MINNESOTA DEPARTMENT OF AGRICULTURE

Ethanol: *Rumor* vs. *Reality*

Rumor: Increased ethanol production has dramatically increased consumer food prices.

Reality: The impact of ethanol on food prices has been greatly exaggerated.

- Retail food products such as cereals, snack foods and beverages contain relatively little corn. For example, a standard box of corn flakes contains approximately 10 ounces of corn. Even when corn is priced at $4 per bushel, a box of corn flakes contains less than a nickel's worth of corn *(Source: U.S. Department of Agriculture Economic Research Service).*

- Food prices have not increased proportionately with corn prices. According to the U.S. Congressional Budget Office, corn prices doubled from April 2007 to April 2008 while consumer prices rose by just over 5 percent. During the same period, the CBO found that the rise in the price of corn resulting from expanded production of ethanol contributed between 0.5 and 0.8 percentage points of the 5.1 percent increase in food prices measured by the consumer price index (CPI). Moreover, as corn prices fell from approximately $8 per bushel in July 2008 to $4.25 per bushel in October 2008, food prices did not exhibit comparable downward trends.

- So what *does* influence retail food prices? According to the U.S. Department of Agriculture, labor costs account for 38 cents of every dollar a consumer spends on food. Packaging, transportation, energy, advertising and profits account for 24 cents of the consumer food dollar. Just 19 cents of every consumer dollar can be attributed to the actual price of food inputs. The Congressional Budget Office reported that several factors—including rising global demand for meat and animal feed, the depreciation of the U.S. dollar, and concerns about poor corn harvest conditions—contributed significantly to the rise in corn prices during the spring of 2008.

- One recent study suggests that energy prices have twice the impact on retail food prices that grain prices do *(Source*: *John Urbanchuk, LECG, LCC, June 2007)*. Over the past two and a half years, increases in crude oil prices have added an additional dollar per gallon to the price of regular gasoline. Americans consume about 140 billion gallons of gasoline each year, so a dollar per gallon price increase equates to a $140 billion impact. Seven billion bushels of corn each year are used for food and feed purposes, so an increase of $1 in the price of corn results in a $7 billion impact on prices consumers pay *(Source: Acting USDA Secretary Chuck Conner, U.S. Consumer Federation Address, Sept 28, 2007)*. Between 2007 and 2008, corn producers' expenditures on energy grew by

35 percent and fertilizer expenditures climbed by 50 percent. Overall, during that period, the cost of producing corn rose by 31 percent *(Source: Congressional Budget Office, 2009).*

Rumor: As current ethanol production continues to grow, the U.S. will not be able to meet the demands of global food and feed markets.

Reality: The sad reality is that world hunger is generally due to problems with food access, not food production.

- According to the United Nation's Food and Agriculture Organization, the most likely causes of hunger are a lack of infrastructure and access to capital—not food scarcity.

- U.S. farmers can easily meet demands for U.S. corn from foreign markets. Even though corn use for ethanol has risen dramatically over the past several years, American corn growers continue to serve as the world's top exporter of corn. USDA's 2009 forecast predicts that U.S. corn exports will remain steady at about $9 billion due to record corn harvests.

- There is not a direct relationship between commodities and food as some might assume. Both corn and soybeans are used primarily in the production of meat through feed for livestock and not used in actual retail food products (with the exception of salad oil products). The amount of field corn used for human food processing (starch, sweetener, oil and cereal) ranges between 5 percent and 8 percent of total corn usage. Also, corn demand for food processing markets has been flat for 15 years *(Source: USDA, Pro Exporter Network).*

- Ethanol production utilizes only the starch portion of the corn kernel, which is abundant and of low value. The remaining vitamins, minerals, protein and fiber are sold as high-value livestock feed (*Source*: *Renewable Fuels Association*). A high-quality feed product known as ―distllers grains" is a co-product of ethanol production that can be fed to livestock and poultry, helping to replace corn and soybean meal that can then be used for other purposes. According to the U.S. Grains Council, one bushel (56 pounds) of corn used in the dry mill ethanol process yields about 17 pounds of distillers grains. In 2008, the U.S. ethanol industry produced approximately 27.7 million tons of distillers grains, up from approximately 23 million tons in 2007. In 2009, that figure is expected to increase to 31.5 million tons *(Source: FAPRI, Iowa State University)*. According to the USDA, each bushel of corn used to produce ethanol results in a reduction of about a fifth of a bushel of direct corn feeding due to the use of distillers grains in rations. The United States also exports large amounts of distillers grains annually—in 2008/2009, the U.S. exported nearly 5 million metric tons to various world markets including Mexico, Canada, and Turkey, among others *(Source: USDA Economic Research Service)*.

- While the United States dominates world corn trade, exports account for only a relatively small portion of demand for U.S. corn (about 15 percent). This means that corn prices are largely determined by supply-and-demand relationships in the U.S. market, and the rest of the world must adjust to prevailing U.S. prices.

Rumor: There won't be enough corn to continue the strong growth in the ethanol industry.

Reality: Thanks to continued increases in yields and ethanol processing efficiency, farmers are expected to be able to meet rising demand for corn.

- The amount of corn farmers can grow per acre has quadrupled in the last five decades – from 40 bushels per acre in 1950 to more than 160 bushels per acre in 2009. If yields continue to increase at the rate of the last 10 years, corn yields will reach 180 bushels per acre by 2015. An increase of just two bushels per acre results in an additional 150 million bushels of corn, which can produce 420 million gallons of ethanol *(Source: National Corn Growers Association)*.

- At the same time, technology improvements will mean that we can squeeze more out of each bushel of corn. The average ethanol conversion rate today is 2.8 gallons per bushel, up from 2.5 gallons per bushel several years ago. The conversion rate may soon be as high as 3 gallons per bushel because of emerging processing technologies.

Rumor: Ethanol supporters claim it is the total answer to our nation's energy independence.

Reality: Instead of seeing ethanol as a silver bullet, supporters describe it as a step in the right direction for reducing our nation's dependence on foreign oil.

- While imperfect, today's renewable fuels create a necessary foundation for future renewable fuel technologies that will offer even greater environmental and economic benefits. Just as the early biplanes were necessary first steps toward transcontinental air travel, today's renewable fuels sector is a first step down a road that supporters believe will ultimately lead to energy independence. As crop production and ethanol processing technologies improve, the carbon footprint per unit of

renewable energy decreases. In contrast, as crude oil and other fossil fuels become harder to find, their carbon footprint increases.

- Without corn ethanol and soy biodiesel, the U.S. would not have the necessary foundation in infrastructure, markets, and technology to support future efforts to commercialize cellulosic ethanol and other advanced biofuels. By maintaining the renewable fuels industry of today, we are building a better framework for tomorrow's technology.

- Many of the concerns about renewable fuels being raised on a national level today mimic those raised decades ago when ethanol was first emerging as a fuel option in Minnesota. Our experience has shown that ethanol can provide a real-world boost to our economy and our environment even though it has practical limitations and technical obstacles, like any other energy option.

Rumor: Ethanol contributes little to our nation's energy security.

Reality: Ethanol makes a significant and growing contribution today by reducing our need to purchase foreign energy.

- By 2030, the Energy Information Administration projects the U.S. will import about 40 percent of its petroleum. A major portion of this petroleum is expected to come from the volatile Middle East, where much of the remaining known petroleum reserves exist**.** \

- In 2008, the production and use of 9 billion gallons of ethanol in 2008 saved American consumers and taxpayers $32 billion and eliminated the need to import more than 320 million barrels of oil *(Source: Renewable Fuels Association)*.

- Minnesota led the way in 1997 by establishing the use of ethanol blends as the market norm—and other states are following in Minnesota's footsteps. Today, fully 10 percent of the state's gasoline is ethanol and Minnesota is leading a national initiative to extend that norm to higher-level blends.

Rumor: Ethanol is heavily subsidized in comparison to other fuels.

Reality: Subsidies of renewable fuels are modest when compared with the subsidies directed to fossil fuels.

- It is important to compare "apples to apples" when discussing fuel subsidies. According to the Government Accountability Office (GAO), the U.S. has spent more than $130 billion over the last three decades in subsidies to the oil industry. Add to this the amount of money that the U.S. spends to maintain a major presence in the Middle East, and you begin to see the "embedded" cost in our gasoline coming from the oil imported from this region.

- Ethanol has received government subsidies as well. However, with the rise in today's market price of corn, agricultural subsidies in their current form will be reduced from more than $10 billion per year to approximately $2 billion per year. Even by factoring in the current cost of the U.S. excise tax credit to gasoline blenders, which amounts to about $4.7 billion annually, the subsidy level is greatly reduced from previous norms *(Source: Renewable Fuels Association, American Coalition for Ethanol)*.

Rumor: It takes more energy to produce a gallon of ethanol than you get from it.

Reality: Most studies show ethanol to have a positive net energy balance, while all studies show gasoline has a net negative energy balance.

- Over the last 20 years, the amount of energy needed to produce ethanol from corn has significantly decreased because of improved farming techniques, more efficient use of fertilizers and pesticides, higher-yielding crops, and more energy-efficient ethanol conversion technology *(Source: U.S. Department of Energy)*.

- According to reports from the Congressional Research Service and the U.S. Department of Energy, ethanol produced from corn provides about one third more energy than is used during production. Furthermore, a CRS report concluded that there is a net energy loss of 19 percent in the production of gasoline.

- Since 1995, at least 11 independent studies have found ethanol to have a positive net energy balance while only one study—using methods that have been challenged by other scientists—found the energy balance to be negative *(Source: National Corn Growers Association)*. Studies that claim a negative energy balance for ethanol fail to take into account significant factors such as improved crop yields or energy contained in the co-products.

MINNESOTA DEPARTMENT OF AGRICULTURE

Rumor: Ethanol only provides a small reduction in greenhouse gases over gasoline.

Reality: In 2008, ethanol use in the U.S. reduced CO2-equivalent greenhouse gas emissions by approximately 14 million tons, the equivalent to removing annual emissions of more than 2.1 million cars from the road. *(Source: Renewable Fuels Association)*

- The American Lung Association of Chicago credits ethanol-blended gasoline with reducing smog-forming emissions in the Chicago area by 25 percent since 1990 (*Source: Renewable Fuels Association*).

- According to the U.S. Department of Energy, on a life cycle basis, ethanol produced from corn results in about a 20 percent reduction in GHG emissions relative to gasoline. Recent analyses by the U.S. Environmental Protection Agency came to similar conclusions, finding ethanol produced from today's technology to reduce greenhouse gases by an average of 21 percent over petroleum products. With improved efficiency and use of renewable energy, this reduction could be as much as 52 percent. Renewable fuels produced from dedicated energy crops like cellulosic ethanol are expected to reduce greenhouse gases even further, by up to 86 percent.

- In 2005, a ~~"~~well-to-wheels" life cycle analysis of energy use and greenhouse gas emissions commissioned by General Motors concluded there is no better way to address petroleum fuel use and carbon dioxide emissions than by using ethanol. Hybrid and diesel propulsion systems reduced carbon dioxide emissions by 20 to 30 percent, while E85 reduced carbon dioxide emissions anywhere from 75 to 85 percent.

- In the future, it is anticipated that more and more U.S. petroleum imports will come from unconventional sources like Canadian oil sands. According to the Canadian Association of Petroleum Producers, Canada exports approximately 70 percent of its crude oil and in 2008 provided just over 19 percent of the United States' foreign oil imports. Oil sands production currently comprises just over half of western Canada's total crude oil production. Canadian oil sands production is expected nearly double and U.S. demand for Canadian crude to increase by approximately 40 percent by 2015. The current federal requirements for renewable fuels compare current biofuels to a petroleum baseline from 2005, thereby disregarding this significant change in the source of our nation's petroleum supply.

MINNESOTA DEPARTMENT OF AGRICULTURE

Rumor: To produce high corn yields to meet ethanol demand, applications of farm chemicals will need to be dramatically increased.

Reality: Over time, farmers are becoming more efficient and are using smaller amount of costly farm inputs per acre.

According to the USDA's Economic Research Service, the anticipated increase in corn yields will not require a large increase in nitrogen use per acre. Furthermore, with the improved genetic traits of seeds, less pesticide will be required. Since 1996, biotech crops have reduced pesticide sprayings by 500 million pounds – 6.9 percent reduction worldwide *(Source:* Graham Brookes, PG Economics, Ltd.*)*.

Rumor: Producing biofuels such as corn-based ethanol and soy-based biodiesel requires large volumes of water.

Reality: Improvements in technology have dramatically improved water efficiency during the biofuel production process, and irrigation of crops for biofuels continues to decline.

- Today, the ethanol production process in Minnesota requires about 2.5 gallons of water or less – down from about 6 gallons in the 1990s (*Source: Institute for Agriculture and Trade Policy*). Ethanol producers are employing advanced technologies and water recycling techniques to continue decreasing the amount of water used in the production of ethanol.

- Crop irrigation trends continue to decline as well thanks to improved varieties that are more drought-resistant and more efficient irrigation systems. In 1980, the total U.S. crop was irrigated at a rate of 150 billion gallons per day, versus fewer than 140 billion gallons per day in 2000 (*Source: USGS*). Moreover, relatively little of the U.S. corn crop is irrigated – in 2008, the U.S. irrigated about 15 percent of harvested corn acres, and Minnesota only irrigated about 3.5 percent of its corn crop. Irrigation trends for soybeans are even lower (*Source: U.S. Department of Agriculture*).

- The potential for cellulosic biofuels brings even greater promise for reduced water consumption – it is anticipated that cellulosic ethanol will demand less water during the production process, and dedicated energy crops will require less irrigation for growth.

MINNESOTA DEPARTMENT OF AGRICULTURE

Rumor: Ethanol's economic benefit for local communities has been overstated.

Reality: At the 670 million gallon production level in 2007, Minnesota's ethanol industry generated an estimated $2.27 billion in total economic impacts and over 4,000 jobs. (*Source: Minnesota Department of Agriculture*).[1]

- Many of the jobs created in Minnesota are located in rural areas, where the state's ethanol plants are located.

- Nationwide, the 2008 ethanol industry supported more than 240,000 jobs. This economic activity helped boost U.S. household income by $20 billion *(Source: Renewable Fuels Association)*.

Rumor: Increased ethanol production is driving global land use changes such as deforestation in the Amazon.

Reality: Gains in crop productivity have mitigated the need to expand agricultural land use.

- Thanks to improved technology and increasing corn yields, more bushels of corn can be harvested from fewer acres of land today than ever before. In 2008, U.S farmers harvested about 20 percent fewer acres of corn and produced a crop that was five times larger than in 1932 (*Source: U.S. Department of Agriculture*).

- As a result, the U.S. can meet federal requirements for 15 billion gallons of corn ethanol by 2015 without harvesting additional acres of corn. In 2007, the U.S. harvested about 85 million acres of corn at a yield of 160 bushels per acre, devoted approximately 25 percent of the crop to ethanol, and produced about 2.8 gallons of ethanol per bushel of corn to produce more than 9 billion gallons of ethanol. In 2015, corn yields are expected to reach about 180 bushels per acre and ethanol conversion rates will rise to about 3 gallons per acre, allowing the U.S. to produce 15 billion gallons of corn ethanol from the same 85 million acres of corn.

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[1] Minnesota estimates are derived with the use of a University of Minnesota input-output economic assessment system called IMPLAN that includes direct, indirect and induced economic and job impact from industry on the state's economy.

MINNESOTA DEPARTMENT OF AGRICULTURE

- In 2007 and 2008, the U.S. ethanol industry met its grain requirements with less than 1 percent of major world cropland (on a gross basis). Recent economic projections suggest that, even as ethanol production increases to the 15 billion gallons required to meet federal requirements in 2015, the amount of land needed to support production will continue to be less than 1 percent of world cropland *(Source: Informa Economics)*. Moreover, cellulosic ethanol and other advanced biofuels are expected to have even higher yields per acre than corn and perennial crops can be grown on more marginal lands with less impact on the environment.

- Recent studies out of the U.N. Food and Agriculture Organization and Stanford University have identified significant amounts of unused and abandoned agricultural lands that could be brought into production—without changing any current global land use patterns (*Source: Renewable Fuels Association*). Moreover, in 2005 the U.S. Departments of Energy and Agriculture found that the U.S. can grow adequate biomass feedstocks to displace approximately 30 percent of current gasoline consumption by 2030 on a sustainable basis with only modest changes in land use.

- The majority of land clearing in the Amazonian rainforest is attributable to timber and livestock production. For instance, 50 percent of arable land in Brazil goes to cattle grazing while just 1 percent of Brazil's arable land is used for ethanol (which replaces 50 percent of the country's gasoline consumption). Moreover, the production of sugarcane for ethanol in Brazil occurs far from protected rainforest areas (Source: UNICA).

- The recent debate on ethanol's impact on indirect land use has failed to acknowledge the impact of petroleum products on land use. Petroleum extraction has been linked to the clearing of forests and other protected areas in various regions across the world including Nigeria, Canada and Ecuador.