

Evaluating Finishing Performance of Cattle Fed High-Moisture Corn and Steam-Flaked Corn Blends with Modified Distillers Grains

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Summary with Implications

The objective of this study was to determine the impacts of feeding different inclusions of high-moisture corn or steam-flaked corn in diets with 20% modified distillers grains plus solubles. Additionally, this study was designed to quantify any associative effects when high-moisture and steam-flaked corn are blended together with modified distillers grains plus solubles. Cross-bred yearling steers ($n=90$; $BW=777 \pm 7.9$ lb) were individually fed using a Calan Gate system for 168 days. Animals received one of five finishing diets containing 100% high-moisture corn, one of three blends of high-moisture:steam-flaked, or 100% steam-flaked corn to determine the optimum inclusion of the corn types with distillers grains. There was no difference in dry matter intake, but final body weight, average daily gain, and feed conversion all linearly increased as steam-flaked corn inclusion increased. In conclusion, no associative effects were observed and feeding steam-flaked corn with 20% modified distillers resulted in the greatest performance.

Introduction

Steam-flaked corn (SFC) has been widely used in feedlots in the southern United States to improve feed conversion (F:G) by increasing starch digestibility. Similarly, feedlots in the Midwest have commonly fed high moisture corn (HMC), both to ensure corn supply for the year and to improve F:G when fed with distillers grains. Popularity of SFC in the Midwest is increasing, but producers still realize the benefits of HMC

Table 1. Composition of steam-flaked corn and high-moisture corn based finishing diets containing 20% modified distillers grains plus solubles

	Treatments				
	100	75	50	25	0
HMC%	100	75	50	25	0
SFC%	0	25	50	75	100
<i>Ingredient</i>					
SFC ¹	0.00%	17.50%	35.00%	52.50%	70.00%
HMC ²	70.00%	52.50%	35.00%	17.50%	0.00%
MDGS	20.00%	20.00%	20.00%	20.00%	20.00%
Grass Hay	6.00%	6.00%	6.00%	6.00%	6.00%
Supplement ³	4.00%	4.00%	4.00%	4.00%	4.00%

¹SFC- Steam-flaked corn average 29.9 lb/bu

²HMC- High moisture corn (70% DM rolled and stored in bunker)

³Supplement—Formulated to provide 1.37% fine ground corn, 1.64% limestone, 0.10% tallow, 0.50% urea, 0.30% salt, 0.05% beef trace mineral, 0.015% vitamin ADE, and provide 30 g/ton rumensin-90 and 8.8 g/ton tyran-40

based on price and supply. Additionally, while both SFC and HMC are rapidly fermented in the rumen, it is possible that rates of fermentation differ enough so that ruminal starch digestion is slowed and a positive associative effect may be observed when feeding HMC and SFC in combination. Distillers grains has also become a staple ingredient to provide protein and energy in finishing diets. Steam-flaked corn has an improved F:G compared to HMC when fed without distillers; however, when distillers is included up to 40% of the diet on a dry matter (DM) basis, HMC has an advantage over SFC (2007 Nebraska Beef Cattle Report, pp 33–35). Similarly, SFC has improved F:G compared to dry-rolled corn (DRC) when fed without byproducts, but when both corn types are fed with 35% WDGS, performance was similar (2012 Nebraska Beef Cattle Report, pp 70–72). Therefore, the objective was to determine the implications of feeding different inclusions of HMC or SFC when modified distillers grains plus solubles (MDGS) was included at 20% of the diet on a DM basis. Additionally, this study was designed to determine if positive associative effects are observed when HMC and SFC were fed together with MDGS.

Procedure

The relationship between HMC and SFC in diets with distillers was explored at the Eastern Nebraska Research and Extension Center (ENREC) to compare finishing cattle performance when fed HMC, SFC, or a blend with 20% MDGS. This study utilized 90 yearling steers (777 ± 7.9 lb) individually fed using the Calan gate system. Treatments included (Table 1): 100% HMC, 75% HMC blended with 25% SFC, a 50% blend of the grains, 25% HMC blended with 75% SFC, or 100% SFC (DM basis); as the grain included at 70% of the diet). Steam flaked corn averaged 29.9 lb/bu and was delivered three times per week from a local commercial feedlot near Memphis, Nebraska (Raikes Feedyard). High moisture corn was harvested, rolled in a roller mill, and stored in bunkers prior to initiation of this trial. Corn was fed at 70% DM in this study. Modified distillers grains plus solubles was fed at 20% of the diet (DM basis), which reflects current industry inclusions. Additionally, all diets contained 6% grass hay and a 4% supplement, which was formulated with 0.5% urea, 30 g/ton rumensin (Elanco Animal Health), and 8.8 g/ton of tyran (Elanco Animal Health). Animals were implanted on day 1 with a Revalor IS (Merck Animal

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Table 2. Effect of steam-flaked corn and high-moisture corn inclusion in finishing diets fed with 20% MDGS on performance characteristics

		Treatment				P-value		
HMC% ¹	100	75	50	25	0			
SFC% ²	0	25	50	75	100	SEM	Linear	Quad
Initial BW, lb	774	775	782	778	776	12.87	0.84	0.75
Car. Adj. FBW ³ , lb	1365	1366	1410	1408	1429	20.41	0.009	0.94
DMI, lb	22.3	22.4	22.6	22.1	23.0	0.46	0.50	0.66
ADG, lb	3.53	3.52	3.74	3.75	3.89	0.09	< 0.01	0.80
F:G ⁴	6.35	6.41	6.07	5.92	5.91	0.123	< 0.01	0.91
HCW ⁵ , lb	860	861	889	887	900	12.85	< 0.01	0.94
LM Area, in ²	13.9	14.1	14.1	14.6	14.4	0.337	0.12	0.75
Fat, in	0.54	0.56	0.65	0.62	0.65	0.04	0.01	0.52
Marbling ⁶	522	524	520	502	549	22.36	0.65	0.33
Dressing, %	62.4%	62.9%	62.7%	62.9%	63.5%	0.004	0.09	0.70

¹HMC%—percent of total corn that is fed as high-moisture corn

²SFC%—percent of total corn that is fed as steam-flaked corn

³Car Adj. FBW—calculated based on HCW/common 63% dress

⁴F:G—analyzed statistically as G:F

⁵HCW—hot carcass weight

⁶400 = Small 00, 500 = Modest 00, 600 = Moderate 00

Health) and then reimplanted on day 57 with a Revalor 200 (Merck Animal Health). Cattle were on feed 168 days. Initial BW was determined based on an average of 3 day BW following 5 days of limit feeding to equalize gut fill. Before slaughter, a 1 day live final BW was collected and animals were slaughtered at a commercial abattoir. During harvest, hot carcass weight (HCW) was recorded and carcass adjusted final BW was calculated based on a common 63% dressing percentage. Carcass characteristics included marbling, 12th rib fat thickness, and *Longissimus* muscle (LM) area were collected following a 48-hour chill.

Data were analyzed using the PROC MIXED procedure of SAS (SAS Institute Inc., Cary, N.C.) as a completely randomized design with cattle stratified by initial body weight (BW) and animal as the experimental unit. This resulted in 18 replications per treatment. The model included the proportion of SFC and HMC. Linear and quadratic contrasts were developed to quantify if a positive or negative associative effect occurred between SFC and HMC when fed with 20% MDGS.

Results

Results showed no differences in initial BW, dry matter intake, longissimus muscle area, or marbling score between treatments ($P > 0.12$; Table 2). Ending BW, HCW, ADG

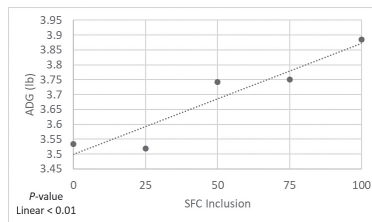


Figure 1. Average daily gain (ADG) of finishing steers fed high moisture corn (HMC), steam-flaked corn (SFC), or a blend of the two grains with 20% modified distillers grains plus solubles.

(Figure 1), and F:G all linearly improved with increasing inclusion of SFC in the diet ($P < 0.05$). Carcass adjusted F:G improved linearly ($P < 0.01$; Figure 2) from 6.35 to 5.91 for 100% HMC compared to 100% SFC diets, respectively. This improvement in F:G was a result of an increase in ADG from 3.53 to 3.89 lbs/d in favor of the 100% SFC diet. Dry matter intake was similar across all treatments at 22.5 lbs. No quadratic response was detected for any measure collected in this trial. These performance data suggest that feeding blends of SFC and HMC did not result in an associative effect and replacing HMC with SFC resulted in a linear improvement in ADG and F:G. The results of this study differ from previous work, but deoiled MDGS was used in this study compared to full fat wet distillers grains plus solubles in previous work.

Conclusion

In conclusion, feeding steam-flaked corn in finishing diets resulted in improved

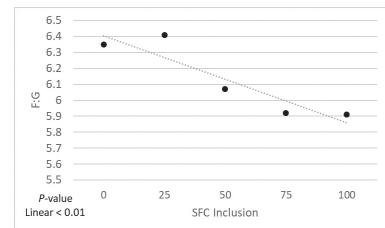


Figure 2. Feed conversion of finishing steers fed high moisture corn (HMC), steam-flaked corn (SFC), or a blend of the two grains with 20% modified distillers grains plus solubles.

performance compared to high-moisture corn in diets containing 20% modified distillers grains plus solubles. The increasing popularity of feeding steam-flaked corn in the Midwest with modified distillers grains plus solubles included in the diet is a viable option and may improve feed efficiency when compared to traditional high-moisture corn based diets. However, increased processing costs associated with the steam flaking process must be analyzed to determine profitability in this system.

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