

## Abstract #194

A new corn ethanol wet fractionation system provides a uniform, high quality co-product, similar to corn gluten meal, known as “flash dried” Glutenol (45% crude protein, 3.9% crude fat, 0.7% phosphorus), suitable for use in poultry and livestock feeds, and pet foods. Ingredient matrix values needed to be developed so 2 universities performed similar assays. University 1 (U1) used 4 adult Leghorn ceca-intact roosters per sample for true metabolizable energy N-corrected (TMEn) testing and 4 cecectom-ized roosters for true amino acid availability (TAAA) testing. University 2 (U2) used 10 adult Leghorn ceca-intact roosters per sample for TMEn testing and 8 cecectomized roosters for TAAA testing. University of Missouri laboratory performed amino acid tests for all ingredient and excreta samples to improve consistency of data.

Gross energy (GE, 10% moisture) content of Glutenol samples were 10,758 kcal/kg at U1 and 10,865 kcal/kg at U2. The TMEn was 3,210 kcal/kg (1,457 kcal/lb) at U1 and 3,236 kcal/kg (1,471 kcal/lb) at U2, amounting to 29.8% and 29.8% TMEn/GE, respectively. Overall mean TMEn for Glutenol was 3,233 kcal/kg (1,462 kcal/lb). Using NRC (1994) ratio of 97.6% for corn gluten meal MEN/TMEn, the MEN for Glutenol is estimated at 3,155 kcal/kg (1,431 kcal/lb). Soybean meal (SBM) and DDGS samples averaged 2,676 and 3,074 kcal TMEn/kg, respectively. The TAAA for Glutenol and DDGS averaged, respectively: Asp 81.98, 76.25%; Thr 80.62, 74.98%; Ser 84.86, 80.43%; Glu 91.71, 87.45%; Pro 90.10, 85.72%; Ala 90.45, 85.71%; Cys 82.93, 77.95%; Val 86.60, 79.05%; Met 92.08, 87.05%; Ile 87.68, 81.14%; Leu 94.12, 89.87%; and Trp 84.61, 86.45%. Overall TAAA for Glutenol was 86.86% vs 82.53% for DDGS. The TMEn of Glutenol (3,223 kcal/kg) is greater than that of SBM (2,676 kcal/kg) or DDGS (3,074 kcal/kg) and TAAA (86.86%) is at least as good as or higher than commodity DDGS (82.53%).

**Key Words:** amino acid availability, cecectomized, Glutenol, rooster, TME

## Objective

To determine the true metabolizable energy and true amino acid availability values for Glutenol (45% CP) in ceca-intact and cecectomized Leghorn roosters, respectively, compared to similarly ascertained values for DDGS and SBM.

## Introduction

Glutenol is a new animal feed and pet food ingredient that is highly digestible, palatable (not exposed to any sulfur dioxide during production), and consistent (uniform color, texture, moisture, and nutrients). Flash dried Glutenol is produced using a wet fractionation system for corn. Ingredient nutrient matrix values needed to be developed for poultry. The TMEn and TAAA rooster assays were used to quantify values for TMEn and TAAA in Glutenol samples and to compare results to those of DDGS and soybean meal samples. Similar adult Leghorn roosters assays were performed at 2 universities to get reliable estimates. With these results and other nutrient composition data, commercial poultry nutritionists can better determine the nutritional value and economic worth of Glutenol.

## Materials and Methods

Samples of Glutenol, commodity DDGS, and high-protein soybean meal were submitted to 2 universities for testing. Gross energy of the samples and excreta were determined by bomb calorimetry. Researchers at University 1 (U1) used 4 adult Leghorn ceca-intact roosters per sample for true metabolizable energy N-corrected (TMEn) and 4 adult Leghorn cecectomized rooster per sample for TAAA assays. Values were stated assuming 10% moisture levels in the ingredient samples. University 2 (U2) used 10 adult Leghorn ceca-intact roosters per sample for TMEn and 8 adult Leghorn cecectom-ized roosters per sample for TAAA assays. The University of Missouri laboratory performed amino acid tests for all ingredients and excreta samples to improve consist-ency of data.

## Results and Discussion

The GE, TMEn, and estimated ME n values are shown in Table 1. The crude protein values for the soybean meal (SBM), DDGS, and Glutenol samples, adjusted to 10% moisture, were 51.0, 28.7, and 47.5%, respectively. Although differing considerably in crude protein contents, DDGS and Glutenol had relatively similar GE values of 11,002 and 10,812, respectively, on a 10% moisture basis. Interestingly, these GE values are both higher than SBM at 9,523 kcal/kg even though it had highest crude protein. The TMEn values adjusted to 10% moisture basis for SBM, DDGS, and Glutenol were 2,676, 3,074, and 3,223 kcal/kg, respectively, giving advantages in TMEn for Glutenol over DDGS of 4.85% and over soybean meal of 20.46%. The MEN of Glutenol was estimated from TMEn using corn gluten meal’s MEN/TMEn ratio of 97.6% in NRC (1994). These assays determined that Glutenol was a substantial energy source for chickens, having approximately the same MEN as corn (i.e., Glutenol contained an estimated 1,431 kcal/lb).

The true protein contents of SBM, Glutenol, and DDGS calculated as total amino acids were 49.17, 43.56%, and 25.41%, respectively. On a 10% moisture basis, SBM, Glutenol, and DDGS amino acid contents, respectively, were: Met 0.71, 0.96, and 0.57%; Lys 3.32, 1.31, and 0.99%; and Thr 1.95, 1.66 and 1.02%. The SBM and Glutenol® appear to be complementary for improving Met and Lys profiles of feed.

The TAAA values for Met were 91.52% for SBM, 92.08% for Glutenol, and 87.05% for DDGS (Table 2). The Lys bioavailabilities were 90.55% for SBM and 72.25% for Glutenol vs 68.76% for DDGS. The Thr bioavailabilities were 87.02% for SBM, 80.62% for Glutenol, and 74.98% for DDGS. Overall TAAA values by ingredients (averaging 17 individual amino acid bioavailabilities) were 90.92% for SBM, 86.86% for Glutenol, and 82.53% for commodity DDGS.

## Conclusion

Samples of SBM, Glutenol, and commodity DDGS contained 51.0, 47.5, and 28.7% crude protein on a 10% moisture adjusted basis. Adult Leghorn rooster assays were conducted at 2 universities using ceca-intact birds for TMEn and cecectomized birds for TAAA evaluations. All ingredients and excreta samples were analyzed for moisture and amino acids at the University of Missouri laboratory to improve consist-ency of data. The TMEn values adjusted to 10% moisture basis for SBM, DDGS, and Glutenol were 2,676, 3,074, and 3,223 kcal/kg, respectively, giving advantages in TMEn for Glutenol over DDGS of 4.85% and over soybean meal of 20.46%. The Glutenol estimated MEN value (1,431 kcal/lb) is similar to that of corn. Overall TAAA values by ingredients (averaging 17 individual amino acid bioavailabilities) were 90.92% for SBM, 86.86% for Glutenol, and 82.53% for commodity DDGS.

Table 1. Gross energy, TMEn, and estimated MEN (10% moisture basis) of corn Glutenol, commodity DDGS, and high-protein soybean meal by ceca-intact rooster assays at 2 universities (U1 and U2)

		Glutenol	Commodity DDGS	High-Protein Soybean Meal
Gross energy, kcal/kg	U1	10,866	11,226	9,696
	U2	10,758	10,778	9,350
	U1&U2	10,812	11,002	9,523
	kcal/lb	4,905	4,991	4,320
TMEn, kcal/kg	U1	3,236	3,075	2,750
	U2	3,210	3,074	2,602
	U1&U2	3,223	3,074	2,676
	kcal/lb	1,464	1,396	1,215
MEN <sup>1</sup> , kcal/kg	U1	3,158		
	U2	3,133		
	U1&U2	3,155		
	kcal/lb	1,431		

<sup>1</sup>The MEN of Glutenol estimated from TMEn using NRC (1994) corn gluten meal MEN/TMEn ratio of 97.6%.

Table 2. True amino acid availability values (TAAA; 10% moisture basis) for corn Glutenol, commodity DDGS, and high-protein soybean meal from cecectomized rooster assays at 2 universities combined

Amino acid	True amino acid availability, %		
	Glutenol (47.5% CP)	Commodity DDGS (28.7% CP)	High-Protein Soybean Meal (51.0%)
Asp	82.0	76.3	90.9
Thr	80.6	75.0	87.0
Ser	84.9	80.4	90.1
Glu	91.7	87.5	93.5
Pro	90.1	85.7	91.5
Ala	90.5	85.7	87.4
Cys	82.9	78.0	87.5
Val	86.6	79.1	88.9
Met	92.1	87.1	91.5
Ile	87.7	81.1	92.0
Leu	94.1	89.9	91.1
Tyr	89.7	85.9	91.7
Phe	91.0	86.8	92.8
Lys	72.3	68.8	90.6
His	87.7	84.2	90.4
Arg	88.2	85.4	92.5
Trp	84.6	86.5	96.2
Average	86.86	82.53	90.92