Compositional values of commercial sources of feather meal for use in poultry diets

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Formulation of economical poultry diets requires accurate information on nutrient content and bioavailability of different feedstuffs. There are many potential sources of this information, but often times the data are based upon outdated analyses or older processing methods that might influence the digestibility of nutrients, especially protein. Recently, results of studies conducted to determine the nutritive value of commercial samples of feather meal were published (Cotanch et al. 2006; 2007). These assays focused primarily upon the nutritive value of feather meal for cattle. Additional research has been conducted to also provide information that will be useful for those considering feather meal as an ingredient for poultry diets.

The study included samples of feather meal collected from eighteen plants representing about 85% of the feather meal production in the United States. A representative sample of each day's production was collected at each plant for five consecutive days and three consecutive weeks. Some of the plants added blood to the feathers during processing while others did not. Weekly composite samples were analyzed for dry matter, crude protein, ether extract, ash, and selected minerals. Total amino acid content was also determined on weekly composite samples. A blended sample of feather meal representing all collections was subjected to IDEA analysis specific for feather meal to estimate the digestibility of the amino acids for poultry. The true metabolizable energy of the feather meal samples was estimated using the equation reported by Dale (1992) as follows: TME_n (Kcal/kg) = 2862 + 77(%fat).

The analysis of the two feather meal samples is in Table 1, with total amino acid composition and estimates of digestible amino acids in Table 2. There was little difference in crude protein and fat content between samples processed with or without blood. Samples with added blood had higher ash content along with increased amounts of phosphorus, sodium, chloride, and potassium. Because both products had similar amounts of fat, the calculated True Metabolizable Energy value of the two different products was relatively equal and similar to that reported by Dale (1992) and NRC (1994).

The amino acid composition and IDEA estimated digestible amino acid of commercial samples of feather meal are in Table 2. The total amino acid values reported in Table 2 are consistent with values reported by major amino acid companies, while the IDEA estimated digestibility coefficients are consistent with recent estimates by other laboratories (Table 3). Therefore, it can be concluded that these nutrient values should be representative of current commercial feather meal production and can be used with confidence by poultry nutritionists during feed formulation.

References

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Table 1. Nutrient analysis of feather meal products with and without blood[1]

Item	Production type	
	No Blood	Added Blood
Dry matter (DM), %	93.3	93.5
Crude protein, % of DM	87.8	87.7
Ether extract, % of DM	10.0	9.5
TME_n kcal/kg[2]	3632	3594
Ash, % of dry matter	1.9	2.6
Ca, %	0.54	0.51
P, %	0.34	0.39
Mg, %	0.03	0.04
Cl ion, %	0.17	0.33
K, %	0.13	0.21
Na, % S, %	0.11	0.24
Cu, ppm	11	11
Fe, ppm	239	607
Mn, ppm	7	7
Zn, ppm	87	83

[1]From Cotanch et al., 2006.

[2]Calculated using equations by Dale, 1992.

Table 2. Amino acid composition (% of Dry matter) and IDEA[1] estimated digestible amino acid of commercial samples of feather meal with comparison to reported total amino acid values.

Amino Acid	With Blood			Without Blood			Total AA estimates	
	% Total (±SE)	% IDEA	% Dig AA.	% Total (±SE)	% IDEA	% Dig AA.	AHL[2]	Degussa[3]
Ala	4.24 ± 0.22	0.80	3.37	3.99 ± 0.28	0.81	3.22	---	3.86
Arg	5.83 ± 0.21	0.84	4.89	6.07 ± 0.19	0.85	5.14	5.84	5.28
Asp	5.98 ± 0.25	0.59	3.50	5.82 ± 0.22	0.61	3.53	---	5.46
Cys	4.26 ± 0.38	0.49	2.09	4.85 ± 0.29	0.52	2.54	4.43	3.53
Glu	9.05 ± 0.38	0.76	6.88	9.24 ± 0.34	0.78	7.17	---	8.50
Gly	6.38 ± 0.25	0.81	5.16	6.76± 0.32	0.82	5.53	---	6.00
His	1.10 ± 0.18	0.71	0.78	0.68 ± 0.12	0.72	0.49	0.87	1.04
Ile	4.08 ± 0.14	0.78	3.18	4.19 ± 0.13	0.80	3.35	3.97	3.67
Leu	7.32 ± 0.35	0.80	5.84	7.17 ± 0.35	0.81	5.84	6.88	6.55
Lys	2.52 ± 0.26	0.70	1.77	1.95 ± 0.17	0.73	1.43	2.06	2.14
Met	0.68 ± 0.05	0.77	0.52	0.62 ± 0.04	0.79	0.49	0.60	0.55
Phe	4.33 ± 0.26	0.84	3.62	4.27 ± 0.18	0.85	3.62	4.09	3.87
Pro	7.74 ± 0.45	0.78	6.08	8.24 ± 0.40	0.80	6.56	---	7.27
Ser	8.17 ± 0.64	0.74	6.02	9.05 ± 0.71	0.75	6.80	----	8.18
Thr	3.96 ± 0.16	0.74	2.95	4.01 ± 0.13	0.76	3.05	3.90	3.64
Trp	0.52 ± 0.09	0.87	0.45	0.46 ± 0.07	0.88	0.40	0.54	0.61
Tyr	2.54 ± 0.16	0.85	2.16	2.53 ± 0.14	0.86	2.18	----	2.53
Val	6.50 ± 0.32	0.76	4.96	6.67 ± 0.30	0.78	5.19	6.12	5.67

[1]Assay conducted by Novus International, St. Louis MO.
[2] True digestibility of essential amino acids for poultry. Revision 7. Ajinomoto Heartland LLC. Chicago IL
[3]AminoDat 3.0. Degussa Feed Additives, Kennesaw GA.

Table 3. Comparison of IDEA estimates of amino acid digestibility coefficients for feather meal processed with and without blood addition with recent estimates

Amino acid	With Blood	Without Blood	Garcia et al (2007)	AHL[1]
Alanine	0.80	0.81	0.826	----
Arginine	0.84	0.85	0.849	0.833
Aspartic Acid	0.59	0.61	0.514	----
Cysteine	0.49	0.52	0.609	0.611
Glutamic Acid	0.76	0.78	0.755	----
Glycine	0.81	0.82	----	----
Histidine	0.71	0.72	0.638	0.697
Isoleucine	0.78	0.80	0.895	0.860
Leucine	0.80	0.81	0.864	0.823
Lysine	0.70	0.73	0.700	0.653
Methionine	0.77	0.79	0.668	0.744
Phenylalanine	0.84	0.85	0.890	0.844
Proline	0.78	0.80	----	----
Serine	0.74	0.75	----	----
Threonine	0.74	0.76	0.695	0.734
Tryptophan	0.87	0.88	----	0.825
Tyrosine	0.85	0.86	----	----
Valine	0.76	0.78	0.834	0.822

[1] Ajinomoto Heartland LLC. Chicago IL