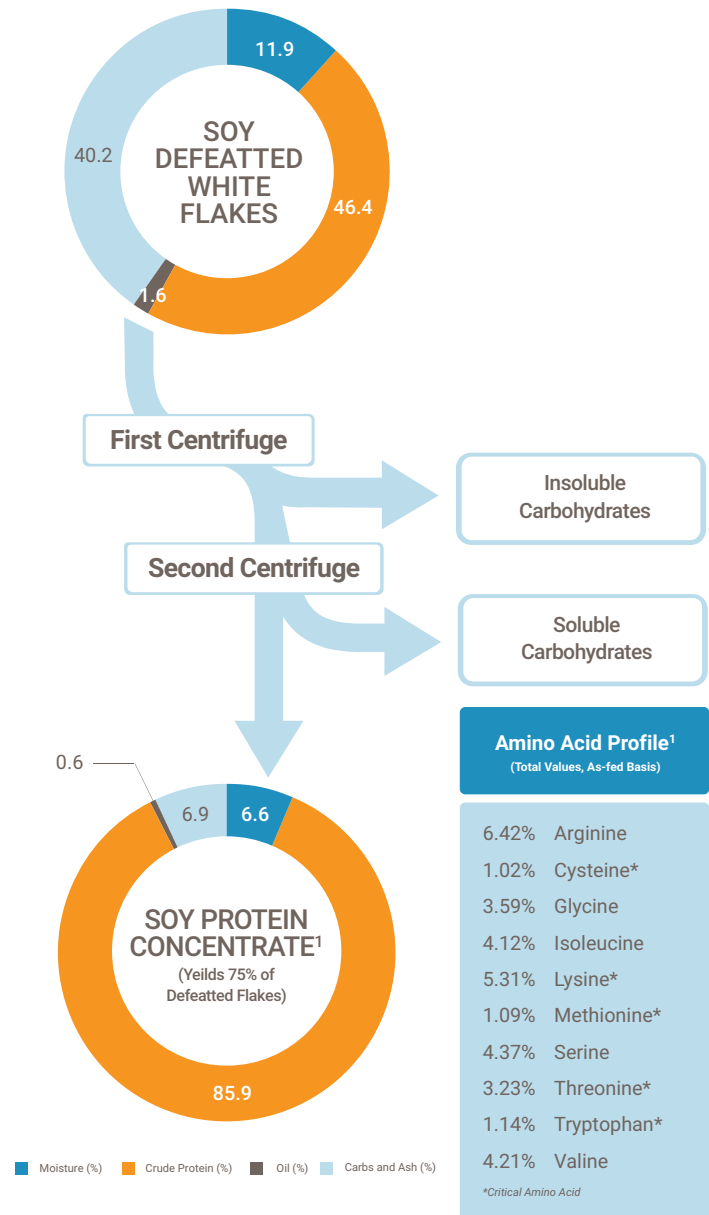
# SOY PRODUCT FACT SHEET: SOY PROTEIN ISOLATE

## Overview

Soy Protein Isolate (SPI) is produced by further processing defatted soy flakes to obtain an ingredient typically at least 90% crude protein on a moisture-free basis. Unlike the flakes used for feed-grade soybean meal, SPI production normally begins with flakes that have been desolventized without direct moisture, called white flakes. The protein fraction in white flakes is nondenatured, which aids in subsequent processes to separate the carbohydrate fractions. First, ground white flakes are added to a solution with pH from 9 to 11. At this pH, the protein fraction is highly soluble and can be separated from the insoluble carbohydrates by centrifuging the mixture. Next, the pH of the resulting mixture is lowered to 4.2 to 4.5. At this pH, the remaining protein is less soluble than carbohydrates such as sucrose and oligosaccharides. These fractions are then separated through a second centrifuging. The resulting product is returned to a neutral pH and dried with heat. After extracting both the soluble and insoluble carbohydrates, the resulting product is composed primarily of protein.

## Form & Functional Properties







SPI is most commonly available in a dry, powdered form. It is easily dispersible in water or milk, making it ideal for use in calf milk replacers and in liquid feed applications. Emulsification, fat adsorption and flavor-binding properties also make SPI a highly used ingredient in processed meats and baked goods for human consumption.



## Nutritional Attributes

SPI provides an extremely dense source of protein and amino acids, along with considerably reduced levels of oligosaccharides, trypsin inhibitors and the antigens  $\beta$ -conglycinin and glycinin. Coupled with its high protein and digestibility, these characteristics make SPI particularly valuable in diets for young animals and as a replacement for fish meal in aquaculture diets.

### Soy Protein Isolate Nutritional Properties<sup>1</sup>

 Gross Energy 5370 kcal/kg	 Oligosaccharides < 0.4%	 Trypsin Inhibitors < 1.0 mg/g		
Species	Metabolizable Energy (kcal/kg) <sup>2</sup>	$\Sigma$ 5 Critical AAs (SID Values) <sup>2</sup>	Maximum Recommended Inclusion Rate <sup>1</sup>	Feeding Advantage
 Poultry	2250	5.91	35%	SBM provides quality protein and high ME vs. other meals High digestible amino acids, specifically in finishing rations SBM capable fishmeal replacement for certain species
 Swine	4200	6.41	35%	
 Aquaculture	2923	6.29	<20%/>50% <sup>4</sup>	

## Product Market

SPI is available globally but predominantly used in Asia, North America, and Europe. Further replacement of fish meal in aquaculture diets and increased human consumption of soy proteins should continue to spur demand for this value-added soy protein product.

<sup>1</sup>Van 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, MO, pages 23, 26-27.*

<sup>2</sup>The International Aquaculture Feed Formulation Database, Feed Ingredient Composition Database (FICD), has composition information for one generic SPI and two commercially available SPIs. While there are slight differences in composition between the SPIs provided by this database, the average composition of two commercially available SPIs is reported. One of these SPIs has 88.0% crude protein on an as-fed basis while the other has 82.8% crude protein. The database containing these composition data can be accessed at <https://www.iaffd.com/home.html?v=4.1.2>.

To learn more about how U.S. Soy can enable your business, please contact your U.S. Soybean Export Council (USSEC) region or country representative; or submit your contact details via <https://ussec.org/contact/>.

### ABOUT THE U.S. SOYBEAN EXPORT COUNCIL (USSEC)

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