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Syngenta Enogen Feed Corn Silage Containing an Alpha Amylase Expression Trait Improves Feed Efficiency in Growing Calf Diets

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Abstract

In 2017, a growing calf study conducted at the Kansas State University Beef Stocker Unit determined that feeding Enogen Feed corn as either dry-rolled or whole-shelled yielded a positive feed efficiency response of 5.50%. It is not known what the extent of the feed efficiency response is when the alpha amylase enzyme trait is present in either grain and/or silage. In order to determine the growing calf response to Enogen Feed corn silage when fed with Enogen Feed corn or control corn, 352 crossbred steers of Tennessee origin that were used on a previous study at the Kansas State University Beef Stocker Unit were reallocated to pens based on weight. Steers were fed a total mixed ration once daily for 90 days. The four treatment diets were formulated to provide 50 Mcal net energy for gain/100 lb. Cattle off-test weights tended to be greater for calves fed Enogen Feed corn silage. Overall, feed efficiency improved by 4.40% and average daily gain improved by 6.00% for calves fed Enogen Feed corn silage.

Introduction

Recent studies involving Enogen Feed corn, containing an alpha amylase enzyme trait, fed to finishing cattle have yielded positive outcomes in feed efficiency. Similar results were seen in a 2017 growing calf study conducted at the Kansas State University Beef Stocker Unit, which determined that feeding Enogen Feed corn as either dry-rolled or whole-shelled yielded a positive feed efficiency response of 5.50%. It is not known what the extent of the feed efficiency response is when the alpha amylase enzyme trait is present in either grain and/or silage. The objective of this study was to evaluate the performance of growing cattle when fed Enogen Feed corn silage.

Experimental Procedures

Crossbred steers of Tennessee origin (n = 362), averaging 656 lb, were allocated to pens based on weight. Animals were previously vaccinated for viral and clostridial diseases and treated for internal and external parasites. Thirty-two pens were used (8 for each

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treatment), composed of 11 animals each. Ten steers on the higher end of the weight range were removed from the research population. The remaining 352 steers were stratified by weight and randomly assigned to pens, which were randomly allocated to 1 of 4 treatments. The four treatment diets were formulated to provide 50 Mcal net energy for gain/100 lb dry matter and all were offered for ad libitum intakes. The experiment was a 2 × 2 factorial design with two varieties of corn silage [Enogen Feed (Syngenta) vs. control] and two varieties of dry-rolled corn (Enogen vs. control). Pen was the experimental unit. The steers were fed their respective diets once daily at approximately 7:00 a.m. for 90 days (Table 1). Individual animal weights were taken on days -6 (allocation), 0 (initial processing), 49 (fecal starch grab), and 91 (final weights). Fecal starch samples were obtained individually on day 49 and analyzed the same week. Pen weights were collected on days 14, 28, 42, 56, 70, 77, and 91. Feed delivery was adjusted based on daily refusals to ensure ad libitum intakes without an excess of leftover feed. Bunk and individual ingredient samples were taken weekly.

Results and Discussion

Over the entire 90-day trial, average daily gain for calves fed Enogen Feed corn silage was greater ($P < 0.01$) than for calves fed control silage (Table 2). Dry matter intake tended to be greater ($P < 0.07$) for calves fed Enogen Feed corn silage over the entire 90-day trial. This difference was especially apparent through day 42, where Enogen-fed calves consumed more ($P < 0.01$) than their control-fed counterparts. Feed efficiency was greater in calves fed Enogen Feed corn silage ($P < 0.02$). Toward the end of the study (days 77 and 90), feed efficiency was greater ($P < 0.02$) for calves fed Enogen Feed corn silage. Overall, the feed efficiency of calves receiving Enogen Feed corn was improved by 4.40%. No significant effects of corn grain type were noted over the entire 90-day trial, nor any significant interactions between corn silage type and corn grain type.

Implications

When fed in an ad libitum fashion to growing calves, Enogen Feed corn silage improves the efficiency of feed conversion by 4.40% and improves average daily gain by 6%. By day 77, this response became significant and continued throughout the remainder of the study. There were no negative observations regarding cattle health or behavior with the feeding of Enogen Feed corn silage.

Table 1. Experimental diets

Ingredient	Dry matter %
Corn[1]	38.50
Supplement	7.50
Alfalfa hay	7.00
Prairie hay	7.00
Corn silage[2]	40.00
Total	100.00

Composition	100% Dry matter basis
Dry matter, %	54.60
Protein, %	12.86
Calcium, %	1.05
Phosphorus, %	0.32
Salt, %	0.40
Potassium, %	0.94
Magnesium, %	0.19
Fat, %	3.30
Acid detergent fiber, %	16.66
Net energy for maintenance, Mcal/100 lb	78.04
Net energy for gain, Mcal/100 lb	50.36

[1]Corn type: Enogen Feed corn vs. control.
[2]Corn silage: Enogen vs. control.

Table 2. Effects of corn silage and corn source on performance

	Corn silage source							
	Enogen[1]		Control					
	Dry-rolled corn source				Standard error of the mean	*P* - value		
Item	Control	Enogen[1]	Control	Enogen[1]		Corn	Silage	Corn × silage
Weight, lb								
Day								
0	654	655	663	659				
14	737	741	736	740	3.37	0.25	0.71	0.97
28	756	751	759	756	5.51	0.47	0.47	0.80
42	823	824	826	820	4.10	0.61	0.93	0.38
56	869	872	871	866	4.37	0.81	0.62	0.35
70	914	916	913	909	5.73	0.90	0.50	0.62
77	939	938	925	931	5.84	0.66	0.09	0.56
91	953	953	944	941	5.94	0.77	0.10	0.85

continued

Table 2. Effects of corn silage and corn source on performance

	Corn silage source							
	Enogen[1]		Control					
	Dry-rolled corn source				Standard error of the mean	*P* - value		
Item	Control	Enogen[1]	Control	Enogen[1]		Corn	Silage	Corn × silage
Average daily gain, lb/day								
Day								
0-14	5.92	6.16	5.18	5.80	0.21	0.06	0.02	0.39
0-28	3.65	3.43	3.42	3.49	0.19	0.70	0.67	0.47
0-42	4.02	4.04	3.88	3.85	0.09	0.96	0.07	0.76
0-56	3.84	3.88	3.71	3.70	0.08	0.84	0.06	0.70
0-70	3.71	3.73	3.57	3.58	0.08	0.83	0.08	0.95
0-77	3.70	3.68	3.40	3.54	0.08	0.47	0.01	0.34
0-91	3.29	3.27	3.09	3.11	0.07	0.97	0.01	0.82
Dry matter intake, lb/day								
Day								
0-14	16.86	17.25	16.88	17.54	0.25	0.04	0.53	0.60
0-28	19.10	19.71	18.89	19.30	0.43	0.25	0.48	0.83
0-42	22.19	22.14	20.22	20.93	0.40	0.42	<0.01	0.35
0-56	22.58	23.01	21.86	21.68	0.46	0.78	0.03	0.51
0-70	22.57	22.51	22.62	22.13	0.47	0.56	0.73	0.64
0-77	23.06	23.51	21.51	24.91	0.41	<0.01	0.85	<0.01
0-91	20.25	20.20	19.92	20.05	0.13	0.78	0.07	0.50
Feed-to-gain ratio, lb								
Day								
0-14	2.87	2.82	3.27	3.06	0.10	0.21	<0.01	0.42
0-28	5.38	5.92	5.56	5.61	0.32	0.37	0.84	0.45
0-42	5.53	5.51	5.22	5.45	0.12	0.41	0.14	0.31
0-56	5.89	5.97	5.89	5.87	0.15	0.85	0.74	0.74
0-70	6.09	6.05	6.34	6.19	0.12	0.47	0.12	0.64
0-77	6.26	6.41	6.32	7.04	0.14	<0.01	0.02	0.04
0-91	6.17	6.21	6.45	6.47	0.11	0.82	0.02	0.91
Gain-to-feed ratio, lb								
Day								
0-14	0.35	0.36	0.31	0.33	0.01	0.20	<0.01	0.45
0-28	0.19	0.17	0.18	0.18	0.01	0.36	0.92	0.40
0-42	0.18	0.18	0.19	0.18	<0.01	0.41	0.13	0.27
0-56	0.17	0.17	0.17	0.17	<0.01	0.91	0.76	0.93
0-70	0.16	0.17	0.16	0.16	<0.01	0.41	0.12	0.67
0-77	0.16	0.16	0.16	0.14	<0.01	0.01	0.02	0.08
0-91	0.16	0.16	0.16	0.15	<0.01	0.93	0.02	0.96

[1]Syngenta.