

U.S. SOYBEAN MEAL'S AMINO ACID PROFILE BEST PROMOTES DIGESTIBILITY IN SWINE AND POULTRY DIETS

- 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 costs and formulation of swine and poultry diets
- U.S. soybean meal has better digestibility characteristics for swine and poultry compared to other origins

The digestibility of amino acids in soybean meal is critical to match the animal's nutritional requirements. Crude protein alone is not a sufficient indicator of overall soybean meal value. It is essential to consider the soybean meal's protein content by understanding the animal's digestibility capability to meet its requirements for tissue synthesis and other critical metabolic functions. Standardized Ileal Digestibility (SID) for soybean meal provides a more accurate measurement of amino acid availability to the animal than crude protein.

Comparing U.S. and Argentina soybean meal data from October 2018 through June 2021¹ **when applying the swine average SID of amino acid coefficients² and poultry average SID of amino acid coefficients^{3,4}, U.S. soybean meal has an advantage in all amino acids** (all differences in SID content means are statistically different at 1%). Moreover, **considering the 10 essential amino acids SID content for pigs** (Arginine, Cysteine, Histidine, Isoleucine, Lysine, Methionine, Phenylalanine, Threonine, Tryptophan and Valine), **the U.S. has a 3.46% advantage over Argentina. Considering the 12 essential amino acids for poultry** (Arginine, Cysteine, Glycine, Histidine, Leucine, Isoleucine, Lysine, Methionine, Phenylalanine, Threonine, Tryptophan and Valine), **the U.S. has a 3.25% advantage over Argentina. When considering the 5 EAAs** (Cysteine, Lysine, Methionine, Threonine, Tryptophan) **the difference is 3.86% and 3.43% for swine and poultry, respectively.**



¹ Data obtained from Evonik and summarized based on international trading specifications and includes observations with crude protein values between 46.0-49.0% and fiber values between 3.5-3.9%.

² Lagos, L. V., & Stein, H. H. (n.d.). Chemical composition and amino acid digestibility of soybean meal produced in the United States, China, Argentina, Brazil, or India. *Journal of Animal Science*, 2017, 95(4), 1626-1636.

³ Ravindran, V. (1), Abdollahi, M. R. (1), & Bootwalla, S. M. (2,3). (n.d.). Nutrient analysis, metabolizable energy, and digestible amino acids of soybean meals of different origins for broilers. *Poultry Science*, 2014, 93(10), 2567-2577.

⁴ Rostagno, H. S.; Albino, L. F. T.; Hannas, M. I.; Donzele, J. L.; Sakomura, N. K.; Perazzo, F. G.; Saraiva, A.; Teixeira, M. V.; Rodrigues, P. B.; Oliveira, R. F.; Barreto, S. L. T. and Brito, C. O. 2017. *Brazilian tables for poultry and swine: Composition of feedstuff and nutritional requirements*. 4th ed. Departamento de Zootecnia, Universidade Federal de Viçosa, Viçosa, MG.

Amino Acid	Mean AA SID - Swine (%)			Mean AA SID - Poultry (%)		
	USA	ARG	USA/ARG (%)	USA	ARG	USA/ARG (%)
Alanine	1.88	1.83	3.02%	1.72	1.69	1.94%
Arginine	3.34	3.22	3.51%	3.09	2.98	3.51%
Aspartic Acid	4.89	4.68	4.26%	4.58	4.34	5.33%
Cysteine	0.58	0.54	6.94%	0.49	0.43	11.53%
Glutamic Acid	7.77	7.39	4.94%	7.48	7.20	3.72%
Glycine	1.91	1.82	4.72%	1.66	1.59	4.53%
Histidine	1.15	1.12	2.47%	1.06	1.02	3.65%
Isoleucine	2.01	1.95	3.00%	1.83	1.78	2.92%
Leucine	3.33	3.23	2.99%	3.06	2.98	2.71%
Lysine	2.69	2.57	4.39%	2.53	2.46	3.09%
Methionine	0.60	0.59	2.25%	0.55	0.54	1.83%
Phenylalanine	2.23	2.15	3.43%	2.07	2.01	2.94%
Serine	2.22	2.16	2.67%	2.02	1.96	3.15%
Threonine	1.67	1.62	2.96%	1.49	1.45	2.83%
Tryptophan ⁵	0.60	0.59	2.58%	0.58	0.57	1.22%
Valine	2.05	1.99	3.20%	1.88	1.84	2.39%
10 EAA (swine) or 12 EAA (poultry) ⁶	16.93	16.35	3.46%	20.31	19.65	3.25%
5 EAA	6.15	5.91	3.86%	5.65	5.45	3.43%

This difference in digestibility is important because the inclusion of soybean meal with higher amino acid digestibility will lower the proportion of dietary amino acids excreted undigested, thus minimizing the nitrogen output to the environment, which is important from a sustainability standpoint.

Moreover, higher amino acid digestibility will reduce the need for synthetic amino acid supplementation in swine and poultry diets, which reduces formulation costs.

These cost savings become more critical during a time when the price of amino acids have increased due to fluctuating market demands, high ocean freight costs, long lead times, and supply chain disruptions.

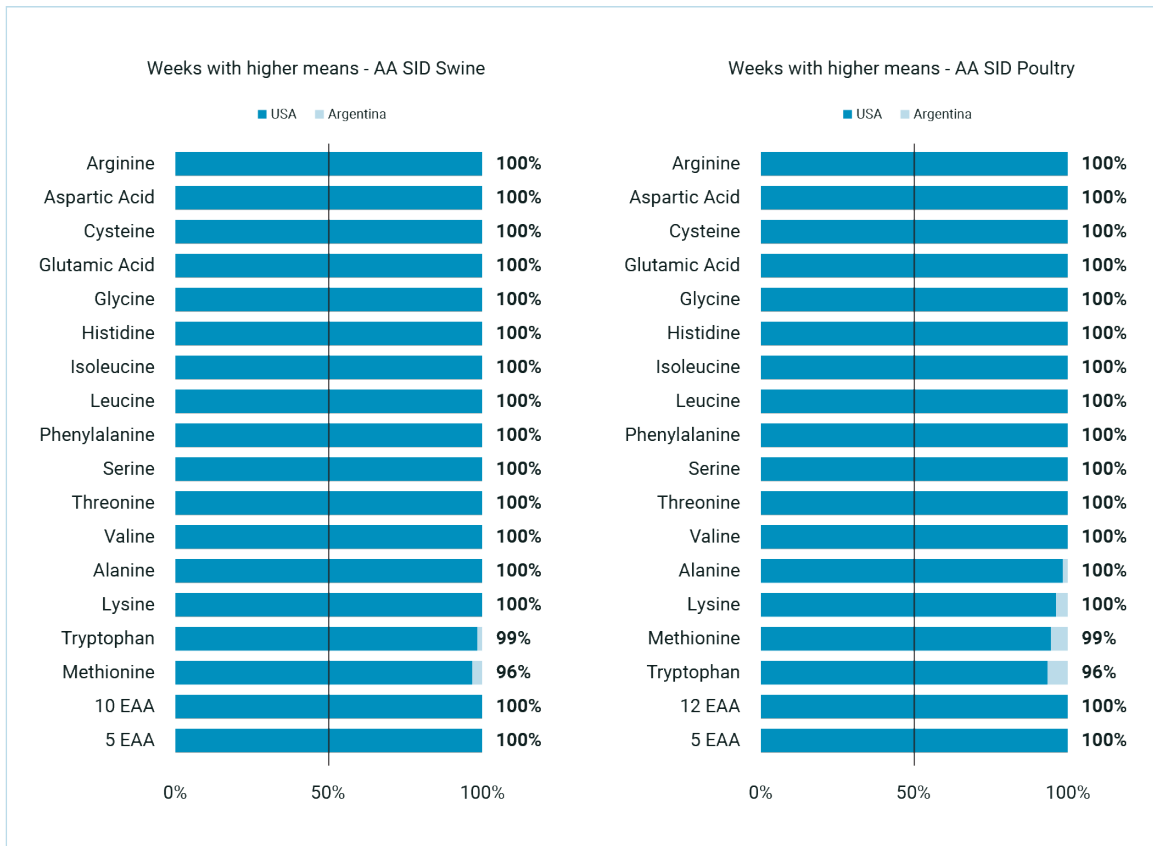
Likewise, feed formulation based on digestible amino acids enables nutritionists to meet animals' requirements in a more precise manner, thus maximizing performance and profitability.

As antibiotic-free production systems become more common, an adequate supply of digestible amino acids which contribute to supporting or restoring gut health is necessary to allow the animal to respond to different challenges that affect their performance, health, and welfare.

¹ Tryptophan for poultry was referenced from Rostagno et al., 2017

² SID Digestibility of 5 EAA, 10 EAA and 12 EAA were implied based on the SID and total content;
*Tryptophan for poultry was referenced from Rostagno et al., 2017

U.S. soybean meal also has a higher SID content compared to Argentina in almost all weeks in the dataset analyzed, as illustrated in the charts below, thus **demonstrating that U.S. soybean meal is consistently more digestible in swine and poultry diets compared to Argentina.**



WHEN STANDARDIZING THE AMINO ACID CONTENT TO CONSIDER THE DIGESTIBILITY IN SWINE AND POULTRY DIETS, U.S. SOYBEAN MEAL HAS HIGHER LEVELS OF SID AMINO ACIDS, WHICH TRANSLATES INTO A MORE RELIABLE SOURCE OF SOYBEAN MEAL COMPARED TO ARGENTINA.

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/>.

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