

# Corn Moisture Level for Feedlot Steers

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## Story in Brief

Dry rolled corn (DC, 14 percent), low moisture (LMC, 20.2 percent), high moisture (HMC, 27 percent) and a mixture of half dry and half HMC grain (HD) were fed to 98 yearling steers in a 96-day finishing trial. Average daily gain and feed efficiency for steers fed DC, LMC, HMC and HD were 2.73, 2.51, 2.87 and 2.93 lb per day and 7.60, 8.99, 7.26 and 7.17 lb of feed per lb of gain. DC fed steers tended to have lower marbling scores but did not differ in dressing percentage, yield grade or number of liver abscesses. Dry matter, organic matter and protein digestibility slightly favored HMC. Fecal starch was least for steers fed HMC and greatest for steers fed LMC. Protein solubility and pepsin digestibility were greatest for the HMC followed by DC and LMC. Grinding of the corns increased digestibility in rumen fluid most with dry corn and low moisture corn. Urea addition also helped, most with the low moisture corn.

## Introduction

The use of high moisture corn for feedlot steers has in recent years become increasingly common. High moisture corn is typically stored at 20 to 28 percent moisture in a pit silo in the ground or rolled form. For ease of handling and esthetic reasons (bright color, less odor), its moisture level has steadily declined the past 10 years. Occasionally, to stretch grain supplies, dry and high moisture corn are fed in combination but limited research information on the combination is available.

The purpose of this study was to examine the effects of corn moisture level and a 50:50 mixture of dry and high moisture corn on growth rate, feed efficiency and carcass characteristics of feedlot steers.

## Experimental Procedure

A 96-day finishing trial was conducted with 98 yearling black baldy steers which were allotted to 12 pens, three pens per treatment. The four treatments evaluated were as follows: dry (14 percent moisture), two high moisture (20.2 and 27 percent) and a mixture of half 27 percent and half 14 percent moisture corn grain.

Harvested corn was selected on the basis of moisture to be ensiled in large horizontal plastic bags. Rations contained, as a percent of dry matter-83 percent rolled corn, 14 percent alfalfa hay and three percent of a urea-mineral-monensin supplement. Steers were implanted with Synovex-S at the start of the trial. Final weights of steers were calculated from carcass weight using a standard dressing percent of 62 percent. *In vivo* dry matter digestibility was estimated from acid insoluble ash content of feeds and fecal grab samples.

## Results and Discussion

All corn was well preserved. On removal from storage, HMC remained cool whereas LMC would heat. This indicates less fermentation and poorer bunk stability of the LMC.

Feed intake and feed required per pound of gain was greater (Table 1) for steers fed LMC than for those fed DC, HMC or HD. Steers fed LMC had lower weight gains

**Table 1. Steer performance and carcass characteristics.**

Item	Dry corn	Low moisture corn	High moisture corn	HMC & dry corn
Feed intake, lb/day	20.79	22.60	20.81	21.01
ADG, lb/day	2.73	2.51	2.87	2.93
Feed/gain	7.60	8.99	7.26	7.17
Dressing, %	61.9	61.4	61.8	62.2
Yield grade	2.5	2.4	2.5	2.6
Liver abscesses	1.00	0.66	1.67	1.67
Marbling score	14.9	16.8	17.2	16.2

**Table 2. Digestibility by feedlot steers.**

Item	Dry corn	Low moisture corn	High moisture corn	HMC + Dry corn
<i>In vivo</i> digestibility, %				
Dry matter	70.0	70.1	74.5	70.6
Organic matter	72.5	73.7	76.3	71.5
Protein	52.1	56.5	65.3	60.4
Nutrient content				
Fecal starch, % DM	8.7	11.7	5.2	7.0
% disappearance	96.7	94.5	97.7	97.1
Fecal pH	6.29	6.39	6.75	6.66

than those fed HMC or the HD mixture and slightly less than those fed DC. Differences (Table 1) were not detected in dressing percentage, yield grade or number of liver abscesses. Marbling scores tended to be lower for steers fed DC.

Digestibility of dry matter, organic matter and protein tended to increase with increasing corn moisture content (Table 2). Fecal starch was lower for steers receiving HMC than LMC, suggesting that starch from LMC was less completely digested. The highest fecal pH observed was associated with the HMC and fecal pH tended to decline ( $r^2 = 0.64$ ) as fecal starch increased. Nitrogen solubility in a buffer solution was greater for HMC than for LMC and DC (Table 3). Similarly, pepsin digestibility was highest ( $P < .05$ ) for HMC.

Dry matter digestibility by ruminal fluid was determined for the DC, LMC and HMC in the unground or whole (W), and the ground (G) state with (+U) and without urea (Table 4). Grinding increased digestibility at each moisture level, especially for DC and LMC. Urea addition also enhanced ruminal digestibility, especially for the LMC.

Results indicate that efficiency of corn use by feedlot steers varies markedly with corn moisture level. At high (27 percent) and low (14 percent) moisture levels nutrient availability appears to be satisfactory while at the intermediate moisture level (20.2 percent) nutrient availability was depressed. Although the steers attempted to compensate for the decreased availability of the LMC with an increased intake, they failed

**Table 3. Laboratory characteristics.**

Item	Dry corn	Low moisture corn	High moisture corn
Buffer protein solubility, %	18.7	15.2	41.1
Pepsin digestibility, %	87.5	84.6	89.3
pH	----	4.6	4.0

**Table 4. Digestion by rumen fluid.**

Item	Dry corn	Low moisture corn	High moisture corn
Unground	%	%	%
+ urea	49.95	55.14	55.45
Ground	55.47	61.48	59.64
+ urea	61.51	60.19	58.50
	69.21	72.95	67.51

to achieve the rate of gain of the steers fed DC or HMC. Elevated fecal starch suggest that lowered energy availability was involved. Fecal starch, daily gain and feed efficiency all ranked the corn moisture levels in the same order from best to worst.

As in work conducted by Davis *et al.* (1978) at Kansas State University, associative effects between dry and high moisture corn in this trial were not evident. This suggests that combinations of corns with varying moisture can be satisfactorily fed but have no great advantage over the mean of the two individual types of corn.

### Literature Cited

Davis, George V., Jr. and Gerald L. Greene. 1978. Garden City Branch, Kans. State Univ. Cattle Feeders' Day, p. 1.