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Conventionally-Dried, Solar-Dried and Acid-Treated  
Corn for Finishing Beef Cattle

R. M. Luther, L. B. Embry and J. F. Giles

Recent concern about costs and availability of energy for drying corn grain at harvest has led to a search for alternative methods of drying or preserving corn. The use of solar energy for drying or preservation with organic acids appear to be economical ways of handling wet corn in the storage structure. Limited information is available as to the nutritional value of corn subjected to these treatments and fed to fattening beef cattle.

An experiment was initiated at the James Valley Research and Extension Center, Redfield, during the summer of 1976 to determine the value of corn grain dried or preserved by different methods. A portion of the trial dealt with methods of administering vitamin A and these results will be reported at a later time.

Procedure

Seventy-eight crossbred steers averaging 750 lb. were purchased through a livestock auction for the experiment. The cattle were from one owner. The steers were ear tagged, weighed and allotted to 6 pens of 13 steers each. Initial and final weights were recorded following an 18-hour overnight stand without feed and water. The steers were vaccinated against IBR (Rednose) and *Clostridium* spp. (blackleg, malignant edema) and implanted with 36 mg zeranol at the start of the trial.

The ration treatments were methods of drying and/or preserving whole corn grain. Whole shelled corn harvested from the 1975 crop was stored in 1000-bushel quantities in separate bins.

Moisture content of corn at harvest was 24% for the solar-dried and 17% for the conventionally-dried corn and acid-treated corn. The corn was harvested between November 3 and 10. Differences in moisture content were due to corn varieties with differing maturity dates and dates of harvest. Conventionally-dried corn was dried with natural gas at a local elevator. Solar-dried corn was stored in an experimental bin designed for drying with solar energy and equipped with a fan and motor. The acid-treated corn was prepared by applying Grain Storer P at the rate of 1.3 gallon per ton (36 bu.). This product supplied propionic acid in an amount to permit safe storage up to 1 year. Acid-treated corn was stored in a granary bin of wood construction.

The cattle were fed chopped hay and oats grain for about a month prior to the start of the trial. During the first 2 weeks of the trial the cattle were gradually shifted to a full feed of whole shelled corn with limited hay. Hay consumption was reduced from 11.5 lb. to 2 lb. of good quality, chopped alfalfa-bromegrass hay per head daily during this period. Hay consumption

over the 106-day trial averaged 2.67 lb. per steer daily. Each corn treatment was replicated with two pens of cattle. The cattle in one replication received 1 lb. of pelleted (1/4-inch) supplement containing ground corn, ground limestone, trace mineral salt and vitamin A to provide 20,400 International Units (IU) of vitamin A per steer per day. In the second replication, the cattle received no supplement but were allowed a free-choice mineral composed of ground limestone and trace mineral salt with added vitamin A to provide 34,000 IU per ounce. It was assumed, based on a previous experiment at this location, that the cattle would consume about 1/3 of an ounce of mineral (8 grams) for a daily intake of about 9,600 IU of vitamin A per steer daily.

### Results

The results of the experiment are presented in table 1.

Table 1. Conventionally-Dried, Solar-Dried and Acid-Treated Corn for Finishing Steers (May 25 to September 8, 1976--106 days)

	Conventionally-dried corn	Solar-dried corn	Acid-treated corn
No. animals	26	25 <sup>a</sup>	26
Avg. initial wt., lb.	776	773	776
Avg. final wt., lb.	1083	1071	1090
Avg. daily gain, lb.	2.90	2.81	2.96
Avg. daily feed, lb. (as fed basis)			
Whole corn	19.31	19.52	20.16
Chopped hay	2.67	2.67	2.67
Mineral	0.027	0.085	0.052
Total	22.007	22.275	22.882
Feed/100 lb. gain, lb.			
Whole corn	648	677	663
Chopped hay	92	95	90
Supplement	17	18	17
Mineral	1	3	2
Total	758	793	772

<sup>a</sup>One steer died of unknown causes.

Steer gains for the three types of corn were essentially the same with the gains of cattle fed solar-dried corn being only slightly lower than the other treatments. Cattle fed solar-dried corn and acid-treated corn consumed more feed than cattle fed conventionally-dried corn. Differences in feed required per unit of gain were small with the lowest requirements obtained with steers fed conventionally-dried corn.

The corn treated with propionic acid was at a lower moisture level than was desired for this treatment. Therefore, the benefits observed in feeding high-moisture corn, either untreated or acid-treated, which often result in improved feed efficiency over dry corn were not observed in this experiment.

The weather at this location during the feeding period was extremely dry, resulting in a natural decline in moisture content of the feeds fed. For example, the corn (all treatments) checked in early August contained 7 to 8% moisture. The whole corn appeared to be hard and tough and may have resulted in reduced consumption. However, corn consumption was in the order of 20 lb. per steer. A considerable quantity of whole corn kernels were observed to pass through the animals. The gains were in the order of 3 lb. per steer and this along with feed consumption indicate satisfactory performance for yearling cattle. Feed requirements of less than 8 lb. per pound of gain indicate efficient utilization of the whole corn.

#### Summary

A feeding experiment with yearling beef steers was conducted to compare the value of conventionally-dried corn, solar-dried corn and acid-treated corn. Steer gains were about the same for the three types of corn with the gains of cattle fed solar-dried corn being only slightly lower than the other treatments. Differences in feed consumption and feed efficiency between corn storage treatments were relatively small.