

Evaluating Syngenta Enogen Feed Corn Silage or Grain on Growing Beef Cattle Performance

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Summary with Implications

A growing trial was conducted to evaluate Syngenta Enogen Feed Corn containing an alpha amylase enzyme trait compared with commercially available corn without the amylase enzyme trait on growing cattle performance characteristics. Corn was harvested as either corn silage or dry corn, and corn silage was further harvested with kernel processing or not. The treatment design was a 2x2+2 factorial with 2 hybrids of silage, kernel processed or not, and then a 40% dry-rolled corn and hay growing diet as Syngenta Enogen Feed Corn or control corn. No interactions were observed between silage hybrids and kernel processing. Cattle fed kernel processed silage had a 6.5% improvement in feed conversion compared to not kernel processed silage. No statistical differences were observed when feeding Syngenta Enogen Feed Corn as dry-rolled corn compared to control dry-rolled corn. There was no benefit of the Syngenta Enogen Feed Corn when fed as corn silage or dry-rolled corn when used in growing rations.

Introduction

To maximize feed conversion in beef cattle, starch digestion must be optimized. Syngenta Enogen Feed Corn (EFC; Syngenta Seeds, LLC) has been genetically enhanced to contain an α -amylase enzyme trait. Previous research has observed a decrease in F:G and an increase in post-ruminal starch digestion when EFC was fed as DRC, compared to 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).

Table 1. Dietary treatment compositions (DM basis) for growing steers fed Enogen or control hybrids as kernel processed silage or not processed compared to both hybrids as dry-rolled corn.

Ingredient, % DM	Corn Silage				Dry-rolled Corn	
	CON ¹		EFC ²		CON ¹	EFC ²
Corn Trait	KP	NKP	KP	NKP	CON ¹	EFC ²
Kernel Processing	KP	NKP	KP	NKP	-	-
CON KP Corn Silage ¹	80.0	-	-	-	-	-
CON NKP Corn Silage ¹	-	80.0	-	-	-	-
EFC KP Corn Silage ²	-	-	80.0	-	-	-
EFC NKP Corn Silage ²	-	-	-	80.0	-	-
CON Dry-rolled Corn ¹	-	-	-	-	40.0	-
EFC Dry-rolled Corn ²	-	-	-	-	-	40.0
Grass Hay	-	-	-	-	40.0	40.0
Modified Distillers Grains	15.0	15.0	15.0	15.0	15.0	15.0
Supplement ³	5.0	5.0	5.0	5.0	5.0	5.0
Fine Ground Corn	2.099	2.099	2.099	2.099	2.099	2.099
Limestone	1.5	1.5	1.5	1.5	1.5	1.5
Urea		0.9	0.9	0.9	0.9	0.9
Salt		0.3	0.3	0.3	0.3	0.3
Tallow		0.125	0.125	0.125	0.125	0.125
Beef Trace Mineral		0.05	0.05	0.05	0.05	0.05
Vitamin ADE		0.015	0.015	0.015	0.015	0.015
Rumensin 90		0.01102	0.01102	0.01102	0.01102	0.01102

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

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

³Supplement formulated to provide 200mg/steer daily Rumensin* (Elanco Animal Health, DM Basis)

2016 *Nebraska Beef Cattle Report*, pp. 135–138; 2016 *Nebraska Beef Cattle Report*, pp. 143–145).

Feeding corn silage allows cattle feeders to take advantage of the entire corn plant at a time of maximum quality and tonnage as well as secure substantial quantities of roughage/grain inventory (2013 *Nebraska Beef Cattle Report*, pp. 74–75). Incorporating corn silage based growing diets containing 80% corn silage in combination with distillers grains has been shown as a potentially economical and efficient way to grow steers prior to the finishing phase (2011 *Nebraska Beef Cattle Report*, pp. 16–17).

Therefore, the objective of this study was to compare EFC corn to commercially available corn without the alpha amylase

enzyme trait when used as a silage, and also how EFC grain will work in non-silage, forage-based diets such as hay.

Procedure

An 84-d growing study, utilizing 576 crossbred steers (BW = 674 lb; SD = 51 lb) in a randomized block design, was conducted at the Eastern Nebraska Research and Extension Center (ENREC) feedlot near Mead, NE. Steers were limit fed a diet consisting of 50% alfalfa hay and 50% Sweet Bran (Cargill; Blair, NE) at 2.0% BW for 5 consecutive days to equalize gut fill. Steers were weighed on 2 consecutive days and the average of those 2 days was used as initial BW. Cattle were implanted with Ralgro®

Table 2. Effect of corn silage variety and kernel processing on growing cattle performance.

Performance	Corn Silage ⁷				Dry-rolled Corn ⁸		P-Values					
	CON ¹		EFC ²		CON ¹	EFC ²	SEM	F-Test	Main Hybrid ³	Main KP ⁴	Int. ⁵	EFC as DRC ⁶
	-KP	+KP	-KP	+KP	-	-						
Initial BW, lb	675	673	674	675	675	675	0.8	0.28	0.43	0.76	0.03	0.87
Ending BW, lb	991	995	982	997	966	966	4.7	<0.01	0.44	0.06	0.28	0.96
DMI, lb/d	21.6	20.7	21.6	21.7	24.6	24.1	0.27	<0.01	0.06	0.12	0.06	0.24
ADG, lb	3.77	3.83	3.67	3.82	3.47	3.47	0.06	<0.01	0.36	0.06	0.46	0.92
Feed:Gain	5.74	5.39	5.89	5.68	7.09	6.94	-	<0.01	<0.01	<0.01	0.19	0.37

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

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

³Effect of corn silage variety.

⁴Effect of kernel processing.

⁵Interaction effects of corn silage and kernel processing.

⁶Effect of Syngenta Enogen Feed Corn as dry-rolled corn.

⁷Corn silage included in the diet at 80%, 15% MDGS, 5% supplement.

⁸Dry-rolled corn included in the diet at 40%, 40% grass hay, 15% MDGS, 5% supplement.

(Merck Animal Health) on d 1. Steers were blocked by BW into light, medium, and heavy BW blocks (n= 2, 4, and 2 replicates, respectively) based on d 1 BW, stratified by BW and assigned randomly to 1 of 48 pens with pens assigned randomly to 1 of 6 treatments. There were 12 steers/pen and 6 replications/treatment.

Dietary treatments (Table 1) were arranged in a 2x2+2 factorial, and included 1) conventional commercial corn silage with kernel processing (CON KP), 2) CON corn silage without kernel processing (CON NKP), 3) Syngenta Enogen Feed Corn silage with kernel processing (EFC KP), 4) EFC silage without kernel processing (EFC NKP), 5) CON dry-rolled corn with grass hay (CON DRC), and 6) EFC dry-rolled corn with grass hay (EFC DRC). Diets were formulated to meet or exceed NRC requirements for protein and minerals. The final growing diets provided 200 mg/steer daily of Rumensin (Elanco Animal Health). Ending BW was determined similarly to initial BW. Steers were limit fed a diet consisting of 50% alfalfa hay and 50% Sweet Bran (Cargill; Blair, NE) at 2.0% BW for 5 consecutive days and weighed 2 consecutive days. Ending BW was calculated by averaging the 2-d weights.

Performance (BW, DMI, ADG, F:G) data were analyzed using the MIXED procedure of SAS (SAS Inst., Inc., Cary, N.C.) with pen as the experimental unit. Data were analyzed as a 2x2+2 factorial. Within corn silage, the interaction was tested

between corn trait and kernel processing. If no interaction was detected, than main effects will be discussed. If an interaction occurred, than simple effects of kernel processing within corn silage trait will be discussed. A preplanned pairwise comparison was made between hybrids when fed at 40% of the diet as DRC.

Results

No interactions between corn silage hybrid and kernel processing were observed for ending BW, ADG, or feed efficiency ($P \geq 0.19$; Table 2). A tendency for an interaction was observed for DMI ($P = 0.06$) where steers fed CON KP silage tended to consume less than CON NKP or either EFC silage. Due to no interaction being observed, main effects of corn silage hybrid and kernel processing were tested. For the main effects of corn silage hybrid (Table 3), DMI was lower for cattle fed the CON silage than EFC ($P = 0.01$), while average daily gain did not differ ($P = 0.29$), thus, steers fed the CON silage had a lower F:G compared to those fed EFC ($P < 0.01$). Steers fed kernel processed silage had greater ending BW than those fed silage that was not kernel processed ($P = 0.03$; Table 4). Additionally, cattle fed kernel processed silage displayed decreased DMI ($P = 0.05$) and increased ADG ($P = 0.03$) than those consuming non-processed silage. Due to decreased DMI, and increased ADG, F:G was lower for cattle fed kernel processed silage ($P <$

0.01). Kernel processing corn silage when fed at 80% of the diet appears to have a positive effect on feed efficiency of growing steers, when compared to non-kernel processed silages. Feeding kernel processed silage resulted in a 5.2% improvement in efficiency when diets included silage at 80%, suggesting the silage was improved by 6.5% (5.2/0.80) compared to not kernel processing silage.

Control and EFC DRC when included at 40% of the diet with 40% grass hay were not statistically different from one another for any of the performance characteristics ($P \geq 0.37$; Table 2). Cattle fed EFC DRC had numerically lower DMI (0.50 lb/day less) than those fed CON DRC ($P = 0.24$). Therefore, F:G was numerically lower for the cattle fed EFC DRC (6.94) than those fed CON DRC (7.04; $P = .37$). These results suggest that EFC DRC had no statistical benefit over the CON DRC.

Conclusion

Feeding growing cattle Syngenta Enogen Feed Corn silages did not improve any of the performance characteristics when compared to traditional silage, when fed at 80% of the diet. Traditional corn silage had lower DMI, greater ADG, and F:G. Using kernel processing in corn silage did not interact with the hybrid type. However, kernel processing improved feed efficiency by 5.2% when fed at 80% inclusion (DM), suggesting a 6.5% improvement in the silage as a

Table 3. Main effect of corn silage hybrid on cattle performance.

Item	Treatment		SEM	P-value ³
	CON ¹	EFC ²		
Pens	16	16		
<i>Performance</i>				
Initial BW, lb	674	674	0.6	0.48
Ending BW, lb	994	990	2.9	0.37
DMI, lb/d	21.1	21.7	0.15	0.01
ADG, lb	3.80	3.76	0.03	0.29
Gain:Feed	0.181	0.174	0.002	<0.01
Feed:Gain	5.55	5.77	-	<0.01

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

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

³P-value for the main effect of corn silage hybrid

feed. Furthermore, feeding growing cattle Syngenta Enogen Feed Corn as dry-rolled corn did not have any effect on performance characteristics when compared to traditional dry-rolled corn, when fed at 40% of the diet with 40% grass hay.

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Table 4. Main effect of kernel processing on cattle performance.

Item	Treatment ¹		SEM	P-value ²
	+KP	-KP		
Pens	16	16		
<i>Performance</i>				
Initial BW, lb	674	674	0.6	0.79
Ending BW, lb	996	987	2.9	0.03
DMI, lb/d	21.2	21.7	0.15	0.05
ADG, lb	3.84	3.73	0.03	0.03
Gain:Feed	0.182	0.173	0.002	<0.01
Feed:Gain	5.52	5.80	-	<0.01

¹Treatments were kernel processed (+KP) or not kernel processed (-KP)

²P-value for the main effect of kernel processing