



Low Test-Weight Corn for Feedlot Cattle

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Feeding low test-weight corn is an excellent opportunity for producers to salvage a low-value crop or to reduce production costs and improve the profitability of their beef cattle feeding operation.

Many producers have noticed reduced intake, reduced gain, poorer feed efficiency, and reduced dressing percentage when low test-weight corn is fed to feedlot cattle. These observations have led nutritionists and feed representatives to speculate that the net energy for maintenance (NEm) and gain (NEg) values of low test-weight corn are lower than those of high test-weight corn.

University of Minnesota research demonstrated that low test-weight corn or corn harvested at the early-milk, early-dough, or mid-dent maturities had lower starch, lower dry matter, and higher crude protein content than normal corn (Table 1). When fed to lambs, the light corn had less digestible energy than mature or normal weight corn.

Energy

Only limited research has been conducted examining cattle performance or the energy that cattle derive from low test-weight corn compared with normal corn.

In the early 1940s and the early 1950s, SDSU researchers fed immature, frost-damaged corn to yearling steers. This research demonstrated no differences in performance due to the type of corn fed. Weight gains, feed intake, feed conversion, and carcass traits were similar for immature and mature corn treatments. Applying net energy equations to the performance data shows no differences in the NEm or NEg values for immature versus mature ear corn.

In 1993, SDSU researchers measured the net energy values of light- and heavy-weight corn for growing cattle. The light corn weighed 41 lbs per bushel, while the normal corn weighed 54 lbs per bushel. The light test-weight corn exhibited NEm values that were 13% higher and NEg values that were 11% higher than the normal corn.

Nebraska researchers evaluated light-weight and heavy-weight corn for growing and finishing. Cattle (Table 2). Gains and feed efficiency were similar for both corn types during the growing periods. Net energy values were similar for both corn types during the growing phase. However, performance was better during the finishing phase. NEm and NEg appeared to be 8.1 and 5.5% greater in year 1 and 13.4 and 8.4% greater in year 2 for the light

Table 1. Characteristics of corn harvested at four stages of kernel maturity.

Item	Stage of kernel maturity			
	Early milk	Early dough	Mid-dent	Mature
Date of harvest	8/12	8/23	9/6	10/12
Test weight, lb/bu	35	47	55	58
Kernel dry matter, %	20.9	35.7	55.5	76.6
Cob dry matter, %	27.5	37.0	42.8	56.1
Shelling percentage	57.1	61.9	80.0	81.0
Crude protein, %	16.6	12.5	10.7	10.9
Starch, %	47.4	55.0	58.7	63.7
Digestible energy, Mcal/kg*	4.03	4.07	4.18	4.28

Thorton et al. (1969).

*Determined in lambs.

test-weight corn compared with the normal test-weight corn.

Protein

The protein content of light test-weight corn generally is thought to be greater than that of normal corn. However, about half of the light test-weight corn samples observed during 1992 and 1993 had significantly lower crude protein than normal corn. Protein values on a dry matter basis for some of these samples were as low as 7.5% compared to book values for normal corn of 10.1%.

If finishing diets are formulated assuming a value of 9.5 to 10.0% for crude protein and the actual value is 7.5 to 8.0%, a serious protein deficiency could be created in the diet. Diets deficient in protein generally result in reduced intake, reduced gain, poorer feed efficiency, and lower dressing percentage. This may explain the performance reductions observed during 1992 and 1993.

Recommendations

To feed light test-weight corn most effectively to growing and finishing cattle, follow these recommendations based on the research data:

- **The evidence suggests only minimal differences in energy content** for light corn as compared with normal corn in growing diets. Net energy values may actually be higher for light test-weight corn than for normal corn in finishing diets. Whenever possible, **blend normal test-weight corn with low test-weight corn to minimize any differences.**

- Because low test-weight grain has a greater volume per unit weight, **it is critical to use a scale to measure feeding rates. Feeding by volume can result in gross feeding errors.**

- **Protein content of low test-weight corn is extremely variable. It is critical to submit corn to a feed testing lab for protein determination and to balance the ration for protein.**

Table 2. Effect of corn test weight on performance of growing and finishing cattle.

Item	Year 1		Year 2	
	Normal	Light	Normal	Light
Corn characteristics				
Test weight, lb/bu	56.5	47.8	56.1	46.1
Moisture, %	11.7	13.4	14.3	15.4
Crude protein, % ^a	9.8	10.2	8.6	9.9
Growing program				
ADG	2.49	2.51	2.40	2.49
DMI	16.51	16.77	17.19	17.85
F/G	6.65	6.70	7.16	7.12
Corn NE _m ^b	96.19	94.03	94.70	96.38
Corn NE _g ^b	68.78	67.14	67.65	68.95
Finishing program				
ADG	2.71	2.82	3.50	3.61
DMI	18.76	18.36	23.58	22.70
F/G	6.92	6.47	6.65	6.32
Corn NE _m ^b	106.07	114.64	108.38	122.87
Corn NE _g ^b	68.99	72.78	70.07	75.97

Rush et al. (1995).

^aDry matter basis.

^bMcal per cwt corn dry matter. Calculated from performance and diet composition data.

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