THE METABOLIZABLE ENERGY OF CORN: ARE TABLE VALUES TOO HIGH?

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Due to the time and expense involved in conducting the chick bioassay for metabolizable energy, there has been no systematic confirmation of published values for more than two decades. Nevertheless, over the past several years, a number of reports have included determined M.E. values for corn (Table 1). (For consistency, only values are included which were obtained using the chick bioassay and for which the dry matter content of the corn was specified. All values have arbitrarily been converted to 85% dry matter, as this is representative of corn currently available to industry.)

It is evident that all determined values are markedly lower than that reported by the National Research Council (NRC). The mean value for 3,075 Kcal/KG (1,398 kcal/lb.) is 6.3% less than the NRC value of 3,276 kcal/kg. The disparity is obviously much greater if one has routinely employed the value actually listed by the NRC (3,430 kcal/kg, or 1,560 kcal/lb.), which is based on an 89% dry matter content.

As part of a project at this laboratory to study the repeatability of determined T.M.E. values, seven samples of yellow corn were assayed during the past nine months. All samples were obtained from commercial channels in the Athens, Ga., area. As is evident from the proximate composition of the samples (Table 2), none is atypical of the corn currently available to the poultry industry.

The mean T.M.E. content of the seven samples (Table 2) was 3,411 kcal/kg, or 1,550 kcal/lb. on an 85% dry matter basis. This is in good agreement with T.M.E. assays conducted elswhere. Although a direct conversion of T.M.E. values to M.E. is imprecise, a reasonable estimate of M.E. can be obtained by reducing T.M.E. values by 10% (2). When the M.E. values of the seven corn samples are estimated in this manner, a mean value of 3,070 kcal/kg, or 1,395 kcal/lb. is obtained. This is in excellent agreement with the recent direct M.E. studies (Table 3).

In the quarter century since M.E. values were established for the major feed ingredients, it is conceivable that genetic selection for increased yields may have inadvertently reduced the amount of energy in corn available to the chicken. Nevertheless, it should be noted that even in 1960, considerable variation in the M.E. of corn was reported in the literature. Hill and co-workers at Cornell (3) assayed five corn samples, finding a range of from 1,496 to 1,683 kcal/lb., with a mean of 1,566 (85% D.M.). At Conneticutt, Potter and Matterson (4) assayed 10 samples, ranging from 1,369 to 1,511 kcal/lb. (85% D.M.), with a mean of 1,445.

On the basis of recently reported M.E. values, and the results of T.M.E. assays conducted at this laboratory and elswhere, it appears likely that varieties of corn in common use today more nearly resemble those used by Potter and Matterson in terms of available energy. If the M.E. content of corn is in fact marketly lower than is indicated by current tables of nutrient composition, this would be expected to alter accepted calorie:nutrient ratios, calculations of energetic efficiency, and the relative value of alternative energy sources.

CONCLUSION:

There appears to be increasing reason to question the metabolizable energy (M.E.) values for yellow corn listed in the standard tables of feed ingredient composotion. Assays conducted at various institutions over the last 10 years and indirect evidence based on true metaboliz- able energy (T.M.E.) studies suggest that currently accepted M.E. values for corn may overesti- mate the energetic content of this ingredient by as much as 7%. When adjusted to a dry matter content of 85%, the M.E. value for corn listed by the National Research Council (1) is 3,276 kcal/kg, or 1,489 kcal/lb.

TABLE 1. Recently Determined M.E. Values for Yellow Corn

Year	Reference	Authors	Location	kcal* kg	kcal* lb.
1975	5	Hochstetler & Scott	Cornell	3130	1423
1976	6	Han et. al.	Cornell	3042	1383
1976	6	Han et. al.	Cornell	3049	1386
1976	7	Garlich et. al.	North Carolina	3164	1438
1980	**	Dale & Fuller	Georgia	3020	1373
1980	**	Dale & Fuller	Georgia	3088	1403
1980	8	Halloran	California	2984	1356
1980	**	Maurice	Clemson	3012	1369
1982	9	Dinn et. al.	Wisconsin	3188	1449
			Average	3075	1398

* Adjusted to 85% dry matter.
**Unpublished data.

TABLE 2. Proximate Composition and T.M.E. Of Seven Samples of Yellow Corn

#	Crude protein	Ether extract	% Crude fiber	Moisture	Ash	T.M.E.*, ** (kcal/kg)
1	7.02	3.65	2.13	13.55	1.16	3417
2	7.60	3.73	2.18	13.82	1.29	3409
3	9.45	3.41	2.25	12.43	1.43	3366
4	7.97	3.31	2.10	13.17	1.20	3400
5	8.17	3.40	2.11	12.92	1.21	3455
6	8.08	3.25	2.07	14.26	1.22	3362
7	9.22	4.10	2.20	12.60	1.43	3468

* Adjusted to 85% dry matter.
**30-hour collection period.

TABLE 3. Comparison of Table And Recently Determined Energy Values for Corn

	kcal* kg	kcal* lb.
NRC (1977)	3276	1489
M.E. Studies (from Table 1)	3075	1398
T.M.E. — 10% (from Table 2)	3070	1395

*All values adjusted to 85% dry matter.

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