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Effects of corn processing and wet corn gluten feed on newly received and growing cattle

Abstract

Newly arrived feedlot cattle present numerous challenges and are often considered to be the most difficult type of fed cattle to handle. Receiving cattle typically are highly stressed and have had feed withheld for a significant amount of time. Formulating rations that are cost-effective and nutrient-dense is essential to accommodating lowered intake. The objective of this experiment was to evaluate effects of corn processing (whole shelled or dry-rolled), wet corn gluten feed (WCGF) inclusion, and their interaction on cattle performance.

Keywords

Kansas Agricultural Experiment Station contribution; no. 13-162-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 1083; Cattle; Corn Processing; Wet corn gluten; Cattle performance; Dry rolled corn

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Effects of Corn Processing and Wet Corn Gluten Feed on Newly Received and Growing Cattle

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Introduction

Newly arrived feedlot cattle present numerous challenges and are often considered to be the most difficult type of fed cattle to handle. Receiving cattle typically are highly stressed and have had feed withheld for a significant amount of time. Formulating rations that are cost-effective and nutrient-dense is essential to accommodating lowered intake. The objective of this experiment was to evaluate effects of corn processing (whole shelled or dry-rolled), wet corn gluten feed (WCGF) inclusion, and their interaction on cattle performance.

Experimental Procedures

All procedures used in the care, handling, and sampling of animals were approved by the Kansas State University Institutional Animal Care and Use Committee.

Crossbred steers ($n = 279$; 507 lb initial body weight) were assembled through commercial sale barn market facilities and used in a randomized complete block design with a 2×2 factorial arrangement of treatments to evaluate the effects of corn processing (whole shelled versus dry-rolled) and WCGF inclusion (0% or 30%). All calves were blocked by truck ($n = 3$), stratified by arrival weight, and randomly assigned to pens. Twenty-four pens of equal size were used to allow for 6 pens per treatment. The day after arrival, all calves were dewormed and vaccinated for clostridial and viral diseases. Calves also were given a subcutaneous injection of Excede (Pfizer Animal Health, Whitehouse Station, NJ) at a rate of 7 ml/head.

Calves were fed twice daily for a total of 60 days. The test diets (Table 1) were whole shelled corn (WSC) with no WCGF (WSC/0WCGF), WSC with 30% WCGF (WSC/30WCGF), dry-rolled corn (DRC) with no WCGF (DRC/0WCGF), and DRC with 30% WCGF (DRC/30WCGF). All diets contained the same amount of alfalfa and prairie hay. Diets without WCGF contained 5% molasses to condition the total mixed ration. The amount of feed delivered to each pen was recorded on a daily basis. Total mixed diets were sampled weekly. Cattle were weighed at initial processing (day 0), during revaccination (day 14), and on days 28 and 60. Fecal grab samples were taken from each animal and composited by pen on days 14, 28, and 60 and subsequently analyzed for starch concentration. At the end of the experiment (day 60), all calves were weighed.

Results

No effects of corn processing (Table 2) were observed ($P \geq 0.34$), substantiating earlier research indicating that lightweight cattle are able to masticate corn effectively. Final body weight and average daily gain increased with the inclusion of WCGF in diets ($P = 0.03$ and $P = 0.04$, respectively). There was tendency to increase dry matter intake

in the diets with WCGF ($P = 0.13$). An impact was observed for WCGF on efficiency for the receiving period (d 0 to 28; $P = 0.03$), but no improvement in WCGF was observed for the 60-day feeding period. Digestibility (Table 3) of dry matter was improved with the inclusion of WCGF in the diet ($P = 0.006$). An interaction between corn and WCGF was observed ($P = 0.017$). Starch digestibility was improved with WCGF ($P = 0.009$). No corn processing effects were observed for digestibility of dry matter or starch (all $P \geq 0.32$).

Implications

Processing corn for receiving and growing cattle is unnecessary. WCGF inclusion improved gains, tended to increase feed intake, and improved digestibility of dry matter and starch.

Table 1. Composition of diets containing whole shelled corn or dry rolled corn with 0 or 30% wet corn gluten feed (WCGF) expressed on a 100% dry matter basis

Ingredient, %	Whole shelled corn		Dry-rolled corn	
	0WCGF	30WCGF	0WCGF	30WCGF
Whole shelled corn	47.1	28.6	—	—
Dry-rolled corn	—	—	47.1	28.6
Wet corn gluten feed	—	30.0	—	30.0
Alfalfa hay	17.5	17.5	17.5	17.5
Prairie hay	17.5	17.5	17.5	17.5
Molasses	5.0	—	5.0	—
Supplement	12.9	6.4	12.9	6.4
Dry corn gluten feed	5.2	1.8	5.2	1.8
Soybean meal	2.2	—	2.2	—
Dried distillers grains	1.9	—	1.9	—
Urea	0.85	—	0.85	—
Wheat middlings	0.75	3.1	0.75	3.1
Fat	0.26	—	0.26	—
Salt	0.39	0.38	0.39	0.38
Limestone	0.32	0.82	0.32	0.82
Potassium chloride	0.26	0.02	0.26	0.02
Calcium phosphate (21% P)	0.65	—	0.65	—
Magnesium oxide	0.06	0.001	0.06	0.001
Beef vitamin ¹	0.004	0.001	0.004	0.001
Ruminant trace mineral ¹	0.003	0.001	0.003	0.001
Molasses	—	3.0	—	3.0
Rumensin 90 ²	0.014	0.019	0.11	0.019

¹ Cargill Animal Nutrition, Minneapolis, MN.

² Elanco Animal Health, Greenfield, IN.

NUTRITION

Table 2. Effects of whole shelled corn (WSC) and dry-rolled corn (DRC) with and without wet corn gluten feed (WCGF) on average daily gain, feed intake, and efficiency

Item	Whole shelled corn		Dry-rolled corn		SEM	<i>P</i> -values		
	0WCGF	30WCGF	0WCGF	30WCGF		Corn	WCGF	Corn × WCGF
Days on feed	60	60	60	60				
Initial weight, lb	508.0	508.0	508.2	508.0	0.21			
Final weight, lb	703.5	719.2	707.7	715.0	4.77	0.97	0.03	0.42
Dry matter intake, lb/day								
Day 0 to 14	12.4	12.6	12.8	12.6	0.23	0.34	0.80	0.34
Day 0 to 28	14.3	15.1	14.8	14.5	0.23	0.83	0.40	0.03
Day 0 to 60	16.3	17.4	16.6	16.6	0.34	0.45	0.13	0.12
Average daily gain, lb								
Day 0 to 14	3.1	3.6	3.1	3.5	0.25	0.82	0.08	0.67
Day 0 to 28	3.3	3.7	3.3	3.7	0.12	0.69	0.004	0.89
Day 0 to 60	3.3	3.5	3.3	3.5	0.09	0.93	0.04	0.40
Gain:feed								
Day 0 to 14	0.247	0.289	0.244	0.276	0.029	0.67	0.07	0.79
Day 0 to 28	0.230	0.242	0.224	0.257	0.010	0.66	0.03	0.30
Day 0 to 60	0.20	0.20	0.20	0.21	0.006	0.60	0.47	0.65

Table 3. Effects of whole shelled corn (WSC) and dry-rolled corn (DRC) with 0 or 30% wet corn gluten feed (WCGF) on digestibility of diet dry matter and starch

Digestibility, %	Whole shelled corn		Dry-rolled corn		SEM	<i>P</i> -values		
	0WCGF	30WCGF	0WCGF	30WCGF		Corn	WCGF	Corn × WCGF
Dry matter	59.69	60.19	55.73	61.86	1.15	0.32	0.006	0.017
Starch	68.40	73.39	68.83	71.15	1.35	0.50	0.009	0.33