

Soybean Meal Value Considerations

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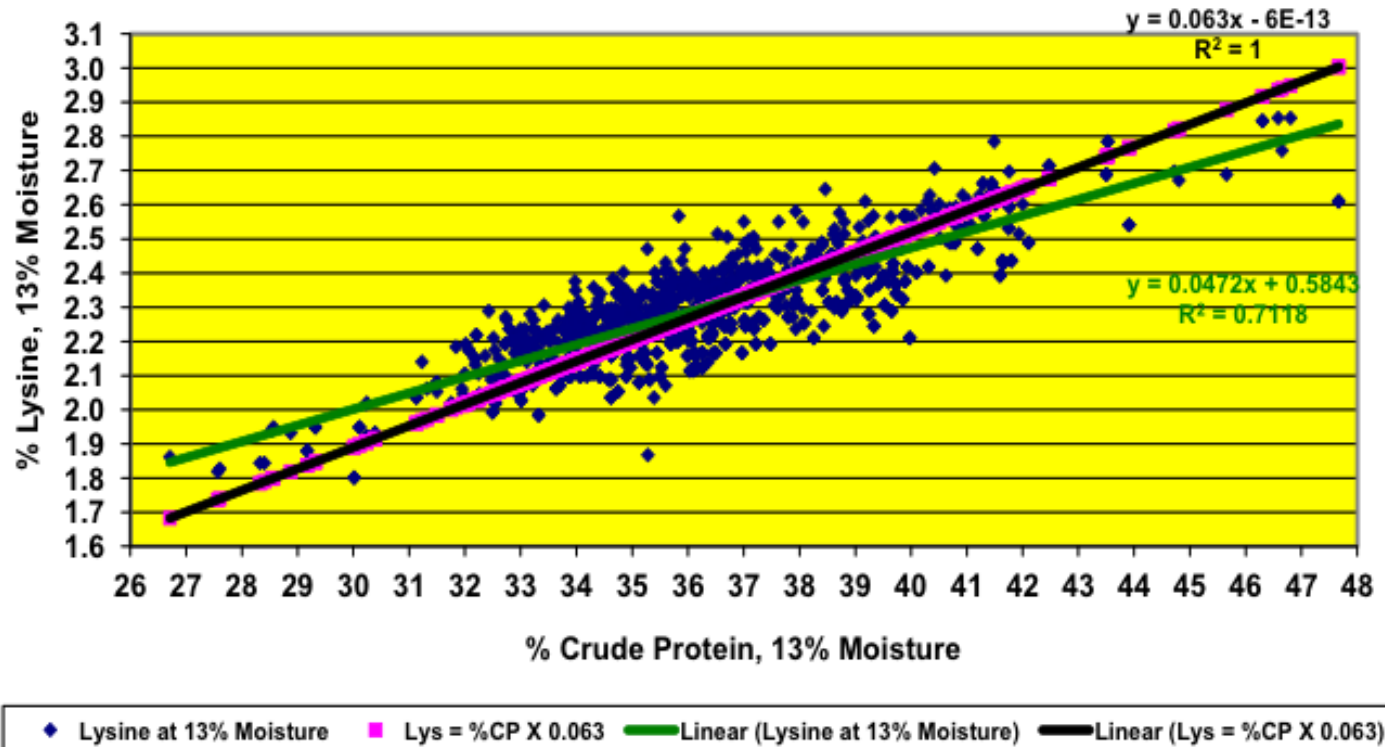
Focus is on Amino Acids

- **Soybean meal is used primarily as a source of supplemental amino acids in poultry and swine feeds**
- **Growing poultry and swine have a dietary need for specific amino acids, not crude protein.**
 - **Crude protein is based on nitrogen content**
 - **Crude protein is an inadequate descriptor of nutritional value**
 - **With the evolution of improved measurement tools, nutritionists have moved away from using Crude Protein to Amino Acids**
 - **Digestible Amino Acids is preferable to Total Amino Acids**



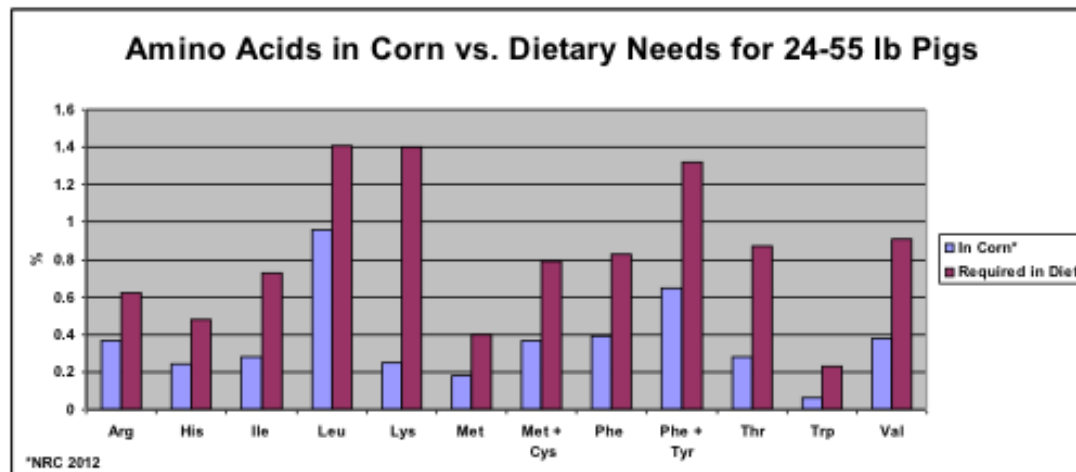
Soybean Protein and Lysine by Wet-Chemistry Analysis Compared to Constant Lysine to Protein Relationship

927 Observations from sob18 NIR Calibration



Focus is on Amino Acids

- **Nutritionists use soybean meal to provide limiting amino acids in poultry and swine feeds.**
 - **In domestic feeds, corn is typically the major ingredient**
 - **Amino acid levels in corn will not support optimum health and growth, therefore the need for supplemental sources of amino acids**



- For over 50 years, SBM has been a primary source of supplemental amino acids in feeds



“Tag-Along” Value

- **While the level and balance of amino acids in soybean meal are the primary driver of meal usage, other characteristics represent “tag-along” value such as:**
 - **Nutritionally available energy**
 - **Minerals**
 - **Vitamins**
- **The combination of all nutritional characteristics represents SBM’s “Nutritional Bundle”**



Plant: USBGV -USB Meal Trait GAV Matrix

Ingredient	48% Soybean Meal	Units	Level
Nutrient Code	Description		
1	Weight	Lbs	1
3	Moisture	%	10
4	Dry Matter	%	90
6	Met Energy Poultry	kcal/lb	1,109
9	Digest Energy Swine	kcal/lb	1,673
10	ME Swine	kcal/lb	1,500
11	Net Energy Swine	kcal/lb	967
12	ME Swine Mcal/lb	Mcal/lb	1.5
20	Crude Protein	%	47.5
24	Dig Lys Swine	%	2.72
25	Dig Thr Swine	%	1.61
26	Dig Met Swine	%	0.61
27	Dig TSAA Swine	%	1.25
28	Dig Try Swine	%	0.59
29	Dig Val Swine	%	2.02
30	Lysine	%	3.00
31	Threonine	%	1.88
32	Tryptophan	%	0.69
33	Methionine	%	0.71
34	Meth + Cys	%	1.41
35	Arginine	%	3.67
36	Histidine	%	1.20
37	Leucine	%	3.63
38	Isoleucine	%	2.13
39	Phenylalanine	%	2.36
40	Phenylala + Tyrosine	%	4.07
41	Valine	%	2.47
44	Dig Lys Poultry	%	2.75
45	Dig Thr Poultry	%	1.63
46	Dig Met Poultry	%	0.61
47	Dig TSAA Poultry	%	1.23
48	Dig VaL Poultry	%	2.10
50	Crude Fat	%	0.9
57	18:2 Linoleic Acid	%	0.54
65	Crude Fiber	%	3.4
84	Calcium	%	0.26
85	Phosphorus-Total	%	0.64
86	Phosphorus-Available	%	0.16
88	Sodium	%	0.01
89	Chloride	%	0.04
90	Potassium	%	2.13
91	Magnesium	%	0.30
92	Sulfur	%	0.44
95	Copper	mg/lb	9.23
97	Iron	mg/lb	59.5
98	Manganese	mg/lb	16.9
99	Selenium	mg/lb	0.0454
100	Zinc	mg/lb	25.9
103	Vitamin E	IU/lb	1.0
106	Choline	mg/lb	1,251

Example of Nutritional Characteristics Attributed to Soybean Meal for Use in Least-Cost Feed Formulation

• Soybean Meal’s Nutritional “Bundle”



Meal's Nutritional “Bundle”

- **Multiple nutritional factors:**
 - “Complicate” the assessment of meal value
 - BUT**
 - **Relatively small shifts in multiple characteristics can add up to meaningful changes in value**
 - **Represents peril or opportunity, depending on whether and how differences are managed**

SBM Usage and Value

- **SBM must constantly compete for usage with alternate sources of the nutrients it provides**
- **Usage is dependant upon SBM's value-proposition relative to other ingredients**
- **The end-user determines market value**
 - **Different applications have different needs and associated values**
 - **Value varies with each usage scenario**



Crystalline Amino Acid Cascade Swine Feed Illustration

Diet	"A"	"B"	"C"	"D"	"E"
Formulation Type	Com-Soy	"A" + Lys	"B" + Thr	"C" + Met	"D" + Trp
Ingredient					
Com	1392	1489	1510	1591	1639
SBM	492	392	370	285	235
L-Lysine HCL		3.1	3.8	6.5	8
L-Threonine			0.3	1.5	2.2
DL-Methionine				0.8	1.2
L-Tryptophan					0.3
Other	116	115.9	115.9	115.2	114.3
Total	2000	2000	2000	2000	2000
Limiting Dig AA	Lysine	Threonine	TSAA	Tryptophan	Valine



Meal's Value-Proposition

- **A products Value-Proposition includes all factors associated with its use**
 - **For SBM it is a function of:**
 - **Meal's attributed Nutrient Bundle**
 - **Nutrient specifications of a given feed**
 - **Other ingredients offered and their attributed nutrient profiles**
 - **Cost of meal relative to other ingredients which provide the same nutrients**
 - **Other factors associated with meal use**



Improving SBM Value

“In a competitive setting, a product will improve or diminish”

- **The Composition Opportunity**
 - **Dependent upon the extent to which:**
 - **Differences in soybean composition exist**
 - **The economic value associated with compositional differences**
 - **Pursuit is feasible**
 - **Market systems**
 - **Measurement tools**
 - **Maintenance of inherent value**
 - **Within the value chain**
 - **Through processing**
 - **Requires a comprehensive approach**



Nutrient Concentration Considerations

<u>Soybean at 87% DM</u>		<u>Meal Crude Protein</u>	
<u>Protein</u>	<u>Oil</u>	<u>No Hulls</u>	<u>With Hulls*</u>
35.0	18.0	47.9%	47.9%
35.0	19.0	48.7%	48.0%
35.0	20.0	49.4%	48.0%
36.0	18.0	49.3%	48.0%
36.0	19.0	50.1%	48.0%
36.0	20.0	50.9%	48.0%
37.0	18.0	50.7%	48.0%
37.0	19.0	51.5%	48.4%
37.0	20.0	52.3%	49.1%

* Hulls limited to that in a bushel. (No "outside" hulls.)

Optimization of Nutrient Utilization

- **Considerations**

- **Anti-Nutritional Characteristics**

- Heat labile
 - Heat stable

- **Proper “toasting” to:**

- **Adequately de-nature heat labile anti-nutritional factors**
 - Some heat is required to remove residual hexane
 - **Not over-toast to the extent that proteins become less digestible**

No Heat

Over Toasted



▲
Optimum



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Improving Soybean Meal's Value Proposition

- “In a competitive setting, a product will either improve or diminish”**
- **Meal-Relevant Changes in Soybean Composition**
 - **Soybean Genetic Selection**
 - From existing commercial lines
 - Creation of “New” soybeans
 - **Agronomic practices**
 - **Market System Improvements**
 - **Processor Derived Enhancements**
 - **Precision improvements in feed formulation and manufacture**

