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Distillers Grains With Solubles and Ground Ear Corn in Feedlot Diets

Terry L. Mader¹

Summary

In a 162-day finishing study, steers were fed various levels of dried distillers grains with solubles (DGS) with ground ear corn harvested at 45% moisture, and compared with steers fed 25% DGS, rolled corn, and corn silage. Steers fed the highest level of DGS (37.5% of diet DM) with ground high-moisture ear corn had the lowest ADG and DMI, but F:G tended to be improved by feeding 25% and 37.5% DGS with ear corn as compared with feeding rolled corn plus corn silage. Feed cost of gain (COG) and total COG was most favorable (4.4% lower than control) for cattle fed the 25% DGS plus 35% ear corn diet.

Introduction

High moisture ground ear corn is one example of an alternative source of both energy and roughage for feedlot cattle. Ground ear corn can be harvested with a silage chopper equipped with a snapper head (called snaplage) or harvested with a combine modified to save a large portion of the cob but removing the husk and shank. High-moisture ear corn has several advantages: 1) increased yield from harvesting early, 2) increased feed value associated with fermentation, and 3) its inherent roughage that can replace forages typically added to diets for growing and finishing cattle. However, storage for the fermented feedstuffs is required. In general, the value of high-moisture ear corn has been defined (NRC, 2000), but when fed with dry distillers grains plus solubles (DGS), its value has not been determined.

Procedure

From a group of 235 steers, 156 head of the medium and heavy

Table 1. Rations containing dry distillers grains plus solubles (DGS) and high-moisture ground ear corn.

Ingredient	DGS25Control	DGS12.5	DGS25	DGS37.5
DGS	25	12.5	25	37.5
Rollled corn	53	47.5	35	22.5
Ground ear corn	0	35	35	35
Corn silage	17	0	0	0
Liquid supplement	5	5	5	5

weight groups were selected. Prior to trial initiation, cattle were implanted (Revalor®-XS), revaccinated (Vision® 7), and fed a common ration *ad libitum* for five days. The steers subsequently were weighed and allocated to one of two 12-pen blocks (12 pens of seven steers/pen, and 12 pens of six steers/pen). Based on mean pen weight, within a block, diet treatments were assigned randomly to the pens. Diet treatments included high moisture ear corn harvested at 55% DM and fed at 35% of DM in combination with various levels (12.5; 25, and 37.5%) of DGS (Table 1). In addition, a typical DGS-dry rolled corn-corn silage diet was utilized as a control diet. Dry matter intake was recorded daily for the duration of the 162-day study. An intermittent weight was taken on day 64. At slaughter, carcass tags were matched to ID tags and carcass data were collected. Final weight was calculated from hot carcass weight using a dressing percentage of 63%. One animal was removed from the trial due to reasons unrelated to treatment.

Results

The study was conducted during the winter of 2009-10, which was one of the worst winters for feeding cattle in northeast Nebraska since the 1980s. Steers fed the highest level of DGS with ground, high-moisture ear corn had the lowest ($P < 0.01$) 64-day and overall ADG and the lowest DMI (Table 2). However, F:G tended ($P = 0.06$) to be improved by feed-

ing 25% and 37.5% DGS with ear corn. When compared among diets containing 25% DGS, steers fed ear corn ate less feed and gained slower than cattle fed dry-rolled corn plus silage ($P < .05$), but their F:G was 6.5% superior. Relative to the control group, DMI and ADG were depressed more during the first 64 days by feeding the high moisture ear corn when compared with the remaining 98 days on feed, but the F:G advantage was quite similar for both parts of the feeding trial (7.5% early versus 5.5% later). The percentage of cattle grading choice and prime among steers fed high-moisture ear corn was greatest (97.3%) for the 12.5% DGS diet group and lowest (53.8%) in the 37.5% DGS diet group. Feed cost of gain (COG) and total COG was most favorable (4.4% lower than control) for cattle fed the 25% DGS plus 35% ear corn diet.

High-moisture ground ear corn has generally had a feed value comparable to feeding approximately 75% high moisture corn with 25% roughage, although in some trials, high-moisture ear corn without husk or shank has had a feeding value (ME or NE_g) between 96 and 100% of high-moisture corn grain (www.ansi.okstate.edu/research/research-reports-1/1995/1995-1%20Hills.pdf). The relatively high feed value of ear corn combined with an approximate 20% greater dry matter yield per acre markedly increases return per acre of grain harvested. In the current study, the combination of 25% DGS

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with 35% ground high moisture ear corn appeared to produce the greatest complementary effects.

However, the enhanced feed value was associated with a linear ($P < 0.01$) decline in DMI as the % of ear corn increased. Both of these effects could be due to the high moisture (45%) of the ear corn and the high digestibility attributed to the early harvest, processing and fermentation of the fiber (cob, husks, etc.). In addition, rumen microbes, which complement the digestion of fiber in DGS, are quite similar to the microbes that digest fiber of the ear corn. Even though the digestion rate may have been lower, as evidenced from lower DMI, the extent of digestion appeared to be enhanced by feeding DGS with ear corn vs. with dry-rolled corn grain. The larger and potentially more homogenous microbial population in the rumen may have contributed to the enhanced feed value associated with feeding DGS and ear corn together. Thus, feeding high-moisture ear corn with DGS potentially enhances the feeding value of the combined ingredients over feeding DGS with corn in a feedlot finishing diet; however, duration of feeding period may need to be

Table 2. Animal performance and cost of gain (COG) for cattle fed DGS and high-moisture ground ear corn (EC).

	Control DGS25	ECDGS12.5	ECDGS25	ECDGS37.5	P-value
Init. wt, lb	794	797	790	798	0.97
Final wt ¹	1,362	1,327	1,316	1,296	0.08
64 d ADG, lb	3.60 ^a	3.45 ^{ab}	3.27 ^b	2.83 ^c	<0.01
64-162 day ADG, lb	3.45	3.15	3.23	3.24	0.29
162 d ADG, lb	3.51 ^a	3.27 ^b	3.24 ^b	3.07 ^c	<0.01
64 d DMI, lb/day	22.56 ^a	20.61 ^{ab}	18.94 ^b	17.35 ^c	<0.01
64-162 day DMI, lb/day	21.03 ^a	19.86 ^b	18.64 ^{bc}	17.78 ^c	<0.01
162 d DMI, lb/day	21.63 ^a	20.15 ^b	18.76 ^c	17.61 ^d	<0.01
64 day F:G	6.29	6.02	5.82	6.21	0.25
64-162 day F:G	6.13	6.39	5.79	5.52	0.07
162 day F:G	6.19	6.17	5.79	5.74	0.06
USDA yield grade	2.66	2.61	2.55	2.44	0.44
USDA choice/prime	82.1	97.3	74.4	53.8	0.01
Feed (COG, \$/cwt) ²	62.42	61.72	57.35	56.28	—
Total (COG, \$/cwt) ²	83.23	84.02	79.56	79.7	—
% change	0	0.95	-4.41	-4.24	—

^{abcd}Means with different superscripts differ ($P < 0.05$).

¹Adjusted to 63% dress.

²Ear corn prices at 80% of the value of rolled corn on a DM basis.

extended to compensate for the slower ADG for cattle fed ear corn.

Based on net energy calculations using observed DMI and ADG, net energy values for the four diets were 60, 61, 65, and 67 mcal NEg/cwt of dry matter. Assuming the NEg value of dry corn and DGS were constant, the NEg of the high moisture ear corn in these diets were 62, 69, and 73 mcal/cwt, respectively for the 12.5, 25 and

37.5% ear corn diets. Feeding value of the ear corn was superior to the combination of dry-rolled corn plus silage and combining more DGS with high moisture ear corn increased the value of the ear corn, the DGS, or both.

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