U.S. SOYBEAN MEAL’S AMINO ACID PROFILE BEST PROMOTES DIGESTIBILITY FOR POULTRY AND SWINE

To know the true value of soybean meal, its amino acid profile and the digestibility of those amino acids must be considered.

Soybean meal digestibility impacts formulation costs of poultry and swine diets.

U.S. soybean meal has better digestibility characteristics for poultry and swine compared to Argentina and Brazil.

It is well known that soybean meal is a major component of poultry and swine diets. The quantity and value of soybean meal in the diet are determined by its amino acid (AA) profile and the digestibility of those amino acids. The quality and consistency, not the total amount, of amino acids supplied by dietary protein in soybeans and its resulting soybean meal represents what is available to monogastric animals for the key components of digestibility -- tissue synthesis and other metabolic processes. Therefore, it is critical that the value of soybean meal protein is based on the capability by the animal to digest amino acids.

When comparing U.S. soybeans and resulting soybean meal to those of other origins, there are differences in AA profiles and how digestibility is impacted by the initial quality of the bean. The most accurate measurement of amino acid (AA) digestibility for poultry and swine is the Standardized Ileal Digestibility (SID). SID is measured by the difference of amino acids ingested with the feed and the amino acids recovered from the digesta in the ileum\(^1\), adjusted by the basal endogenous amino acid losses. It can be represented as a relative (%) or an absolute measure.

\(^1\) Measuring the ileum (the final section of the small intestine) AA content is more accurate than other methods such as total tract digestibility (difference between the amount of amino acids ingested and the amount of amino acids recovered from the feces), due to fermentation that occurs in the hindgut that can overestimate digestibility. The process utilizes markers in the feed that enable measuring the amount of AA in the recovered ileum digesta. The adjustment by the basal endogenous amino acid losses accounts for the fact that protein is synthesized for metabolic functions by the animal, such as enzymes and sloughed cells, and may not be absorbed at the end of the small intestine and are lost.
To start, the quality of the soybean being crushed is extremely important. As soybeans are crushed into soybean meal, the digestibility of amino acids varies depending on genetics, moisture, storage conditions, the amount of anti-nutritional factors and soybean processing methods utilized, especially heat treatment. Although heat treatment is necessary in some regions to reduce anti-nutritional factors, improper heat application of soybean meal may reduce amino acid digestibility.

The digestibility of amino acids is also impacted by the origin of the soybean. The table below compares the digestibility coefficients and the digestible content of the five essential amino acids (Cysteine, Lysine, Methionine, Threonine and Tryptophan) between the U.S., Argentina, and Brazil for swine and poultry.

The U.S. has an advantage over Argentina and Brazil in both the content of SID amino acids and the SID digestibility of each amino acid listed above.

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*No digestibility data exist for the U.S., Argentina and Brazil for Tryptophan in poultry; thus, the same coefficient was considered based on Rostagno et al., 2017.*
It is critical to include these digestibility measures when comparing soybean meal from different origins. **Failing to consider the digestibility can misrepresent the actual value of the soybean meal and lead to increased costs and over or under supplying nutrients when formulating diets.**

The following chart illustrates the benefit the U.S. has over Argentina and Brazil for the five essential amino acids listed in the table above.

### Mean SID content - 5 EAAs - USA, Argentina and Brazil

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<tr>
<th></th>
<th>USA</th>
<th>Argentina</th>
<th>Brazil</th>
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<tbody>
<tr>
<td><strong>Swine</strong></td>
<td>6.28</td>
<td>5.81</td>
<td>5.96</td>
</tr>
<tr>
<td><strong>Poultry</strong></td>
<td>5.55</td>
<td>5.56</td>
<td>6.10</td>
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**ABOUT THE U.S. SOYBEAN EXPORT COUNCIL (USSEC)**

Soybeans are the United States’ number one food and agricultural export. The U.S. Soybean Export Council (USSEC) is devoted to building preference, improving the value, and enabling market access for the use of U.S. Soy for human consumption, aquaculture, and livestock feed in 82 countries across the world. USSEC is a dynamic partnership of U.S. soybean producers, processors, commodity shippers, merchandisers, allied agribusinesses, and agricultural organizations; and connects food and agriculture industry leaders through a robust membership program. USSEC is farmer-funded by checkoff funds invested by the United Soybean Board, various state soybean councils, the food and agriculture industry, and the American Soybean Association’s investment of cost-share funding provided by U.S. Department of Agriculture’s (USDA) Foreign Agricultural Service (FAS). To learn more, visit [www.ussoy.org](http://www.ussoy.org) and [www.ussec.org](http://www.ussec.org), and engage with us on [LinkedIn](http://www.linkedin.com), [Twitter](http://www.twitter.com), [Facebook](http://www.facebook.com), [Instagram](http://www.instagram.com) and [YouTube](http://www.youtube.com).