

# Soybean Meal Processing

## Solvent Extraction

In this method, soybeans are first cracked and de-hulled, then heated to approximately 60 degrees Celsius for about 10 minutes. After the cracked beans are heated, they proceed through a series of grinding rollers where they are flaked. The flakes are allowed to cool to about 45 degrees Celsius and are then conveyed to the extraction equipment where the oil is removed by the solvent (hexane) in one of several countercurrent extraction systems.

The extracted flakes then proceed to dryers where the solvent is volatilized. From the dryer, the flakes are conveyed to a toaster and, finally, are cooled and ground. At that time, the meal is typically 47% protein. The hulls may be ground and added to the meal at the point to reduce the protein content to 44%. Solvent extracted meal contains about 35% bypass protein.

## Extrusion

In this method, soybeans are fed into an extruder barrel, where a central revolving shaft forces the beans through the extruder. This technique creates sufficient heat through friction to destroy the trypsin-inhibiting enzymes. Steam is frequently injected during the process.

No oil is removed from the soybeans during extrusion. Rather, beans are processed into meal through pressure and heat of friction. Extruded meal has a bypass protein level of approximately 35%.

## Roasting

Roasting of soybeans involves a revolving finned cylinder which lifts the beans through jets of flame. Soybeans leaving the cylinders may reach a temperature of 65 degrees Celsius. Roasted soybeans typically contain 40-45% bypass protein.

## **Expeller Extraction**

In this method, soybeans are initially cleaned, cracked, and dried. The dried soybeans are then transported to tempering devices and heated uniformly. From the tempering bins, the soybeans are fed into expeller presses. A central revolving shaft creates pressure within the press, causing the extraction of oil from the ground soybeans.

The extracted beans leave the presses in the form of flakes, which are subsequently ground. Normal expeller meal contains 40-45% bypass protein.

## **Modified Expeller Extraction - The Patented SoyPLUS® Method**

The SoyPLUS modified expeller extraction system is based primarily on the normal expeller extraction method. However, the SoyPLUS method contains additional reaction and conditioning steps, which are designed to create high levels of bypass protein without damaging the protein quality. The SoyPLUS method is so unique that it has been granted a patent (U.S. Patent #5,225,230).

The state-of-the-art Soy Center, site of SoyPLUS production, is located in Ralston, Iowa and is the only plant anywhere capable of producing SoyPLUS. The heart of the system is a computer control network, controlling over 400 individual points throughout the process. This computer system ensures consistent production of high-quality, high-bypass SoyPLUS. SoyPLUS contains 60% bypass protein.