Food versus Fuel in the United States

Can Both Win in the Era of Ethanol?

EXECUTIVE SUMMARY

Ethanol production has had a profound impact on U.S. agriculture in recent years. Now that more than two billion bushels of U.S. corn are used for ethanol production, a legitimate question is continually being asked—are people going hungry due to the seemingly insatiable U.S. demand for fuel?

U.S. biofuel production will not likely result in more global hunger. First, a negligible volume of U.S. corn is exported to undernourished populations. Second, while a rise in the price of corn and other agricultural commodities can adversely impact food prices, it also provides more opportunity for subsistence farmers around the world that have been devastated by depressed global commodity prices. Third, many of the issues of hunger and poverty that are attributed to biofuels are more appropriately linked to structural problems of corporate concentration and inequalities in agricultural trading systems.

To assure that U.S.-based biofuels do not aggravate hunger, they should first be produced in a sustainable manner that enhances the health of soil and water resources on which future agricultural production will depend. Second, we must ensure this huge market force is managed to provide farmers with fair prices for their crops and that the emerging global trading system for biofuels supports local economies and local food sovereignty.

While well-managed U.S. biofuels production could potentially improve international food security, the same conclusion cannot be extrapolated to biofuels production in other parts of the world. There are serious concerns about the impacts of biofuels production in countries that are facing high levels of food insecurity, and the demand for biofuels from wealthy countries could impair food production in these countries.

Biofuels provide an opportunity to promote production practices that reduce agriculture's reliance on fossil fuels, to improve the quality of our soil and water resources, and to maintain well-functioning agricultural markets in the U.S. and throughout the world. But these societal goals are not likely to be achieved unless these issues are explicitly addressed in the crafting of biofuels policies and incentives. If appropriate policies are crafted, renewable fuels production can play a role in achieving these goals.

Written by Mark Muller, Tammy Yelden and Heather Schoonover, IATP Environment and Agriculture Program

Institute for Agriculture and Trade Policy

2105 First Avenue South | Minneapolis, Minnesota 55404 | USA | (612) 870-0453 | iatp.org

INTRODUCTION

Midwest ethanol production has given the issue of domestic food availability more prominence than it has received in decades. The fact that the United States loses two acres of agricultural land to development every minute,[1] and that millions of acres of productive farmland are at risk because of soil loss, salinization, and loss of water resources, has not generated significant public concern. The substantial growth in the use of corn for non-food or -feed purposes, however, has drawn considerable scrutiny.

The relationship between biofuels and access to food is complicated and part of larger agricultural and trade systems. As the biofuels market develops around the world, important concerns about access to food become much more acute. This paper focuses specifically on the impact of biofuels production in the U.S. on food availability—both in the U.S. and in other countries.

Corn-based ethanol production has attracted so much attention and criticism because it raises important ethical issues. How can we use corn to meet the ever-increasing demand for liquid fuel, for example, when this corn could be used to feed undernourished people, either in the United States or other parts of the world? And if the production of corn for ethanol is not done sustainably—and therefore reduces the long-term productive capacity of the land—how can we justify risking the future food security of our growing global population?

At first glance, shifting corn usage from food and animal feed to fuel for gas-guzzling automobiles looks like a step backwards for combating hunger. But the "food versus fuel" debate needs to be placed in a larger context. First, we need to consider how U.S. corn is actually used. Domestic corn production provides a negligible contribution to the diet of hungry people. Furthermore, a chronic oversupply of corn for the past ten years has resulted in below-cost prices for corn farmers in the U.S. and throughout the world. This has reduced the income of farmers globally and wreaked havoc on rural communities worldwide.

In an environmental context, while intensive corn production has numerous negative environmental impacts, the next generation of biofuels holds promise for deriving fuel from sustainably produced, perennial crops. Rather than exacerbate food security and environmental concerns, well-crafted biofuel policies could diversify the U.S. landscape and increase environmental benefits.

In the context of expanding renewable energy use in the U.S., corn-based ethanol and other biofuels such as soybean-based biodiesel will never displace fossil fuels by themselves. A recent paper from the National Academies of Sciences found that devoting all of 2005 U.S. corn and soybean production to ethanol and biodiesel would have offset just 12 percent of U.S. gasoline demand and 6 percent of U.S. diesel demand, respectively.[2] Obviously, the U.S. is not going to "grow" itself off of its petroleum dependence. Simply developing more fuel-efficient automobiles is also not sufficient for addressing the enormity of the issue. Solutions to climate change and petroleum dependency require both energy conservation and long-term investments in national infrastructure that will develop energy-efficient transportation, food production, and urban design sectors. Sustainable biofuel production is simply part of the mix that can contribute to these necessary shifts.

The outcomes that result from the growth in biofuel production, whether positive or negative, are only partly attributable to biofuels. The more important drivers are the agricultural, trade, and environmental policies that provide the framework into which the biofuels industry is developing. U.S. agricultural policies at one time assured citizens of a plentiful food supply—and assured farmers of a fair price—by managing supplies. But those policies have largely been abandoned in favor of free trade orthodoxy.

The ethanol boom and resulting "food versus fuel" concerns provide an opportunity to consider these larger contexts and critically examine our food and farming systems—particularly where and how they fail to provide food to those who need it most. These concerns may also provide the impetus we need to shift toward more diversified agricultural systems that really can combat hunger and poverty, while also protecting the environment to ensure we can meet the food needs of future generations.

To assure that biofuels do not aggravate hunger, we have identified two key issues. First, biofuels should be produced in a sustainable manner that enhances the health of soil and water resources that future agricultural production will depend on. As the world population grows and the supply of petroleum declines, agriculture will be relied on for more production. Second, biofuel production will only benefit farmers and consumers both in the U.S. and abroad if farmers receive fair prices for their crops, and if global trading systems support local economies and local food sovereignty. It is important to consider not only the use of agricultural commodities to make biofuels, but the systems within which this new industry is developed.

STATE OF THE U.S. ETHANOL INDUSTRY

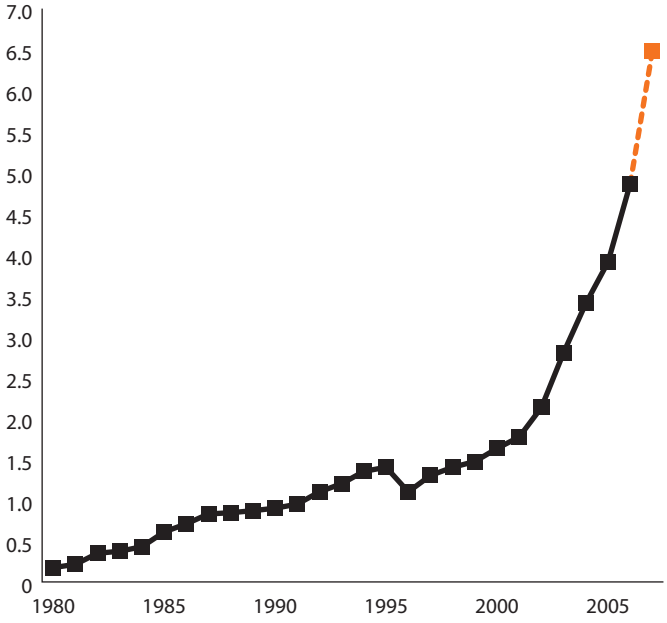
The economic viability of ethanol production in the Corn Belt has increased for a variety of reasons, including higher petroleum prices, government support for the emerging ethanol industry, environmental concerns with ethanol's primary competing fuel oxygenate (MTBE), and policy initiatives promoting domestic and renewable fuel sources. Almost 20 percent of the U.S. corn crop is currently used for ethanol—compared to less than five percent 10 years ago.[3]

In the U.S., ethanol is currently made almost entirely from corn. Estimates of corn ethanol's net energy efficiency vary, but a compilation of studies demonstrates that corn ethanol has a positive energy balance, and that this energy balance has been improving over time.[4] Part of the reason for the improved energy efficiency over the past three decades is that corn farmers have made substantial yield gains without a significant increase in chemical inputs. Another factor has been the development of markets for ethanol's co-products, in particular distillers

dried grains with solubles (DDGS). DDGS have become an important high-protein animal feed, particularly for cattle. As markets are developed for these co-products, the energy cost of producing ethanol and its feedstock is distributed over more products, improving overall energy efficiency.

The Energy Policy Act of 2005 included a 7.5 billion gallon renewable fuels standard to be attained by 2012. This policy has helped spur the large expansion in ethanol production across the United States. As of June 1, 2007, the U.S. ethanol industry had 120 active plants with a capacity of more than six billion gallons of ethanol per year.[5] An additional 6.4 billion gallons of capacity currently under construction will bring total U.S. ethanol capacity to more than 12 billion gallons—surpassing the Renewable Fuels Standard requirements far ahead of schedule. The Food and Agricultural Research Institute (FAPRI) predicts that nearly one-third (32 percent) of the U.S. corn crop will be used for ethanol in 2009.[6]

HISTORIC U.S. ETHANOL PRODUCTION (IN BILLIONS OF GALLONS)

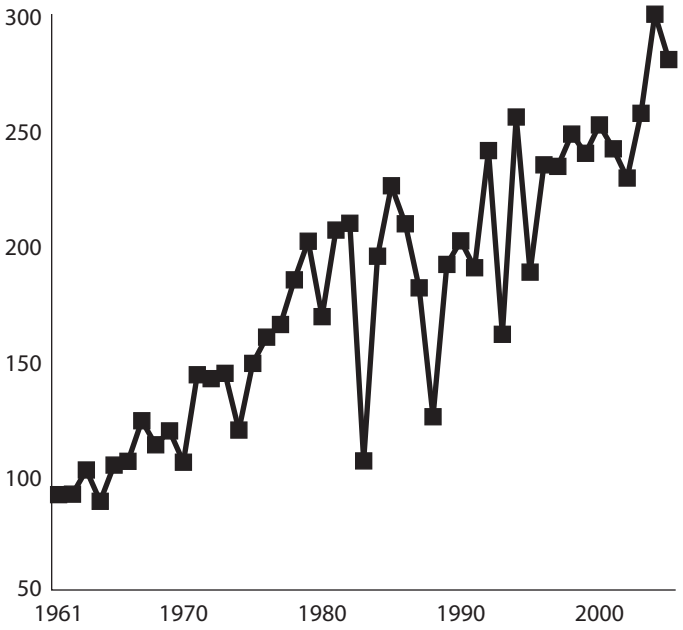


Source: Data from Renewable Fuels Association. 2007 data includes production as of August 1, 2007

THE PREVALENCE OF CORN

The tremendous soils, ample precipitation, and moderate weather in the U.S. Midwest provide ideal growing conditions for corn and soybeans, the two crops that dominate Midwest agriculture. Thanks to these environmental conditions, as well as federal policies and research, U.S. corn and soy production have increased steadily over the past 40 years. Not surprisingly, these crops have become prevalent in both our food and our fuel. While soy-based biodiesel production is increasing, it is still very small compared to corn-based ethanol. And because it is corn-based ethanol that is at the heart of the U.S. food vs. fuel debate, this paper is focused primarily on corn.

U.S. CORN PRODUCTION (IN MILLIONS OF METRIC TONS)



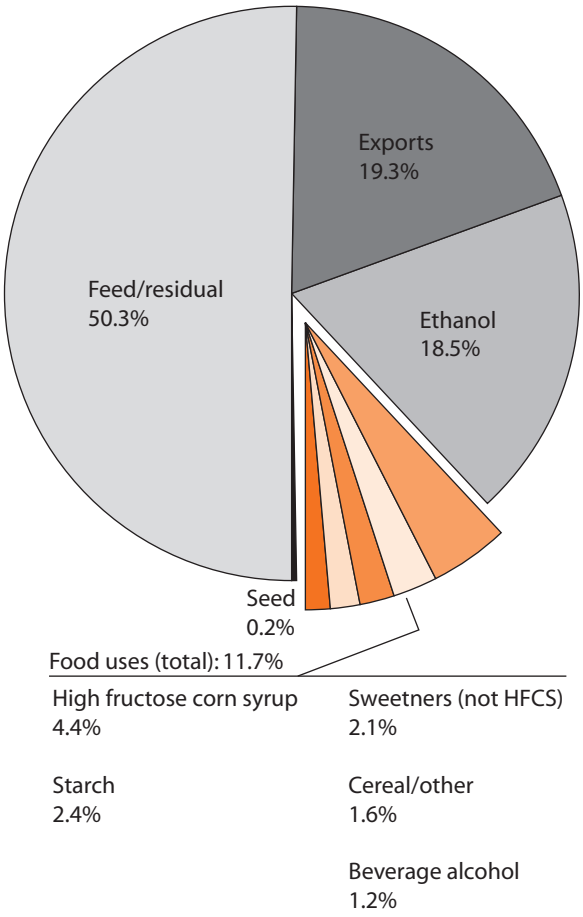
Source: Data from FAO Stat

Whether we know it or not, corn has become a staple in the diet of most Americans. Over the past 30 years there has been a significant shift away from livestock raised on pasture to livestock raised primarily on corn and soybeans. With the low prices of corn and soybeans, it has become more economical for animals to be raised in confinement rather than on pasture. Even the dairy industry is shifting to large confinement facilities. About half of U.S. corn is used as animal feed.

Refining corn allows the commodity to be used in a variety of different ways, ranging from sweetener in soda to an additive in animal feed. Corn products are now used in a variety of industrial foods, such as dextrose in jams and jellies; corn oil as an edible oil; gluten in animal feed; and high fructose corn syrup (HFCS) as an added sweetener in everything from soda to frozen products to salad dressings. The large supply and low cost of corn has driven the proliferation of these corn-based products.

Exports consume about 19 percent of the corn crop, but that percentage has been declining over the past 25 years as other countries have captured many of the emerging markets. International concerns about the widespread use of genetically modified corn varieties in the United States have also limited export opportunities.[7] The increasing domestic use of corn for ethanol production will likely perpetuate the already stagnant level of corn exports.[8]

U.S. CORN USAGE 2006



Source: USDA Feed Grains Database

DOES INCREASED U.S. CORN ETHANOL INCREASE HUNGER ABROAD?

The most compelling argument against using U.S. corn for ethanol is if that corn would otherwise provide nutrition to the hungry. Indeed, underlying much of the food versus fuel debate seems to be a perception that the U.S. exports a large quantity of corn to countries where hunger is prevalent. An analysis of data from the Food and Agriculture Organization of the United Nations (FAO), however, demonstrates that U.S. corn does not feed the hungry of the world. The ten countries with the highest percentage of undernourished people receive less than one-hundredth of one percent (.01 percent) of U.S. corn exports. The 24 countries in which at least a third of the population is undernourished receive less than 0.1 percent. In contrast, 55 percent of U.S. corn exports are directed to other wealthy countries in the OECD (Organization for Economic Cooperation and Development). Japan imported 33 percent of U.S. corn exports in 2005.[9] As would be expected, U.S. corn exports are traded to countries that have the ability to buy them.

PERCENTAGE OF CORN EXPORTS TO TEN MOST UNDERNOURISHED COUNTRIES

	Undernourished population (%)	U.S. corn exports received (%)
Eritrea	75	0.0
Dem. Rep. of Congo	74	0.0
Burundi	66	0.006
Comoros	60	0.0
Tajikistan	56	0.0
Sierra Leone	51	0.0
Liberia	50	0.0004
Zimbabwe	47	0.0
Ethiopia	46	0.0
Haiti	46	0.0
Zambia	46	0.0
Total percentage of U.S. corn exports		**0.0064**

Ethanol production has also raised concerns about U.S. food aid—namely that rising commodity prices due to ethanol demand will decrease the quantities of food aid delivered by the U.S.[10] But recent declines in food aid deliveries are in part the result of bigger problems with the U.S. Food Aid program. Rather than contributing cash that can be used by recipient countries to purchase food from nearby sources and thereby stimulate agricultural production in hunger-prone regions, the U.S. requires that the majority of its food aid be in the form of food produced and processed in the U.S. itself. A recent report from the U.S. Government Accountability Office (GAO) found that nearly two-thirds (65 percent) of U.S. food aid expenditures are spent on transportation and business costs—not food—and that increases in these costs have contributed to the declines in food aid shipments.[11]

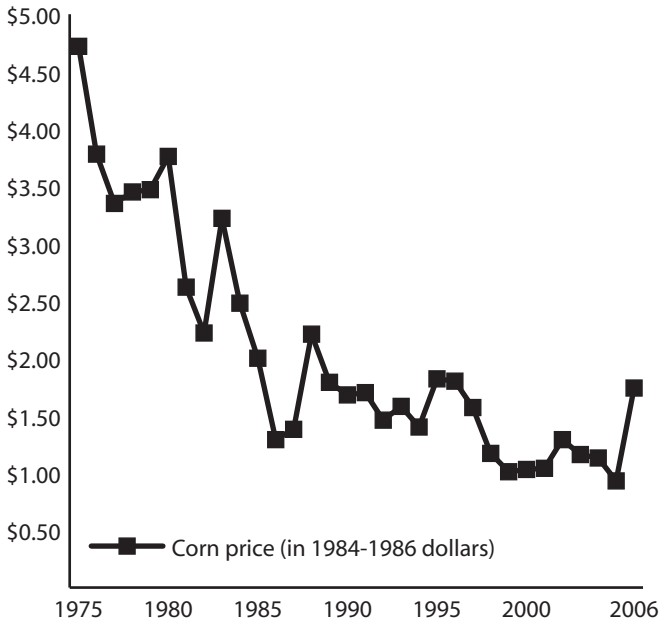
Food aid

Most countries that provide food aid donate cash with which recipient countries can purchase food from local or nearby sources. Food purchased from local sources not only reduces or eliminates shipping costs and transportation times, but can also stimulate much-needed agricultural production and economic activity in hunger-prone regions.[12] The U.S., on the other hand, requires that at least 75 percent of its food aid be procured, processed, bagged and shipped in and from the U.S., by U.S. firms. An OECD study found that in-kind food aid such as that from the U.S. is at least 30 percent more costly per metric ton than food aid purchased by the recipient countries through cash donations.[13] The U.S. also is one of only two countries that sells some of its food aid—a practice known as monetization— another practice that can undermine local farmers and food production in other countries.[14] The U.S. Food Aid program has been widely criticized for both of these practices.

THE PRICE ISSUE: WORLD MARKETS

Although the increased use of corn for fuel in the U.S. will likely not directly impact the availability of food in the most undernourished nations of the world, it can still alter global markets. Increased demand for ethanol has raised the price of corn, and is inducing farmers to plant more acreage in corn at the expense of other commodities such as soybeans and wheat. The decreased production of these commodities will likely raise global prices for these crops also. But if looked at historically, the current price of U.S. corn is not even close in real dollars to the price in the 1970s.[15] What we are seeing is not so much high corn prices as a return to fair corn prices that provide farmers with an adequate income without government subsidies.

THE REAL PRICE OF CORN 1975-2006 (IN 1984–86 DOLLARS)



Source: USDA Economic Research Service.

Higher commodity prices do not necessarily translate into higher food prices in developing countries. In fact, higher commodity prices could actually increase food security in developing countries by reducing agricultural dumping. The dumping of agricultural products—the selling of products below their cost of production—is perhaps the most damaging of all current market distortions in world trade. Developing country agriculture, vital for food security, rural livelihoods, poverty reduction and generating foreign exchange, is crippled by the competition from major commodities dumped onto world markets. In 2003, U.S. corn was exported (dumped) at an average price of 10 percent below the full cost of production.[16]

Agricultural dumping

The structural price depression associated with selling food products below their cost of production has two major effects on developing country farmers who raise competing products. First, below-cost imports drive developing country farmers out of their local markets. If the farmers do not have access to a safety net of tariffs or subsidies and/or credit—which in most poor countries they do not—the underpriced competition can drive them out of business. When this happens, the local farm economy shrinks, in turn shrinking the rural economy as a whole and sending rural people into trade-related migration. Second, developing country farmers who sell their products to exporters find their global market share undermined by a depressed global price. The cascading effects of dumping are felt around the world.

Of course, an increase in corn and other commodity prices does raise some concerns. Many of the urban poor in developing countries spend 50 percent or more of their income on food. Any price increase for food is likely to result in increased hunger and malnutrition. The price of agricultural commodities is a component of the cost of food. The rising price of tortillas in Mexico is one example of the effect of increased commodity prices on food prices—although this, too, is a result of forces larger than ethanol alone (see box).

The Mexican tortilla crisis

The increased price of tortillas in Mexico is often cited as an example of the impact of ethanol on food prices. But this, too, needs to be placed in a larger context. Why is the price of Mexican tortillas dependent on U.S. corn prices? The tortilla crisis likely could not have happened without the North American Free Trade Agreement (NAFTA) opening the Mexican market to a flood of cheap U.S. corn imports, undermining Mexico's domestic corn sector and forcing many Mexican farmers off their land. Since NAFTA took effect in 1994, the price Mexican corn farmers receive for their crops has fallen by half[17] and an estimated two million agricultural jobs have been lost,[18] while U.S. corn exports to Mexico have increased 240 percent.[19] One of the positive impacts of the rising price of corn is that it has resulted in better prices for Mexican farmers and greater corn production.[20]

Despite the cheap corn, increasing industrialization and concentration in the tortilla industry have contributed to a rise in tortilla prices. Whereas Mexican tortillas were traditionally made from fresh corn by many small millers, the majority of Mexican tortillas are now industrially produced from corn flour.[21] Two companies control 90 percent of Mexican corn flour production, with one of those companies—GRUMA—controlling 70 percent of the corn flour market. U.S.-based agribusiness giant ADM—the U.S.'s largest producer of ethanol[22]—owns a 27 percent share in GRUMA.[23]

Higher commodity prices may result in higher international food prices in the short term. And short-term food needs must be addressed immediately with safety nets and other policies. But in the longer term, higher prices could benefit developing country agriculture, allowing farmers to receive fair prices for their crops, raising farm incomes and generating economic activity in these countries.

Any policies that could exacerbate problems with food access in developing countries are a cause for concern. The evidence is clear, however, that the current distortions in global markets due to the dumping of cheap commodities are particularly damaging to the poor in developing countries. Longer-term food needs require real food security, and this likely cannot result without changes in U.S. farm and trade policies that currently undermine the ability of many farmers around the world to produce food for themselves.

THE PRICE ISSUE: DOMESTIC MARKETS

From a U.S. perspective, ethanol production has generated concerns about rising household grocery bills. The USDA predicts that U.S. food prices will rise 2.5-3.5 percent this year,[24] and many point to ethanol as the reason for this increase. But this, too, needs to be put into context.

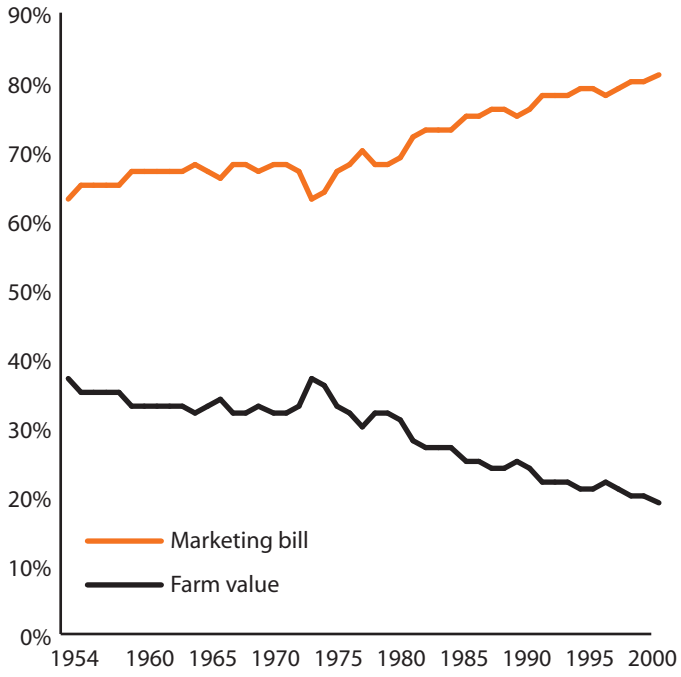
How much retail food prices might rise with increasing commodity prices depends on what portion of the retail food price is accounted for by commodity inputs—also known as the "farm value." For many food products this is very small; in a box of corn flakes, for example, the farm value is only four percent of the retail price.[25] The rest of the price is accounted for by the "marketing bill," which includes transportation, marketing, processing, packaging, retailing, etc.—the costs of which have risen as well.

In the U.S. food supply overall, the farm value has been declining while the marketing bill has continued to increase. The farm value now stands at an average of only 19 percent; in other words, for every dollar spent on food, an average of 81 cents goes toward non-food components. Thus, a 50 percent increase in the price of corn does not translate into a fifty percent increase in the price of food. Instead, a 50 percent increase in the cost of corn would raise the price of a box of Corn Flakes only two percent—just a few pennies. For most food products, the marketing bill contributes much more to the retail price than the commodity inputs. Any discussion about higher retail food prices, therefore, needs to consider increases in the marketing bill as well.

Of course, several commodity prices impact the price of food, most notably petroleum. A recent study contends that rising energy prices have much more of an impact on food price inflation than corn prices.[26]

Regardless of ethanol production, some increase in food prices should be expected. The USDA has predicted a 2.5-3.5 percent price increase for 2007, which is actually smaller than food inflation in recent years. Food prices have risen an average of 2.5 percent per year during this decade, compared to an average of 4.6 percent during the 1980s.[27] It is also important to compare the cost of food to the cost of other expenditures; the projected increase in food prices is roughly equal to the increase in the price of housing (3.4 percent) and less than that of either energy (4.4 percent) or medical care (4.0 percent) between March 2006 and March 2007.[28] Americans still spend an average of only 10 percent of their disposable income of food—less than any other country in the world.[29]

FARM VALUE VS. MARKETING BILL, PERCENTAGE OF THE FOOD DOLLAR



Source: USDA ERS Briefing Room: Food Marketing and Price Spreads: USDA Marketing Bill.

Ethanol and healthy food

When talking about food vs. fuel, it is important to consider what exactly is meant by "food." The fact that corn prices are generating concerns about food prices points to the prevalence of corn in our food system. But the prevalence of corn in our food system should itself raise some important questions—particularly with respect to health. For example, in addition to health risks posed by confinement production itself,[30] grain-fed livestock and dairy have been shown to be less nutritious than their pasture-raised counterparts.[31] Similarly, the majority of corn used for "food uses" in 2006 was in the form of sweeteners, starch and beverage alcohol; only 1.6 percent of U.S. corn went toward cereal products.[32]

Public health concerns about obesity, diabetes and other diet-related diseases have been linked to the prevalence of cheap corn, which provides an indirect incentive for food companies to find ways to use corn in everything from ketchup to Big Macs. To the extent that higher corn prices might shift some livestock and dairy production back onto pasture or lead to fewer added sweeteners or processed food products, ethanol production could actually be a positive influence on our food system and our diets.

Ethanol, livestock and meat prices

Large confinement poultry and livestock producers have been at the forefront of those voicing concerns about increasing commodity prices and warning that consumer meat prices will need to rise to cover the increased feed costs.[33] But in light of these assertions, it is important to consider how much these large producers have unfairly benefited from cheap feed in the past.

A recent study from Tufts University's Global Development and Environment Institute found that the broiler chicken industry saved an estimated total of $11.25 billion between 1997 and 2005 by purchasing feed at prices an average of 21 percent below the cost of production. Similarly, the hog industry saved an estimated $8.5 billion with feed prices 26 percent below production costs.[34] Both of these industries were able to reduce overall operating costs by an estimated 13 percent by purchasing under-priced feed.

Tyson Foods Inc., the U.S.'s largest meat producer, has been one of the most vocal about both higher feed costs and the resulting risk of higher consumer meat prices.[35] Yet Tyson alone saved $2.59 billion between 1997 and 2005 due to below-cost feed.[36] As of July 2007, Tyson's shares were trading near an all-time high.[37]

Diversified livestock producers who raise their animals on pasture or who grow their own feed do not enjoy the indirect subsidy of below-cost feed. If higher commodity prices help ensure that integrated livestock producers pay a fair price for their feed, they will also help level the playing field for more diversified, healthier, sustainable livestock production.

WILL CORN PRICES REMAIN HIGH?

When talking about the impacts of higher commodity prices, it is also important to consider that there is no guarantee the current record-high corn prices will continue into the future. The high prices and increasing demand for corn are driving increases in corn plantings, which could drive prices back down as supplies increase to meet demand. The USDA is predicting a 15 percent increase in corn plantings for 2007 over 2006, to 90.5 million acres—the largest area in corn since 1944.[38] And as the ethanol industry moves toward cellulosic feedstocks, less corn will be needed for fuel production.

Also, agricultural commodity markets tend to correct much more quickly for unusually high prices than they do for excessively low prices. U.S. corn demand can diminish quickly when livestock producers, for example, shift to alternative feed sources or procure crops from other parts of the world. Farmers, on the other hand, make planting decisions several months in

advance of harvest, and have little ability to expand or contract production based on prices. The high fixed costs in agricultural production, particularly of land, generally make it economically advantageous to farm even when prices are low.

Rapid commodity price fluctuations present serious challenges to farmers as well as food processors. Depressed prices obviously are a problem for farmers, but temporary price spikes also create issues because high crop prices inevitably lead to higher prices for land, seed and chemicals. Price fluctuations also present a challenge to smaller food industry companies that do not have the global reach to purchase crops from other parts of the world, or the storage capacity to maintain their own crop reserves. An effective supply management system, which until the recent past was a cornerstone of U.S. agricultural policy, could help moderate market distortions that adversely impact farmers and the food system.

THE CHALLENGE OF GLOBAL BIOFUEL PRODUCTION

While this paper focuses primarily on the impacts of U.S. corn production for ethanol—the main focus of the current U.S. food vs. fuel debate—it is also important to consider the broader impacts of biofuels production in other parts of the world. For example, in countries such as Malaysia, land from food crops is rapidly being converted to palm tree plantations to produce palm oil for the European biodiesel market.[39] In addition, many are touting biofuels as an important opportunity for economic growth in developing countries, even countries that are currently facing high levels of food insecurity.

At the global level, patterns of biofuel production and trade demonstrate the problems created by gross inequities in wealth: millions of consumers in the United States and Europe can spend much more on calories for their automobile tanks than billions of people can spend on calories to nourish their families. This is not to say that less developed countries are not in a position to benefit from biofuel production, particularly for local consumption. But just as the distortions in the U.S. agricultural economy contribute to the dumping of commodities on less developed countries, biofuel demand from wealthy countries can also create serious global market distortions. The incredible discrepancies in wealth between countries dictate a need for global trade rules that prioritize global food security. As biofuel production rapidly becomes globalized, significant study is needed for developing and implementing federal and international policies that protect food sovereignty.

ASSURING FUTURE FOOD PRODUCTION

It is unclear what effect the burgeoning demand for ethanol will have on long-term U.S. capacity to produce food. The immediate impact of ethanol growth appears to be more acreage planted in corn, and much of that land farmed more intensively and with shorter crop rotations than at present. But the associated negative soil and water impacts of large-scale, industrial corn production are well known and are not sustainable.

Ethanol and water use

An immediate natural resource concern that ethanol production has raised is water usage. According to the Minnesota Department of Natural Resources, ethanol plants report a wide range of water use, with most plants ranging from 3.5 to 6.0 gallons of water consumed per gallon of ethanol produced.[40] This large, new consumption of water, combined with a potential increase in crop irrigation to meet the feedstock demand of these ethanol plants, creates a particular concern in the Great Plains region that has limited water resources. Greater water efficiency must be a priority for the renewable fuels industry.

Cellulosic-based renewable fuels derived from perennials, on the other hand, hold considerable promise for increasing environmental benefits. Perennial crops would help to diversify the landscape, shifting some land away from annual row crops and their associated environmental impacts. Many perennial crops can also be grown on less desirable ground that is generally not used for corn. Additionally, grain farmers could incorporate perennials into their rotation, which would strengthen the soil for future food production. But perennial crops must be grown sustainably; monocultures of perennials such as switchgrass are not the solution to monocultures of corn and soybeans.

Federal agricultural and energy policies have an important role to play in pushing for a more sustainable U.S. renewable fuel industry. Given the tremendous growth in ethanol production in recent years, this is an appropriate juncture to consider if and how these policies should be modified. To date, policies have focused on carving out a market for biofuel based on corn. Now that the market has established itself, policymakers should focus on emphasizing more sustainable ethanol production that assures the long-term productive capacity of agriculture to meet future demands.

CONCLUSIONS

The growth in ethanol production has had a profound impact on U.S. agriculture in recent years. The explosion in ethanol demand has raised a number of important concerns, including how the United States uses agricultural land, what energy and chemical inputs are used in corn production, how agricultural commodities are used, and how commodity prices impact food prices and food security both in the U.S. and around the world.

Some of the concerns raised in the food versus fuel debate are legitimate, but they are in part the result of much bigger issues with our food, farm and trade systems than simply ethanol production. From this perspective, the food versus fuel debate provides an opportunity to critically examine our food, farm and trade systems and to think about how to shift those systems so that they really do combat hunger and poverty while ensuring the availability of food for both present and future generations.

Hunger and poverty have existed long before the biofuels boom, and simply tweaking or curtailing biofuel production will do little to address their underlying causes. If we are serious about addressing hunger and poverty, we must also address the larger, structural issues that underlie our food and farm systems. The most important aspect of the food and fuel debate should be whether an agricultural system develops that truly increases food security—both in the present and for future generations—for people around the world.

By no means does renewable fuel production provide a solution to the unsustainable use of fossil fuels in the U.S. Nor does it solve the agricultural commodity market distortions that can have devastating effects on developing countries and world hunger. Renewable fuels, however, are a tool that could help shift U.S. food and energy systems toward greater sustainability and drive the development of more diversified agricultural systems that would benefit farmers, communities, public health and the environment alike.

From a food security perspective, the most important policy goals should be for everyone to have access to healthy food, to promote agricultural production practices that reduce agriculture's reliance on fossil fuels, to improve the quality of our soil and water resources, and to maintain well-functioning agricultural markets in the U.S. and throughout the world. If appropriate policies are crafted, renewable fuels production can play a role in achieving these goals.

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