2018

Impact of Syngenta Enogen Feed Corn on Finishing Cattle Performance and Carcass Characteristics

Melissa L. Jolly-Breithaupt
University of Nebraska-Lincoln, melissa_jolly_brethaupt@unl.edu

Curtis J. Bittner
University of Nebraska-Lincoln, curtis.bittner@unl.edu

F. Henry Hilscher Hilscher
University of Nebraska-Lincoln, henry.hilscher@unl.edu

Galen E. Erickson
University of Nebraska - Lincoln, gerickson4@unl.edu

James C. MacDonald
University of Nebraska-Lincoln, jmacdonald2@unl.edu

See next page for additional authors

Authors
Melissa L. Jolly-Breithaupt, Curtis J. Bittner, F. Henry Hilscher Hilscher, Galen E. Erickson, James C. MacDonald, and Matt K. Luebbe

Impact of Syngenta Enogen Feed Corn on Finishing Cattle Performance and Carcass Characteristics

Melissa L. Jolly-Breithaupt
Curt J. Bittner
Fred H. Hilscher
Galen E. Erickson
James C. MacDonald
Matt K. Luebbe

Summary with Implications

Two finishing experiments were conducted to evaluate Syngenta Enogen Feed Corn containing an alpha amylase enzyme trait compared to the near negative isoline control corn at two locations on cattle performance and carcass characteristics. No statistical differences were observed for final BW, DMI, ADG, or F:G for steers fed Syngenta Enogen Feed Corn versus the near negative isoline control corn. Fat depth and calculated yield grade were greater for steers fed Syngenta Enogen Feed Corn; however, HCW and marbling scores were not different. Previous research has observed a 2.6% to 16.4% decrease in F:G when Syngenta Enogen Feed Corn was fed; however, under this study a 1.6% reduction in F:G was observed.

Introduction

Starch digestion occurs in the rumen by bacterial fermentation or by pancreatic α-amylase secretion into the small intestine. The absorption of glucose by the small intestine is energetically more efficient. However, high-starch diets have been shown to be limited in pancreatic α-amylase concentration and/or secretion which can limit intestinal starch digestion of dry-rolled corn. Syngenta Enogen Feed Corn (SYT-EFC; Syngenta Seeds, LLC) has been genetically enhanced to contain an α-amylase enzyme trait that may increase postruminal starch digestion, resulting in improved animal performance. Four previous experiments have evaluated the impact of feeding SYT-EFC on cattle performance and starch digestibility. In these experiments, there was a decrease in F:G and an increase in postruminal starch digestibility when SYT-EFC was fed as dry-rolled corn (DRC) compared to cattle fed corn not containing the α-amylase enzyme trait (2016 *Nebraska Beef Report* pp. 135; 2016 *Nebraska Beef Report* pp. 139; 2016 *Nebraska Beef Report* pp. 143). However, the increased response has been variable warranting the need for a large, well-replicated trial. Therefore, the objective of this experiment was to determine the feeding value of SYT-EFC when processed as DRC.

Table 1. Dietary treatments evaluating Syngenta Enogen Feed Corn and Near Negative Isoline Parental Control Corn

Ingredient, % DM	NEG[1]	SYT-EFC[2]
NEG[1]	66.0	-
SYT-EFC[2]	-	66.0
DGS[3]	18.0	18.0
Corn silage	12.0	12.0
Meal supplement (ENREC)[4]	4.0	4.0
Fine ground corn	1.2362	1.2362
Limestone	1.689	1.689
Urea	0.5	0.5
Salt	0.3	0.3
Tallow	0.10	0.10
Trace mineral premix	0.05	0.05
Potassium chloride	0.083	0.083
Rumensin-90	0.0165	0.0165
Vitamin ADE premix	0.015	0.015
Tylan-40	0.0102	0.0102
Liquid Supplement (PHREC)[5,6]	6.0	6.0

[1]NEG: Near negative isoline parental control corn
[2]SYT-EFC: Syngenta Enogen Feed Corn containing α-amylase enzyme
[3]DGS: Distillers grains plus solubles
[4]Meal Supplement fed at the Eastern Nebraska Research and Extension Center
[5]Liquid Supplement fed at the Panhandle Research and Extension Center
[6]Supplement formulated to provide a dietary DM inclusion of 1.34% limestone, 0.5% urea, 0.3% salt, 0.2% potassium chloride, 30 mg/kg Zn, 50 mg/kg Fe, 10 mg/kg Cu, 20 mg/kg Mn, 0.1mg/kg Co, 0.5 mg/kg I, 0.1 mg/kg Se, 1000 IU of vitamin A, 125 IU of vitamin D, 1.5 IU of vitamin E.

Procedure

Three hundred crossbred steers (initial BW = 703 lb, ± 43) were utilized in a finishing trial at the UNL Eastern Nebraska Research and Extension Center (ENREC) feedlot near Mead, NE. All corn [SYT-EFC and near negative isoline parental control corn (NEG) seed from Syngenta Seeds, LLC] was grown during the summer of 2015 at ENREC, harvested in November 2015, and processed as DRC at time of feeding. Cattle were limit fed a diet at 2% of BW for 5 d prior to the start of the experiment. Two-day initial weights were recorded on d 0 and 1 which were averaged and used as the initial BW. The steers were blocked by BW into two weight blocks, light and heavy, (n = 10 and 5 pen replicates, respectively) based on d 0 BW, stratified by BW within block and assigned randomly to 1 of 30 pens. Pen was assigned randomly to treatment. There were 10 steers/pen and 15

Table 2. Effect of corn hybrid on finishing performance and carcass characteristics

	Dietary Treatments[1]			P-Values	
Item	NEG	SYT-EFC	SEM	Trt	Location
Animal Performance					
Initial BW, lb	669	668	0.5	0.13	< 0.01
Final BW, lb[2]	1351	1350	4.9	0.88	0.03
DMI, lb/d	22.8	22.6	0.13	0.19	< 0.01
ADG, lb[2]	3.90	3.90	0.03	0.99	< 0.01
F:G[2,3]	5.85	5.79	-	0.17	< 0.01
Carcass Characteristics					
HCW, lbs	852	852	3.1	0.88	0.03
Marbling Score[4]	470	486	12	0.33	0.34
Fat Depth, in	0.53	0.56	0.01	< 0.01	0.79
LM Area, in^2	13.2	13.0	0.07	0.02	0.44
Calculated Yield Grade[5]	3.24	3.49	0.08	0.02	0.23
Liver Abscess, %	8.60	6.03	2.33	0.25	0.81

[1]Dietary treatments: NEG = Near negative isoline parental control corn; SYT-EFC = Syngenta Enogen Feed Corn containing alpha amylase enzyme
[2]Calculated from HCW adjusted to a common 63% pressing percentage.
[3]Analyzed as G:F, the reciprocal of F:G.
[4]Marbling Score: 300=Slight^{00}, 400= Small^{00}.
[5]Calculated as 2.5 + (2.5 x 12th rib fat) + (0.2 x 2.0 [KPH]) + (0.0038 x HCW)–(0.32 x LM area).

replications/treatment. Dietary treatments included 1) SYT-EFC and 2) Near negative isoline parental control (NEG; Table 1). Steers were adapted to the finishing diets over a 21-d period with corn replacing alfalfa hay, while inclusion of corn silage, modified distillers grain plus solubles (MDGS), and supplement remained the same in all diets. Diets were formulated to meet or exceed NRC requirements for protein and minerals. The final finishing diets provided 330 mg/steer daily of Rumensin (30 g/ton of DM; Elanco Animal Health, Greenfield, IN), and 90 mg/steer daily of Tylan (8.2 g/ton of DM; Elanco Animal Health, Greenfield, IN). Steers were implanted with Component IS (Elanco Animal Health, Greenfield, IN) on d 22 and Component S (Elanco Animal Health, Greenfield, IN) on d 92.

On d 169, feed was offered at 50% of the previous day DMI and cattle were weighed at 1500 h to determine final live BW. A 4% pencil shrink was applied to the final live BW to calculate dressing percentage. All steers were harvested at a commercial abattoir (Greater Omaha, Omaha, NE) on d 170 and hot carcass weights (HCW) and liver scores were recorded on the d of slaughter. Fat thickness, LM area, and USDA marbling score were recorded after a 48-h chill. Yield grade was calculated using the USDA YG equation [YG = 2.5 + 2.5 (fat thickness, in)−0.32 (LM area, in^2) + 0.2 (KPH fat, %) + 0.0038 (HCW, lb)]. Final BW, ADG, and F:G were calculated using HCW adjusted to a common 63% dressing percentage.

Three hundred crossbred steers (initial BW = 624 lb, ± 34) were utilized in a finishing trial at the UNL Panhandle Research and Extension Center (PREC) feedlot near Scottsbluff, NE. All corn utilized was grown at the ENREC and shipped to the PREC during the trial. Initial BW protocols, BW blocking, treatment assignment, number of steers per pen, and replications per treatment were the same as previously described at ENREC. Steers were adapted to the finishing diets over a 21-d period with corn replacing alfalfa hay, while inclusion of corn silage, wet distillers grain plus solubles (WDGS), and supplement remained the same in all diets. Dietary treatments were the same as ENREC with the exception of WDGS in place of MDGS and the inclusion of supplement at 6% instead of 4% of the diet DM. Steers were implanted with Component IS (Elanco Animal Health, Greenfield, IN) on d 1 and Component S (Elanco Animal Health, Greenfield, IN) on d 91. Steers were harvested at a commercial abattoir (Cargill Meat Solutions, Fort Morgan, CO) on d 181. Carcass data collection procedures and calculations were the same as previously described.

Overall, 600 steers were utilized among the two locations to provide a total of 30 replications per treatment. Performance and carcass characteristic data were analyzed using the MIXED procedure of SAS as a generalized randomized block design with pen as the experimental unit. Liver abscess incidence data were analyzed using the GLIMMIX procedure of SAS with the number of animals affected by liver abscesses divided by the total number of animals within the pen as binomial variables. The effect of location, treatment, and location × treatment were all included in the model with BW block as a fixed variable. If the location × treatment interaction was not significant ($P \geq 0.05$), main effects were discussed and the interaction term was removed from the model.

Results

There were no treatment by location interactions ($P \geq 0.30$) observed for initial BW, final BW, DMI, ADG, F:G, and liver abscess percentage (data not shown). No significant differences in final BW, DMI, ADG, F:G, or liver abscess percentage were observed for steers fed SYT-EFC compared to NEG ($P \geq 0.17$; Table 2). A small (2% due to grain) numerical decrease ($P = 0.17$) in F:G was observed for steers fed SYT-EFC compared to NEG. A location effect ($P \leq 0.03$) was observed for final BW, DMI, ADG, and F:G with steers fed at PREC having greater final BW, DMI, ADG, and decreased F:G compared to ENREC (data not shown). Previous research has shown small positive results in cattle performance with steers fed SYT-EFC processed as DRC. Overall, greater ADG and improvements in F:G have been reported in steers fed SYT-EFC compared to commercial corn or NEG (*2016 Nebraska Beef Report* pp. 135; *2016 Nebraska Beef Report* pp. 143).

Fat depth and calculated YG were greater ($P < 0.01$ and $P = 0.02$, respectively) for steers fed SYT-EFC compared to NEG; however LM area was slightly greater ($P = 0.02$) for NEG. Previous research has reported either an increase in fat depth ($P \leq 0.03$) and calculated YG ($P \leq 0.03$; *2016 Nebraska Beef Report* pp. 135) or no difference ($P \leq 0.22$ and $P \leq 0.17$, respectively; *2016 Nebraska Beef Report* pp. 135; *2016 Nebraska Beef Report* pp. 143) when steers were fed SYT-EFC. No significant differences by treatment were observed for HCW or marbling score ($P \geq 0.33$). Previous research has reported mixed results for marbling score of steers fed SYT-EFC compared to commercial corn or NEG either observing an increase (*2016 Nebraska Beef Report* pp. 135) or no difference (*2016 Nebraska Beef Report* pp. 143). Differences in cattle response between previous trials and this current trial could be attributed to growing conditions of the corn resulting in a year effect.

Conclusion

In conclusion, previous finishing trials have observed a 2.6% to 16.4% reduction in F:G when SYT-EFC has been fed as the main source of dietary corn grain. However, results from this trial would suggest that there is no significant change in F:G by feeding the Syngenta Enogen Feed Corn hybrid containing an alpha amylase enzyme trait as the response was too small to detect. The change in F:G was only 1% due to diet, which is assumed to be only 1.6% due to corn grain (65% of the diet, average between ENREC and PREC).

Melissa L. Jolly-Breithaupt, research technician

Curt J. Bittner, research technician

F. Henry Hilscher, research technician

Galen E. Erickson, professor, Animal Science, Lincoln

James C. MacDonald, associate professor, Animal Science, Lincoln, NE

Matt K. Luebbe, associate professor, Animal Science, Panhandle Research and Extension Center, Scottsbluff, NE