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Economic Impact of Sulfur Levels in Distillers Grains Diets Fed to Beef Cattle

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Summary

*An economic evaluation of a growth performance study (*2011 Nebraska Beef Cattle Report*, pp. 62-64) comparing wet or dry distillers grains with solubles (DGS) containing varying levels of sulfur was conducted. Diets containing DGS were more profitable than the control diets containing no co-product (Control). Wet DGS showed greater profitability than Control and dry DGS diets. Sulfur content in dry DGS did not affect profitability. Profits were lowest for Control and greatest for wet DGS (0.82% S) at 30% inclusion. Low sulfur concentration in wet DGS allows shipment to feedlots further away.*

Introduction

Dietary sulfur affected cattle growth performance, even before sulfur levels reached critical levels for animal health (*2011 Nebraska Beef Cattle Report*, pp. 62-64). Feedlot owners may lose money even when polioencephalomalacia incidence is zero because ADG can be reduced by high sulfur concentration in distillers grains. The objectives of our evaluation were to 1) build a deterministic enterprise budget that evaluates sulfur concentration and level of inclusion of wet or dry distillers grains with solubles for beef cattle finishing diets, and 2) determine how much freight cost can be supported by differences in animal performance.

Procedure

Treatments and Experimental Design

Data from a growth performance study were used for an economic evaluation. Steers (n = 120; BW = 761 ± 75 lb) were fed in individual bunks (Calan system) for 151 days. They were assigned in a randomized complete block design to 1 of the 13 treatments that were based on the combination of: three levels of DGS inclusion (20%, 30%, and 40% DM basis), fed dry or wet, with low (0.82%) or high (1.16%) sulfur concentration [S] in the DGS. A control diet was also evaluated with no DGS. All diets contained 5% supplement, 15% corn silage, and a blend of high-moisture and dry-rolled corn (60:40), which was replaced by DGS in those diets (*2011 Nebraska Beef Cattle Report*, pp. 62-64).

Cost Inputs

Corn processing cost was assumed to be $1.58 and $4.71/ton of DM for dry-rolled and high-moisture corn, respectively. Corn silage was based on corn price (scenario specified below), varying from $106.00 to $136.00/ton of DM. Different diets required specific supplements for which costs were individually estimated (average supplement cost = $250.00/ton DM). Yardage cost was assumed at $0.40 and $0.45/head/day for steers fed dry and wet diets, respectively (higher for wet diets due to the greater amount fed on an as-is basis and more time feeding). As the treatments did not provide any animal health problems, $25.00/head for processing and medication was added to the cost for all diets. A typical implant strategy cost of $5.00/head was used. Fed and feeder cattle prices were $96.00 and $115.00/cwt, respectively. Death loss was assumed to be 1.5% and the cattle and feed interest rate of 7.5% was used. A freight cost of $3.50/mile and a distance of 35 miles were assumed for delivery of DGS.

Several budget scenarios were created based on different corn prices ($3.50, $4.00, and $4.50/bu). Co-product prices were fixed at 75%, 85%, and 95% of the corn price, on DM basis. In each of these scenarios, overall profitability ($/head) and profitability above the control treatment were calculated. As the final BW was different among the steers fed different diets, the highest average of final BW diet was utilized, and extra days calculated to reach this BW were used for all cattle. As a result, overall profitability and profitability above the control treatment were compared on the same final BW.

Profit was analyzed using PROC GLIMMIX procedure of SAS (factorial 3x2x2). Orthogonal contrast between the control and other diets was used to test linear and quadratic effects of level of DGS.

Results

The Control (no co-product inclusion) was profitable only when corn price was less than $3.50/bu ($0.86, -$37.55, and -$75.95/head for corn price at $3.50, $4.00, and $4.50/bu, respectively). When corn price was more than $4.00/bu and DGS was priced at 85% or 95% of the corn price, profitability was negative for diets containing dry DGS, regardless of S content of DGS. Diets containing wet DGS were profitable in almost all scenarios, except when wet 1.16% S DGS (high S concentration) was fed at 40% inclusion and corn was priced

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Table 1. Distance (miles) that wet distillers grains with solubles (WDGS) can be shipped to equalize profitability of dry distillers grains with solubles (DDGS).

	20%[1]		30%		40%	
Sulfur concentration in the co-product	Miles	Profit[3]	Miles	Profit	Miles	Profit
Low sulfur (0.82%)	431	4.87	252	21.51	105	34.84
High sulfur (1.16%)	303	15.02	179	24.60	# [2]	—

[1]20, 30 and 40% = percentage of co-product inclusion (DM basis).
[2]Wet co-product will not be more profitable than the dry co-product.
[3]Profit = $/head.

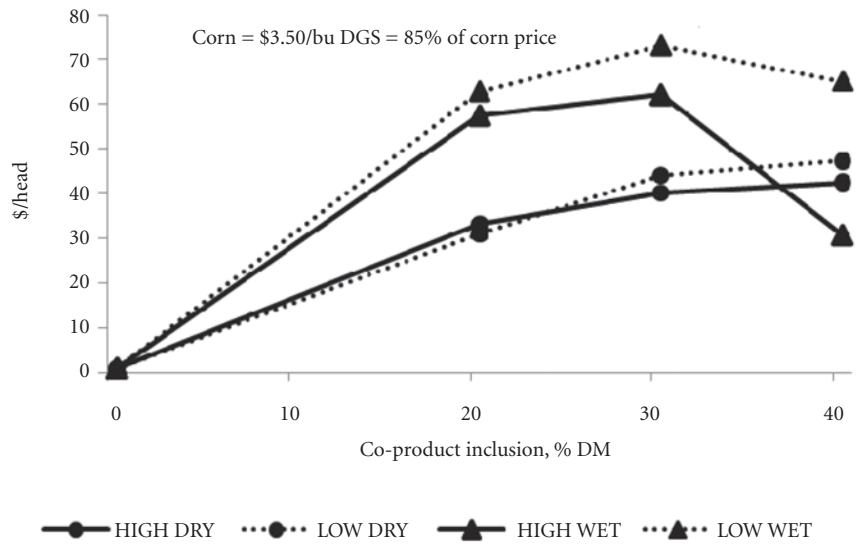

Figure 1. Overall profit ($/head). Corn price at $3.50/bu and DGS at 75% of corn price.

more than $4.00/bu, and when corn was priced at $4.50/bu and DGS at 95% of corn price, in which all diets were not profitable.

Based on the assumption that diets with no co-product are usually close to the breakeven, due to adjustment of cattle prices, evaluating profit above the Control diet may be more appropriate. All diets containing DGS were more profitable than the Control diet. Profit above the Control diet for steers fed DGS with 0.82 or 1.16% S did not differ ($P > 0.05$), except when wet 1.16% S DGS at 40% inclusion was fed (Figure 1). However, in general, steers fed wet DGS were more profitable than steers fed dry DGS. Feeding wet DGS diets had a quadratic ($P \leq 0.05$) response for profit above the Control, in which the greatest values were observed for 20 and 30% inclusion. Steers fed dry DGS showed linear ($P < 0.05$) increase in profit above the control as the co-product increased in the diet, although lower than wet DGS diets.

Corn price definitely has a large importance on cattle profitability. The exercise using scenarios with increasing corn price showed us that each $0.50/bu of increase in corn price was responsible for $35.00 of decrease in overall profitability ($/head). Also, it is important to remember that when corn price goes up, usually feeder cattle price goes down making positive adjustments on cattle profit; however, the shape of the lines shown in Figure 1 did not change. Albeit, the relationship between cattle and corn price usually is not quickly reflected by subtle changes in corn price.

Additionally, as expected when distillers grains price goes up, cattle profit goes down; however, this impact has less importance compared to the effect of corn price. For example, for each 10 percentage units of increase in co-product price (co-product as a percentage of corn price), around $9.00/head is missed in overall profitability. Again, the shape of the response shown in Figure 1 is not changed, only the magnitude of response.

The greater moisture content of wet DGS influences co-product price at the feedlot due to freight cost. Table 1 shows the amount of miles that wet DGS with high and/or low sulfur can be shipped to results in profitability equal to dry DGS. Higher profitability can be reached with higher co-product inclusions. The distances in miles that wet DGS can be shipped to provide the same profit of dry DGS decrease when high-sulfur wet DGS is utilized, because steers fed high-sulfur diets had lower performance and freight was higher for wet co-products on a DM basis.

In conclusion, diets containing wet 1.16% S DGS at 40% inclusion was less profitable compared to 0.82% S wet DGS. High-sulfur content wet DGS and lower wet co-product inclusions (20 or 30%) are still desirable as opposed to using dry DGS. The diet containing wet DGS with 0.82% sulfur at 30% inclusion was the most profitable treatment, while the diet containing no DGS inclusion was the least. Low sulfur concentration in wet DGS allows shipment to feedlots further away from the plant.

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