

Wet Distiller's Grains and Wet Corn Gluten with Dry-Rolled or Whole-Shelled Corn in High-Energy Limit-Fed Diets Do Not Affect Growing Cattle Performance

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Introduction

More efficient gains could be achieved early in the growing period by limit-feeding high-energy diets based primarily on corn by-products. Research conducted at the Kansas State University Beef Stocker Unit leading up to this research trial has been carried out using only wet corn gluten feed as the corn by-product. While results have been positive, wet corn gluten feed is a commodity not available to all producers throughout Kansas, mostly because of the financial burden associated with transport. Our goal was to analyze the effects of utilizing a high-energy limit-fed diet containing wet distiller's grains (a much more accessible commodity) compared to the traditional diet we had been feeding based on wet corn gluten feed (Sweet Bran, (Cargill, Blair, NE)). In addition, to our knowledge, research had not been conducted exploring the effects of dry-rolled or whole shelled corn processing in this particular feeding strategy.

Experimental Procedures

A total of 320 crossbred steers were purchased from a single source and shipped from 2 locations to the Kansas State University Beef Stocker Unit, Manhattan, KS, over a 2-day period from February 15 to 16, 2017. Two loads were shipped from Groesbeck, TX, (590 mi) and 2 loads from Hatch, NM, (886 mi) and used to determine the effects of by-product (wet corn gluten feed or wet distiller's grains with solubles) and extent of corn processing (whole shelled or dry-rolled corn) in a randomized complete block design with a 2 × 2 factorial arrangement of treatments. All 4 diet combinations were formulated to provide 60 Mcal net energy for gain/100 lb dry matter and contain 40% of their respective by-product (Table 1). On arrival, calves were weighed and assigned by body weight to pens, which were randomly assigned to dietary treatment. There were 10 steers per pen and 8 pens per treatment combination for a total of 32 pens. Animals were weighed individually on days -1, 0, 14, and 70. A pen scale was used to measure weights on days 7, 21, 35, 42, 49, 56, and 63. After weighing, diet delivery was adjusted by pen each week such that 2.0% of body weight on dry matter basis was offered for

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all treatments daily, targeting 2 lb/day average daily gain. All pens were fed daily at 7:00 a.m. Performance was calculated from day -1 to days 14, 28, 42, 56, and 70 and pen was the experimental unit. Approximately 12 hours before weighing on day 70, water was restricted overnight to more accurately estimate biological gain. Because day -1 weights were measured directly off the truck, and feeding occurred once daily, the goal was to have two shrunk weights to calculate performance.

Results and Discussion

There were no animals treated for respiratory disease throughout this trial, indicating the presence of healthy cattle. Performance data are in Table 2. There was a by-product × corn processing interaction for final dry matter intake ($P < 0.01$). This result was unexpected as all pens were meant to receive the same amount of feed on a dry matter basis. Analysis conducted after the trial was completed indicated the wet corn gluten feed diets were dryer than initially thought, thus more dry matter was being delivered. Despite the difference in dry matter intake, neither by-product, corn processing, nor their interaction, affected average daily gain or efficiency of gain ($P \geq 0.38$). Results from this trial indicate high-energy diets formulated with wet corn gluten feed or wet distiller's grains with solubles containing either dry-rolled or whole corn can be offered at 2% of body weight on a dry matter basis and achieve similar gains. This is important because producers have the choice of by-product and whether or not to process corn without their decision negatively affecting performance in this novel programmed-feeding strategy.

Table 1. Experimental diets¹

Ingredient, % dry matter	By-product			
	Wet distiller's grains		Sweet Bran	
	Corn processing			
	Dry-rolled	Whole	Dry-rolled	Whole
Alfalfa	8.00	8.00	6.50	6.50
Prairie hay	8.00	8.00	6.50	6.50
Dry-rolled corn	36.50	---	39.50	---
Whole corn	---	36.50	---	39.50
Wet distiller's grains with solubles	40.00	40.00	---	---
Sweet Bran ²	---	---	40.00	40.00
Supplement ³	7.50	7.50	7.50	7.50

¹Diets formulated to supply 60 Mcal net energy for gain/100 lb dry matter.

²Sweet Bran (Cargill, Blair, NE).

³Supplement pellet was formulated to contain (dry matter basis) 10% crude protein, 8.0% calcium, 0.24% phosphorus, 5.0% salt, 0.55% potassium, 0.25% magnesium, 1.67% fat, and 8.03% acid detergent fiber.

Table 2. Effects of by-product and corn processing in limit-fed diets¹ on performance

Item	By-product				Standard error of the mean	P-value ²		
	Sweet Bran		Wet distiller's grains			By-product	Processing	By-product × processing
	Dry-rolled	Whole	Dry-rolled	Whole				
Number of pens	8	8	8	8				
Number of animals	80	79	79	79				
Body weight, lb								
Day -1	1228	1235	1228	1232	42	0.62	0.14	0.50
Day 70	1676	1552	1545	1532	57	0.36	0.57	0.83
Final average daily gain, lb/day	2.1	2.0	2.0	1.9	0.1	0.34	0.34	0.93
Final dry matter intake, lb/day	12.7	12.3	12.3	12.4	0.4	0.09	0.10	<0.01
Dry matter intake, % of body weight	2.01	1.94	1.95	1.98	0.02	0.04	<0.01	<0.01
Final gain to feed ratio, lb:lb	0.16	0.16	0.16	0.15	0.01	0.46	0.38	0.51

¹Diets formulated to supply 60 Mcal net energy for gain/100 lb dry matter.

²By-product: Sweet Bran (Cargill, Blair, NE) or wet distiller's grains plus solubles (Craig, MO). Processing: extent of corn processing; dry-rolled or whole.