Food Costs are Eating American Family Budgets

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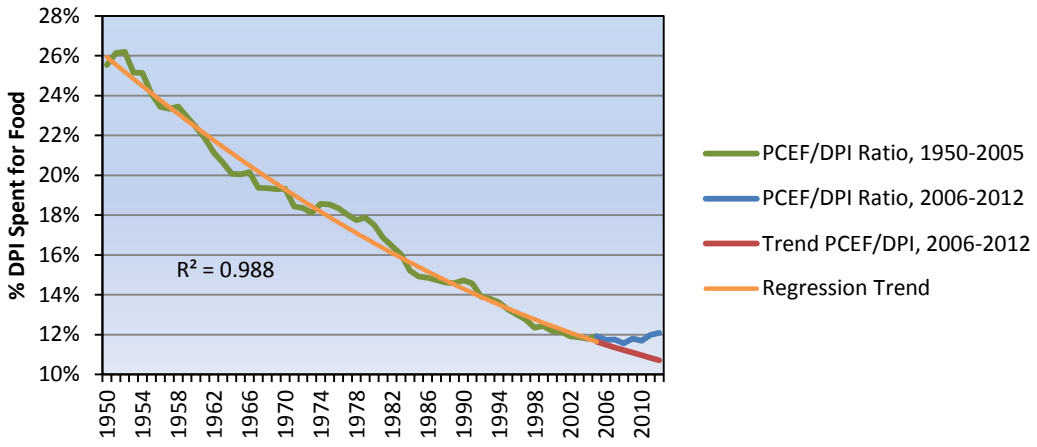
Background: A major U.S. long term economic trend has been increasingly affordable food. Affordability has been commonly measured as the percent of income spend for food. The trend is not a straight line; affordability improvement has been slowing over time, but was still trending down until 2006. See the Appendix to this study for the actual trend equation. Since 2006 this trend has reversed, and that reversal is the largest since 1950. Increasing food affordability has freed up income for spending on all other consumer goods and services, helping the economy grow and add jobs.

Since 2006, food prices are increasing compared to all other prices, and consumers' food costs are now increasing relative to disposable income. The gap between the 1950-2005 long term affordability trend and actual food costs is increasing. The last time the gap grew in a manner similar to the current experience was during the mid 1970s when farm commodity prices boomed as a result of growing grain and soybean exports. The current gap is much larger than that one.

Below is a graph that shows this departure from the long term affordability trend. Food spending is shown as a percent of disposable (after tax) personal income. With a R^2 of 0.988, the 1950-2005 affordability trend line (orange) is a near perfect fit to the actual data (green). The blue line is 2006-2012 actual data, the red line is the 1950-2005 trend projected from 2006 to 2012. A declining trend shows improving food affordability. The blue line trends up, and indicates declining affordability.

This study will show that the recent increase in percent of DPI spent for food (or food cost, if you prefer) relative to trend is strongly associated with rising raw commodity costs, and corn in particular. Rising commodity costs are strongly associated with increased use of corn for fuel ethanol production.

Personal Consumption Expenditures for Food (PCEF): Percent of Disposable Personal Income (DPI)



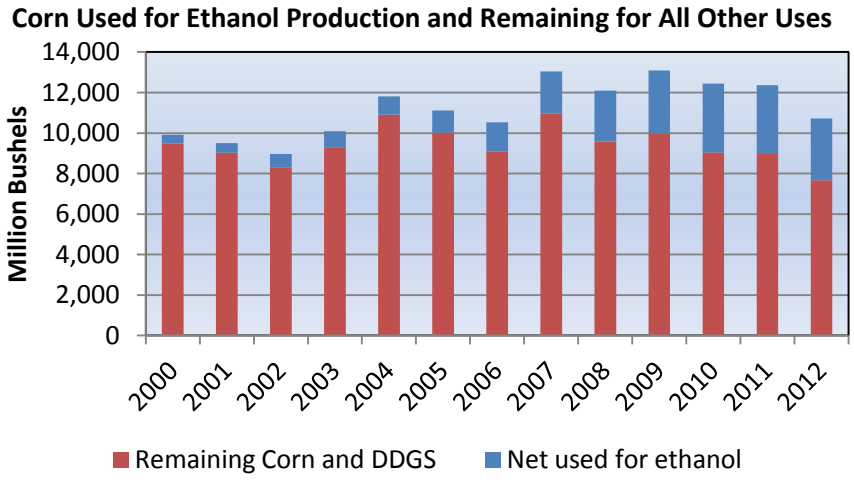
Source: U.S. Department of Commerce. Bureau of Economic Analysis. National Income and Product Accounts database. Food spending includes both "Food and beverages purchased for off-premises consumption" and "Food services and accommodations, Purchased meals and beverages". Found at http://www.bea.gov/iTable/iTable.cfm?ReqID=9&step=1&acrdn=2. Accessed 12-4-2012. 2012 projected by FarmEcon LLC. Total food spending is defined broader here than in USDA data that excludes beverages and other minor categories.

The Ethanol and Corn Price Connection to Food Costs: A major component of the current decline in food affordability is, like the 1970s, booming grain and soybean prices. Unlike the 1970s, it is not

exports this time around; grain and soybean exports are actually declining. Rather, the primary cause is booming use of corn in fuel ethanol production in the face of declining corn production.

The 2005 advent of federal mandates for fuel ethanol consumption (also known as the Renewable Fuel Standard, or RFS for short), together with increasing gasoline prices, have created a highly favorable environment for increased fuel ethanol production. In 2007 a federal energy bill (Energy Independence and Security Act) was passed and signed into law. This law greatly increased mandates for fuel ethanol production and use.

Fuel ethanol production capacity, based almost entirely on corn as a feedstock, exploded from 2006 to 2009. Demand for corn to supply the new plants also exploded. Corn production did not keep up with the higher demand, and corn prices have more than tripled since the mandates came into effect. The chart below shows the rapid post-2007 decline in corn supply available after ethanol production. DDGS (distiller's dried grains with solubles, a feed by-product of ethanol production) is included in the remaining corn (red bar). As shown by the total height of the chart's bars, increasing ethanol use and declining corn production happened at the same time.



Source: USDA. World Agricultural Supply and Demand Estimates. December 11, 2012 and prior issues. Estimated DDGS production was grossed up by 10% to account for lower moisture content and higher nutrient density of DDGS relative to corn.

The chart above actually understates the impact of increasing corn used for ethanol on what is left over for food production. The issue is that DDGS is far from a perfect substitute for the corn it helps replace in animal feeds. In poultry and pig diets the amount of DDGS is limited by nutritional variability content of DDGS compared to corn.

DDGS poultry and pig nutrition issues include the protein profile (especially for lysine digestibility), and fat and phosphorus content. The energy value of DDGS for poultry is approximately 17% lower than that for corn (1,280 versus 1,540 kcal/lb, respectively), and has the most influence on the value of DDGS as a poultry feed. The variation in DDGS can be due to the corn feedstock itself, processing at the ethanol plant (mash times, temperatures, distillation process, etc), drying temperatures and the amount of solubles that are added back to the product.

Between ethanol plants, and sometimes even within plants, there can be a high variation in the moisture level, lysine digestibility, sodium, protein and phosphorus content. Reliable nutrient values are important to obtain when using DDGS in poultry diets, especially when high levels of inclusion are being

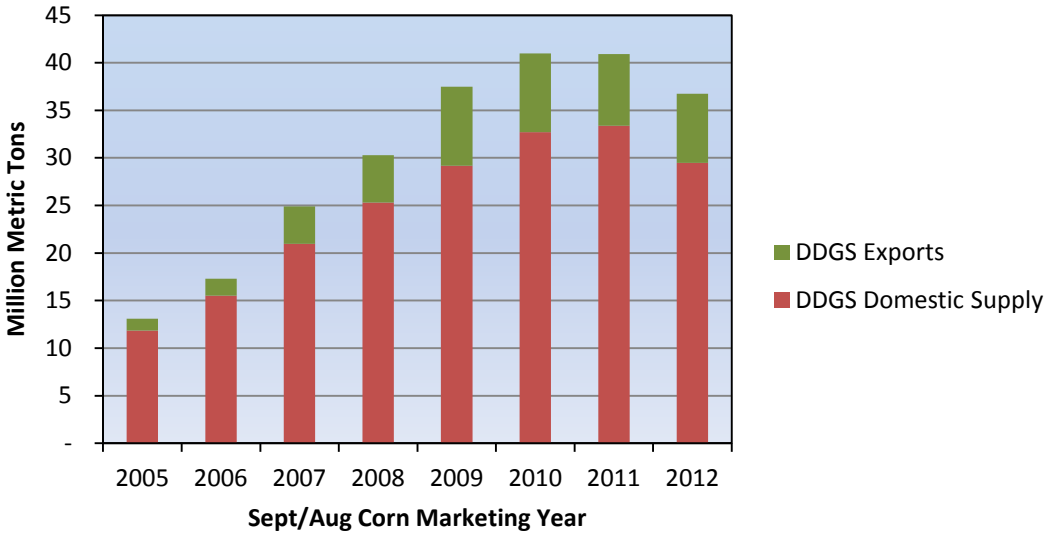
used, as the risk associated with nutrient variability becomes greater. This means that every load of DDGS has to be tested, and diets formulated to offset the DDGS's nutritional variability.

DDGS is high in fiber. Feeding pigs diets that are higher in fiber results in slightly lower carcass yields; and the reduction is more severe as you increase the amount of DDGS in the diet. Lower carcass yields mean less income for pig producers. Income reductions can easily offset any savings from using DDGS when it is priced at a discount to corn.

Finally, there can be significant physical handling issues with DDGS. The product tends to clump, and even turn into a solid mass, during storage and transportation. This can cause issues with unloading and during feedmill processing.

Limitations of DDGS use have led to the need to export DDGS, even in the face of the declining supplies of corn left after ethanol use shown in the prior chart. The chart below shows total DDGS production (total height of the bars) exports and domestic use.

U.S. DDGS Production, Exports and Domestic Supply

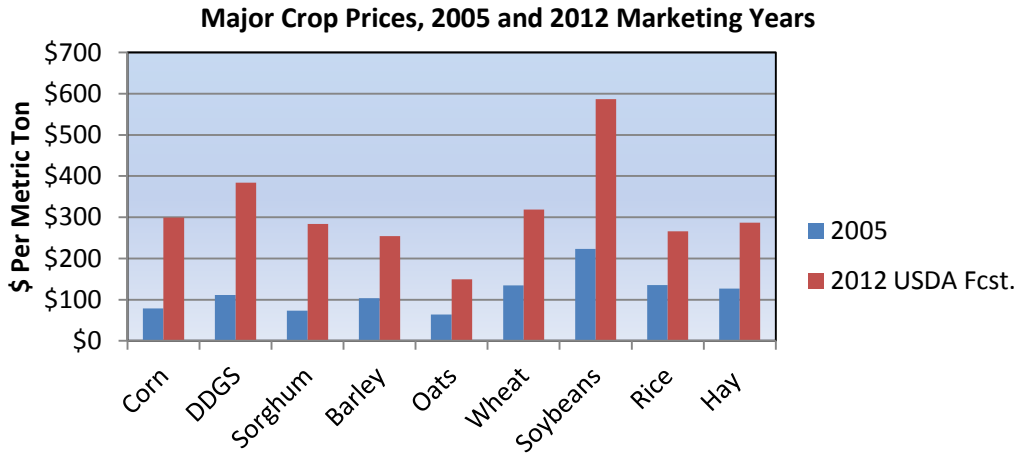


Source: USDA. World Agricultural Supply and Demand Estimates. December 11, 2012 and prior issues. DDGS exports for the 2012/13 corn marketing year are projected based on DDGS production and the year-to date export pace.

Corn is just one of many basic farm inputs used to produce the U.S. food supply. However, with increases in biofuel demand and declining corn production, corn prices have increased sharply. In turn prices of other major crops have also gone up significantly. This ranges from major field crops like soybeans and wheat, to horticultural crops such as potatoes, strawberries, and processing vegetable crops. Higher prices for other crops were necessary in order for those crops to compete with corn for land. The dramatic 2005-2012 increase in major crop prices is shown in a chart on the next page. These higher commodity prices mean higher incomes for crop producing farmers, but also higher food production costs, higher consumer food prices, and increased food costs for family budgets.

Corn and other major crop prices have increased relative to their long term trend far more than food costs compared to their trend. Farm commodity markets are price inelastic, and their costs are at the base of the value chain. While many other costs are required to convert these raw products to the food

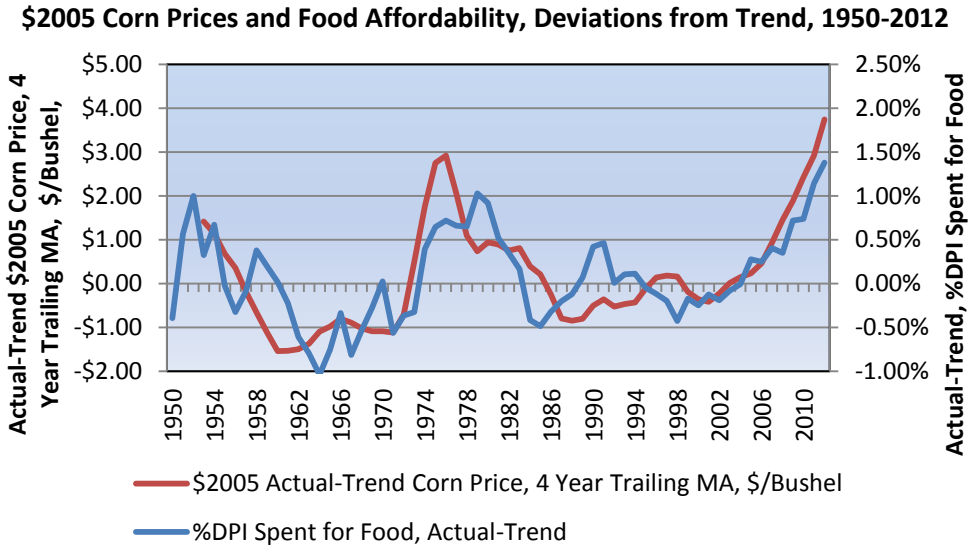
we buy at supermarkets and restaurants, the food system cannot absorb added costs of the magnitude shown on the price chart below. Consumers will eventually see the higher costs in the form of higher supermarket and restaurant menu prices.



Source: USDA. Agricultural Prices 2005 and 2012. World Agricultural Supply and Demand Estimates. December 11, 2012 and prior issues. Hay price for 2012 is projected based on year-to-date prices.

With a very long and involved chain of production and supply of all the items that use these major crops, increases in their prices do not immediately show up at the supermarket or restaurant. In fact, short term volatility in major crop prices rarely show up at the consumer level. But, with the sustained price increases since 2005, we are now seeing major impacts on food production costs, retail food prices, and restaurant menu prices.

Looking at the record of corn prices and food affordability (measured as percent of disposable income spent for food, see next chart) there is a clear relationship between changes in corn prices and food affordability. As already mentioned, corn prices affect markets and prices for other farm products, so when corn prices rise as they have since 2005, other farm product prices will go up too, adding pressure to increase retail prices of a broad range of food prices.



The prior graph shows the relationship between constant dollar (using the 2005 base year Personal Consumption Expenditures (PCE) price deflator) corn price deviations from trend versus food affordability deviation from trend. Due to the high year-to-year volatility of corn prices, a 4 year moving average of the corn price trend deviations is used. The data are, again, 1950 to 2012. An increase in food spending as a percent of DPI is a reduction in food affordability.

Except for 1989-1998, there is a clear relationship in this graph. When corn prices fell relative to trend (1952-1962), food price affordability improved (% of DPI spent for food declined) relative to trend. The sharp increase in post-2005 corn prices shows up as the largest above-trend post-1950 decrease in food affordability on record. The last time we saw this phenomenon was in the 1970s, when major crop prices increased less in real terms than the 2005-2012 corn price increase. After the 1970s corn price increase, prices declined in the 1980s, and affordability improved.

The timing of changes in corn prices (and thus, other major crops) versus food affordability is variable. Much depends on market dynamics, and how quickly cost increases can be passed along to the retail level. The 1990s was a decade of historically high economic growth, likely contributing to food spending and costs that increased slightly relative to trend, despite $2005 corn prices that were under-trend.

Costs to the Average Food Consumer, Family of Four and the U.S. Economy: The post-2005 increase in food costs relative to trend has had added significant expense to family food bills and the nation's food expense. The table below details these food cost increases versus the long term affordability trend.

In current 2012 dollars, the average person saw a 2012 food bill that was $514 higher than trend. For a family of four, the increased cost above the trend was $2,055.

For the country's food spending, the current dollar above-trend 2012 food bill was $162 billion. In perspective, the increase in food spending is about the same as annual consumer spending on either vehicle repairs, college education, or telecommunications. Given the outlook for sustained high major crop prices through mid-2013, we are likely to see another very large 2013 food bill increase.

Food Cost Increases Versus 1950-2005 Trend

Year	Per Capita Actual-Trend Cost, $2005	Per Capita Actual-Trend Cost, $Actual	Family of 4 Food Cost, $Actual	Family of 4 Actual-Trend Cost, $Actual	Total Economy Actual-Trend Cost, Billion $2005	Total Economy Actual-Trend Cost, Billion $Actual
2006	$79	$82	$15,589	$326	$24	$24
2007	$132	$139	$16,255	$557	$40	$42
2008	$116	$126	$16,754	$504	$35	$38
2009	$230	$250	$16,484	$1,002	$71	$77
2010	$238	$264	$16,807	$1,057	$74	$82
2011	$371	$423	$17,736	$1,690	$116	$132
2012	$440	$514	$18,017	$2,055	$139	$162

Of the $162 billion above-trend total food cost increase for the 2012 U.S. food bill, about $71.3 billion (next table), or 44%, is due to 2005-2012 price increases for grains, soybean products, DDGS and hay. These are the major commodities used to produce our meats, eggs, dairy products, bread, bakery products, cereal, and are also included in a wide range of other supermarket and restaurant food items. In addition, costs for a wide variety of other related minor agricultural commodities have also increased.

Cost Impact of Major Farm Commodity Price Increases, 2005-2012, $Billion

Commodity Unit of Measure	Corn $/Bu.	DDGS $/Bu.	Sorghum $/Bu.	Barley $/Bu.	Oats $/Bu.	Wheat $/Bu.	Soybean Oil $/Lb	Soybean Meal $/Ton	Hay $/Ton
2005 Price	$2.00	$1.88	$1.86	$2.63	$1.63	$3.42	$0.23	$174.00	$115.00
2012 Price	$7.40	$6.67	$7.10	$6.45	$3.90	$8.00	$0.51	$455.00	$260.00
2012 Domestic Consumption	5,517	1,171	155	210	161	1,023	13,100	29.4	120
2005-2012 Cost Impact $B	$29.8	$5.6	$0.8	$0.8	$0.4	$4.7	$3.6	$8.3	$17.4
2005-2012 Total Cost Impact $B									$71.3

Source: USDA. Agricultural Prices 2005 and 2012. World Agricultural Supply and Demand Estimates. December 11, 2012 and prior issues. Hay price for 2012 is projected based on year-to-date prices.

Why is this increase in food spending important? Since 2005 consumers have diverted increasing amounts of income to food, leaving less for more discretionary items. That spending diversion has contributed to the slow rate of improvement in unemployment, job creation, and thus total U.S. income. In short, increased food costs have decreased discretionary spending, robbing other sectors of sales needed to increase production and jobs.

Another major impact of commodity price and food cost inflation has been rapidly increasing farmland prices. Crop farmers' windfall profits have fueled very rapid increases in farmland prices, especially in the Midwest. After increasing 25% in during 2011, Iowa farmland prices are expected to have increased another 20% or more during 2012.

From 2005 to 2012, the value of land assets owned by U.S. farmers increased by over $700 billion. A sure sign that this land price boom was fueled by landfall profits is that farm debt over that same period only increased by about $60 billion. Crop farmers ploughed their windfalls into land, and did not have to take out substantial debt to finance land purchases.

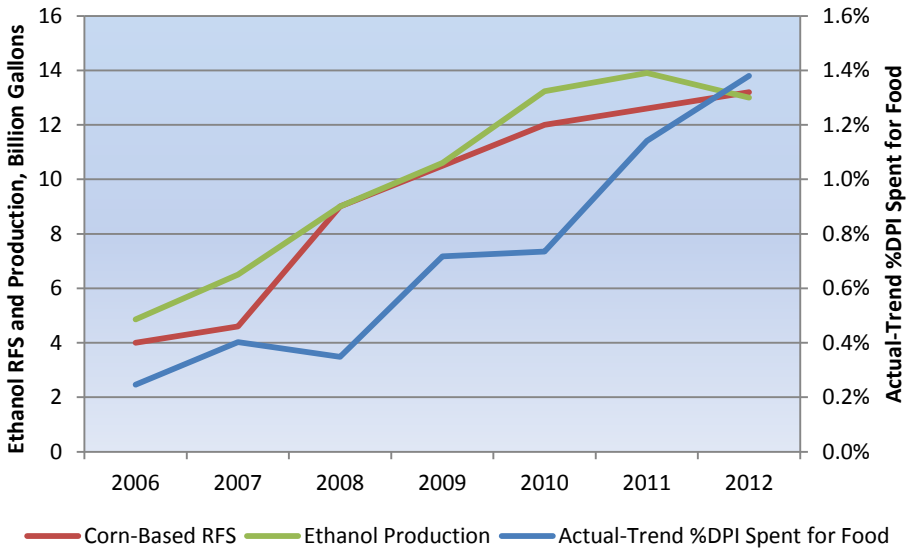
While consumers have struggled with declining food affordability, crop farmers have seen their personal income and wealth explode along with crop prices. Livestock, poultry and dairy farmers, burdened by higher feed costs, have seen their profitability fall since 2005. A relatively narrow slice of the U.S. economy has reaped enormous benefits, while the vast majority of us have seen their economic fortunes decline.

Is the Decline in Food Affordability Related to Fuel Ethanol Mandates and Production? In a word, yes, but ethanol mandates and higher fuel ethanol production are not the only factors. RFS mandates have provided ethanol producers with demand assurance for large, and increasing, production volumes. Ethanol production was also encouraged by high fuel prices that increased the attractiveness of converting corn to ethanol.

As clearly shown above, as ethanol production increased, other corn users faced sharply diminished corn supplies. DDGS production did increase, but was far less than the decline in corn supply left over after ethanol use. All corn users (ethanol producers, feed, export and food users) found corn prices increasing sharply to ration the smaller supply. As corn prices rose, prices of soybeans, wheat, DDGS and other crops also rose. Higher costs for those important basic commodities account for 44% of the 2006-2012 increase in the U.S. food bill.

The graph below shows the increasing ethanol RFS and the percent of DPI spent for food. While the relationship is not perfect, it is true that they both increase steadily from 2006 to 2011. The decline in 2012 ethanol production is caused by the 2012 drought, and extremely short corn supplies. That same drought is putting increased upward pressure on food prices, and will cause further increases in 2013 food spending.

RFS, Ethanol Production and Increasing Food Spending as Percent of Disposable Personal Income



Other factors, including higher fuel prices, have also contributed to the increase in food costs. Nonetheless, at 44% of the increase, higher commodity costs are the largest single contributor.

2013-2014 Food Spending and Cost Outlook: The lag between commodity price increases and retail food prices is lengthy, and somewhat variable. Current high prices for corn and other raw commodities will continue to work through the system during 2013 and 2014. Even if we were to have bumper 2013 crops, 2012 commodity cost pressures will still push food spending higher for all of this year.

Beyond 2013, an improved food cost outlook depends on significantly increased agricultural commodity production, and resulting lower commodity prices. More specifically, unless corn production recovers to the point where all users have adequate supplies, food affordability will continue to decline.

To balance corn production with feed, food, export and ethanol use would take a 2013 crop of close to 14 billion bushels, a 30% increase over 2012, and a billion bushels higher than the record-large 2009 crop. By 2015, when the corn-based RFS reaches 15 billion gallons, the total annual corn requirement will reach about 14.5 billion bushels.

Given a continuing drought in the western Corn Belt, corn production is unlikely to reach the levels required in 2013-2015. Even if we were to see a 14 billion bushel 2013 crop, history tells us that we cannot expect record-large crops every year. In short, 2013-2015 increases in the RFS coupled with corn production constraints strongly suggests at best, limited gains in food affordability are possible over the next few years. More realistically, food affordability will continue to decline under the current RFS program.

Renewable Fuels Policy Outlook: Other than major increases in corn production, the only other possibility for food affordability relief is to amend the RFS, and lower ethanol production incentives. Under EPA's current interpretation of the RFS, even the extreme 2012 drought did not justify relaxing the 2012 or 2013 RFS ethanol mandates. If there is to be flexibility in the RFS it will apparently take either an amendment to the waiver process, or fundamental changes in the RFS schedule itself.

There is mounting pressure to reform the entire RFS process. This pressure is coming from several major issues that have come into focus since 2007:

1. The corn-based RFS out of touch with the realities of our declining corn production;
2. Given the slow pace of technology advances, the cellulosic-based RFS is completely unrealistic;
3. Many cars in the current fleet cannot safely use ethanol blends above 10%;
4. We have already reached the limit at which we can blend 10% ethanol; and
5. Current and prospective ethanol prices relative to gasoline offer motorists no economic incentive to purchase blends higher than 10%.

In fact, absent artificial, policy-driven, incentives for motorists to buy gasoline blends with more than 10% ethanol, or unprecedented increases in corn production, we have reached the limit of how much ethanol we can move in the U.S. market.

This so-called ethanol "blend wall" is causing those obligated to blend biofuels to look at increased biodiesel blending as a way to satisfy their RFS requirements. Because biodiesel can be fully substituted for diesel in current diesel engines, it does not face that same 10% blending limit. Also, when using biodiesel, blenders receive 1.5 gallons of ethanol credit for each gallon of biodiesel. The higher credit is given for the higher energy content of biodiesel relative to ethanol.

There are, however, significant constraints on biodiesel feedstock supplies. In common with ethanol, biodiesel costs and prices will increase with increasing production. Because it also relies heavily on food commodities as feed stocks, increasing biodiesel production will also further reduce food affordability.

RFS Reform Options: There are several options for RFS reform. The most extreme is to eliminate the RFS, and let markets decide whether agricultural commodities are used for food or fuel. Short of eliminating the RFS, there are many options for reforming the 2007 requirements. Proposals for a formula-based RFS volume adjustment mechanism, and reducing the current requirements to more realistic levels, are two options that have been considered. Broadening the scope of biofuel feedstocks to include natural gas has also been proposed. Biofuel and corn special interest groups are strenuously opposing all efforts to change the current RFS program, or its dependence on agricultural commodities.

One thing is clear. Absent reform, the increasing RFS will continue to pull more and more agricultural commodity tonnage out of the food sector, further driving up food costs, and cause further reductions in food affordability. Food affordability will continue to decline, even if there is no domestic market for additional ethanol.

Appendix
1950-2005 Food Affordability Trend Equation

% DPI spent for food = 26.3065 - 0.3771 x Time + 0.002058 x Time^2

Where:

%DPI Spent for Food = (Food and beverages purchased for off-premises consumption + Purchased meals and beverages) / Disposable personal income

Time = 1, 2, 3… where 1950 = 1, 1952 - 2, etc.

R^2 = .988

t Statistic for Time = -23.1451
t Statistic for Time^2 = 7.4278

Both time variables are highly significant.

Data Source: U.S. Department of Commerce. Bureau of Economic Analysis. National Income Accounts database accessed December 4, 2012. Found at:
http://www.bea.gov/iTable/iTable.cfm?ReqID=9&step=1&acrdn=2

Comment: The trend rate of decrease in % DPI spent for food was 0.37% per year in 1950, and 0.15% per year in 2005. The rate of improvement has slowed over time, but was showing no signs of departing from the long term trend until the first RFS came into effect in 2006.