

Purposes of Extrusion:

- * **Cooking**
 - Related to deactivation of anti-nutritional factors
 - Increased digestibility of protein and energy (higher by-pass protein)
- * **Expansion**
 - Allows for gelatinization of starch cells, oil cell rupture, shaping and texturing the product.
- * **Sterilization**
 - Bacterial, viral, mold and yeast destruction
- * **Dehydration**
 - 50% loss in moisture can be achieved
 - Allows for dehydrating products which have too high a moisture level for storage
- * **Stabilization**
 - Used to inactivate enzymes that cause rapid deterioration of nutritional properties (such as lipase and lipoxygenase in rice bran)

Dry-Extruded/Expelled vs. Conventional Solvent-Extracted

APPARENT ILEAL DIGESTIBILITY*

Item (%)	Solvent Extracted	Express™ With Hulls	Soybean Meal W/O Hulls
CP ^a	83.22	86.21	85.42
Lysine ^a	88.58	90.90	91.08
Threonine ^a	78.15	79.14	79.79
Tryptophan ^a	86.96	88.38	87.25
Methionine	89.10	88.85	88.51
Cysteine	80.72	81.98	82.65
Isoleucine ^a	86.95	89.72	89.85
Valine ^a	85.23	87.37	87.42
Arginine ^a	91.39	93.70	93.75
Histidine	88.07	89.42	89.91
Leucine ^a	85.52	88.48	88.58
Phenylalanine ^a	86.80	90.01	90.40

^aDry-expelled vs. solvent extracted (P<.05).

AMINO ACID ANALYSIS*
(Indispensible)

Item (%)	Solvent Extracted	ExPress™ With Hulls	Soybean Meal W/O Hulls
Lysine	2.97	2.96	3.11
Threonine	1.83	1.85	1.93
Tryptophan	0.68	0.73	0.72
Methionine	0.66	0.65	0.69
Cysteine	0.73	0.82	0.83
Isoleucine	2.14	2.08	2.31
Valine	2.30	2.24	2.46
Arginine	3.37	3.85	3.57
Histidine	1.27	1.27	1.35
Leucine	3.66	3.68	3.89
Phenylalanine	2.41	2.41	2.58

ANALYZED NUTRIENT COMPOSITION*

Item (%)	Solvent Extracted	ExPress™ With Hulls	Soybean Meal W/O Hulls
DM	88.25	94.59	95.96
CP	47.14	47.52	50.47
Fat	1.14	4.89	5.86
Fiber	3.60	4.80	3.30

References:

Evaluation of Different Soybean Meal Processing Techniques on Growth Performance of Pigs¹

J.C. Woodworth, M.D. Takach, J.L. Nelssen, R.D. Goodband, and R.E. Musser

Apparent Ideal Digestibility of Amino Acids and Digestible and Metabolizable Energy Values for Conventional Soybean Meal or Dry Extruded-expelled Soybean Meal for Swine¹

J.C. Woodworth, M.D. Tokach, R.D. Goodband, J.L. Nelssen, P.R. O'Quinn, and D.A. Knabe