



## Intestinal Digestion of Bypass Protein

### Trial Summary:

- The bypass protein supplied by Soy Best is more digestible in the lower gut than the bypass protein supplied by many other ingredients (see Table 1).
- Soy Best supplies more intestinally available protein, expressed as a percent of total crude protein, than many other protein ingredients (see Table 2).
- The bypass protein supplied by *mechanical-extracted products* tends to be more digestible in the lower gut than the bypass protein supplied by *solvent-extracted products* (see Table 1).

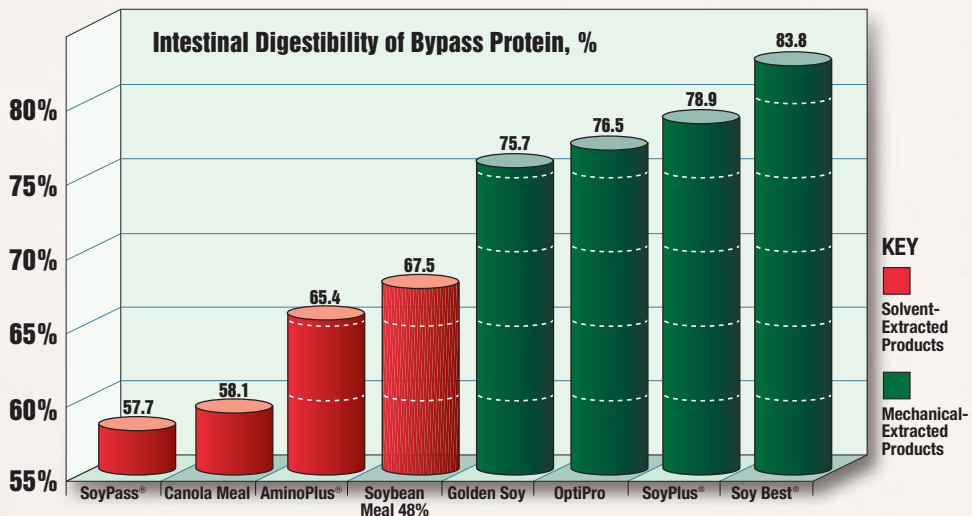


Table 1. 83.8% of the bypass protein (RUP) in Soy Best is digestible in the small intestine. The bypass protein supplied by mechanical-extracted products is more digestible in the intestine than the bypass protein supplied by solvent-extracted products.



## Trial

**Background:** Soy Best has always been manufactured by a unique, all-natural mechanical-extraction process. The controlled heat treatment renders the protein more resistant to degradation in the rumen, allowing for more bypass protein and amino acids. Application of fresh gums (soy lecithin) increases rumen bypass of protein and amino acids even more.

The purpose of this trial was to measure the extent to which the bypass protein of Soy Best is digested in the small intestine, and to compare that to other protein ingredients.

**Methods:** Eight protein ingredients were evaluated. Field samples were collected and analyzed according to the procedure of Calsamiglia and Stern<sup>1</sup>. Dacron bags containing samples of the ingredients were suspended in the rumen of a cow for 16 hours. The residue of each ingredient was then subjected to an enzymatic procedure to estimate digestibility of the rumen undegraded protein (RUP) in the small intestine.

**Result:** *Soy Best bypass protein is highly digestible in the lower gut.*

The bypass protein fraction in Soy Best had an estimated intestinal digestibility of **83.8%**. This was higher than the intestinal digestibility of the bypass protein fraction in the other ingredients. Those ranged from 57.7% to 78.9% (see Table 1).

**Result:** *Mechanical extraction is superior to solvent extraction.*

Ingredients with the highest intestinal digestibility (75.7% - 83.8%) were all mechanical-extracted products (see Table 1). No solvent is used in the course of manufacturing of Soy Best, SoyPlus, OptiPro and GoldenSoy.

Ingredients with the lowest intestinal digestibility (57.7% - 67.5%) were all solvent-extracted products. In the course of manufacturing SoyPass, Canola Meal, AminoPlus and Soybean Meal 48%, hexane is used to extract the oil from the original seed.



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**Result:** *Soy Best ranked first in intestinally absorbable protein*

The graph below shows the intestinally absorbable protein. This is the product of percent bypass protein multiplied by intestinal digestibility. The bypass protein values that are generated by this laboratory protocol are lower than values normally used in ration formulation for lactating cows. The important issue is the relative ranking of the ingredients, each one to the others. All ingredients were tested at the same time and under the same conditions.

Expressed as a percent of crude protein, Soy Best had the highest intestinally absorbable protein.

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**Intestinally Absorbable Protein,  
% of Crude Protein (RUP X Intestinal Dig.)**

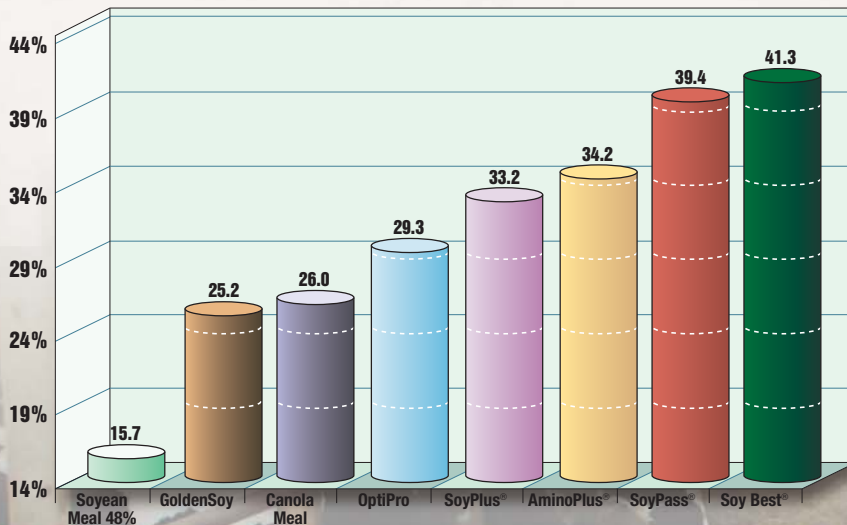


Table 2. Soy Best supplies more intestinally available protein, expressed as a percent of total crude protein, than other protein ingredients. This is calculated by multiplying Rumen Undegraded Protein (as percent of total crude protein) times the intestinal digestibility.



## Observation

Mechanical-extracted products had higher intestinal protein digestion than solvent-extracted ingredients in this trial.

The superior intestinal protein digestibility of mechanical-extracted products has also been reported by scientists at Kansas State University. Woodworth et al.<sup>2</sup> reported 85.5% ileal digestibility for mechanical-extracted soybean meal protein and only 83.2% for solvent-extracted soybean meal protein. The difference was significant ( $P < 0.05$ ).

## Conclusion

New-process Soy Best is an excellent source of bypass protein. That's important. But the extent to which bypass protein is digested in the lower gut is also important. Bypass protein that is not digested in the lower gut will be wasted as manure.

This study shows that **83.8%** of the bypass protein supplied by Soy Best is digested in the intestine. Other protein ingredients do not meet this high standard.

This is an important consideration when making purchasing decisions for dairy feed ingredients.

### FOOTNOTES:

1. Calsamiglia and Stern. 1995. J. Anim. Sci. 73:1459-1465. (University of Minnesota)
2. Woodworth, et al. 2001. J. Anim. Sci. 79:1280-1287. (Kansas State University)

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