IMPACT OF WAIVING THE RENEWABLE FUEL STANDARD ON TOTAL NET FEED COSTS

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Severe drought has sharply reduced yields of corn, other feed grains, soybeans, and many forage crops and pushed market prices to record levels. Prices of other commodities such as wheat and barley, whose yields have not been as affected by drought, also have increased sharply. These commodity price increases have driven production costs higher for the livestock, dairy, and poultry industries, as well as the ethanol industry and other grain users. Higher prices have also ignited calls from livestock, dairy and poultry producers to waive the volumetric requirements of the Renewable Fuel Standard (RFS2). The RFS2 conventional renewable fuel requirement for 2012 is 13.2 billion gallons and increases to 13.8 billion gallons in 2013. As of this writing, Governors of six states (AR, DE, MD, NC, TX and VA) have requested waivers from the 2013 RFS2 renewable fuel requirements. Their basic argument is that if the RFS2 is waived, less corn would be used to produce ethanol and fewer soybeans would be crushed for oil to make biodiesel; in turn, they argue, more grain and oilseed meal would be available to feed animals, and presumably feed prices would fall.

This study quantifies the impact of waiving the 2013 RFS2 requirements on total net feed costs for beef cattle, dairy, swine and poultry in the U.S. Our findings suggest that reducing ethanol and biodiesel production consistent with a waiver from the RFS2 requirements in 2013 would marginally reduce the prices of corn and soybeans and potentially increase their availability for feeding by a slight amount. However, when viewed in the context of changes in the prices for other key feed ingredients such as distillers dried grains with solubles (DDGS) and soybean meal, the change in total net

feed costs for livestock, dairy and poultry feeders would either *increase* slightly or decrease by a negligible amount if a waiver of the RFS2 was granted. This is due to the fact that if a waiver reduced biofuel output, it would also reduce the available supply of DDGS and soybean meal, which would naturally lead to higher prices for those key feed ingredients.

Assumptions

As indicated above, the RFS2 conventional biofuel mandate for 2012 is 13.2 billion gallons and 13.8 billion gallons in 2013. It is unclear how much ethanol and biodiesel output would be reduced in response to a full or partial waiver of the 2013 RFS2 requirements. The uncertainty stems from a number of factors including the degree of inflexibility in the gasoline refining industry to replace ethanol with other octane sources and oxygenates, refining economics, and the supply of excess RIN credits from production in prior years that will enable obligated parties (i.e. blenders and refiners) to meet some portion of their RFS2 obligations with "paper credits" rather than wet gallons.

To reflect this uncertainty we have evaluated two scenarios for biofuel production under a waiver:

- A "Low Scenario" in which ethanol production in 2013 is reduced by 500 million gallons, or 3.7% below 2012 levels, and biodiesel production is reduced by 500 million gallons, or 50% below 2012. The assumed change in biodiesel production reflects the unprofitability that would likely accompany a waiver of the RFS2 biodiesel usage requirements.

- A "High Scenario" in which ethanol production in 2013 is reduced 1,425 million gallons or 10.5% from 2012 levels. No additional reduction in biodiesel production is included beyond the reduction in the Low Scenario.

These scenarios are consistent with recent analyses of RFS2 waiver impacts by Iowa State University and Purdue University. The Iowa State analysis estimated a full waiver would reduce ethanol output by 500 million gallons in 2012/13, while the Purdue study showed a partial waiver resulting in a 1,400 million gallon reduction over the case where excess RINs are used for compliance.[1,2]

[1] Wallace E. Tyner, Farzad Taheripour and Chis Hurt. "Potential Impacts of a Partial Waiver of the Ethanol Blending Rules". Purdue University. August 16, 2012.

Reductions in corn and soybean oil demand consistent with biofuel production in each of these scenarios were evaluated using a proprietary model of the U.S. agriculture sector that incorporates the supply, demand, and price projections sourced from the August 2012 USDA WASDE report. Specific assumptions for biofuel underlying the model include:

- 98% of ethanol demand uses corn as the feedstock
- 90% of corn ethanol is produced in dry mills with an average ethanol yield of 2.75 gallons per bushel
- 10% of corn ethanol is produced in wet mills with an average ethanol yield of 2.50 gallons per bushel
- 17 pounds of DDGS are produced from every bushel of corn processed in dry mills.
- 50% of biodiesel is produced from soybean oil
- Corn not used for ethanol production under a waiver and soybeans not crushed for oil to produce biodiesel would be available for other use (e.g. feed, export), and demand shifts reflect changes in relative prices.
- Typical feed rations for each species are based on published recommendations of specialists at Universities and Extension Services. We assumed rations that incorporate near-maximum recommended quantities of DDGS.

Analysis

A waiver of the RFS2 requirements in 2013 might reduce demand for, and production of, ethanol and biodiesel. Reduced production of biofuels would lower demand for corn for ethanol and soybean oil for biodiesel which would, in turn, reduce crush demand for soybeans. As indicated above there is considerable uncertainty about the amount by which a waiver for 2013 would reduce biofuel demand. To reflect this we modeled two different scenarios described above.

[2] Babcock, Bruce. “Preliminary Assessment of the Drought’s Impacts on Crop Prices and Biofuel Production”. CARD Policy Brief 12-PB-7 , July 2012

These initial changes in corn and soybean use were evaluated through the use of an econometric model of the U.S. agriculture sector to determine shifts in demand for other uses (e.g. feed and exports) and prices. The resultant price changes were used as inputs to estimate the impact on net feed rations for beef cattle (finishing steers); swine (farrow-to-finish); dairy cattle; broilers and laying flocks. The basic rations used in this analysis incorporate near-maximum recommended amounts of DDGS and are based on recommendations of University nutritionists and Extension Service specialists. The sources for livestock rations are shown in the accompanying bibliography.

Results

Reducing corn use for ethanol production slightly increases available supplies, marginally reduces corn prices and results in higher demand both for feed use and exports. All of these impacts are modest. Reductions in biodiesel production reduce the demand for soybean oil and crush demand for soybeans. As shown in Table 1, ethanol and biodiesel production in the Low Scenario both are reduced 500 million gallons. Corn use for ethanol falls 180 million bushels for the 2012-13 marketing season and soybean oil use is cut 1,688 million pounds, or the equivalent of 148 million bushels of soybeans.

The decline in demand for ethanol production results in slightly more corn used for feed and exports. In the Low Scenario, corn feed demand increases 100 million bushels and 25 million more bushels are exported. Ending stocks increase modestly and the average farm price of corn is expected to fall 5.5%, or $0.46 per bushel compared to the Base Case. By comparison, the recent study on the impact of drought on crop prices and biofuel production prepared by Iowa State Professor Bruce Babcock estimated a 4.6% decline in corn prices from removing the RFS2 mandate. The reduction in soybean oil demand for biodiesel reduces soybean crush demand by155 million bushels and soybean prices are expected to fall $0.74 per bushel, or 4.5% from baseline levels.

Table 1
Impact of Waiver on Selected Agricultural Variables 2012/13 Marketing Year
Low Scenario: 500 Million Gallon Ethanol Reduction in 2013

	BASE	LOW	DIFF	% Diff
Ethanol Production (Mil gal, Cal. Yr.)[3]	13,633	13,135	-500	-3.7%
B100 Production (Mil gal, Cal. Yr.)	1,000	500	-500	-50.0%
DDG Production (Thou tons)	35,438	34,020	-1,418	-4.0%
Corn Ethanol Use (Mil bu)	4,500	4,320	-180	-4.0%
Corn Feed Use (Mil bu)	4,075	4,175	100	2.5%
Corn Exports (Mil bu)	1,300	1,325	25	1.9%
Corn Ending Stk (Mil bu)	650	705	55	8.4%
Corn, Farm price ($/bu)	$8.28	$7.83	-$0.46	-5.5%
DDGS Price ($/ton)	$309.55	$329.72	$20.18	6.5%
Soy Oil Use Biodiesel (Mil lb)	3,375	1,688	-1,688	-50.0%
Soybean Equiv Biodiesel (Mil bu)	296	148	-148	-50.0%
Soybean Crush Demand (Mil bu)	1,515	1,360	-155	-10.2%
Soybean Farm Price ($/bu)	$16.50	$15.76	-$0.74	-4.5%
Soy Meal Production (Thou tons)	36,004	32,320	-3,684	-10.2%
Soy Meal Price, 48% Pro ($/ton)	$495.05	$528.01	$32.96	6.7%
All Hay Price ($/ton)	$206.00	$197.00	-$9.00	-4.4%
Corn Silage ($/ton)	$40.00	$38.00	-$2.00	-5.0%

Initially these reductions seem beneficial for the livestock, dairy and poultry industry. However, lower ethanol output reduces production of DDGS by 4% and smaller soybean crush results in an anticipated reduction of 10.2% in soybean meal output. In both cases these reductions are expected to result in higher prices: $20 per ton, or 6.5% for DDGS and nearly $33 per ton, or 6.7% for high protein soybean meal. By comparison, the Babcock study estimated a 5.3% increase in soybean meal prices in response to a full RFS2 waiver. When viewed in the context of total feeding costs, these price increases for DDGS and soybean meal largely offset lower corn and soybean prices.

The results of the High Scenario, in which ethanol production is reduced 1,425 million gallons and biodiesel production by 500 million gallons, are shown in Table 2. In this Scenario, corn use for

[3] Ethanol and biodiesel (B100) production is expressed on a calendar year basis while data for corn, DDGS , soybeans and products, and other feeds are presented on a marketing year basis.

ethanol falls 514 million bushels for the 2012-13 marketing season while soybean oil demand for biodiesel production is reduced the same as in the Low Scenario.

Table 2
Impact of Waiver on Selected Agricultural Variables 2012/13 Marketing Year
High Scenario: 1,425 Million Gallon Ethanol Reduction in 2013

	BASE	HIGH	DIFF	% Diff
Ethanol Production (Mil gal, Cal. Yr.)	13,633	12,208	-1,425	-10.5%
B100 Production (Mil gal, Cal. Yr.)	1,000	500	-500	-50.0%
DDG Production (Thou tons)	35,437	31,391	-4,046	-11.4%
Corn Ethanol Use (Mil bu)	4,500	3,986	-514	-11.4%
Corn Feed Use (Mil bu)	4,075	4,325	250	6.1%
Corn Exports (Mil bu)	1,300	1,350	50	3.8%
Corn Ending Stk (Mil bu)	650	864	214	32.9%
Corn, Farm price ($/bu)	$8.28	$7.81	-$0.48	-5.8%
DDGS Price ($/ton)	$309.55	$328.66	$19.11	6.2%
Soy Oil Use Biodiesel (Mil lb)	3,375	1,688	-1,688	-50.0%
Soybean Equiv Biodiesel (Mil bu)	296	148	-148	-50.0%
Soybean Crush Demand (Mil bu)	1,515	1,375	-140	-9.2%
Soybean Farm Price ($/bu)	$16.50	$15.55	-$0.96	-5.8%
Soy Meal Production (Thou tons)	36,004	32,667	-3,337	-9.3%
Soy Meal Price, 48% Pro ($/ton)	$495.05	$520.79	$25.73	5.2%
All Hay Price ($/ton)	$206.00	$197.00	$157.00	-4.4%
Corn Silage ($/ton)	$40.00	$38.00	-$2.00	-5.0%

In the High Scenario, corn feed demand increases 250 million bushels and 50 million more bushels are exported. Ending stocks increase modestly and the average farm price of corn is expected to fall 5.8%, or $0.48 per bushel compared to the Base Case. It is interesting to note that as a consequence of demand shifts (less ethanol, more feed and exports) a larger response to an RFS2 waiver has only a modestly larger impact on corn prices (i.e., corn prices fall only $0.02 per bushel further in the High Scenario versus the Low Scenario). As is the case in the Low Scenario, lower ethanol output reduces production of DDGS by 11.4%, and smaller soybean crush results in an anticipated reduction of 9.3% in soybean meal output. In both cases these reductions are expected to result in higher prices: $19 per ton, or 6.2%, for DDGS and nearly $26 per ton, or 5.2% for high protein soybean meal.

As pointed out above, increases in DDGS and soybean meal prices offset declines in corn and soybean prices, and result in a minimal impact on net feed ration costs. The effects of the changes in feed prices for each scenario described above are illustrated in Tables 3 and 4.

The individual rations for each species and impacts by component and scenario are shown in Appendix Tables 1 and 2. As indicated above, we use industry standard feed rations for each species but include DDGS at near-maximum recommended rates. The use of DDGS has increased sharply in recent years as production and availability grew along with corn ethanol output. Animal feeders use DDGS as a protein and energy supplement for dairy cattle, beef cattle, swine, and poultry rations because it is an economical source of energy compared to feed grains like corn and an economical source of protein compared to soybean meal. Today, more DDGS is fed to livestock, dairy and poultry than soybean meal, indicating the importance of this product to the U.S. feed complex.

DDGS produced from corn typically has a protein content of 25 to 30%.[4] In addition, DDGS has a superior energy value to corn when being feed to beef cattle. DDGS competes with a wide range of other protein and energy feeds including other cereal energy feeds, cereal protein feeds, oilseed meals, and animal protein feeds.

Extension Service specialists recommend that up to 20% of a dairy cow feed ration may consist of DDGS, while most recommendations for beef cattle call for inclusion at the 30-35% level. It should be noted that higher levels of DDGS (e.g., 40-50% of the diet) have been fed to beef cattle when economical. DDGS also are use by swine and poultry feeders, however issues related to fiber content and amino acid levels typically limit feeding rates to a maximum of 20% for swine, 15% for layers, and 6% for broiler chickens.

For this analysis, we incorporated these DDGS feeding rates into typical rations. The feed rations presented are for feeding a steer calf to a finished weight of 1,150 pounds; a hog producer that farrows sows and feeds the pigs to a slaughter weight of 270 pounds; broiler chickens that reach market weight at 8 weeks; replacement pullets for laying flocks at 20 weeks; and daily feed costs for a 1,300 pound dairy cow at mid-lactation.

[4] This paper uses the term “DDGS” to refer to all forms of distillers grains, including wet and modified distillers grains.

When the total cost of the rations is examined using the changes in feedstuff prices described above, we find that a moderate reduction in ethanol output resulting from a waiver (such as described in the Low Scenario) would actually *increase* the net feed costs for dairy cattle by more than 4% (Table 3). Meanwhile, net feed costs for swine, broilers and layers *increase* less than 1%. The relatively high share of feed costs for feeder cattle accounted for by corn grain is the reason for a slight decrease in net feed costs for beef. The primary cause of these net feed cost increases is the reduced output and higher prices for DDGS and soybean meal resulting from a waiver.

Table 3
Impact of an RFS2 Waiver on Net Life Cycle Feed Ration Costs
Low Scenario: 500 Million Gallon Ethanol Reduction in 2013

	BASE ($/head)	Low Scenario ($/head)	Diff	% Diff
Cattle, Finishing Steers	$800.29	$795.20	-$5.09	-0.6%
Hogs, Farrow-to-Finish	$136.91	$137.57	$0.66	0.5%
Dairy (Midwest) ($/cow/day)	$7.02	$7.30	$0.29	4.1%
Broilers	$2.72	$2.73	$0.01	0.2%
Layers (Replacement Pullets)	$1.21	$1.22	$0.01	0.8%

A larger ethanol output response to a waiver, as described in the High Scenario, does result in net feed cost reductions (albeit slight) for feeder cattle, swine, and broilers, while the increases for dairy and layers are smaller (Table 4).

Table 4
Impact of an RFS2 Waiver on Net Life Cycle Feed Ration Costs
High Scenario: 1,425 Million Gallon Reduction in Ethanol for 2013

	BASE ($/head)	High Scenario ($/head)	Diff	% Diff
Cattle, Finishing Steers	$800.29	$793.1	-$7.19	-0.9%
Hogs, Farrow-to-Finish	$136.91	$136.70	-$0.21	-0.2%
Dairy (Midwest) ($/cow/day)	$7.02	$7.24	$0.23	3.2%
Broilers	$2.72	$2.71	-$0.02	-0.6%
Layers	$1.213	$1.214	$0.01	0.1%

Conclusion

The response of ethanol and biodiesel demand and production to a waiver of RFS2 requirements for 2013 is uncertain. Under a waiver, any reduction in corn use for ethanol and soybeans to produce soybean oil for biodiesel would be expected to slightly increase demand for feed and exports, modestly increase stocks and marginally lower prices, at least in the near term.

While lower corn and soybean prices under a waiver scenario initially appear to be a benefit to beef and dairy cattle, swine and poultry producers, the size of the impact will be limited by increases in the prices of DDGS and soybean meal. Production of these important feed components is directly linked to biofuel production and a waiver will reduce output and increase prices.

A modest response of biofuel production to a waiver is expected to actually *increase* net feed ration costs for dairy cattle, swine, broiler chicken and layers, while a more aggressive response would provide, at best, a marginal improvement in net feed ration costs for some species.

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Appendix Table 1
Impact of an RFS2 Waiver on Net Life Cycle Feed Ration Costs
Low Scenario: 500 Million Gallon Ethanol Reduction in 2013

	Feed Ration	Feed Component	Base Ration	RFS Waiver	Diff
	(lb/head)	%	$	$	%
Beef, Finishing Steers					
Shelled Corn	2,761	48.8%	$408.43	$385.92	-5.5%
DDGS	2,050	36.2%	$317.29	$337.97	6.5%
Alfalfa Hay	724	12.8%	$74.57	$71.31	-4.4%
Minerals/Supplements	128				
Total	5,663	100.0%	$800.29	$795.20	-0.6%
Hogs, Farrow to Finish					
Corn	467.5	58.2%	$69.16	$65.34	-5.5%
DDGS	164.5	20.5%	$25.46	$27.12	6.5%
Soybean Meal	170.9	21.3%	$42.29	$45.11	6.7%
Total	802.9	100.0%	$136.91	$137.57	0.5%
Broiler Chicken					
Corn	9.8	64.0%	$1.45	$1.37	-5.5%
DDGS	1.0	6.4%	$0.15	$0.16	6.5%
Soybean Meal	4.5	29.6%	$1.12	$1.20	6.7%
Total	15.3	100.0%	$2.72	$2.73	0.2%
Layers (Replacement Pullets)					
Corn	4.0	48.1%	$0.58	$0.55	-5.5%
DDGS	1.2	15.0%	$0.19	$0.20	6.5%
Soybean Meal	1.8	21.6%	$0.44	$0.47	6.7%
Other	1.3	15.3%			
Total	8.3	100.0%	$1.21	$1.22	0.8%

Dairy Cattle (Midwest)	lb./cow/day	%	$/cow/day	$/cow/day	%
DDGS	10.3	20.0%	$1.60	$1.70	6.5%
Soybean Meal	15.5	30.0%	$3.83	$4.09	6.7%
Corn Silage	12.9	25.0%	$0.26	$0.24	-5.6%
Alfalfa Hay	12.9	25.0%	$1.33	$1.27	-4.4%
Total (DMI)	51.6	100.0%	$7.02	$7.30	4.1%

Appendix 2
Impact of an RFS2 Waiver on Net Life Cycle Feed Ration Costs
High Scenario: 1,425 Million Gallon Ethanol Reduction in 2013

	Feed Ration	Feed Component	Base Ration	RFS Waiver	Diff
	(lb/head)	%	$	$	%
Beef, Finishing Steers					
Shelled Corn	2,761	48.8%	$408.43	$384.91	-5.8%
DDGS	2,050	36.2%	$317.29	$336.88	6.2%
Alfalfa Hay	724	12.8%	$74.57	$71.31	-4.4%
Minerals/Supplements	128				
Total	5,663	100.0%	$800.29	$793.10	-0.9%
Hogs, Farrow to Finish					
Corn	467.5	58.2%	$69.16	$65.17	-5.8%
DDGS	164.5	20.5%	$25.46	$27.04	6.2%
Soybean Meal	170.9	21.3%	$42.29	$44.49	5.2%
Total	802.9	100.0%	$136.91	$136.70	-0.2%
Broiler Chicken					
Corn	9.8	64.0%	$1.45	$1.37	-5.8%
DDGS	1.0	6.4%	$0.15	$0.16	6.2%
Soybean Meal	4.5	29.6%	$1.12	$1.18	5.2%
Total	15.3	100.0%	$2.72	$2.71	-0.6%
Layers (Replacement Pullets)					
Corn	4.0	48.1%	$0.584	$0.551	-5.8%
DDGS	1.2	15.0%	$0.190	$0.202	6.2%
Soybean Meal	1.8	21.6%	$0.438	$0.461	5.2%
Other	1.3	0.0%	$0.000	$0.000	0.0%
Total	8.3	100.0%	$1.213	$1.214	0.1%

Dairy Cattle (Midwest)	lb./cow/day	%	$/cow/day	$/cow/day	%
DDGS	10.3	20.0%	$1.60	$1.70	6.2%
Soybean Meal	15.5	30.0%	$3.83	$4.03	5.2%
Corn Silage	12.9	25.0%	$0.26	$0.24	-5.6%
Alfalfa Hay	12.9	25.0%	$1.33	$1.27	-4.4%
Total (DMI)	51.6	100.0%	$7.02	$7.24	3.2%