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Feeding Nucleotides with Corn Germ Meal or Dried Corn Distillers Grains Does Not Promote Growth Performance of Receiving and Growing Calves

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Abstract

Corn germ meal is often used in swine and poultry diets, but very little information exists on the effects on beef cattle and on newly arrived stressed cattle. When formulating receiving and growing diets, calf health and stress are important factors to consider. Including nucleotides, an immune-boosting feed additive may aid in gastrointestinal health of an animal and furthermore improve growth performance. The objective of these experiments was to determine: 1) the effects of corn germ meal in comparison to dried corn distillers grains on growth performance and 2) the effects of nucleotides on growth performance, by receiving and growing cattle.

Keywords

receiving and growing diet, nucleotide, corn germ meal

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KANSAS STATE UNIVERSITY CATTLEMEN'S DAY

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Introduction

Corn germ meal is often used in swine and poultry diets, but very little information exists on the effects on beef cattle and on newly arrived stressed cattle. When formulating receiving and growing diets, calf health and stress are important factors to consider. Including nucleotides, an immune-boosting feed additive may aid in gastrointestinal health of an animal and furthermore improve growth performance. The objective of these experiments was to determine: 1) the effects of corn germ meal in comparison to dried corn distillers grains on growth performance and 2) the effects of nucleotides on growth performance, by receiving and growing cattle.

Key words: receiving and growing diet, nucleotide, corn germ meal

Experimental Procedures

Crossbred heifers (n = 213, initial body weight = 576 lb) were shipped from three separate sources (Searcy, AR; Snook, TX; and Melbourne, AR) to the Beef Stocker Unit in Manhattan, KS, to determine the feeding value of corn germ meal in comparison with dried corn distillers grains and to evaluate the effects of nucleotides on receiving stocker cattle health and performance (Experiment 1). The heifers were blocked by source, stratified by arrival weight within each block and assembled into 11 or 12 head per pen. Pens were randomly assigned one of six treatments: 1) corn germ meal with 0 g/heifer daily nucleotides (corn germ meal 0); 2) corn germ meal with 2 g/heifer daily nucleotides (corn germ meal 2); 3) corn germ meal with 4 g/heifer daily nucleotides (corn germ meal 4); 4) dried corn distillers grains with 0 g/heifer daily nucleotides (dried corn distillers grains 0); 5) dried corn distillers grains with 2 g/heifer daily nucleotides (dried corn distillers grains 2); and 6) dried corn distillers grains with 4 g/heifer daily nucleotides (dried corn distillers grains 4) (Table 1). Heifers were fed once daily and feed samples of each diet were collected weekly from each bunk and stored for later analysis. Heifers were individually weighed on day 0, 28, 56, 84, and 85. A second experiment

[1] ADM Animal Nutrition, Inc., Quincy, IL.
[2] Agri-Trails Coop, Tampa, KS.

was conducted to follow up on the effects of nucleotides on receiving stocker cattle health and performance (Experiment 2). Brahman × Hereford crossbred heifers (n = 240, initial body weight = 590 lb) were blocked by weight, stratified by weight within each block, and randomly assigned to one of three treatments from the previous experiment; dried corn distillers grains 0, dried corn distillers grains 2, and dried corn distillers grains 4. Calves were fed once daily. Feed samples of each diet were collected weekly from each bunk and stored for later analysis. Heifers were individually weighed on days 0, 28, 56, and 57 (completion of trial).

Results and Discussion

In Experiment 1, inclusion of corn germ meal at 24.5% on a dry matter basis was similar to dried corn distillers grain diets containing 22.0% dried corn distillers grains for dry matter intake ($P \geq 0.19$), average daily gain ($P \geq 0.57$), and gain:feed ($P \geq 0.34$) (Table 2). There were no linear ($P \geq 0.15$) or quadratic ($P \geq 0.28$) effects of nucleotides on the growth performance of growing and receiving beef heifers. Likewise, in Experiment 2, there was no difference (linear or quadratic) in dry matter intake (all $P \geq 0.43$), average daily gain ($P \geq 0.18$), or gain:feed ($P \geq 0.26$) by nucleotide inclusion level over the 56 day feeding period (Table 3).

Implications

These experiments indicate that corn germ meal yielded similar growth performance to dried corn distillers grains. There was no effect of nucleotides on the growth performance of receiving and growing calves in these experiments.

Table 1. Composition of diets (% of dry matter) containing corn germ meal, dried distillers grains and a nucleotide additive fed during Experiments 1 and 2

	Corn germ meal			Dried corn distillers grains		
	Nucleotide additive, g/day					
Item	0	2	4	0	2	4
Ingredient						
Cracked corn	25.5	25.5	25.5	29.0	29.0	29.0
Corn germ meal	24.5	24.5	24.5	-	-	-
Dried distillers grains	-	-	-	22.0	22.0	22.0
Prairie hay	18.0	18.0	18.0	10.7	10.7	10.7
Alfalfa hay	13.0	13.0	13.0	22.8	22.8	22.8
Corn steep liquor	7.0	7.0	7.0	7.0	7.0	7.0
Corn gluten meal	4.0	4.0	4.0	0.5	0.5	0.5
Limestone	1.5	1.5	1.5	1.5	1.5	1.5
Mineral supplement[1]	1.0	1.0	1.0	1.0	1.0	1.0
Nucleotide additive[2]	5.5	5.5	5.5	5.5	5.5	5.5
Composition, analyzed (Experiment 1)						
Dry matter, %	77.4	77.5	77.6	76.4	77.0	76.5
Crude protein, % of dry matter	18.3	18.9	18.1	18.9	18.7	19.4
Ether extract, % of dry matter	2.6	2.7	2.6	4.1	4.1	4.4
Calcium, % of dry matter	0.96	0.94	1.00	1.12	1.08	0.99
Phosphorus, % of dry matter	0.51	0.53	0.50	0.55	0.54	0.57
Composition, analyzed (Experiment 2)						
Dry matter, %				75.0	74.7	74.9
Crude protein, % of dry matter				20.2	19.5	20.0
Ether extract, % of dry matter				3.9	3.9	3.8
Calcium, % of dry matter				1.22	1.27	1.23
Phosphorus, % of dry matter				0.58	0.56	0.56

[1] Mineral supplement was supplemented to contain (dry matter basis) 18.7% calcium, 4.14% phosphorus, 0.24% magnesium, 0.43% potassium, 26.88% sodium chloride, 10.62% sodium, 16.38% chloride, 1.43% sulfur, 399.41 ppm fluorine, 35.66 ppm cobalt, 177.79 ppm iodine, 775.26 ppm iron, 6516.67 ppm manganese, and 4018.94 ppm zinc.

[2] Nucleotide additive was formulated to provide 0, 2, or 4 g/heifer daily when dry matter intake was 8.2 kg/d. At this inclusion level, the nucleotide provides 0 g/kg dietary dry matter, 0.242 g/kg dietary dry matter, and 0.489 g/kg dietary dry matter.

Table 2. Effects of corn germ meal and dried corn distillers grains and the addition of a nucleotide additive on beef heifer gain, intake and efficiency (Experiment 1)

	Corn germ meal			Dried corn distillers grains				P-value				
	Nucloetide additive[1], g/day											
Item	0	2	4	0	2	4	SEM	BP[2]	NA-L[3]	NA-Q[4]	BP×NA-L[5]	BP×NA-Q[6]
Days on feed	84	84	84	84	84	84						
Initial body weight, lb	578	577	575	577	576	576	35	0.78	0.20	0.72	0.41	0.91
Final body weight, lb	784	777	784	770	791	721	15	0.88	0.33	0.72	0.32	0.23
Dry matter intake, lb												
day 0 to 28	17.1	16.4	17.3	16.9	17.0	17.2	2.0	0.76	0.66	0.28	0.83	0.31
day 28 to 56	21.0	19.7	20.5	19.8	20.8	20.6	1.6	0.96	0.84	0.77	0.42	0.26
day 56 to 84	24.2	23.6	24.0	22.0	22.5	23.6	2.1	0.19	0.58	0.65	0.44	0.94
day 0 to 84	20.7	19.8	20.5	19.6	20.1	20.4	1.8	0.55	0.65	0.56	0.45	0.48
Average daily gain, lb												
day 0 to 28	3.00	3.04	3.22	2.93	3.28	3.31	0.35	0.57	0.15	0.80	0.71	0.48
day 28 to 56	2.87	2.64	2.71	2.49	2.76	2.71	0.22	0.65	0.90	0.97	0.38	0.43
day 56 to 84	1.39	1.41	1.41	1.37	1.52	1.41	0.20	0.83	0.85	0.72	0.99	0.75
day 0 to 84	2.45	2.38	2.49	2.29	2.56	2.51	0.18	0.88	0.28	0.70	0.39	0.25
Gain:feed												
day 0 to 28	0.17	0.19	0.19	0.18	0.20	0.19	0.02	0.47	0.15	0.41	0.99	0.87
day 28 to 56	0.14	0.13	0.13	0.13	0.13	0.13	0.01	0.64	0.96	0.78	0.56	0.72
day 56 to 84	0.06	0.06	0.06	0.06	0.07	0.06	0.01	0.59	0.96	0.55	0.72	0.66
day 0 to 84	0.12	0.12	0.12	0.12	0.13	0.12	0.01	0.34	0.41	0.28	0.93	0.45

[1] Nucleotide (NA); PSB Complex, DSS Global, Chicago, IL.
[2] BP indicates byproduct effect.
[3] NA-L indicates nucleotide additive linear effect.
[4] NA-Q indicates nucleotide additive quadratic effect.
[5] BP × NA-L indicates byproduct × nucleotide additive linear effect.
[6] BP × NA-Q indicates byproduct × nucleotide additive quadratic.

Table 3. Effects of the addition of a nucleotide additive to diets containing dried distillers grains on beef heifer gain, intake, and efficiency

	Nucleotide additive, g/day				P-value	
Item	0	2	4	SEM	Linear	Quadratic
Days on feed	56	56	56			
Initial body weight, lb	589	591	590	15.3	0.49	0.54
Final body weight, lb	713	714	706	3.8	0.42	0.29
Dry matter intake, lb/day						
day 0 to 28	19.1	19.2	18.5	0.48	0.46	0.51
day 28 to 56	19.7	19.4	19.0	0.57	0.44	0.96
day 0 to 56	19.4	19.3	18.7	0.48	0.43	0.73
Average daily gain, lb						
day 0 to 28	3.15	2.98	2.89	0.132	0.18	0.85
day 28 to 56	1.26	1.43	1.26	0.132	0.96	0.23
day 0 to 56	2.20	2.20	2.07	0.066	0.23	0.36
Gain:feed						
day 0 to 28	0.165	0.155	0.157	0.0054	0.26	0.40
day 28 to 56	0.084	0.112	0.093	0.0173	0.72	0.28
day 0 to 56	0.114	0.115	0.111	0.0031	0.54	0.58

[1]PSB Complex, DSS Global, Chicago, IL.