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Summary with Implications

A finishing study evaluated the effect of corn hybrid and processing type on finishing performance of yearling steers. Treatment design was a 2×3+1 factorial, with two hybrids that included a conventional commercial corn (CON) and Syngenta's Enogen Feed Corn (EFC). Corn was processed and fed as dry-rolled corn (DRC), high-moisture corn (HMC), or a 50:50 blend of the two for each hybrid. An additional treatment included 50% EFC DRC and 50% CON HMC, to evaluate a blend of the two hybrids and processing types. An interaction between hybrid and processing method was observed for ADG and F:G. Cattle fed EFC had numerically improved F:G and similar ADG when fed EFC compared to CON as DRC or a 50:50 ratio of DRC:HMC. For cattle fed HMC, ADG and F:G were better for CON compared to EFC, leading to the interaction. Cattle fed a blend of EFC as DRC with CON as HMC performed similar to those fed a blend of the CON hybrid. Feeding Enogen Feed Corn may improve performance when processed as DRC but results were not statistically different than feeding the CON hybrid despite a 3% improvement in efficiency.

Introduction

Replacing roughage with corn grain in feedlot cattle diets increases the energy density of the diet substantially, which can increase gain and efficiency. Starch is the major energy component in corn, and must be digested by cattle either in the rumen by microbes or the intestine by enzymatic digestion from the cattle. Syngenta Enogen Feed Corn (EFC; Syngenta Seeds, LLC) has been genetically enhanced to contain an α-amylase enzyme trait. This trait may result in improved animal performance by increasing post-ruminal starch digestion. Previous research has observed an improvement in F:G and an increase in post-ruminal starch digestion when EFC was fed as dry-rolled corn (DRC), compared to cattle fed corn not containing the α-amylase enzyme trait (*2018 Nebraska Beef Cattle Report*, pp. 92–94; *2016 Nebraska Beef Cattle Report*, pp. 135–138; *2016 Nebraska Beef Cattle Report*, pp. 143–145). However, the same response has not been observed when cattle were fed high-moisture corn (HMC; *2016 Nebraska Beef Cattle Report*, pp. 143–145).

A majority of producers who utilize HMC feed it as a ratio with DRC; therefore, the objective of this study was to evaluate EFC when fed at different ratios as either 100% DRC, 100% HMC, or a 50:50 blend of DRC:HMC.

Table 1. Dietary treatment compositions (DM basis) for finishing steers fed Enogen or control hybrids as dry-rolled corn, high-moisture corn, or a blend.

Trait	CON[1]			EFC[2]			EFC/CON[3]
Processing Method	DRC	Blend	HMC	DRC	Blend	HMC	Blend
Dry-Rolled Corn CON[1]	70.0	35.0	-	-	-	-	-
Dry-Rolled Corn Enogen[2]	-	-	-	70.0	35.0	-	35.0
High-Moisture Corn CON[1]	-	35.0	70.0	-	-	-	35.0
High-Moisture Corn EFC[2]	-	-	-	-	35.0	70.0	-
Wheat Straw	5.0	5.0	5.0	5.0	5.0	5.0	5.0
MDGS	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Supplement[4]	5.0	5.0	5.0	5.0	5.0	5.0	5.0

[1]CON= Commercially available corn grain without the alpha amylase enzyme trait

[2]EFC = Syngenta Enogen Feed Corn provided by Syngenta under identity-preserved procedures, stored, and processed as dry-rolled corn (DRC) or high-moisture corn (HMC), and fed separately

[3]EFC/CON= 50/50 Blend of EFC DRC and CON HMC.

[4]Supplement contained 0.5% urea, limestone, trace minerals, vitamins ADE, and was formulated to provide 30g/ton Rumensin® (Elanco Animal Health, DM Basis) and 8.8g/ton Tylan® (Elanco Animal Health, DM Basis)

Procedure

A 148-d finishing study, utilizing 336 crossbred yearling steers (BW = 915 ± 37 lb) in a randomized block design, was conducted at the Eastern Nebraska Research and Extension Center (ENREC) feedlot near Mead, Nebraska. Steers were limit fed a diet consisting of 50% alfalfa hay and 50% Sweet Bran (Cargill; Blair, NE) at 2.0% BW for five consecutive days to equalize gut fill. Steers were then weighed on two consecutive days and the average was used as initial BW. Cattle were implanted with Revalor 200® (Merck Animal Health) on d 1 of the trial. Steers were blocked by BW into light and heavy BW blocks (n = 3 replicates for each BW block) based on d 0 BW, stratified by BW and assigned randomly to 1 of 42 pens, with pens assigned randomly to 1 of 7 treatments. There were 8 steers/pen and 6 replications/treatment.

Dietary treatments (Table 1) included 1) conventional commercial corn processed as HMC (CON HMC), 2) CON

Table 2. Effect of corn hybrid and processing method on cattle performance and carcass characteristics

	Treatments								P-Values					
	CON[1]			EFC[2]			EFC/CON[3]		Main Effects		Int.[4]		Hybrid Effect[5]	
	DRC	Blend	HMC	DRC	Blend	HMC	Blend							
Pens	6	6	6	6	6	6	6	SEM	Hybrid[6]	L Proc.[7]	L	Q	DRC	HMC
Performance														
Initial BW, lb	919	919	919	920	919	919	919	0.6	0.28	0.30	0.66	0.44	0.21	0.53
Final BW, lb[8]	1459	1460	1479	1455	1470	1448	1464	9.4	0.27	0.49	0.18	0.11	0.72	0.03
DMI, lb/d	26.4	24.9	24.2	25.4	24.9	23.8	24.8	0.29	0.03	<0.01	0.33	0.16	0.01	0.24
ADG, lb[8]	3.65	3.66	3.78	3.61	3.73	3.58	3.68	0.064	0.25	0.45	0.21	0.10	0.66	0.03
Feed:Gain[8]	7.25	6.82	6.41	7.04	6.68	6.66	6.74	-	0.85	<0.01	0.09	0.47	0.30	0.16
Carcass Characteristics														
HCW, lb	919	920	932	916	926	912	922	5.9	0.25	0.49	0.18	0.11	0.71	0.03
Ribeye Area, in	13.6	13.9	14.4	13.8	13.9	14.1	14.1	0.21	1.00	0.02	0.23	0.84	0.44	0.35
Marbling Score[9]	525	493	526	497	511	526	489	15.0	0.78	0.32	0.38	0.22	0.20	0.97
Back Fat Thickness, in	0.66	0.60	0.65	0.63	0.67	0.64	0.62	0.026	0.63	0.92	0.55	0.07	0.38	0.96

[1]CON= Commercially available corn grain without the alpha amylase enzyme

[2]EFC = Syngenta Enogen Feed Corn provided by Syngenta under identity-preserved procedures, stored, processed as corn silage.

[3]EFC/CON= 50/50 Blend of EFC DRC and CON HMC.

[4]Interaction effects of hybrid type and grain processing

[5]Effect of hybrid type on grain processing

[6]Main effect of hybrid type.

[7]Linear effect of grain processing

[8]Calculated from hot carcass weight, adjusted to a common 63% dressing percentage

[9]Marbling Score 400-Small00, 500 = Modest00

processed as DRC (CON DRC), 3) a 50/50 blend of CON HMC and CON DRC (CON BLEND), 4) Syngenta Enogen Feed Corn processed as HMC (EFC HMC), 5) EFC processed as DRC (EFC DRC), 6) a 50/50 blend of EFC HMC and EFC DRC (EFC BLEND), and 7) a 50/50 blend of EFC DRC and CON HMC (EFC/CON BLEND). Steers were adapted over a 5 diet, 21-d step-up period, where by-product and wheat straw inclusions were held constant, while corn replaced alfalfa hay.

Steers were harvested on day 149 at Greater Omaha (Omaha, NE). During harvest, hot carcass weight (HCW) was recorded and carcass-adjusted final BW was calculated from a common 63% dressing percentage. Carcass characteristics included marbling score, 12th rib fat thickness, and LM area, which were recorded after a 48-hr chill.

Data were analyzed using the PROC GLIMMIX procedure of SAS (SAS Institute, Inc., Cary, N.C.) as a randomized block design, with pen as the experimental unit and block as a fixed effect. The treatment design was a 2×3+1 factorial. Linear and quadratic interaction effects of hybrid and grain processing were evaluated for the 2×3 factorial. If no significant interactions were detected, then main effects of hybrid and corn processing were evaluated. If a significant interaction existed, then simple effects of hybrid within processing method were compared. Preplanned contrasts compared CON versus EFC within each processing method, and CON BLEND to EFC/CON BLEND.

Results

There were no interactions between corn hybrid and processing method for initial BW, DMI, ribeye area, or marbling score ($P \geq 0.16$, Table 2). A tendency for a quadratic interaction was observed for HCW and final BW between hybrid and processing method. Cattle fed the CON hybrid as DRC weighed the least and weights increased as HMC inclusion increased. Cattle fed EFC had lower weights when it was fed as DRC or HMC, thus, the response to processing was different. A quadratic interaction was observed for ADG between processing and hybrid (Figure 1). The ADG was numerically greater for cattle fed EFC as DRC or the blend of DRC:HMC, but then ADG did not further increase for cattle fed EFC as HMC like was observed for the CON hybrid. Furthermore, a linear interaction was observed ($P = 0.09$) for feed efficiency between hybrid and processing method. Feed conversion improved as HMC inclusion increased. However, this improvement was greater in cattle fed the CON hybrid compared to the EFC hybrid (Figure 2).

In general, when fed as DRC or fed as a blend of DRC:HMC, steers fed EFC

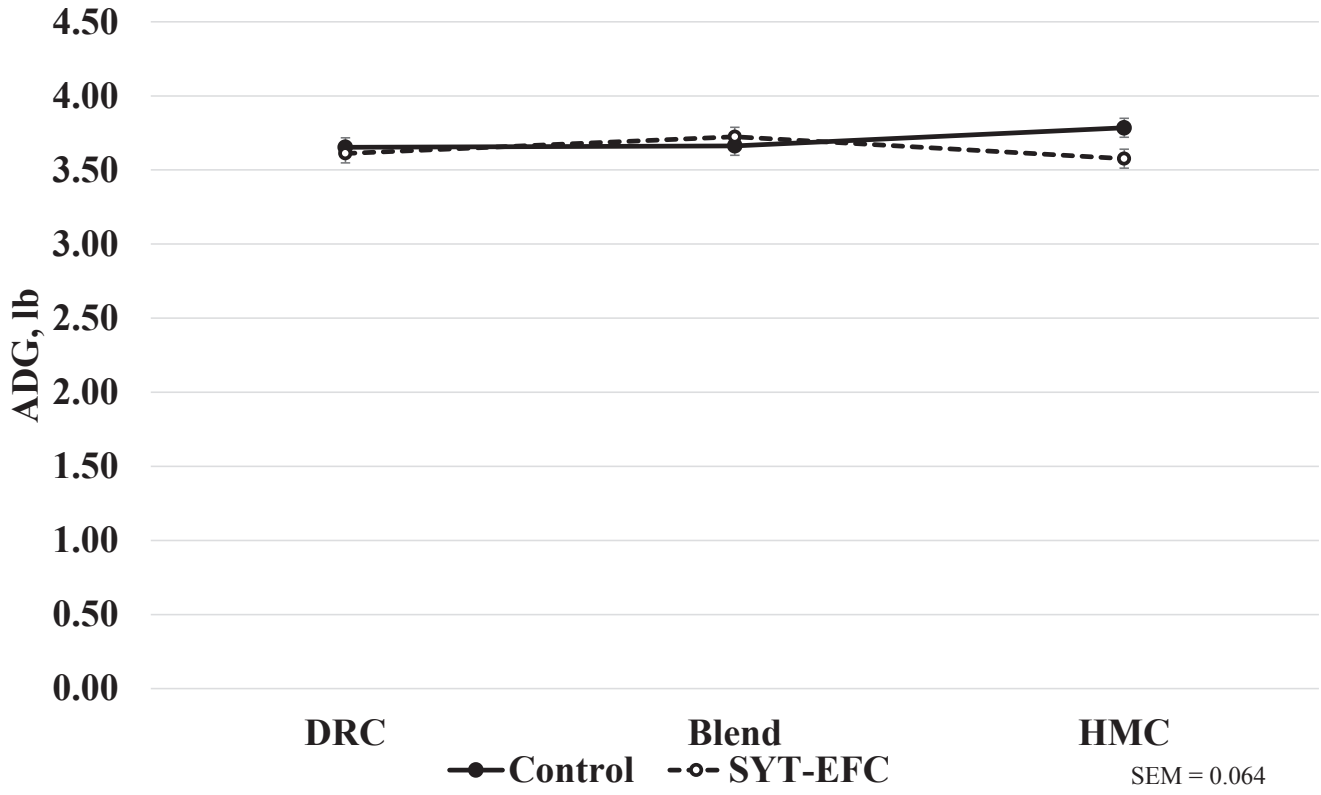

Figure 1. Effect of corn hybrid and processing method on average daily gain.

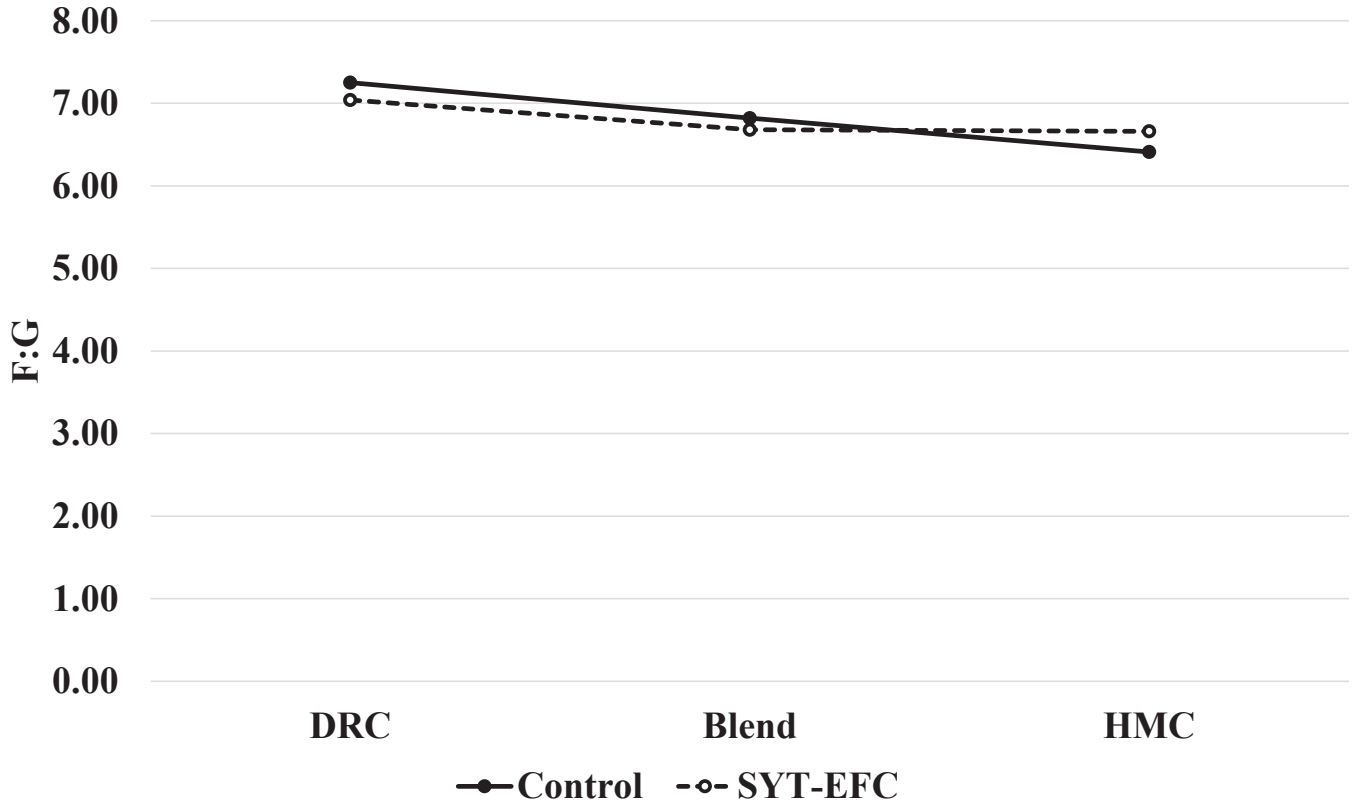

Figure 2. Effect of corn hybrid and processing method on feed to gain ratio.

had similar ADG, but lower or equal DMI, resulting in numerically lower F:G compared to the CON DRC or BLEND. The improvement of F:G was about 3% for EFC compared to CON when fed as DRC which equates to a 4.3% improvement in the grain itself (70% inclusion). This was not statistically different based on the pairwise comparison ($P = 0.30$). When fed as HMC, steers fed CON had greater ADG ($P = 0.03$), and numerically better F:G ($P = 0.16$) compared to EFC. Previous data suggested that when fed as HMC, no differences were observed between EFC and comparable control hybrids (*2016 Nebraska Beef Cattle Report*, pp. 143–145).

As expected, as DRC was replaced with HMC, DMI decreased while ADG was fairly similar which showed that feeding HMC improved F:G compared to DRC and the blend of 50:50 DRC:HMC was generally intermediate to feeding either alone.

A blend of EFC DRC and CON HMC was compared to the blend of control DRC and HMC (CON BLEND). No significant effects were observed for any of the growth performance or carcass characteristic parameters measured ($P \geq 0.47$).

Conclusion

Finishing cattle with Syngenta Enogen Feed Corn as DRC, HMC, or a 50/50 blend of the two did not statistically improve any of the growth performance or carcass characteristics that were measured. However, cattle fed the EFC BLEND had numerically heavier final BW, greater ADG, improved F:G, greater HCW, increased marbling score, and greater back fat thickness compared to those fed the CON BLEND. Additionally, steers consuming EFC DRC had numerically lower F:G than those fed CON DRC.

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