



**National Corn Growers Association**

**Testimony of**

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**before the**

**United State Senate  
Committee on Environment and Public Works and  
Subcommittee on Clean Air and Nuclear Safety**

**Oversight Hearing on Domestic Renewable Fuels  
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Chairwoman Boxer, Ranking Member Vitter, Chairman Carper and Ranking Member Sessions, thank you for the opportunity to testify about the impacts of the Renewable Fuel Standard on our nation's domestic renewable fuels.

My name is Jon Holzfaster and I have been farming for 27 years in Perkins County, Nebraska. Not only do I run a cattle finishing operation, but also farm corn, soybeans, popcorn, wheat and alfalfa. I currently serve on the Corn Board for the National Corn Growers Association and chair the NASCAR Advisory Committee. I have previously served as the Corn Board's liaison to the National Cattlemen's Beef Association and was a member of NCGA's Ethanol Committee for nine years. NCGA was founded in 1957 and represents over 40,000 dues-paying corn growers. NCGA and its affiliated state associations work together to help protect and advance corn growers' interests. Corn is important globally, as a food ingredient, an animal feedstock, a fuel, and beyond. It is possibly the most versatile crop in the world and demand is at an all-time high.

The Renewable Fuel Standard (RFS) is a critical piece of our nation's energy policy. Since its enactment in 2005, it has accomplished what it was designed to do, namely, it has created jobs, lessened our dependence on foreign oil and thereby increased national security and improved the environmental footprint of our nation's transportation fuels. In 2012 alone, the RFS supported more than 300,000 jobs across the country, displaced the equivalent of 465 million barrels of imported oil, and lowered the price consumers paid at the pump by nearly a dollar per gallon. It also spurs innovation and helps drive the development of advanced and cellulosic biofuel facilities. In short, it is doing exactly what it was designed to do – spur the development of a significant alternative to petroleum that ignites economic development for those who produce these new fuels and for those who use it.

Due to increasing yields in agricultural production, farmers have avoided clearing additional acres of land that would have been required to produce the same amount of food. In the last 30 years, corn production has improved on all measures of resource efficiency, by *decreasing* per bushel: land use by 30 percent, soil erosion by 67 percent, irrigation by 53 percent, energy use by 43 percent and greenhouse gas (GHG) emissions by 36 percent.<sup>1</sup> All of these improvements have continued despite the increased demand of corn for ethanol.

This testimony will provide an overview of the manner in which the Renewable Fuel Standard has positively impacted the domestic renewable fuel supply and the agriculture sector by reducing greenhouse gases, creating jobs and promoting rural development, and allowing our nation to grow our energy at home.

## **ENVIRONMENTAL BENEFITS**

Between 1900 and 2012, the world's population grew from 1.6 billion to more than 7 billion. The Food and Agriculture Organization of the United Nations estimates that the world's population will increase to 9 billion by 2050. With the increased demand for conventional agriculture, it is more important than ever to produce crops today while looking towards the future health of the planet. Corn farmers work hard to be good stewards of the land and environment while producing crops that will be used for animal feed, fuel, food and hundreds of other applications. Farmers know first-hand that they must embrace and seek practices that will sustain the soil and climate to produce the crops of the future.

Fortunately, U.S. agriculture has made incredible technological advances. In 1960, the average U.S. farmer fed 26 people; today, due to these advances, the number has increased to 155 people. In fact, in the last 30 years, corn production has improved on all measures of resource efficiency. Crops have doubled between 1980 and 2009 by only planting just 3 percent more acres. All of these improvements have continued while the ethanol industry has increased corn demand.

With increasing yields in agricultural production, farmers have avoided clearing additional acres of land that would have been required to produce the same amount of food. The impact of the higher yields has curbed greenhouse gases equal to a third of the total emissions since the dawn of the Industrial Revolution in 1850. No other industry can claim to have done more. A 2010 study<sup>2</sup> from Stanford University found that advances in high-yield agriculture have prevented massive amounts of GHG from entering the atmosphere, the equivalent of 590 billion metric tons of carbon dioxide (CO<sub>2</sub>). In fact, the study concludes that "improvements of crop yields should therefore be prominent among a portfolio of strategies to reduce global greenhouse gas emissions."

Not only have significant advancements been made in agriculture but also in corn ethanol production. According to a recent report issued by the Global Renewable Fuels Association, ethanol production and use was estimated at reducing GHG emissions by 100 million metric tons in 2012 alone, equivalent to removing 20.2 million light duty vehicles from the highways.

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<sup>1</sup> "Environmental and Socioeconomic Indicators for Measuring Outcomes of On-Farm Agricultural Production in the United States" Field to Market: The Keystone Alliance for Sustainable Agriculture, July 2012.

<sup>2</sup> <http://news.stanford.edu/news/2010/june/agriculture-global-warming-061410.html>

While a definite reduction in GHG emissions is clear, the reduction is underestimated for multiple reasons. First, corn yield improvements have increased at a rate of 2.1 percent per year for the last 35 years (including the drought from 2012) - a huge gain reflected in several contributing categories. This increase in yield decreases the amount of land needed to grow corn. In addition, fertilizer use, especially nitrogen, has decreased per unit of grain produced. Fertilizer production and usage are the most intensive GHG emission contributors to farming; the amount of fertilizer needed to produce the same amount of grain has decreased in the last 30 years and, thus, so has the GHG intensity of U.S. farming. Furthermore as yields increase, farmers are able to harvest a portion of the corn stalks/cobs, known as stover, normally left in the field. Stover can be used as animal feed or as a cellulose feedstock for ethanol production.

Second, the EPA underestimated the rate of improvement in corn ethanol process technologies. As shown in Table 1, the values EPA estimated in 2008 for ethanol production in 2012 were significantly lower than recently measured.

**Table 1: Comparison of fuel production for ethanol, EPA estimated vs. actual**

Energy or GHG emissions	EPA value (estimated in 2008 for 2012)	Actual value (determined in 2012) <sup>3</sup>
Natural Gas, BTU/gal	33,032	23,862
Electricity, kWh/gal	0.780	0.750

Additionally, when the renewable fuel standard was developed, corn ethanol plants made two products, ethanol and distillers dried grains (DDGs). DDGs are a valuable high protein product which is used to feed livestock. Today, most ethanol plants also produce corn oil, which is used to produce biodiesel or fed to the livestock industry. Although the EPA anticipated the development of a corn oil industry, it dramatically underestimated the speed of technology adoption. This underestimation results in higher calculated energy requirements for processing the DDGs.

Third, baseline emissions determined for petroleum-derived fuels did not take into consideration real-world scenarios thereby underestimating their emissions. Increasing amounts of U.S. petroleum feedstock derived from tar sands, and sour, heavy crudes have significantly higher GHG emissions than conventional hydrocarbons. The old baseline is no longer appropriate since petroleum feedstock are becoming more energy and GHG emission intensive.

Fourth, current indirect GHGs are overestimated for biofuels while the indirect GHG for petroleum fuels are simply omitted. Thus, the actual improvements being made far exceed the estimated numbers. Today, EPA considers the total GHG emission value of gasoline from petroleum as 91.54 g CO<sub>2</sub>/MJ of fuel (baseline 2005 value) vs. 77.56 g CO<sub>2</sub>/MJ of ethanol from corn (calculated for 2022). When all of these optimizations are taken into consideration further improvements in GHG savings would be more evident. In fact, a case can be made to demonstrate that corn starch ethanol today produces nearly 50 percent less GHG emissions than petroleum, as shown in Table 2. This represents tremendous advancements in agriculture and corn starch to ethanol production technologies.

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<sup>3</sup> Mueller, S. et al. (2013). 2012 Corn ethanol: emerging plant energy and environmental technologies, available: [http://www.erc.uic.edu/PDF/mueller/2012\\_corn\\_ethanol\\_draft4\\_10\\_2013.pdf](http://www.erc.uic.edu/PDF/mueller/2012_corn_ethanol_draft4_10_2013.pdf)

**Table 2. Comparison of GHG emissions for petroleum and corn ethanol**

	<b>Petroleum</b>	<b>Corn Ethanol</b>	<b>Corn Ethanol (including optimizations)<sup>3,4</sup></b>
Direct GHG g CO <sub>2</sub> /MJ	91.54	41.39	46.4
Indirect GHG g CO <sub>2</sub> /MJ	0*	30.17	2.14
<b>Total</b> g CO <sub>2</sub> /MJ	<b>91.54</b>	<b>77.56</b>	<b>48.58</b>

\*Note that petroleum has no indirect GHG accounting.

Fifth, during the process of indirect land use change (ILUC) calculations, the sum of the land use change attributed to each of three primary feedstock investigated (corn, soybeans, and sugarcane) is much higher than the land use change determined and utilized when all three feedstocks are modeled together.<sup>5</sup> This inconsistency results in a dramatic overestimation of the value for the ILUC emission factor and determining the GHG emissions that biofuels have provided. Despite recent improvements and refinements of the models, large uncertainties and shortcomings still exist. Thus, serious inaccuracies have resulted in final number calculations and are reflected in a less than optimal value for biofuel.

In the five years since Energy and Independence and Security Act (EISA) was enacted and EPA modeled ILUC, significant advances to the art of calculating ILUC have been developed. This, combined with improved models as well as empirical evidence, illustrate that the initial calculations by the EPA grossly over predicted the ILUC impacts to renewable fuels and negatively impacted the true value of reductions in GHG emission savings for corn starch ethanol. American agriculture and corn ethanol processing are lowering the GHG intensity of ethanol, and are producing more products using fewer resources. We fully expect this trend to continue as both farmers and ethanol producers continue to become more efficient.

## **ENERGY SECURITY AND NATIONAL SECURITY**

The U.S. government has invested and continues to invest in alternative energy resources as a means to increase national security. This has been done through a series of funding initiatives to government, academic, and private organizations. The foresight of this nation's leaders has supported the abilities of our citizens and provides one of the hallmarks of this country to produce some of the most advanced technologies in the world.

One of these initiatives is the RFS, which has contributed to U.S. energy security by providing an affordable and domestically produced alternative to oil while decreasing greenhouse gas emissions. The recent proposed rule issued by the EPA to lower the 2014 RFS volume

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<sup>4</sup> Lifecycle greenhouse gas emissions were estimated for a corn ethanol pathway that includes collecting corn stover and substituting it for corn grain in cattle feed plus the isolation of corn oil during ethanol production. Using stover as feed results in a GHG credit for the displaced corn. The credit includes the energy inputs and emissions associated with corn farming and transport of corn as well as reduced indirect land use change (ILUC) emissions associated with corn farming. ILUC is defined as the conversion of forests and other natural lands around the globe to agriculture to replace grain or cropland diverted to biofuels.

<sup>5</sup> RFA Letter to EPA. August 4, 2010. <http://renewablefuelsassociation.createsend1.com/t/y/l/qhyitk/kuluiiuhh/y>

obligations would be devastating to the structure already established. By reducing the RVOs to fuel levels below what can already be created, it disrupts the foundation of a successful program that combats GHG emissions and provides a domestic, renewable fuel supply.

Another mechanism has been through the Corporate Average Fuel Economy (CAFE) Standards, which decreases vehicle fuel consumption through increased mileage requirements. The continued support of methods to decrease the use of, and provide alternatives to, the consumption of energy while preserving the environment are critical to sustaining the planet for future generations – something farmers have been doing for generations.

As a result of these and other commitments from the government, the United States is now more energy secure than it was prior to the implementation of the RFS. The production of more than 40 billion gallons of biofuel, mainly ethanol, in the last four years has provided an alternative to petroleum while decreasing GHG emissions. Reliance on foreign oil has decreased from 60 percent in 2005 to 40 percent today due to several factors including decreased usage, greater automobile fuel efficiency and a replacement of 10 percent of the gasoline supply with ethanol.

Since gasoline production is responsible for approximately 45 percent of U.S. oil consumption,<sup>6</sup> a 10 percent decrease in gasoline consumption corresponds to an approximately 4.5 percent decrease in overall oil consumption. Additionally, the shift in the United States from being a net importer of gasoline in 2006 to a net exporter in 2012 averaging 366,000 barrels per day is noteworthy. While this shift has occurred, the production and utilization of 870,000 barrels per day of ethanol (equivalent to 13 billion gallons) has enhanced the U.S. gasoline supply. Ethanol allows for a decreased reliance on foreign oil and contributes to the U.S. fuel supply such that gasoline can be exported.

In addition to creating a stable energy supply, the RFS has also had a positive impact on gas prices. Ethanol prices have typically been substantially below gasoline prices at the wholesale level in recent years. For the first five months of 2013, ethanol prices in Chicago have averaged \$2.48 per gallon, while gasoline prices have averaged \$2.96 per gallon in Chicago (wholesale prices in Chicago were utilized since it is the central pricing point for ethanol and the regulatory conditions for gasoline are not as varied as on the East and West Coasts). This 48 cent-per-gallon discount translates to a gross benefit of almost \$0.05 per gallon of finished motor gasoline supplied to consumers.<sup>7</sup> This does not take into account either the indirect benefit that ethanol has on gasoline prices by effectively lowering demand for gasoline (a benefit especially in past years when refineries were running close to capacity) or the enhanced octane value of ethanol over gasoline.

Today, 95 percent of the nation's light-duty vehicles run on a blend of 10 percent ethanol with gasoline. This represents over 13 billion gallons of ethanol. In the last several years, due to partnerships between the ethanol and corn industries and with the help of some state American Lung Associations, higher blends of ethanol, namely E85, have been introduced into the retailer infrastructure. Approximately 3200 retail stations offer E85 and in addition, with the recent approval of E15, eleven states now have 50 retail stations offering this option to consumers. This

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<sup>6</sup> According to the U.S. EIA "U.S. refineries produce about 19 gallons of motor gasoline from one barrel (42 gallons) of crude oil. The remainder of the barrel yields distillate and residual fuel oils, jet fuel, and many other products. <http://www.eia.gov/tools/faqs/faq.cfm?id=24&t=6>.

<sup>7</sup> Most gasoline contains 10% ethanol, thus price reduction is 10% of \$0.48

additional infrastructure has provided the means for distributing mainly corn starch derived ethanol. With the advent of second generation fuels, namely ethanol from corn stover plants and other non-corn starch derived ethanol, this same infrastructure will be in place to distribute this renewable fuel to our nation's consumers. Thus, even though it was expected that the petroleum industry would utilize the RIN system for infrastructure, the ethanol and corn producers have stepped up to provide the necessary infrastructure for renewable fuel consumption. Infrastructure has kept up with the increased volumes of biofuels as directed by the RFS and is on track to continue to do so. However, this industry faces continuing challenges by the petroleum industry on E15 and E85 pricing and availability as well as inconsistent and non-science based policy blocks regarding physical properties of E15 (Reid Vapor Pressure, RVP).

## **BENEFITTING RURAL DEVELOPMENT AND CREATING JOBS**

The expansion of the ethanol industry has catalyzed substantial growth in the agriculture sector's output, efficiency and value. The role of the RFS has been to create a certain and stable market environment for renewable fuels producers and feedstock providers. In turn, this certainty has enabled investment in new agricultural technologies, such as more efficient farm machinery and higher-yielding corn seed. Agricultural gross domestic product (GDP), net farm income, livestock receipts and crop receipts have all hit new record highs in recent years indicating that the net impact of ethanol expansion on the agriculture sector has been resoundingly positive.

Expansion of the ethanol industry of the past decade has created and/or supported tens of thousands of jobs across all sectors of the economy. In 2012 alone, the RFS supported more than 300,000 jobs across the country.<sup>8</sup> While it is difficult to assess how much of the increase in farm revenue is attributable to RFS demand versus increased export demand, farm income has risen.

My farm sits in the very heart of Nebraska corn country—and there are over twenty ethanol plants within my state. This has provided me with a number of competitive options for marketing my grain—options that exist because of the promise and the commitment that Congress made in establishing the RFS. The investments by ethanol production companies—and their shareholders, including corn farmers themselves—have been predicated on a national strategy of increasing our domestic fuel supply through renewable fuels such as ethanol and biodiesel. These companies and investors have committed themselves to the long-term viability of renewable fuels, based on the commitment that Congress made in establishing the RFS.

Before these ethanol plants were built, a high percentage of the corn in our area was exported to domestic or international markets—shipped out as raw corn, sold at the going price. Now virtually every bushel is transformed into fuel and feed—adding considerable value to every kernel. That value is captured and multiplied several times throughout the communities in my area—generating economic vitality and tax revenue. The economic vitality that the RFS has spurred in rural America extends well beyond my farm. I see the impact of increased tax revenue for our county to build roads and provide services. I see main street businesses with customers in the aisles. I see entrepreneurs starting new ventures—many of which are based in agriculture and food production.

Despite the negative effects of the ongoing recession in the manufacturing sector, agricultural equipment manufacturers have been largely immune to the downturn. This is solely because as

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<sup>8</sup> Renewable Fuels Association.

farm income has risen, farmers have expanded and recapitalized their operations. A large part of this recapitalization is new equipment purchases. Likewise, as farm returns and income have risen, land prices have also risen. This has expanded the property tax base in rural America which is vital to funding schools, roads and other public services. Finally, according to the USDA, total net agriculture income has risen since the passage of the RFS. In 2006, average farm income was \$57.4 billion. In 2012, farm income was \$112.8 billion, a 97 percent increase. As Table 3 indicates, while farm income has increased, this increase was not solely in the crop sector. Livestock receipts have increased over this time period as well.

**Table 3: Income Statement for the U.S. Farm Sector (billion \$)**

	2006	2007	2008	2009	2010	2011	2012F	2013F
<b>Crop Receipts</b>	122.1	150.1	175.0	168.9	179.6	208.3	219.6	216.3
<b>Livestock Receipts</b>	118.5	138.5	141.6	120.3	141.6	166.0	171.7	176.5
<b>Gross Income</b>	290.2	339.5	377.7	343.3	365.6	428.5	446.5	481.1
<b>Total Expenses</b>	232.8	269.5	292.6	280.3	285.2	310.6	333.7	352.9
<b>Net Farm Income</b>	57.4	70.0	85.1	63.0	80.4	117.9	112.8	128.2

U.S. meat output has grown steadily since the original RFS was enacted in 2005. In fact, 2013 production of red meat and poultry is projected to be the second-highest on record (only behind 2008) and 7 percent higher than output in 2005.<sup>9</sup> If, as some critics claim, the RFS has been overly detrimental to the livestock industry, annual meat production should have declined post-RFS. This can also be used as a proxy for employment in the meat sector. A decline in meat production would have resulted in a loss of jobs. This is not to say some companies did not bear the brunt of the change, but overall the sector appears to have increased production.

While the emergence of the ethanol industry has increased demand for corn, U.S. farmers have responded by growing significantly larger corn crops. The average annual U.S. corn crop averaged 7.2 billion bushels (bbu.) in the 1980s and USDA estimates 14 bbu. for 2013. Of this increased crop, 39.5 percent was used for livestock feed, 30.8 percent was utilized for ethanol, and 9.2 percent was processed into dried distillers grains (DDGs).<sup>10</sup> According to the U.N Food and Agriculture Organization, DDGs have become the most popular alternative ingredient used in beef, dairy, swine and poultry diets in the United States and in over 50 countries worldwide due to the “abundant supply, excellent feed value and low cost relative to maize and soybean meal.”<sup>11</sup> As a result of larger annual corn harvests and the growing production of animal feed co-products, increased ethanol production has not affected availability of corn for traditional users.

This spring I will be planting my next corn crop that will be marketed in 2015. Until now, the RFS provided some certainty that there will be a growing commodity market. Based on USDA

<sup>9</sup> USDA (April 2013). World Agricultural Supply and Demand Estimates.

<sup>10</sup> USDA, ERS Feed Outlook, Jan 15, 2013.

<sup>11</sup> U.N. Food & Agriculture Organization (2012). Biofuel Co-products as Livestock Feed. Makkar, H. (Ed.). Rome, Italy: FAO Press.

commodity costs and returns, in 2012 it cost \$655 per acre to plant corn. While costs have risen, that would require farmers to receive \$4.25 a bushel to simply cover costs at this year's end. On Monday, the cost of corn was \$4.17—\$0.08/bushel below the cost of production. This recent decline in the price of corn is the largest drop in prices in six decades. Combined with increased input costs and lower crop prices, it will no longer be viable for farmers to continue to provide the resources they do. If the RFS is revised downward, as indicated by the EPA's proposed rule, rural communities and domestic energy sources will be left to wonder what might happen next. That uncertainty erodes confidence, undermines potential investment and generally stifles the robust growth we have seen in America's heartland.

## **FOOD PRICES AND FOOD SECURITY**

There is no credible evidence to support the notion that the RFS has adversely affected consumer food prices. The RFS has little direct impact on agricultural commodity prices; because the farm value of commodities represents such a small share of retail food prices, the impact of the RFS itself on food prices is indiscernible. That said, higher energy prices as a result of increased petroleum costs play a much larger role in consumer food prices. In 2013, the World Bank found that nearly two-third of the increase in food prices since 2004 are the result of the increased price of crude oil.

According to the USDA, across all commodities, the farm share of the food dollar is 15.5 cents for 2011. This is below the average of 16.1 cents per dollar for the time period 1993-2011. Because the farmer is getting such a small percentage of the food dollar, commodity prices alone or some other single factor like the RFS cannot and should not be blamed for food price inflation.<sup>12</sup>

Commodity prices, not just corn, have increased since the mid-2000s. These price increases are a result of several factors—increased corn demand for fuel ethanol being only one of those factors. For commodity producers, this increase has not been all profit. In fact, cost of production has increased as a result of higher energy costs, which has significantly impacted a producer's break-even point. At the beginning of the last decade, corn producers were facing significantly depressed prices averaging \$2 per bushel. Through the 2002 farm bill, Congress responded to this economic disaster in rural America to help commodity producers survive tough times. At the same time, livestock producers benefited considerably from these significantly below market prices. However, the prices received for livestock products were considerably lower during this period as well. As commodity prices have rebounded in the last five years, the Federal Government has seen significant savings in the commodity title of the farm bill. Livestock producers, like grain farmers, are "price takers" in that they sell a commodity and have to accept a market price. Meaning no single producer is large enough to move the market, nor are they able to pass increased costs of production onto the next player in the marketing chain. Meat production has expanded in almost every sector since the passage of the RFS. Fortunately for livestock producers, during this same period of increased feedstuff costs, the U.S. has been expanding export markets for meat products. Increased exports have driven up the cost of meat and livestock and thereby covered much of the higher costs of production.

While the cost of production, partially due to higher feedstuff costs, has risen, a more likely explanation of the increased food costs are factors outside of agriculture. Specifically, rising

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<sup>12</sup> <http://www.ers.usda.gov/data-products/food-dollar-series/food-dollar-application.aspx>.

diesel fuel and labor costs have greatly impacted food prices. All food sold in a grocery store is delivered by truck. In 2007, the average price of a gallon of diesel fuel was \$2.88; by 2012 that had increased to \$3.97, a 37.8 percent increase. Likewise, while U.S. labor wages may have stagnated due to the on-going recession, other labor costs, most notably health care has not. Unlike farmers, meat packers, wholesalers and food retailers are not “price takers” and increased costs of production can more easily be passed onto consumers. As the USDA data cited above indicates, the vast majority of the retail food dollar arises after products leave the farm.

The lack of any perceptible relationship between the RFS and retail food prices is further illustrated by the fact that the average American household spends less of its disposable income on food today than it did prior to the existence of the ethanol industry and the RFS. Since enactment of the RFS2 in 2007, Americans have spent an average of just 9.7 percent of their income on food.<sup>13</sup> In the 10 years prior to adoption of the RFS2, spending on food accounted for 10 percent of disposable income. Spending on food, as a share of income, has trended down steadily since the 1940s and the emergence of ethanol and passage of the RFS have in no way interrupted this trend.

## **CONCLUSION**

In conclusion, NCGA appreciates the Committee and Subcommittee’s interest in better understanding the market dynamics surrounding the RFS. We strongly believe the RFS is doing exactly what it was intended to do. It is successfully driving adoption of renewable fuel alternatives to petroleum while decreasing GHG emissions, supporting jobs across the country and ensuring the United States remains a global leader in developing new energy sources here at home. Corn growers will continue to meet the growing demands in an economical and environmentally responsible manner.

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<sup>13</sup> USDA-ERS (2013). Food Expenditures. <http://www.ers.usda.gov/data-products/food-expenditures.aspx>