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The Economic Impact of Feeding Wet Corn Co-Products in Nebraska

Josie A. Waterbury
University of Nebraska-Lincoln

Darrell R. Mark
University of Nebraska-Lincoln, dmark2@unl.edu

Richard K. Perrin Perrin
University of Nebraska-Lincoln, rperrin@unl.edu

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Summary

Isoquants that illustrate combinations of various inputs to produce a given level of output were estimated for wet corn co-products using UNL cattle feeding trial data and applied to actual producer data. Producer economic benefits from feeding wet co-products compared to corn were calculated. Although the combined producer savings from all three wet co-products totaled nearly $39 million, this value was not net of all cost differences between co-products and corn, including transportation, storage, and handling costs.

Introduction

The symbiotic relationship between Nebraska agricultural producers and ethanol plants is in part due to the ability of the state's growers to supply a large quantity of corn while at the same time utilizing the co-products of ethanol production as a feedstuff in cattle rations. The objective of this study was to estimate the aggregate economic benefit to Nebraska cattle producers from feeding wet co-products in feedlot rations versus corn-only (no co-product) rations in 2007. This analysis updates and expands a study by Perrin and Klopfenstein in 2001 (*2001 Nebraska Beef Report,* pp. 45-47) that analyzed the direct economic benefit of feeding wet co-products in Nebraska by measuring the difference between the feed value of the wet co-products and their alternative use as dried feeds.

Procedure

To determine the economic benefit to Nebraska cattle producers from feeding wet co-products in feedlot rations versus rations containing no co-product, a unit isoquant was estimated for three distinct wet corn co-products: wet distillers grains plus solubles (WDGS), wet corn gluten feed (WCGF), and Sweet Bran®. An isoquant represents different combinations of two inputs (in this case co-product and corn) needed to produce a constant output (in this case one pound of beef gain). Separate isoquants were estimated for WDGS, WCGF, and Sweet Bran® using UNL cattle feeding trial and performance data. These isoquants were then used along with feeding practices reported by Nebraska producers in 2007 to calculate the economic benefit associated with feeding WDGS, WCGF, and Sweet Bran®, respectively.

Experimental data from UNL cattle feeding trials included days on feed, feedstuff inclusion levels as a percentage of the total ration (DM basis), daily DM intake, and average daily gain. Pounds of feedstuff per pound of beef gain for each ration ingredient were calculated by multiplying daily DM intake by the feedstuff ration inclusion percentage (DM basis) for each respective feedstuff. This calculation yielded the pounds (DM) of each feedstuff consumed daily, which was then divided by ADG to arrive at lbs of feedstuff (DM) per pound of gain (F_i:G) for each feedstuff included in the experimental data rations. The average F_i:G ratios for co-products were 1.54, 3.34, and 1.90 for WDGS (n = 31), WCGF (n = 17), and Sweet Bran® (n = 16) rations, respectively. The average F_i:G ratios for rolled corn and/or high moisture corn associated with the WDGS, WCGF, and Sweet Bran® rations were 3.86 (n = 40), 3.24 (n = 25), and 3.76 (n = 24), respectively.

Figure 1 graphically represents the statistically estimated isoquants for WDGS, WCGF, and Sweet Bran®. Not only do the isoquants portray various combinations of co-product and corn needed to produce one pound of gain, but the graphs also illustrate the relative feeding values associated with the three different co-products. Sweet Bran® has a higher feeding value (smaller quantities of both corn and co-product are required) than WCGF at all levels of co-product inclusion. WDGS has the highest feeding value of the three over a range of inclusion levels from approximately 13% to approximately 55%. The feeding

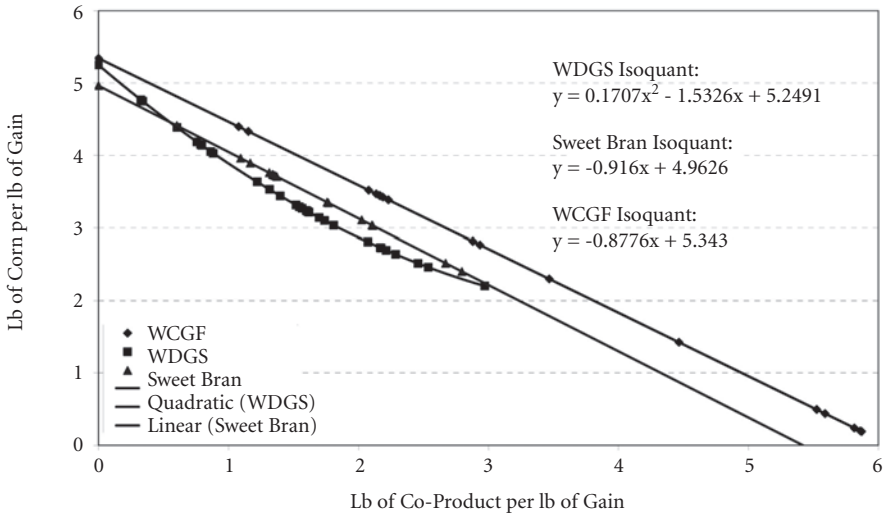

Figure 1. WDGS, WCGF, and Sweet Bran® experimental isoquants.

Table 1. Savings to producers from feeding wet corn co-products, 2007[1].

	WDGS	
	$/lb of gain	$/ton co-product fed, DM
Method 1	0.0397	70.46
Method 2	0.0425	71.94
Method 3	0.0423	74.00
Method 4	0.0424	71.74
Average	0.0417	72.04
	WCGF	
	$/lb of gain	$/ton co-product fed, DM
Method 1	0.0125	25.34
Method 2	0.0132	27.00
Method 3	0.0114	24.20
Method 4	0.0120	24.64
Average	0.0123	25.29
	Sweet Bran®	
	$/lb of gain	$/ton co-product fed, DM
Method 1	0.0097	15.51
Method 2	0.0098	15.53
Method 3	0.0109	15.76
Method 4	0.0099	15.66
Average	0.0101	15.62

[1]Savings estimated as the difference between costs per lb of gain in rations containing co-product and corn-only rations.

value associated with WDGS actually decreases relative to WCGF and Sweet Bran® as co-product inclusion levels decline below approximately 30%.

The primary objective of this study was to calculate the benefits actually realized by Nebraska producers in 2007. To do so, the estimated isoquants for WDGS, WCGF, and Sweet Bran® were applied to actual 2007 producer data from the Ethanol Co-Product User Survey discussed in Waterbury et al. (*2009 Nebraska Beef Report*, pp. 50-52). Although this survey did not provide complete ration information, it did elicit information about producer co-product inclusion levels, allowing prediction of producers' locations on the experimental isoquants in Figure 1.

Producer economic benefit from feeding wet co-products was estimated by comparing ration costs per pound of gain at the reported co-product inclusion level, with the ration cost for corn as the only grain, using prices reported by the respondents. Alternative methods of aggregating results across producers were used, as described below.

Respondents to the Ethanol Co-Product User Survey were asked to provide information regarding the price paid and the ration inclusion level for each co-product purchased in 2007. Although most included both pieces of information, some included only price or only inclusion level information. Therefore, to account for some missing data, producer savings per pound of gain for each co-product were estimated using four different methods as outlined below. The basic framework of all four methods is identical, with variation occurring only in regard to the use of original producer data versus average producer inclusion data (1.22, 0.99, and 1.25 lbs of co-product [DM] per lb of gain for WDGS, WCGF, and Sweet Bran®, respectively) and average producer price data ($118.48/ton, $98.58/ton, and $113.84/ton DM, FOB plant for WDGS, WCGF, and Sweet Bran®, respectively):

1. Individual producer pounds of co-product per pound of gain; average co-product price for all observations: 65, 20, and 29 for WDGS, WCGF, and Sweet Bran®, respectively.
2. Individual producer pounds of co-product per pound of gain; individual producer co-product price with average producer price replacing missing price data: 65, 20, and 29 for WDGS, WCGF, and Sweet Bran®, respectively.
3. Individual producer pounds of co-product per pound of gain with average producer pounds of co-product per pound of gain replacing missing inclusion data and individual producer co-product price: 52, 13, and 17 for WDGS, WCGF, and Sweet Bran®, respectively.
4. Individual producer pounds of co-product per pound of gain with average producer pounds of co-product per pound of gain replacing missing inclusion data; individual producer co-product price with average producer price replacing missing price data): 73, 21, and 29 for WDGS, WCGF, and Sweet Bran®, respectively.

For each of the four applicable methods, savings per pound of gain were calculated separately for each producer using each of the three distinct co-products included in this analysis. Savings per pound of gain values were then divided by each producer's associated pounds of co-product per pound of gain (either individual or average data) to arrive at savings per lb, or per ton, of co-product fed. The average savings value across all producers for each co-product was multiplied by the respective total tons of co-product (DM) produced by ethanol plants in Nebraska in 2007, to arrive at the aggregate producer benefits from feeding co-products rather than corn.

Results

Given the prices reported in the survey, the average cost savings to producers per pound of gain and per ton of co-product fed (DM) were greatest for WDGS, followed by

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WCGF and Sweet Bran® (Table 1). Based on the relative feeding values of the three co-products estimated by the experimental isoquants (Figure 1), WCGF would result in lower benefits than Sweet Bran® if co-product prices were equal. The savings to producers in Table 1 account for co-product cost in addition to cattle performance. The average WCGF price was $98.58/ton DM, while the average Sweet Bran® price was $113.84/ton DM, so the price differential was greater than the feeding value differential. Even more interesting is the fact that the average WDGS price reported by producers ($118.48/ton DM) was actually greater than both WCGF and Sweet Bran® prices. Again, these results show that the feeding value associated with WDGS was great enough to offset the increased cost of the co-product, thereby allowing producer savings from WDGS to be the greatest among the three.

Producer savings also were expanded to the entire state of Nebraska by using the tons of each respective wet co-product produced by ethanol plants in 2007 (Table 2). WDGS again represented the largest portion of total producer economic benefit with $33.88 million in savings. Although the savings per pound of gain and per ton of co-product fed (DM) were greater for WCGF than for Sweet Bran® (Table 1), the total state savings were actually greater for the latter at $2.51 million. In 2007, ethanol plants produced nearly 69,000 more tons (DM) of Sweet Bran® than WCGF. The larger production of Sweet Bran® was more than enough to compensate for the lower producer savings per pound of gain and per ton of co-product fed (DM), thereby allowing Sweet Bran® to represent a greater proportion of the total producer economic benefit. All three wet co-products combined yielded $38.72 million in total state savings, while the per ton (DM) savings from feeding wet co-products compared to corn for all three wet co-products were $25.30/ton.

Table 2. Savings to Nebraska from feeding wet corn co-products, 2007[1].

	Method 1	Method 2	Method 3	Method 4	Average
WDGS (mil of $)	33.14	33.84	34.81	33.75	33.88
WCGF (mil of $)	2.34	2.49	2.23	2.27	2.33
Sweet Bran® (mil of $)	2.49	2.50	2.53	2.52	2.51
Total (mil of $)	37.97	38.83	39.57	38.54	38.72

[1]Producer savings based on Nebraska production of each co-product.

Purchase costs vary between corn and wet co-products as described above, but there also are other cost differentials. The savings to producers reported here are not net of expenses such as transportation, handling, and storage costs. In addition, all wet co-product produced in Nebraska in 2007 was assumed to be included as a ration ingredient for feedlot cattle. Finally, because no data exist regarding Nebraska imports and exports of wet co-product, these values were assumed to be equal, allowing them to be ignored for the purposes of this analysis.

When compared to the study done by Perrin and Klopfenstein (2001), the average WDGS savings to Nebraska in 2007 was $25.71 million greater than the average state savings from 1994 to 1999 ($8.17 million). This significant increase in total state savings seems reasonable as WDGS production in Nebraska from 1999 to 2007 increased nearly 118,000 tons (DM). Although not related to the increased production of WDGS, the producer benefit per ton of WDGS fed (DM) in 2007 was $72.04/ton as compared to $32.95/ton (DM) as reported in the previous study. The large differential in savings per ton of WDGS fed between the previous and current study may be due to differences in corn and/or co-product prices, producer co-product inclusion levels, or a combination of both.

The state savings in 2007 for WCGF and Sweet Bran® equaled a combined total of $4.84 million, approximately $8.16 million less than the average state savings calculated by Perrin and Klopfenstein (2001) for 1992 to 1999. However, it is important to note that the current study estimated the average producer benefit for traditional WCGF and Sweet Bran® at $25.29/ton and $15.62/ton DM, respectively. The analysis done by Perrin and Klopfenstein (2001) estimated this value to be $25.71/ton of WCGF fed (DM) (including Sweet Bran®). So, the savings in dollars per ton (DM) of WCGF and Sweet Bran® fed in 2007 are similar to the average from 1992 to 1999.

[1]Josie A. Waterbury, former graduate student, Darrell R. Mark, associate professor, Richard K. Perrin, professor, Agricultural Economics, University of Nebraska, Lincoln, Neb.