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Dry and High-Moisture Corn Fed Whole or Rolled With
Corn Silage in Cattle Growing-Finishing Diets

J. D. Burkhardt and L. B. Embry

One area of research in beef cattle feeding that is receiving major emphasis at this station is the comparative value of dry and high-moisture grain under various conditions of use and the benefits of processing in comparison to feeding as whole grain. Previous research has involved levels of roughage and moisture content of the roughage (hay or haylage).

In this experiment, dry or high-moisture corn grain was fed whole and rolled with a limited feed of corn silage with urea or soybean meal furnishing the supplemental protein.

Procedures

One hundred twenty-eight Hereford steers initially were used in the experiment. Dietary treatments were dry or high-moisture corn fed whole or rolled with a limited feed of corn silage. Each of the four grain treatments was fed with urea or soybean meal as the supplemental protein using two levels of protein during the first 4 weeks of the experiment. The design resulted in four pens of cattle fed each grain treatment. There was no evidence of any interactions between the grain and protein supplement treatments. Therefore, results from the protein supplements are reported separately (A.S. Series 71-20).

The level of corn silage (71.2% moisture stored in a concrete stave silo) was set at 20 lb. per head daily for the first 147 days. At this time, the original supply of silage was depleted and the silo was refilled with corn silage that had been stored in a pile without packing or cover. It had undergone extensive heat damage from fermentation and was rather dry (37.7% moisture). The level of this silage was reduced to 10 lb. per head daily for the remainder of the experiment. The level of the drier silage resulted in nearly the same dry matter of corn silage intake as from the 20 lb. fed the first 147 days.

The dry corn contained an average of 14.1% moisture. The high-moisture corn was from the same source with water added, resulting in an average moisture content of 25.7%. The high-moisture corn was stored in an oxygen-limiting silo by means of an auger with water being added at several points as it was elevated into the structure. Rolling of both dry and high-moisture corn was just prior to feeding. A roller mill having corrugated rollers 10 inches in diameter with about 10 corrugations per inch was used to roll the grains. The dry grain was rolled to a medium degree of fineness while the high-moisture grain was rolled to produce a flattened kernel with a minimum amount of fine material.

A 64% protein supplement with urea as the major supplemental protein and a 32% protein soybean meal supplement were fed at 1 and 2 lb. per head daily to furnish equal amounts of supplemental protein in the diets. Diethylstilbestrol, chlortetracycline and vitamin A were added to furnish 10 mg., 70 mg., and 20,000

I.U. per head daily, respectively, in the protein supplements. Dicalcium phosphate and trace mineral salt were offered free choice.

The experiment was terminated after 230 days. Carcass data were obtained and livers and rumens were examined for abnormalities.

Results

Average daily gains for all the cattle fed dry or high-moisture corn were the same (2.70 lb). When the dry corn was rolled, rate of gain was 0.10 lb. less (3.6%) than for steers fed whole corn. Feed consumption was also slightly less for steers fed the rolled dry corn resulting in similar feed efficiency between the whole and rolled dry grain.

Rolling of the high-moisture corn did not change the rate of gain in comparison to the whole grain. However, slightly less air-dry matter was consumed with the rolled corn diet, resulting in a small reduction in feed requirements (2.8%) as measured by forced-draft oven moisture determinations.

Previous research at this station has shown only small differences between dry and high-moisture corn and the effect of rolling corn grain when fed with low levels of roughage (10% or less) as hay or haylage. Results of this experiment with the limited amounts of corn silage (about 36% air-dry matter) also indicate essentially no difference between dry and high-moisture corn or any appreciable advantage for rolling.

An U.S.D.A. beef grader placed the carcass grades on the animals after about an 18-hour chill. There appeared to be no consistent effect on carcass grade between treatments imposed in this experiment. Dressing percentage also did not vary between treatments.

Upon slaughter the rumens were examined for abnormalities. Animals receiving high-moisture grains tended to have darker rumen walls. Cattle fed rolled corn also appeared to have less free fluid in the rumen than did the cattle receiving whole corn. While the observations are very subjective, they give some indication of the changes brought about by the diets.

Incidence of abscessed livers was quite low in this experiment. Diets contained about 36% corn silage, air-dry basis, and aureomycin was fed at 70 mg. per head daily. Under these conditions there were only eight abscessed livers, or about 6%. Six of these were from cattle receiving rolled corn. Moisture content of the grain did not appear to influence the incidence of abscessed livers.

Summary

Results of this experiment showed only small differences between dry (14.1% moisture) or high-moisture corn (25.7%) when fed with a limited amount of corn silage (about 36% of the diet air-dry matter).

Feed consumption and rate of gain were slightly lower when the dry corn was rolled, but feed efficiency was about the same as for the whole corn. Steers fed high-moisture rolled corn gained at the same rate as those fed whole corn. Feed consumption was reduced but feed requirements were slightly lower (2.8%) in comparison to high-moisture whole corn as determined by oven-dry moisture.

Carcass characteristics measured did not appear to be affected by moisture content of the grain or by preparation of the grain. More abscessed livers were observed in cattle fed rolled grain. However, total incidence was low, amounting to about 6%.

Table 1. Dry and High-Moisture Corn Fed Whole or Rolled With Corn Silage (January 7, 1971-August 25, 1971 - 230 Days)

	Dry corn		High-moisture corn ^a	
	Whole	Rolled	Whole	Rolled
Number of animals	30 ^b	32	32	32
Init. shrunk wt., lb.	508	506	508	504
Final shrunk wt., lb.	1141	1116	1129	1126
Avg. daily gain, lb.	2.75	2.65	2.70	2.70
Avg. daily feed, lb. (air-dry)				
Corn silage	8.26	8.21	8.22	8.23
Corn grain	13.18	12.50	12.41	11.83
Supplement	1.48	1.48	1.48	1.48
Total	22.92	22.19	22.11	21.54
Feed/100 lb. gain, lb. (air-dry)				
Corn silage	300	310	305	304
Corn grain	478	472	460	437
Supplement	53	56	54	55
Total	831	838	819	796
Dressing percent	63.8	63.7	63.9	64.1
Carcass grade ^c	20.2	20.5	20.4	20.2
Kidney fat, %	2.9	2.7	2.8	2.7
Abscessed livers	2	3	0	3

^a Stored in Harvestore, A. O. Smith Harvestore Products, Inc.

^b Two steers died from pneumonia.

^c Good = 17; Choice = 20. Graded to one-third of a grade.