FarmEcon LLC
A source of information on global farming and food systems
Thomas E. Elam, PhD
President

FarmEcon LLC
3825 Constitution Dr.
Carmel, IN 46032
317-873-9949
thomaselam@farmecon.com
www.farmecon.com

Biofuel Support Policy Costs to the U.S. Economy

Date: March 24, 2008

For: The Coalition for Balanced Food and Fuel Policy

By: Dr. Thomas E. Elam
President, FarmEcon LLC

The information contained herein has been taken from trade and statistical services and other sources believed to be reliable. FarmEcon LLC makes no warranty, express or implied, that such information is accurate or complete and it should not be relied upon as such. This study involves assumptions about the state of markets which are highly volatile. While every effort has been made to portray the future state of these markets as accurately as possible the results of the study rest on the accuracy of the underlying assumptions. The numerical analysis is based on market conditions as of February, 2008. Conditions in energy and food markets are in a state of rapid flux, but the cost differences caused by U.S. Federal biofuels policy should persist despite increasing or decreasing energy prices.

This study was made possible in part by funding from the National Chicken Council, the National Turkey Federation and the American Meat Institute.

Biofuel Support Policy Costs to the U.S. Economy

Executive Summary: The U.S. government has a long history of aiding the biofuel industry. In 1978 the first federal financial supports for use of ethanol blended with gasoline were set at a fixed $0.40 per gallon payment for 1 gallon of ethanol added to 9 gallons of gasoline to make "gasohol"[1], now known as "E10". Subsequent programs changed support levels and added usage mandates, but we have had continuous Federal financial support of biofuels for over 30 years.

Current Federal law pays a fixed minimum of $0.51 per gallon for all ethanol blended with gasoline. Payments go to petroleum blenders in the form of a tax rebate. The recently enacted Energy Independence and Security Act of 2007 also mandated 9 billion gallons of renewable food-based biofuel use in 2008 and 15 billion gallons by 2015. There is also additional Federal support for small ethanol producers[2], a $0.54 per gallon import duty on ethanol, and biodiesel tax credits. Additional Federal mandates for biofuels raise the total mandate to 36 billion gallons in 2022. State and local programs for both fuel ethanol and biodiesel also add to the financial support for biofuels. This paper will focus on the effects of the Federal biofuels program for corn-based ethanol and soyoil-based biodiesel.

Why have biofuel supports become a national concern after 30 years? When energy prices were lower than current levels Federal supports for biofuels had little impact on agricultural feedstock markets or food prices. Ethanol and biodiesel production was not viable enough, even with supports, to use enough corn or soybean oil to make significant differences in prices, production or supplies of crops available for food production. However, over the last three years that situation has changed.

Prices of crude oil, and thus gasoline and diesel, have more than doubled since 2003. Even without Federal policy support biofuels would be playing an increasing role in the demand for feedstocks, mainly corn and soybeans. That is, the energy value of crops used for biofuel production is now higher than their historical food-based prices prior to the run-up in energy prices. Even in the absence of Federal policy support biofuel production would be growing, and crop prices would be higher than in the past, due to the increased demand for biofuels.

Federal support policy has significantly increased the attractiveness of ethanol and biodiesel production to levels well beyond that furnished by market forces alone. U.S. energy policy is now having major effects on crop demand, crop plantings, crop prices, food production costs and the long term availability of major U.S. grain and oilseed crops for food use and exports.

The feedstock demand and price-enhancing effects of Federal energy policy have been so extreme that feedstock prices have increased to the point where biofuels

[1] Energy Tax Act of 1978
[2] An additional $0.10 per gallon is given to producers who sell less than 60 million gallons per year.

profitability itself has been reduced significantly. An ethanol refinery model maintained by DTN[3] showed losses for much of early 2008. In 2006 and 2007, when corn prices were much lower, the model was showing significant profits. Biodiesel production from soy oil has become very unprofitable.

The effect of biofuel policy on biofuel costs and profitability is perhaps the greatest irony of our biofuels support policy. By dramatically increasing demand for limited supplies of feedstocks our Federal energy policy has increased the total cost of biofuel production well beyond what the free market alone would have allowed. Biofuel producers are not reaping most of the benefits of the program. Biofuels support payments have become windfall profits for grain and soybean producers.

As a result of Federal biofuels support cost increases for domestic users of the 2007 corn crop will be about $14.7 billion. Cost increases for domestic users the 2007 soybean crop will be about $8.5 billion. Those extra costs will rise sharply in the 2008/2009 crop year and beyond. Prices of other feed ingredients have also increased in tandem with corn and soybeans. While higher prices represent increased revenue for crop farmers, those revenues are costs to everyone else who uses corn or soybeans – including biofuels producers.

Introduction

Overview: Federal U.S. biofuels policy is designed to increase biofuels production to levels well beyond those that would result from the marketplace alone. However, ethanol and soyoil-based biodiesel, our two major biofuels, use corn and soybeans as their feedstocks. Corn and soybean production are both limited by available land resources. There simply is no significant reserve of fertile, productive, farm land in the U.S. (or in the world) that can be brought into production to satisfy major demand increases. Neither is there any government sponsored set-aside that could be released for production. Yields of both crops have trended up over time, but too slowly to have much short term impact on production. Therefore, if biofuel producers are to use significantly more food, some other U.S. user or overseas customer will need to use less.

Biofuel market value is derived from the underlying prices of petroleum-based fuels and federal tax credits. In the case of ethanol there are two major uses – additives replacement and gasoline replacement. Ethanol has a higher value as an additive replacer than it has for its energy content. Used to replace MTBE as an oxygenator, and as an octane enhancer, ethanol can be priced higher than if it is used simply to replace gasoline for its energy content.

Federal biofuel tax credits add to the market price of biofuels by refunding a fixed amount for every gallon blended with petroleum-based fuels. The refund is, in effect,

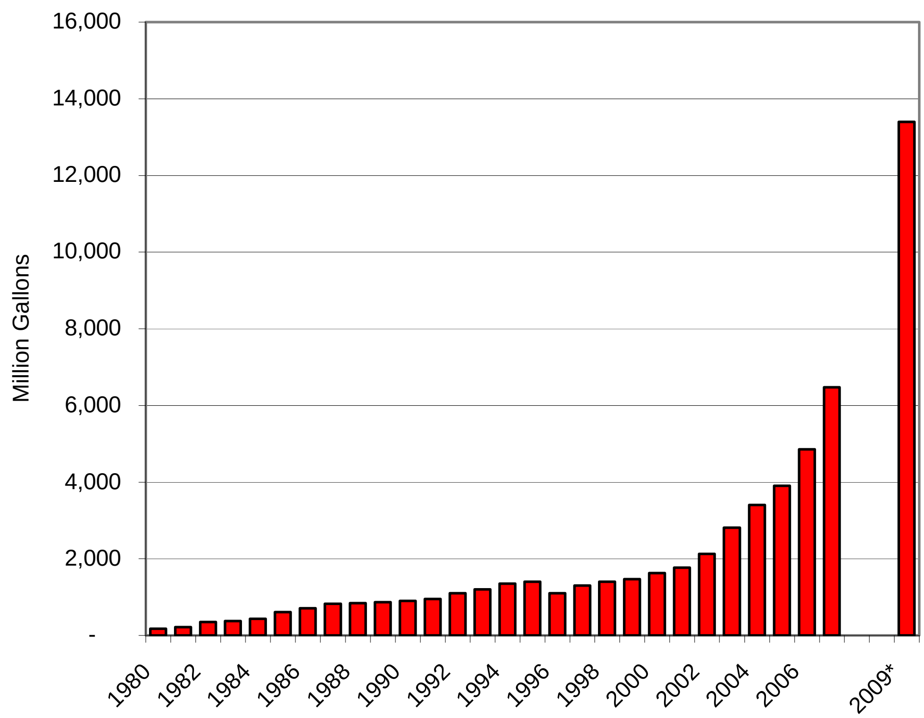
[3] http://www.dtnethanolcenter.com/index.cfm?show=10&mid=32

an amount above market value that can be paid by the blender. Biofuel tax credits drive a wedge between a biofuel's lower true market value and their apparent higher market price.

The high-value market for gasoline additives is limited to a small percent of overall gasoline use. As ethanol production has expanded in recent years the high value additive market has been saturated, and now ethanol is increasingly priced as a lower value gasoline replacement. Since ethanol has only about 66% of the net energy of gasoline fuel mileage declines as ethanol content in fuel blends increase. Therefore, ethanol's market price per gallon needs to be about 66% of that of gasoline to give equal cost per mile.

Until the 2004/2005[4] crop year the energy value of crops used for fuel production was so low that it was not profitable to use them for biofuel production without government support payments. Aided by federal support, limited amounts of corn were being made into ethanol for high value fuel additive use even prior to 2004 (Figure 1). Very little soyoil was being used for biodiesel prior to 2004. Even today, with substantial Federal supports, soy-based biodiesel is not an attractive investment.

Figure 1: U.S. Fuel Ethanol Production
(1980 to 2007 Actual, beginning of 2009 Projected Rated Capacity)*[5]



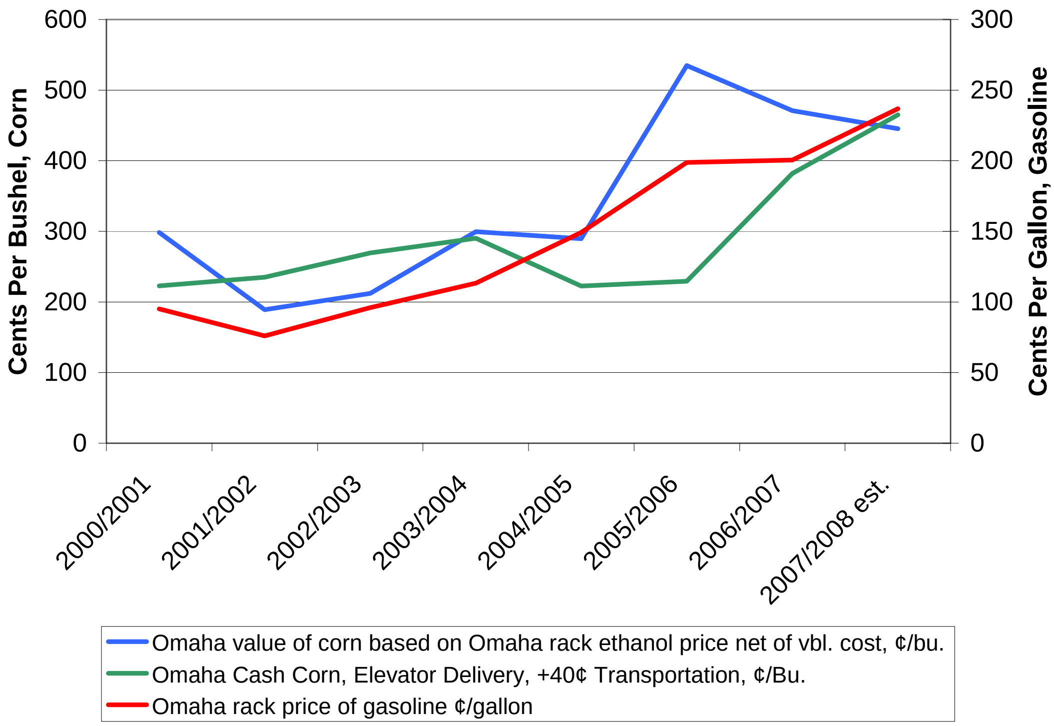
[4] Crop years start on September 1.
[5] Renewable Fuels Association. http://www.ethanolrfa.org/industry/locations/

Federal Ethanol Support Payments and the Gasoline Market: The rapid increase in ethanol production in 2004 and beyond is a result of a period of time when rapidly increasing gasoline prices coupled with fixed-value Federal support payments and mandated use made it extremely profitable to convert corn to ethanol.

Figure 2 shows the indirect effects of rising gasoline prices (red line) on the value of the corn used as an ethanol feedstock versus the actual corn price (green line). The value of corn was modeled based on a refinery paying for corn (at the price shown as the blue line), selling ethanol at the Omaha rack price, and recovering all production costs, including profits and overhead.

In Figure 2, when the blue line is above the green line corn is worth more as ethanol than the price of corn. In 2005/2006 corn was worth almost $3 per bushel more as ethanol than the corn was worth in the market. Clearly, this is a large incentive to add ethanol production capacity, thus the boom in ethanol production in Figure 1.

Figure 2: Corn Breakeven Value as Ethanol vs. Gasoline Price and Corn Price



The energy value discount (blue line below green line) for corn for ethanol prior to 2003 meant that ethanol had only a niche market. After 2004 rising gasoline prices made ethanol production attractive on the basis of its energy cost as a gasoline replacement, even without Federal biofuels supports.

Potential demand for corn as an energy replacement for gasoline is not a limiting factor. The available supply and cost of feedstocks limits the growth of biofuels production. Federal tax rebates can be viewed as funds used to lower the cost of feedstocks. By lowering the effect cost of biofuels producers are given an advantage in the market, and can expand production beyond the level that would happen in a free market. However, feedstock supplies are limiting, and eventually biofuel producers will bid up their prices until they can no longer afford to expand. Take away the tax rebates and the cost of feedstocks would have to fall as biofuel producers exit the business. In other words, without the tax rebates the cost of feedstocks, and the cost of biofuel production itself, would be lower than with them.

The increase in the blue line relative to the actual price of corn (green line) in Figure 2 coincides with very high profits for ethanol producers and the period of time when the U.S. ethanol plant construction boom started. The decline in the value of corn refined into ethanol in 2006/2007 and 2007/2008 (partially estimated) reflects a decline in ethanol prices to closer to its energy value as ethanol production has grown. In Figure 2 we can clearly see the convergence of the corn price and the value of corn to ethanol producers. This is the effect of expanding ethanol production on the corn price.

Comparing actual prices of gasoline and ethanol to the energy value of ethanol also shows the effects of the Federal support program on ethanol prices. To reflect the difference in BTUs per gallon, ethanol's energy value (Figure 3, light blue line) was calculated as 66% of the price of gasoline (dark blue line).

Figure 3: Ethanol Prices Relative to Gasoline and Ethanol Energy Value (Wholesale)

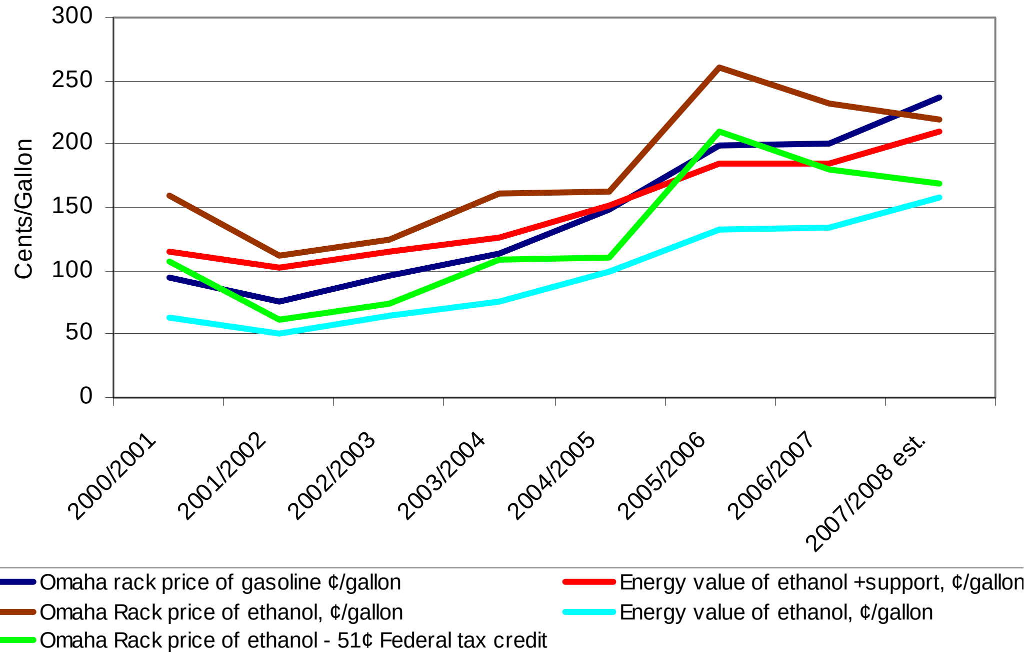


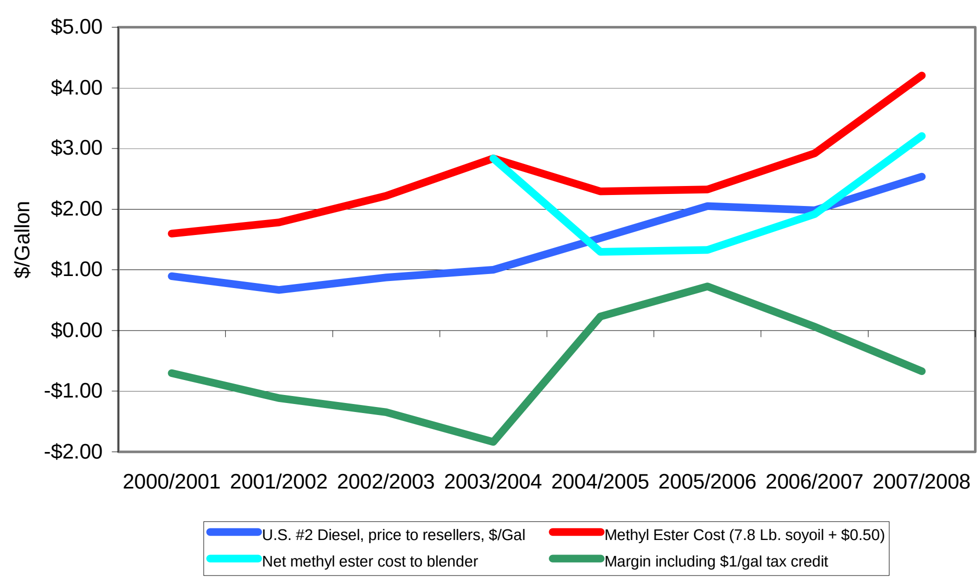
Figure 3 shows that the actual price of ethanol (brown line) has typically exceeded its energy value and the price of gasoline. The high price of ethanol relative to both gasoline and its energy value is largely a function of Federal support. The Omaha ethanol rack price reflects the price paid by a blender to the ethanol refiner, and includes the value of the Federal tax credits received by the blender. That tax credit makes ethanol more valuable to the blender that just the ethanol alone.

If the $0.51 minimum Federal tax credit is subtracted from the ethanol rack price to get a net cost to the blender, the comparison to energy value is much closer. In Figure 3 the net blender price (excluding a $0.51 tax credit) of ethanol (green line) is much closer to the energy value (light blue line)[6]. If other credits and government support received by ethanol plants are taken into account the true market value of ethanol is even closer to the energy value.

In summary, ethanol pricing is a result of a complex mixture of market forces and support policy. Fundamental economic value of ethanol is severely distorted by Federal support payments in the form of tax credits received by companies who buy ethanol to blend it with gasoline.

Federal Biodiesel Support Payments and the Soybean Market: Started in 2004, support of biodiesel production from soybean oil is more recent than ethanol. In 2004 a $1.00 per gallon support payment was placed on soybean oil refined into methyl ester and blended with diesel fuel. The initial effect was to make production of methyl ester, the technical name for the oil used to make biodiesel, appear to be profitable. However, ethanol supports have reduced soybean acreage and significantly raised the price of soybean oil. The economics of biodiesel from soybean oil is looking much less profitable. Unlike ethanol, many other feedstocks are also available, but their prices are generally correlated with soybean oil.

Figure 4: Price of Diesel vs. Cost of Soy-Based Methyl Ester



[6] The high value of ethanol relative to gasoline in 2005/2006 was largely caused by outages at oil refineries.

The cost of methyl ester was calculated as 7.8 pounds of crude soybean oil plus $0.50 per gallon processing cost[7]. As can be seen in Figure 4, value margins have positive in only 2 years since 2000/2001. With soybean oil priced at over $0.70 per pound in March, 2008 the net cost of methyl ester was about $6 per gallon versus about $3 for wholesale diesel. Even with the $1 tax credit it currently costs about $2 per gallon more for methyl ester than diesel. Biodiesel production is falling as a result. However, future mandates could result in increases in soybean oil based biodiesel production even if the costs are significantly higher than diesel prices.

Biofuels Support Policy, Feedstock Demand and Feedstock Prices

A stated objective of U.S. biofuel policy is to increase both the supply and demand for biofuels. On the demand side of the market policy mandates levels of biofuel use. On the supply side policy offers financial support for producers and protects the U.S. ethanol market via an ethanol tariff that shields U.S. producers from competition.

The "Renewable Fuel Standard" (or RFS) contained in current energy law mandates levels of use of ethanol and biodiesel as motor fuels. This feature creates a guaranteed market for the RFS level of production. The current RFS for all biofuels is contained in the table below[8]. The "Renewable Biofuel" column includes both ethanol and biodiesel. To make biodiesel more attractive each gallon used counts for 1.5 gallons of the RFS. Ethanol from cellulose is given 2.5 gallons of credit for each gallon used. This paper is concerned with only the "Renewable Biofuel" RFS.

Table 1: U.S. 2008-2022 Biofuel Standards, Billion Gallons/Year

Year	Renewable Biofuel	Advanced Biofuel	Cellulosic Biofuel	Biomass-based Diesel	Undifferentiated Advanced Biofuel	Total RFS
2008	9					9
2009	10.5	0.6		0.5	0.1	11.1
2010	12	0.95	0.1	0.65	0.2	12.95
2011	12.6	1.35	0.25	0.8	0.3	13.95
2012	13.2	2	0.5	1	0.5	15.2
2013	13.8	2.75	1		1.75	16.55
2014	14.4	3.75	1.75		2	18.15
2015	15	5.5	3		2.5	20.5
2016	15	7.25	4.25		3	22.25
2017	15	9	5.5		3.5	24
2018	15	11	7		4	26
2019	15	13	8.5		4.5	28
2020	15	15	10.5		4.5	30
2021	15	18	13.5		4.5	33
2022	15	21	16		5	36

[7] Rudy Pruszko. Alternative Feedstock and Biofuel Production. Practical Biodiesel Blueprint Conference. Kuala Lumpur, Malaysia. 1-23-08
[8] Renewable Fuels Association. http://www.ethanolrfa.org/resource/standard/

To make production more attractive Federal biofuels policy provides for “tax rebates” based on the amount of ethanol or methyl ester purchased by companies who blend the products with conventional petroleum fuels. The “rebates” are paid whether or not the blending company has any tax liability or not. Thus, they are not actually rebates, but direct Federal support payments for ethanol use. Since the market for biofuels is very competitive the rebates are largely passed back to biofuels producers.

Rebates account for a high percentage of the value of biofuels. The minimum Federal ethanol rebate of $0.51/gallon is about 30% of the value of ethanol as a motor fuel. Biodiesel rebates account for close to 40% of the economic value of soy-based methyl ester.

Feedstock Demand and Price Effect of the RFS: The RFS is a mandate for use of biofuels. Blenders are assigned a percent of the fuel they buy that must consist of the various biofuels in Table 1. It is enforced via fines and penalties if blenders do not purchase and blend their minimum required amounts of biofuels. A blender is free to purchase and use more than his RFS minimum, and will if the biofuel price is low enough relative to petroleum fuels to make substitution attractive.

In effect, the RFS creates a price inelastic demand curve for biofuels. The 2008 RFS mandates the use of 9 billion gallons of ethanol and methyl ester. The vast majority of that volume will be ethanol. At 2.75 gallons of ethanol per bushel, the 2008 RFS mandates that about 3.2 billion bushels of corn (close to 25% of the record-large 2007 crop) will be made into ethanol. Given that the capacity of all ethanol plants will easily exceed 9 billion gallons per year by mid 2008, and the record corn crop of 2007, ethanol production alone is likely to slightly exceed the 2008 RFS.

However, this may not always be the case. In the event of a crop disaster the RFS still mandates a fixed amount of use for biofuels that increases over time. Unless the EPA and Department of Agriculture agree to reduce the RFS in a short-crop year a higher price of feedstocks would need to choke off enough feed use, food use and exports to make the RFS mandate possible. There are no specific guidelines for adjusting the RFS to account for feedstock supplies. If nothing else, the RFS makes forecasting demand and price much riskier in a short crop situation and potentially adds to food price inflation. The effects of a crop disaster would be devastating to food production if the mandates were not reduced.

Feedstock Demand and Price Effects of the Renewable Fuel Tax Credits: The tax credits given blenders for ethanol and biodiesel lower the actual **cost** of those fuels by the amount of the credit. This partially explains why the market **prices** of biofuels often exceed their petroleum-based counterparts. The effective price paid for ethanol is at least $0.51 per gallon less than the market price. For soy-based methyl ester the effective price is $1.00 less than the methyl ester market price.

Competition among blenders ensures that the tax credit is passed back to biofuels producers. Market conditions may allow blenders to keep a portion of the tax credit if there is oversupply of a biofuel, but this tends to be short term.

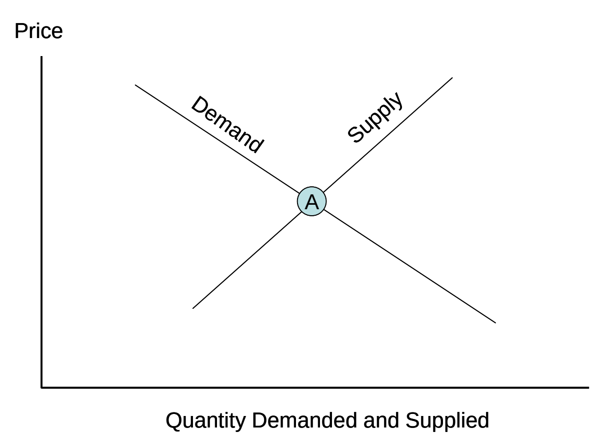
Above the RFS amount, the U.S. cannot produce enough corn or soybeans to make a major difference in overall energy supplies. **To replace just the U.S. gasoline supply with 100% ethanol would use not only the U.S. corn crop, but the entire world's total grain crop.** Blending all U.S. diesel with 20% soybean-based methyl ester would require about 70 billion pounds of soybean oil, 3.5 times the current U.S. soyoil production and 25% of the world's total vegetable oil supply.

While there are limits on **supply**, the long term **demand** for ethanol and biodiesel is effectively limited only by the underlying demand for gasoline and diesel. With essentially unlimited potential demand, and limited feedstock supplies, the market will ensure that feedstock producers, not biofuel producers, will be the major beneficiaries of biofuel production and biofuel policies that support that production.

In summary, tax credits given to biofuel blenders subsidize biofuel producers. However, biofuel producers must compete for limited supplies of feedstocks. Given a limited supply of feedstocks, biofuel producers will tend to bid up feedstock prices until they cannot afford to build additional capacity. The end result is that tax credits flow from taxpayers to blenders to biofuel producers to feedstock producers. At the current time the only major U.S. potential feedstock sources are corn and soybeans.

Combined Effects of the RFS and Tax Credits: Federal biofuels policy, by design, distorts market forces of demand for biofuels and the underlying demand for feedstocks. Normally, a market price will reflect both the value that consumers place on a product and the costs of production of suppliers. Also, we normally expect that if prices rise consumers will buy less and producers will want to supply more. Thus the classic demand and supply diagram, Figure 5. In Figure 5 price and quantity are determined by the intersection of the 2 lines at point A. A movement in either line will change equilibrium Point A, and both price and quantity.

Figure 5: Normal Supply and Demand Market

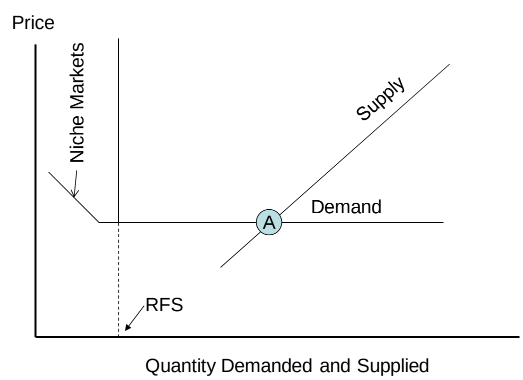


For biofuels, the RFS creates a portion of the demand curve that does not respond to price. The 2008 RFS specifies 9 billion gallons of renewable biofuel production regardless of price. Long term demand for biofuels is essentially unlimited by potential demand. That is, relative to the supply limit imposed by feedstocks, potential amounts of biofuels are near-perfect substitutes for gasoline and diesel. This is true even if we do not support biofuels with tax credits.

Figure 6 shows a general demand curve for a biofuel with a RFS mandate but no tax credit. The graph assumes that the supply is sufficient to meet the RFS. Assuming the RFS is set at a volume that more than satisfies higher value/price niche markets (oxygenation or MTBE replacement for ethanol) the equilibrium price will be the energy value of the biofuel, and the quantity produced is determined by the intersection of supply and demand at point A. The energy value is set by the BTU content of the biofuel relative to the petroleum fuel (about 66% for ethanol, near 100% for methyl ester). If wholesale gasoline is priced at $3.00 per gallon the energy value of ethanol is $1.98. The horizontal part of the demand curve would be at a price of $1.98 per gallon.

At that price the market will freely substitute the biofuel for petroleum fuel. As the price of petroleum fuel changes, the price for biofuel will also change in the same direction. In Figure 6, the demand line will shift up if the price of petroleum-based fuel increases and down if it decreases. If the petroleum price declines enough no biofuel production may be possible.

Figure 6: Biofuel Supply and Demand with RFS, no Tax Credit



Note that if we shift the supply curve in Figure 6 to the right the price of the biofuel does not change. The supply curve's position is determined largely by the supply of the feedstock available. So, if the feedstock supply increases, shifting the biofuel supply curve to the right, the value of the feedstock does not change, but production increases. This seems to defy logic, but in this case the supply of the biofuel feedstock is simply too small relative to the larger energy market to make any difference in prices. The effect is that the biofuel demand curve beyond the RFS sets a price for the biofuel, and thus the underlying feedstock price.

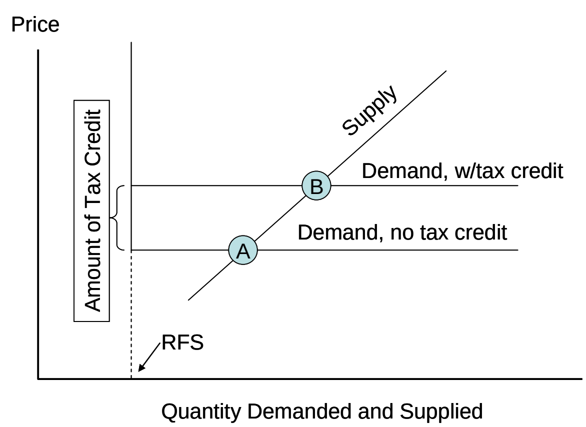
We have seen this effect clearly with the 2007 U.S. corn crop. A record 13+ billion bushel crop had no depressing effect on prices. Rapidly expanding ethanol production, due to extraordinary profits of 2005-2006, soaked up all the additional production, and more.

Simply put, at a given demand level we cannot produce enough agriculturally-based biofuel feedstocks to depress the prices of those feedstocks for more than a short period of time. Biofuel market value, and the underlying feedstock value, is based on a much larger energy market that dwarfs potential biofuels production by a factor of about 100.

A fixed per gallon tax credit shifts the demand curve for biofuels by the amount of the credit. That is, at any given production level the credit increases the price that can be paid for the biofuel. In the case of ethanol, the $0.51 minimum Federal tax credit shifts the demand line for ethanol upward by that amount and moves the equilibrium from A to B in Figure 7. In Figure 7 the lower demand line reflects the market value of the biofuel based on its economic value as a fuel. The higher demand line reflects the increased value made possible by a fixed tax credit. For simplicity's sake the sloping demand curve to the left of the RFS is ignored.

In addition to increasing price, the tax credit also increases the amount supplied by producers. At point B the price of ethanol is higher, as is the amount produced. As point B implies more acreage for the crop planted for this biofuel's feedstock those acres will be taken from other crops, or from previously unplanted land.

Figure 7: Biofuel Supply and Demand with RFS and Tax Credit

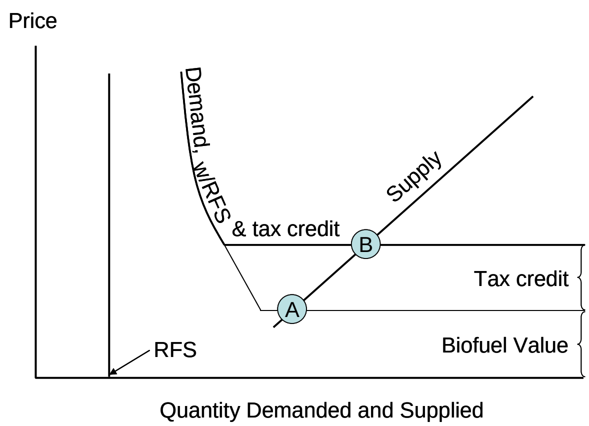


Of course, corn and soybeans have many uses other than biofuels. Biofuel producers must compete with those who want to produce food and other products. The total demand for biofuel feedstocks is the sum of the demand for all users.

For uses other than biofuel production, mainly food production, demand for feedstocks is the normal sloping demand curve (as shown in Figure 5). As prices increase food production users will reduce feedstock use. However, both corn and soybean use for food production is known to not be very responsive to prices, especially in the short run.

Figure 8 shows the combined feedstock demand for biofuels and other uses with both the effects of the RFS and a tax credit. The flat portion of the demand curve is shifted upward by the tax credit. In the case of corn, the upward shift is the value of ethanol made from corn. Since a bushel of corn yields about 2.75 gallons of ethanol the minimum $0.51 tax credit increases the market value of corn by about $1.40 per bushel ($0.51 times 2.75). Looked at another way, the tax credit reduces the corn price the biofuel producer pays by $1.40.

Figure 8: Total Feedstock Supply and Demand with RFS and Tax Credit[9]
(Feedstock supply sufficient to exceed RFS without tax credit)



The RFS portion of biofuel policy also results in an increased feedstock demand curve slope. Total use is less responsive to price due to the fact that the RFS does not decline with increasing prices[10].

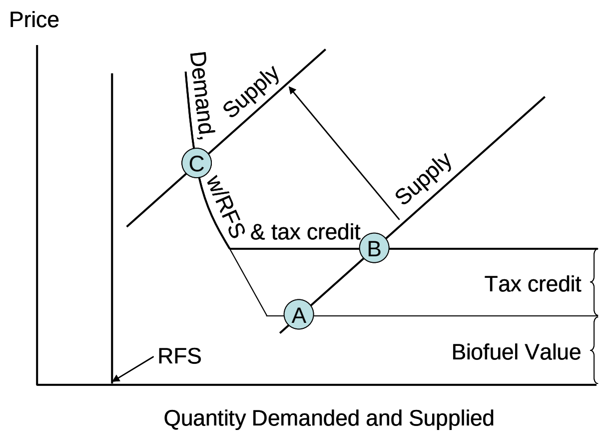
Figure 8 was drawn so that the supply and demand curves imply that biofuels demand will set the minimum price for corn with or without a tax credit. Biofuel production is not limited by price, and will exceed the RFS. This is not the only possibility (Figure 8a).

In Figure 8a the supply line is shifted to the left. The cause of the shift is an assumed crop failure. At Point C the price of the feedstock has increased enough to choke off non-biofuel usage enough to make the RFS feasible. Again, the effect of the RFS in a feedstock shortage scenario is to increase prices until enough competing uses are choked off to make the RFS possible.

[9] Figures 8 and 8a are for illustrative purposes only. No attempt was made to estimate the actual positions of the lines.
[10] The RFS can be reduced by decision of the Secretary of Agriculture and the EPA. How this might happen and what role feedstock prices might play is not spelled out in the energy act.

In summary, U.S. biofuels policy increases feedstock prices via a tax credit for biofuel use and also potentially increases feedstock prices and price volatility via the RFS. By subsidizing one use of feedstocks, biofuels, less total agricultural production is available for other uses, mainly food production and exports. As a consequence of higher prices more of some feedstocks are supplied. However, all of the increased supply will go into biofuel use, and other crop production is reduced to satisfy the increased feedstock demand. The price effects of the biofuel policy thus spread to other crops, and their prices as well.

Figure 8a: Total Feedstock Supply and Demand with RFS and Tax Credit
(Feedstock supply insufficient to exceed RFS without tax credit)



Biofuel producers do not see the full impact of the tax credit on feedstock prices. They are partially insulated from the increase in feedstock price, while all other feedstock users see the full impact. As a result there is in effect a 2-tier cost structure for biofuels versus food uses. By policy design, food use of feedstocks is squeezed back by higher prices, and more feedstocks are available for biofuel use.

Finally, the feedstock price effects of biofuels policy can severely distort crop production decisions and other crop prices. Crops supplying biofuels feedstocks with high policy support levels will have increased acreage; other crops will have less land available. All crops affected by lower acreage will see increased prices, even though they may not be used for biofuel production.

U.S. soybean acreage decreased in 2007 despite biofuel subsidies for soyoil-based biodiesel. Ethanol tax credits, taken back to underlying feedstock production economics, are significantly more valuable than soy-diesel. To make soybean oil competitive with corn used for ethanol would require a significant increase in the biodiesel tax credit. In effect, the ethanol tax credit is so attractive that it has severely curtailed the biodiesel market.

In 2008 we are likely to see an acreage shift back to soybeans and away from corn due to the doubling of soybeans prices that happened after the 2007 acreage shift to corn. However, the increased soybean production will not be enough to have any major effect on soybean oil prices.

In summary, U.S. biofuel policy offers a guaranteed minimum biofuel and feedstock market, shifts demand upward for crops supplying feedstocks, distorts planting decisions, and artificially raises prices throughout the U.S. crop sector. Those higher prices are increased revenue for feedstock producers, but costs to all feedstock users. The next section contains estimates of the magnitude of those cost increases.

Modeling the Overall Cost Effects of U.S. Biofuel Support Policy

Modeling the cost effects of U.S. biofuel support policy imposed on feedstock users is a fairly straightforward procedure. Reflecting the historic effects of Federal biofuels policy, actual crop production, demand and prices were used as a model baseline. Estimates of crop production, use, and prices without Federal biofuel policy effects were made by FarmEcon LLC[11]. The price differences between the baseline and no-biofuels policy scenario are used to estimate the cost impact on animal feed and other major uses of the two major feedstock crops, corn and soybeans, for the 2007/2008 to 2009/2010 crop years. February 8, 2008 USDA estimates for usage and prices[12] were used in the model baseline. Prior supply, demand and price data were also taken as published by USDA as of the same date.[13]

To estimate the impact of biofuels policy models of biofuel production system and costs were needed. A model from the University of Minnesota was used for ethanol production and a simple Iowa State University model was used for soy-based biodiesel. These models are incorporated into the overall FarmEcon LLC policy cost model.

For purposes of this analysis the RFS mandate and ethanol import duties can essentially be ignored. Up until about 2004 the RFS was too small relative to feedstock supply to have much feedstock demand and price effect. After 2004 the increasing price of gasoline and diesel fuel raised the economic value and production of biofuels to a point that minimized the effect of the RFS[14], but caused the value of tax credits to be bid into feedstock prices. Even if the ethanol import duty were repealed the large size of potential U.S. ethanol demand is such that additional imported supply can be used without significantly depressing ethanol prices.

Underlying assumptions and data sources, crop year 2007/2008: To model the effects of biofuels policy it is necessary to compare history with biofuel policy effects against what the model suggests would have happened without biofuels policy. In the model it was assumed that in 2004 the $0.51 ethanol tax credit was eliminated, the $1.00 biodiesel tax credit was never enacted, and there is no RFS for biofuels. In

[11] The full FarmEcon LLC ethanol/feedstock model is available upon request
[12] http://usda.mannlib.cornell.edu/usda/current/wasde/wasde-02-08-2008.txt
[13] USDA, PS&D, database inquiry of 02/08/2008
[14] 2007 ethanol production exceeded the 2007 RFS by about 30%

effect, in the model, post-2004 biofuels compete in the feedstocks and energy markets on an unaided basis alongside other feedstock users and fuels.

To model the price effects of biofuel policy it was assumed that absent federal policy biofuels are priced in the market at energy parity with the petroleum fuels they replace.

To separate the effects of biofuel policy by animal agriculture feedstock-using sector the diets of major livestock and poultry segments were modeled.

For corn and soybean balance sheets the February 8, 2008 USDA estimates were used as a baseline. Estimates of those same balance sheets without biofuels policy effects were prepared by FarmEcon LLC.

All historical energy data were compiled from the Department of Energy and the Nebraska Ethanol Board.

Underlying assumptions, crop year 2008/2009: In addition to 2007/2008, 2008/2009 crop balance sheets were estimated by FarmEcon LLC. Ethanol plant profitability was assumed to be affected by overcapacity as more new plant capacity will come on line by the end of 2008 than there is corn available. Ethanol was assumed to be priced at an energy parity of 66% of the price of gasoline. Methyl ester was assumed to need to sell for the same price as diesel fuel to have a viable long term market.

Summary of Results: Differences between actual and modeled scenarios for key variables are shown in Table 2 for crop years 2007/08 & 2008/2009. The model tells us that if biofuels were to compete with other uses, without tax credits or the RFS, fewer gallons of biofuel would be produced, and at lower costs and prices. Other corn and soybean users would have more of the feedstock crops available, and also at lower prices. With the lower prices of the no-policy scenario costs of producing meat, poultry, dairy and other food products would be lower. Estimated amounts of the cost increases will be covered later.

The no-policy model also reduces the crop production distortions of biofuels policy. Corn acreage is reduced, and soybean acreage is increased, versus the price distorting effects of the policy. The price distorting effects of the policy on soybean prices is largely eliminated, but methyl ester production from soybean oil is still much lower without the $1 tax credit - despite lower soybean oil prices.

Estimates were also made for 2009/2010 with and without tax credits and RFS. Results are similar to 2008/2009 shown in Table 2, next page.

Corn and soybean prices are lower if there are no biofuel tax credits or RFS, but still higher than 2000-2005 averages. The primary driver for higher corn prices with no tax credits or RFS is the higher price of gasoline. The higher price of soybeans even without tax credits is driven by higher corn demand for ethanol production and fewer soybean acres. Without soydiesel tax credits the value of methyl ester is not high enough to compete with diesel fuel. A minimum amount of methyl ester production is in the model to account for non-economic use.

Ethanol production increases, even without tax credits or the RFS, but at a much slower pace than if the credits or RFS are available. All food consumers, domestic and export, of corn and soybean based products have more of both crops available, and at lower costs, if there are no tax credits or RFS.

Table 2: 2007/08 & 2008/2009 Vs. No Tax Credit/No RFS Model, Key Variables

Crop	Item	Units	2007/08	"No Policy" Model	Difference	2008/09	"No Policy" Model	Difference
Corn	Harvested Acreage	Mill. Acres	86.5	76.0	-10.5	82.0	77.0	-5.0
Corn	Production	Bill. Bu.	13,074	11,481	-1,592	12,698	11,924	-774
Corn	Feed Use	Bill. Bu.	5,950	6,100	150	5,300	6,100	800
Corn	Exports	Bill. Bu.	2,450	2,550	100	2,300	2,500	200
Corn	Food and Seed	Bill. Bu.	1,355	1,360	5	1,350	1,360	10
Corn	Ethanol Use	Bill. Bu.	3,200	1,650	-1,550	4,000	1,800	-2,200
Corn	Price, Farmgate	$/Bu.	$4.10	$2.70	-$1.40	$4.85	$2.81	-$2.04
	Ethanol Production	Bill. Gal.	8.8	4.5	-4.3	11.0	4.9	-6.1
	Ethanol Price, Omaha	$/Gal.	$2.20	$1.69	-$0.51	$2.10	$1.59	-$0.51
Soybeans	Harvested Acreage	Mill. Acres	62.8	72.0	9.2	68.0	71.0	3.0
Soybeans	Production	Bill. Bu.	2,585	2,963	378	2,845	2,970	126
Soybeans	Crush	Bill. Bu.	1,830	1,900	70	1,650	1,900	250
Soybeans	Exports	Bill. Bu.	995	1,200	205	850	1,100	250
Soymeal	Domestic Use	000 Tons	35,300	36,300	1,000	33,000	34,500	1,500
Soyoil	Domestic Use	Mill. Lbs.	16,099	17,000	901	14,500	17,000	2,500
Soybeans	Price, Farmgate	$/Bu.	$10.40	$5.90	-$4.50	$12.25	$7.00	-$5.25
Soymeal	Price, 49%	$/Ton	$320	$200	-$120	$400	$250	-$150
Soyoil	Crude	¢/Lb.	47.5¢	25.0¢	-22.5¢	60.0¢	35.0¢	-25.0¢
	Methyl Ester Production	Mill. Lbs.	3,000	1,500	-1,500	1,000	500	-500

Figure 9 shows the model results for corn prices with and without the ethanol tax credit and RFS. Note that even without the tax credit effect, corn prices increase in 2007/2008 and remain higher than prior years. Ethanol demand is the main driver behind the corn demand and price increase, even without a biofuels policy.

The increase in corn demand and prices is due to wholesale gasoline increasing from $1.49/gallon in 2004/2005 to about $2.40/gallon in 2007/2008 and assumed to remain at that level in subsequent years. Based on costs of converting corn to ethanol, the corn prices shown without a tax credit (green line) will result in a step up in ethanol production as long as gasoline prices remain near those of 2007/2008.

In summary, $2.40/gallon wholesale gasoline prices equate to about $1.60/gallon ethanol on an equal net energy basis. At $1.60/gallon, and without a tax credit, the current cost of ethanol production makes it possible for an ethanol producer to pay up to about $2.75/bushel for corn. Since corn was priced below $2.75 per bushel prior to 2007/2008 ethanol production in the model was profitable without a tax credit. In response, ethanol producers would increase production until the corn price is bid up to $2.75. At that corn price excess ethanol profits disappear and there is no incentive to increase ethanol production further. Minor adjustments in crop acreage and use are required to accommodate the ethanol production increase.

Figure 9: Estimated Corn Prices with and Without Ethanol Tax Credit or RFS
Crop Years 2004/2005 to 2009/2010

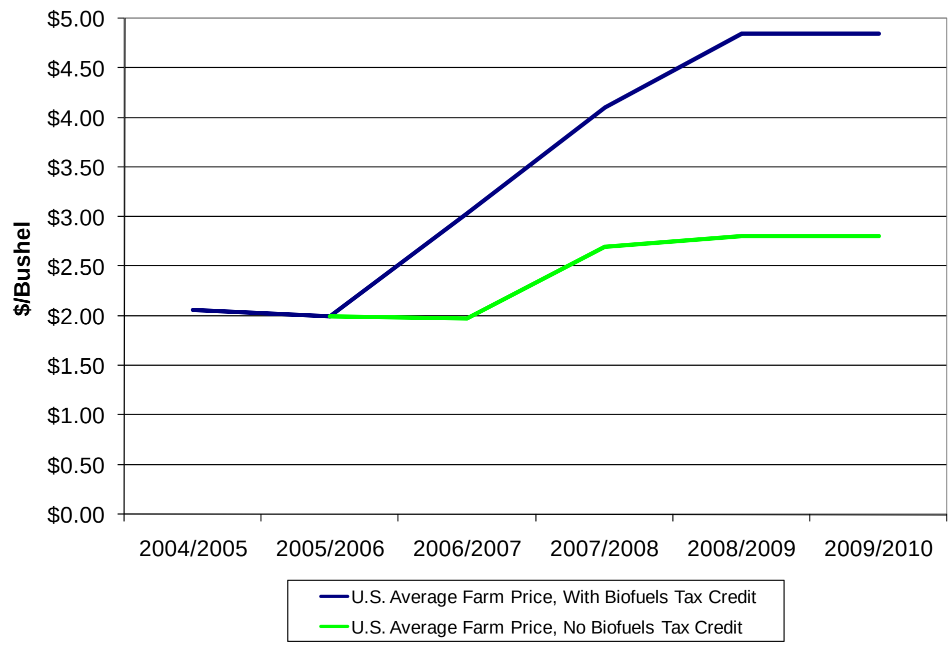
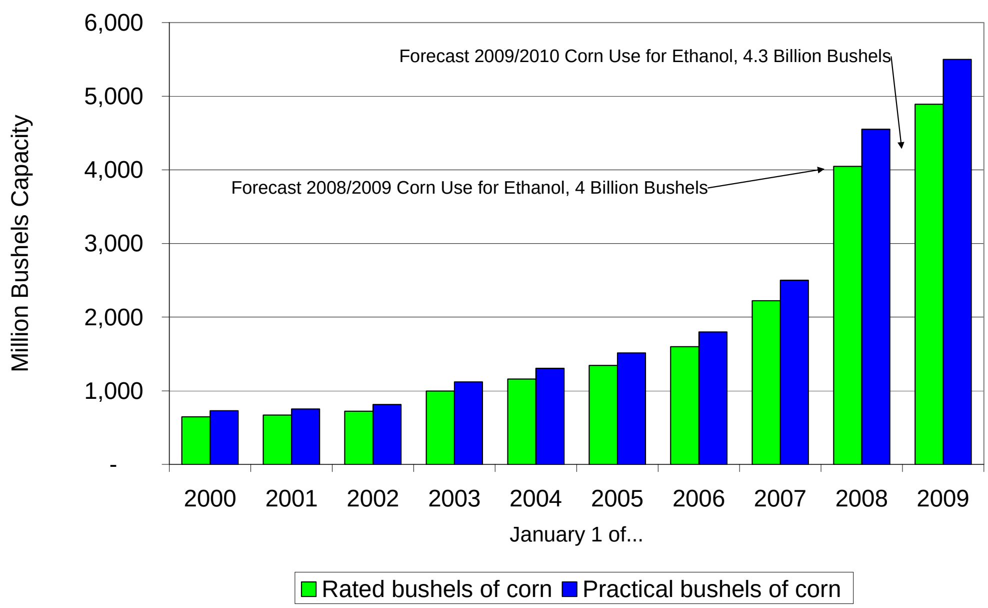


Figure 10: Ethanol Refinery Potential Corn Use, Rated and Practical Capacity
January 1, 2000 to January 1, 2009



Results for 2008/2009 and 2009/2010 are also affected by the overcapacity that will occur in the ethanol industry by the end of 2008 (Figure 10). Current refineries, and those under construction, will have the capacity to use up to about 5.5 billion bushels of corn per year by January 1, 2009[15].

We will not have that much corn available for ethanol use. The 2007/2008 shift to corn as a result of higher corn prices caused sharply higher soybean prices. Higher soybean prices will prevent any shift to even more corn, and will likely result in fewer corn acres in 2008/2009. Reduced corn acreage will result in only about 4 billion bushels of corn being available to ethanol use even if feed, food and export use is reduced. Only about 75% of total potential January 1, 2009 ethanol capacity will be utilized in 2008/2009.

Given a major shortage of corn vs. ethanol potential use it was assumed that ethanol plants would bid up corn prices until only their variable costs for corn, energy, labor, transportation and materials were covered. In the model that takes a farm level corn price of slightly under $5 per bushel if wholesale gasoline is the assumed $2.40 per gallon. Ethanol producers cannot pay higher than $5 farm level corn prices to bid corn away from other users or they will have a negative cash flow[16]. Also, the RFS is satisfied by ethanol in both years, and has no effect on feedstock prices.

The total effects of biofuels policy in crops years 2008/2009 and 2009/2010 are probably not sustainable in the long run under the assumed conditions. Eventually the ethanol industry will either need to reduce production capacity in line with feedstocks supplies, receive more generous Federal support, or the price of gasoline will need to rise further in order to allow ethanol plants to choke off food demand with higher corn prices.

Soybean meal and soybean oil prices are also lower without biofuel tax credits (Figures 11 and 12). The mechanism for these lower prices is that without biofuel support acreage does not move from soybeans to corn as happened in 2007. Higher soybean acreage results in more soybean production and lower prices for soybeans, soymeal and soyoil. Costs of methyl ester production from soybean oil are also lowered in the process, but despite lower costs it is still not a financially attractive product due to the assumed lack of any tax credits.

---

[15] Renewable Fuel Association. http://www.ethanolrfa.org/industry/locations/. Rated capacity in operation or under construction totals 13.4 billion gallons per year as of March 4, 2008. Practical capacity = 112.5% or rated. 1 bushel of corn = 2.75 gallons of ethanol. 112.5% of 13.4 billion gallons rated capacity = 15.1 billion gallons. 15.1 billion gallons at 2.75 gallons per bushel = 5.5 billion bushels.

[16] The price of corn can exceed $5 if gasoline prices are higher than $2.40. However, in the model the difference in corn price levels due to biofuels policy would not change. If gasoline prices rise one effect would also be fewer soybean acres and higher soybean product prices than those in the current model results. Through soybean prices higher gasoline prices would also have an effect on food production costs.

Figure 11: Estimated Soybean Meal Prices With & Without Ethanol Tax Credit & RFS
Crop Years 2004/2005 to 2009/2010

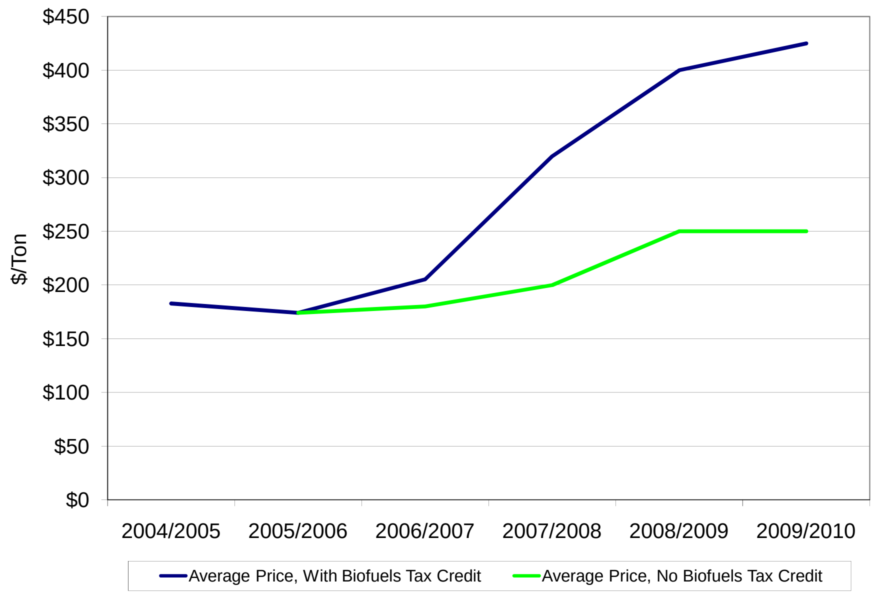
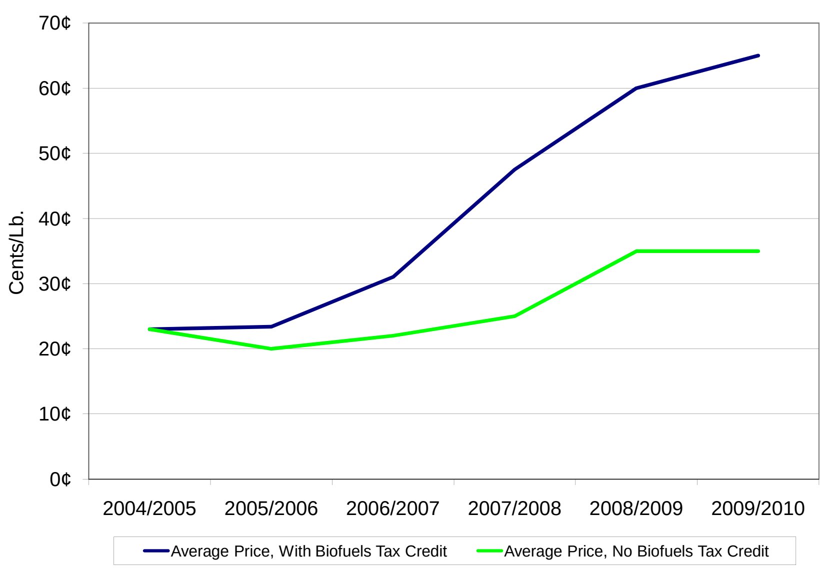
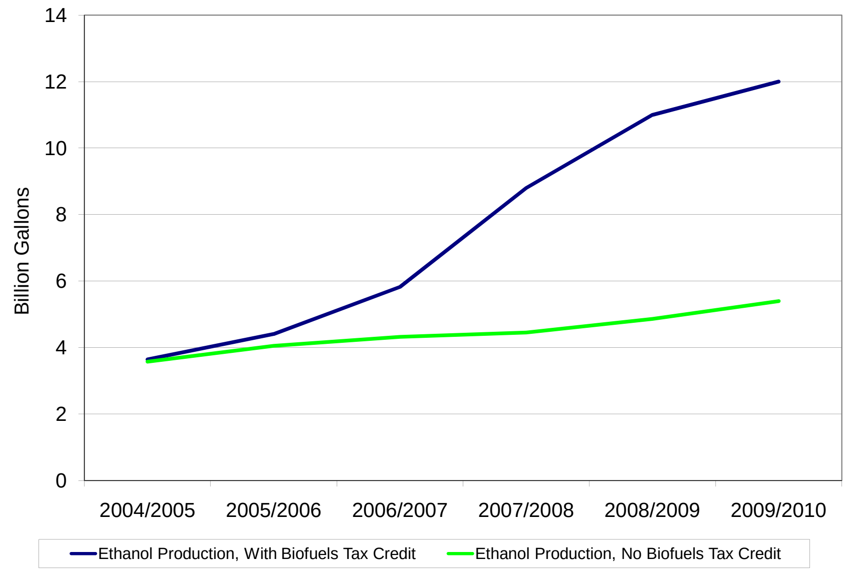


Figure 12: Estimated Soybean Oil Prices With & Without Ethanol Tax Credit & RFS
Crop Years 2004/2005 to 2009/2010



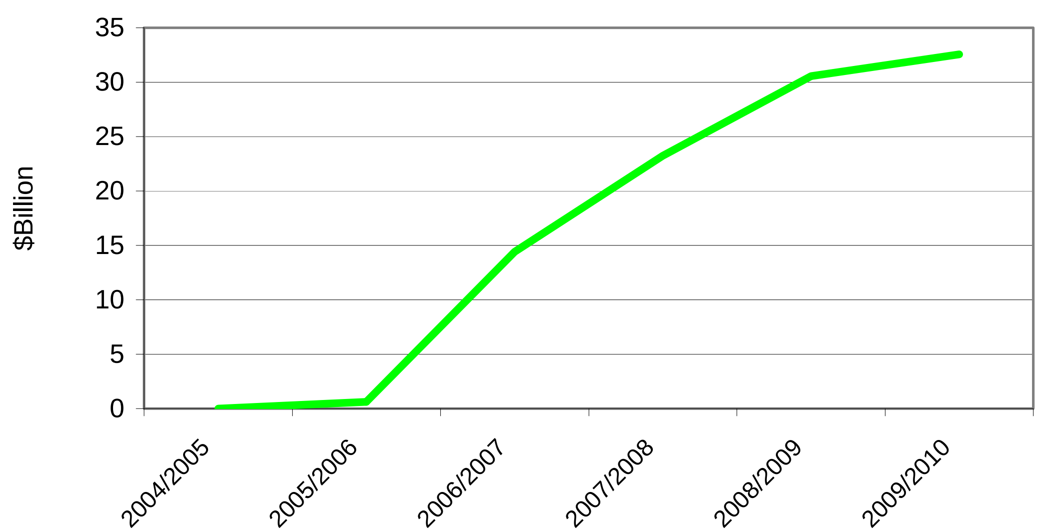
Ethanol production would be significantly lower if ethanol producers had to compete for feedstocks on a level playing field with other users (Figure 13). Instead of reaching 12 billion gallons in 2009/2010 ethanol production would be less than 6 billion gallons without the tax credit or RFS.

Figure 13: Estimated Ethanol Production With & Without Ethanol Tax Credit & RFS
Crop Years 2004/2005 to 2009/2010



Estimated Cost Differences: Using the price differences for corn and soybean products applied to amounts used the total biofuels policy cost to all domestic feedstock users is shown in Figure 14. Biofuel users are included in the cost estimates. The total increase over the years shown is about $101 billion.

Figure 14: Estimated Biofuels Tax Credit Policy Cost to Corn and Soybean Users
Crop Years 2004/2005 to 2009/2010



The cost estimates in Figure 14 do not include increased costs of feed and food inputs other than corn and soybeans. Other food production inputs affected include other feedgrains[17], animal-based by-product fats used for feed, other oilseed oils[18], other feed proteins[19], and other by-product feeds (including ethanol by-products).

Summary: Biofuels tax credits result in a significant diversion of agricultural resources into biofuels production, especially ethanol. In the process prices for feedstocks are increased, resulting in higher costs of producing all products that use those feedstocks (even biofuels themselves). Prices of related products, including most other animal feed ingredients, are also increased in tandem with feedstock prices.

While the increase in biofuels production is exactly the intention of the biofuels policy, the trade-off of higher costs of food production is a critical side effect. Effects on other areas include:

Wheat: Wheat prices have set new all-time highs, but the strength in wheat appears to be mostly unrelated to biofuels policy. Issues with wheat production in several key producing countries appear to be the main price driver. However, the amount of grain removed from global food use by U.S. biofuels policy is playing a role in record wheat prices. Weakness of the U.S. dollar is also a significant factor.

Fats and Oils Complex: Biofuels policies in the U.S. and elsewhere are a major driver in the increase in the edible fats and oils prices on a global scale. Biodiesel programs are operating in a number of countries outside the U.S., and are large enough to boost edible oil and fat prices. Diversion of U.S. land into corn in response to ethanol supports has also played a major role.

Other Oilseed Meals: Protein meals from canola, cottonseed and other vegetable proteins have increased in tandem with soybean meal. Biofuels are a major driver via diversion of land into corn.

By-Product Proteins: Products such as meat and bone meal, fish meal, distiller's grains and feather meal have seen price increases that are similar to soybean meal. The reduction in soybean acres as a result of the ethanol program is a major driver in those price increases.

Feed Minerals: Increased demand for fertilizer as a result of increased corn acreage has caused many fertilizer and mineral prices to increase.

Price increases from 2004 to January 2008 for several key feed ingredients are shown in Table 3, next page.

---

[17] Sorghum, barley and oats
[18] Such as sunflower, rapeseed, cottonseed, and palm oil
[19] Such as sunflower, rapeseed, cottonseed, distiller's grains, meat and bone meal

Table 3: 2004-2008 Feed Ingredient Price Increases

Item	2004	Jan. 2008	% Change 2004-2008
Meat and Bone Meal/Ton	$191.68	$347.75	81%
Meat Meal/Ton	$190.63	$335.39	76%
Sunflower Meal/Ton	$107.42	$215.17	100%
Feather Meal/Ton	$246.86	$400.87	62%
Yellow Grease/Ton	$335.70	$528.40	57%
Rice Millfeed/Ton	$27.05	$50.00	85%
Distillers grains, 50%	$45.00	$83.00	84%

Key assumptions that affect the outcome: As with any model the results are dependent on the specific assumptions used. In this model the key assumptions and the result of changes in them are:

Prices of gasoline and diesel: Assumed levels of gasoline and diesel prices are important to the calculated price levels of corn and soybeans. As these prices increase the potential prices of feedstocks also increase. However, increasing prices of gasoline and diesel do not have a significant effect on the biofuels policy-driven differences in prices and costs in the model.

Demand for biofuels: It was assumed that biofuels would be priced at their energy value relative to petroleum products they replace. If there is an oversupply of biofuels relative to potential use prices would weaken relative to petroleum. That would also cause feedstock prices to weaken and cost impacts to decline.

Biofuels conversion factors and costs: Static technology and conversion costs were assumed. If biofuel yields increase, so will feedstock value and prices. If biofuel refinery costs increase feedstock prices will be depressed.

Crop yields: Trend yields were assumed for corn and soybeans. Lower yields would significantly raise the prices of corn and soybeans. Higher yields would have little long term depressing effect on prices due to the overcapacity of the ethanol industry.

Biofuel Support Policy Effects on Costs of Major Feedstock Users

Poultry, red meat and dairy are the major food production users of corn, soybean meal and other feed ingredients. Combined use of these sectors account for nearly all of the feed use reported for corn and soybean meal by USDA. Most of the consumption of ethanol feed by-products is also accounted for in the model.

A major portion of the cost impact of biofuel policy thus falls on animal feed users of corn and soybeans. Costs also fall on other users. Food use of soybean oil, food and industrial use of corn other than ethanol, ethanol itself, and biodiesel users also pay higher feedstock costs as a result of biofuels support policies. Ethanol, now the largest user of U.S. corn (if you count each feed user as a separate category), is the most heavily affected by policy-driven price increases for corn.

To estimate the incidence of costs by user, simplified diets were constructed for major poultry, cattle and swine uses. Only major feed ingredients were included in modeled diets. Price increases from 2004 to 2008 for minor feed inputs were reduced to the percent estimated to have been as a result of biofuels policy on corn prices. That factor was 72% of the price increase. The remaining 28% was assumed to be due to market forces. Results are shown in Tables 4 and 5.

Table 4: Estimated Biofuels Policy Cost by Biofuel Feedstock User

Category	Added Cost, 2007/2008	Added Cost, 2008/2009	Cost Basis
Broilers	$0.39	$0.53	(Per Head Sold)
Turkeys	$2.46	$3.40	(Per Head Sold)
Layers	$0.23	$0.31	(Per Dozen Eggs)
Market Hogs	$27.98	$38.69	(Per Head Sold)
Fed Cattle	$81.51	$110.32	(Per Head Sold)
Dairy Cows in Milk	$0.12	$0.16	(Per Gallon of Milk)
Other Food and Industrial Uses	$35.45	$48.85	(Per Person Per Year)

Table 5: Estimated Biofuels Policy Cost by Major Biofuel Feedstock User

($ Million)

2007/2008						
User	**Corn Cost**	**Soybean Meal Cost**	**Other Protein Cost**	**Soybean Oil Cost**	**Other Fats Cost**	**Total**
Broilers	$1,327	$1,813	$143		$190	$3,473
Turkeys	$341	$234	$30		$41	$646
Layers	$765	$838			$149	$1,753
Swine	$1,859	$1,060				$2,919
Fed Cattle	$1,594		$647			$2,241
Dairy - Milk Cows	$1,977	$179	$572			$2,728
Corn - food & industrial	$1,918					$1,918
Soybean Oil - Food				$3,622		$3,622
Ethanol	$4,477					$4,477
Biodiesel				$675		$675
Total of Above	$14,258	$4,125	$1,392	$4,297	$380	$24,452
2008/2009						
User	**Corn Cost**	**Soybean Meal Cost**	**Other Protein Cost**	**Soybean Oil Cost**	**Other Fats Cost**	**Total**
Broilers	$1,897	$2,154	$266		$280	$4,597
Turkeys	$487	$272	$57		$60	$876
Layers	$1,105	$998			$277	$2,379
Swine	$2,440	$1,193				$3,633
Fed Cattle	$1,812		$1,069			$2,881
Dairy - Milk Cows	$2,320	$222	$1,074			$3,616
Corn - food & industrial	$2,765					$2,765
Soybean Oil - Food				$3,625		$3,625
Ethanol	$8,163					$8,163
Biodiesel				$250		$250
Total of Above	$20,990	$4,838	$2,466	$3,875	$616	$32,786

Other uses of feedstocks that are not included in Tables 4 and 5 include:

- Minor species – ducks, other poultry, aquaculture, sheep, and goats
- Other uses in beef cattle – beef cows, stockers and backgrounder cattle
- Other uses in dairy cattle – dry cows and replacement heifers
- Other uses in swine – breeding stock
- Other uses in poultry – breeding flocks

Including minor uses not shown in Tables 4 and 5 the estimated total biofuels policy cost increase totals $24.5 billion in 2007/2008, or about $81 per capita for the 301 million people in the U.S. For 2008/2009 the cost increase totals $32.8 billion, $108 per person.

Feed rations were estimated based on published sources. Estimated averages include all stages of rations from first-fed to finisher (Table 6). Due to the complexities of phase feeding programs and variations in local feedstuff availability the percentages below will be different from those seen by any individual operations. Rations are also much simpler than those actually used and do not reflect many minor feed ingredients that are used on a local and regional basis.

Table 6: Average Ration Composition Estimated for Major Feed Users 2007/2008

Item	% Corn	% Soybean Meal	% Hay	% Other Protein	% Other Fats	% Other	Total Ration
Broilers	58%	33%		3%	3%	3%	100%
Turkeys	70%	20%		3%	3%	4%	100%
Layers*	57%	26%			4%	13%	100%
Swine	80%	19%				1%	100%
Fed Cattle**	58%		14%	25%		3%	100%
Dairy - Milk Cows**	45%	2%	35%	14%		4%	100%

* “Other” is mostly minerals fed for shell quality
** Other Protein is modified distiller’s grains, 50%. Cattle rations are on a dry matter basis.

USDA feed use estimates for corn and soybean meal as of 2-8-2008 were used for 2007/2008. For 2008/2009 corn and soybean meal feed use was estimated based on crop production, exports, food use and ethanol production.

All feed by-products of ethanol production were assumed to be in the DDGS from. DDGS production was estimated based on ethanol production and corn used for that production. A bushel of corn was estimated to yield 18 pounds of DDGS at 10% moisture. This approach was taken to standardize the wide variety of ethanol by-products produced at different moisture levels.

Table 7 shows that the estimated volume of corn and soybean meal in the total rations fed to the six animal categories in Table 6 account for 94% of U.S. corn feed use and 97% of U.S. soybean meal feed use estimated for 2007/2008 by USDA as of February 8, 2008. About 86% of estimated distiller’s grains use is accounted for by the cattle rations. The remainder is exported and used in minor amounts in swine and poultry. Increased DDGS production does somewhat decrease the impact on corn demand for feed, but the effect is small relative to the increasing amount of corn used in ethanol production[20].

Table 7: Species Feed Use vs. USDA and FarmEcon LLC Estimates

Item	*2007/2008*	*2008/2009*
Corn feed use, million bushels	5,950	5,300
% accounted for in species rations	94%	93%
Soybean meal feed use, million tons	35.3	33.0
% accounted for in species rations	97%	98%
DDGS equivalent production, million tons dry matter	25.9	32.4
Tons used in beef and dairy cattle	22.3	28.0
% accounted for in species rations	86%	87%

Biofuel Support Policy Effect on Total Cost of Ethanol

The ethanol industry's major trade association claims that "The U.S. ethanol industry has a proven track record of cost-effectively replacing MTBE and expanding gasoline supplies…[21]". This statement would be true if ethanol production was based on market forces. However, biofuel policy has a significant effect on the true cost of ethanol. By raising costs in other sectors of the economy a large portion of biofuels policy cost is transferred to food and industrial users of corn, soybeans and by-product feed ingredients. If the costs that are moved to other sectors are instead placed on ethanol a measure of the true cost of the federally supported ethanol supply can be obtained.

To measure the real cost of ethanol policy it is necessary to estimate the cost of ethanol with and without federal support and transfer costs added to other sectors of the economy back to ethanol. Additional gasoline would need to be produced without federal ethanol support. That added cost needs to be netted out of the policy cost impact.

Model results from Table 2 show that without biofuels support, or the RFS, ethanol production would be about 4.5 billion gallons in crop year 2007/2008 instead of 8.6 billion. The price of ethanol would be about $1.69 per gallon instead of an estimated $2.20. Policy-induced costs to other corn and soybean users would be $0 without the tax credit or the RFS instead of $22.3 billion. The cost of gasoline needed to replace the ethanol not produced without supports would be about $6.8 billion.

[20] The ethanol process removes a major portion of the nutrients in corn. By weight only about 33% of the corn that goes into an ethanol plant comes out as DDGS (dry matter basis). The other 67% is either ethanol or waste CO_2. The DDGS that is produced has a metabolizable energy content similar to corn, and is higher in crude protein.
[21] Renewable Fuels Association. http://www.ethanolrfa.org/resource/facts/consumers/

Table 8 summarizes the costs of ethanol, including costs born by other feedstock users, net of the added gasoline needed to replace ethanol not produced by market forces alone. Included in line 11 of Table 8 are all costs born by feed and industrial users as a result of higher prices resulting from biofuel tax credits. Support costs born by ethanol producers are already included in line 8, thus line 11 excludes the costs of higher corn prices on ethanol production costs.

Table 8: Estimated Cost of Ethanol, Including Costs Born by Other Feedstock Users

#	Description	Units	2007/2008	2008/2009
1.	Ethanol price without support (Omaha Rack)	$/gallon	$1.69	$1.59
2.	Ethanol price with support (Omaha Rack)	$/gallon	$2.20	$2.10
3.	Ethanol production without support	Billion gallons	4.46	4.86
4.	Gasoline replaced @66% (=3 x 0.66)	Billion gallons	2.94	3.21
5.	Ethanol Production with support	Billion gallons	8.80	11.00
6.	Gasoline replaced @66% (=5 x 0.66)	Billion gallons	5.81	7.26
7.	Omaha Rack price of gasoline	$/gallon	$2.37	$2.40
8.	Additional gallons of gasoline needed, no support (=6 - 3)	Billion gallons	2.87	4.05
9.	Cost of additional gasoline needed, no support (=7 x 8)	Billion dollars	$6.79	$9.73
7.	Total cost of ethanol without support (=1 x 3)	Billion dollars	$7.53	$7.73
8.	Total cost of ethanol with support (=2 x 5)	Billion dollars	$19.36	$23.10
9.	Less credit for gasoline replaced (=9)	Billion dollars	-$6.79	-$9.73
10.	Net ethanol support cost difference (=8 - 7 + 9)	Billion dollars	$5.04	$5.65
11.	Feed and industrial use cost difference (ex. ethanol)	Billion dollars	$20.53	$25.48
12.	Total ethanol policy cost difference (=10 +11)	Billion dollars	$25.57	$31.12
13.	Cost per gallon of gasoline replaced, no support (=7 ÷ 4)	$/gallon	$2.56	$2.41
14.	Cost per gallon of gasoline replaced, with support (=12 ÷ 6)	$/gallon	$4.40	$4.29
15.	Total wholesale cost of ethanol as % of wholesale gasoline	%	186%	179%

The full cost of each gallon of gasoline replaced by ethanol, including costs born by other users of corn, soybeans and other feed ingredients, is at least 79-86% higher than gasoline. The 2007/2008 $4.40 per gallon total wholesale cost is a minimum. If other federal and local support costs and the policy-induced price increases for other feed ingredients are included the true cost of ethanol is even higher than $4.40 per gallon of gasoline replaced. Adding margins, taxes, other policy support costs and added costs other than higher corn and soybean prices brings the true retail cost of ethanol to over $5.00 per gallon, gasoline equivalent basis.

In 2008/2009 the estimated wholesale total cost of ethanol is slightly lower than 2007/2008. The decrease is due to the overcapacity of ethanol producers in the model leading to lower ethanol prices than 2007/2008. In effect, overcapacity lowers the full cost by depressing ethanol producer profits.

Estimated Changes in 2008/2009 Meat, Poultry and Dairy Production

The increase in feed costs that have occurred since early 2007 had little impact on meat, poultry and dairy production as of early 2008. Given the long production cycles in animal agriculture it takes months, or years, for higher costs to result in producer decisions that result in changes in production numbers. As of the first of 2008 profitability indicators for meat and poultry production were depressed below normal levels, and yet production was generally higher than prior year levels. As 2008 production increases animal and animal product prices will weaken, further depressing profits.

The imbalance between low returns and production levels will be resolved when producers decide to cut meat and poultry output. As output falls, meat, poultry and dairy prices will increase to cover higher feed costs.

Production adjustments will vary depending on the sensitivity of prices to output changes and the opportunities for producers to earn income from other sources. Pork producers, many of whom also produce corn and soybeans, are in a favored position to sell those crops at higher prices and exit pork production. Poultry, dairy and fed beef producers generally do not produce their own feed crops, and have fewer farm income alternatives.

In 2008/2009 the amount of corn available for feed use will be constrained by the rapid expansion of ethanol capacity and an expected shift in acreage back to soybeans. With trend yields for 2008/2009, and only 11 billion gallons of ethanol production from rated capacity of 13.4 billion, corn feed use will need to decline about 4%.

Corn prices in the ethanol profitability model increase 18% in order to increase costs of ethanol production enough to keep that production at well under full capacity. Soybean production increases 10% in 2008/2009, but beginning stocks are very small compared to the 2007/2008 record-high level. In spite of a 10% increase in soybean production the 2008/2009 supply[22] of soybeans is 10% smaller than 2007/2008. Soybean meal feed use declines, and prices increase, due to decreased meal supplies. Exports of corn, soybeans, soybean oil, and soybean meal are also reduced due to higher prices. Feed costs increase enough to reduce feed use of corn and soybean meal to the available levels after exports and biofuel use.

Based on current losses and the opportunity to sell corn and soybeans rather than produce meat, pork producers are the most likely to significantly cut output. Lower pork production will also help boost prices of other meats. The meat and dairy production adjustments in Table 9 balance corn and soybean meal feed use with the amounts expected to be available for feeding.

Estimated production adjustments in Table 9 reflect:

- Increased feed costs
- Early 2008 financial losses of fed beef and pork producers
- Relatively high sensitivity of egg and milk prices to production changes
- Incentives for pork producers to exit the hog business and sell crops

[22] Supply = beginning stocks + production +imports. Soybean imports are minimal.

Estimates in Table 9 depend on the entire set of assumptions relative to crop production, ethanol production, corn and soybean export demand and the sensitivity of meat, poultry and dairy prices to production adjustments. The estimated changes shown are thus only an indication of what could happen under a very specific set of circumstances.

Table 9: Estimated Production Changes 2008/2009 vs. 2007/2008

Item	*% Change*
Broiler production	-2%
Turkey production	-2%
Egg production	-1%
Pork production	-10%
Fed beef production	-5%
Milk production	-1%

There are concrete signs that biofuel policy is starting to have the effects shown in Table 9. On March 12, 2008 Pilgrim's Pride, the largest global broiler producer, announced that the company:

"…will close a chicken processing complex and six of its 13 distribution centers in the United States in response to the crisis facing the U.S. chicken industry from soaring feed-ingredient costs resulting from corn-based ethanol production. These actions are part of a plan to curtail losses amid record-high costs for corn, soybean meal and other feed ingredients and an oversupply of chicken in the United States. The closings, which are expected to begin immediately and will be completed by June, will result in the elimination of approximately 1,100 jobs. Additionally, the Company announced that it is in the process of reviewing other production facilities for potential mix changes, closure and/or consolidation in response to current negative industry fundamentals."

This announcement by the world's leading broiler producer is evidence that the financial stresses flowing from biofuels policy are starting to have the effects of changing production levels as forecast in this study.

Biofuel Support Policy Cost by Animal Feed User and State

Estimates were made for the 2008/2009 cost of biofuel support policy for animal feed users by state.

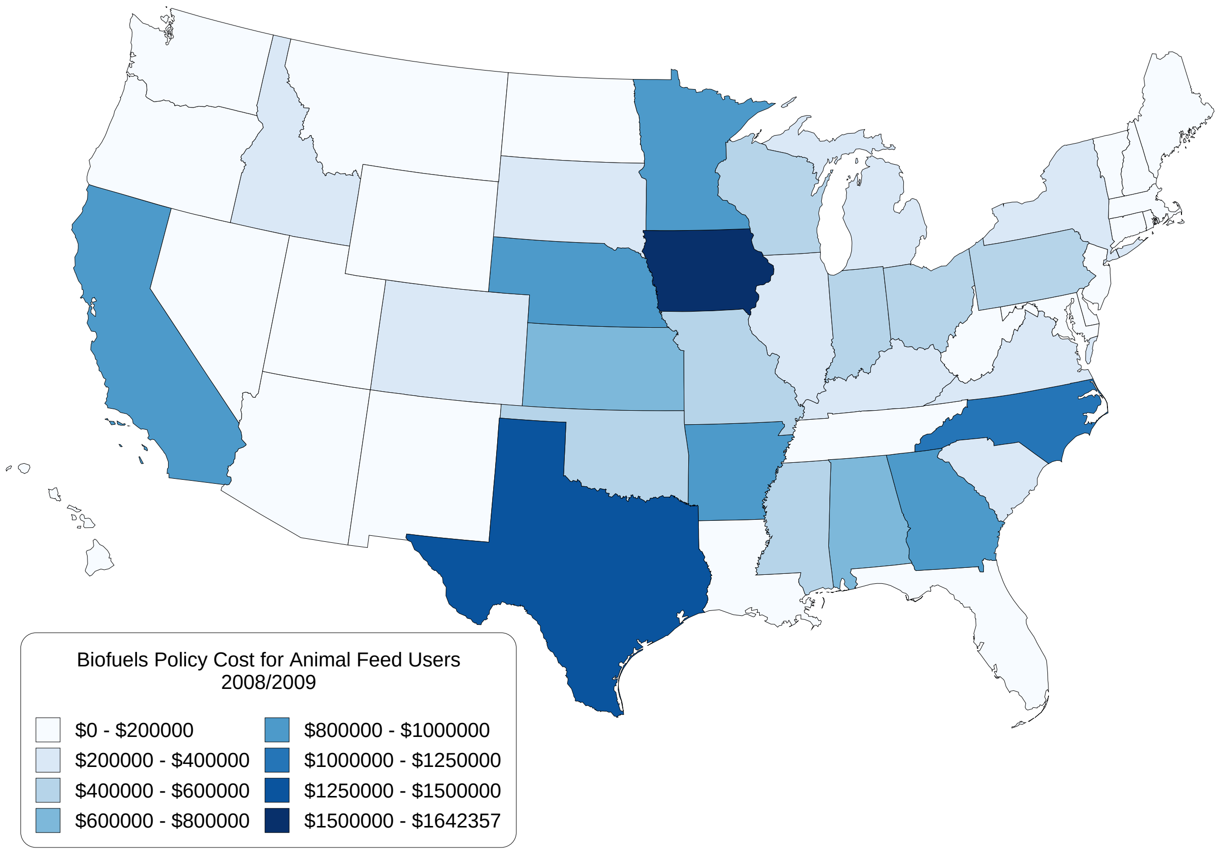
Increased feed costs per head for poultry, hogs and cattle were pro-rated by the estimated number of head produced or in inventory for each state. Estimates are shown in Table 10 and Figure 15. The total feed cost increase of $17.7 billion does not include minor feed uses or food and biofuel production cost increases other than animal feed.

States with large animal populations are obviously the most heavily affected by the higher prices for corn, soybean meal and other feed ingredients.

Table 10: Estimated Biofuels Support Policy Cost by State and Animal Feed User
2008/2009 ($000)

State (ex. Alaska)	Broilers	Turkeys	Layers	Market Hogs	Fed Cattle	Dairy Cows in Milk	Total Animal Feed Uses
Alabama	$555,252	$0	$60,912	$13,197	$642	$4,214	$634,218
Arizona	$0	$2	$0	$8,345	$38,813	$51,176	$98,336
Arkansas	$624,830	$102,050	$98,209	$48,678	$775	$6,322	$880,864
California	$139,617	$53,746	$133,439	$9,890	$85,119	$532,829	$954,641
Colorado	$11	$0	$26,013	$93,648	$234,721	$31,608	$386,002
Connecticut	$142	$17	$19,470	$127	$193	$6,021	$25,970
Delaware	$141,844	$0	$0	$1,947	$109	$2,107	$146,007
Florida	$39,533	$10	$75,898	$2,071	$0	$40,338	$157,851
Georgia	$728,512	$4	$134,517	$24,617	$557	$23,481	$911,688
Hawaii	$472	$0	$3,095	$711	$883	$1,385	$6,547
Idaho	$4	$11	$4,429	$1,425	$66,686	$142,389	$214,943
Illinois	$44	$9,185	$33,282	$245,432	$53,637	$31,307	$372,887
Indiana	$13,608	$46,943	$169,657	$200,184	$17,945	$47,563	$495,901
Iowa	$5,124	$27,894	$356,222	$1,016,900	$179,924	$56,293	$1,642,357
Kansas	$49	$9,905	$0	$110,307	$544,812	$33,114	$698,186
Kentucky	$152,333	$26	$31,417	$24,478	$4,353	$30,705	$243,313
Louisiana	$116,295	$2	$12,741	$819	$243	$9,633	$139,733
Maine	$25	$74	$27,817	$315	$389	$9,633	$38,253
Maryland	$143,267	$2,483	$18,703	$3,029	$1,984	$21,072	$190,539
Massachusetts	$16	$211	$1,700	$439	$105	$4,817	$7,287
Michigan	$2,159	$15,648	$59,268	$56,745	$21,472	$93,922	$249,214
Minnesota	$24,194	$153,075	$76,548	$471,022	$68,892	$133,960	$927,691
Mississippi	$423,687	$11	$44,903	$20,120	$145	$7,225	$496,091
Missouri	$146,419	$68,033	$49,795	$211,620	$22,455	$34,318	$532,640
Montana	$54	$92	$2,356	$9,776	$8,189	$5,720	$26,186
Nebraska	$2,688	$0	$80,963	$212,732	$566,646	$18,062	$881,091
Nevada	$2	$4	$54	$291	$1,558	$8,128	$10,035
New Hampshire	$0	$17	$1,002	$173	$70	$4,817	$6,078
New Jersey	$42	$112	$10,772	$720	$176	$3,462	$15,284
New Mexico	$0	$26	$0	$111	$26,253	$102,351	$128,741
New York	$1,510	$2,143	$27,243	$4,222	$4,712	$196,274	$236,104
North Carolina	$394,802	$127,563	$76,196	$567,420	$144	$15,654	$1,181,778
North Dakota	$100	$4,422	$2,077	$17,382	$9,876	$9,934	$43,791
Ohio	$24,036	$17,349	$196,044	$104,465	$28,712	$82,182	$452,788
Oklahoma	$131,460	$5,779	$21,902	$224,106	$99,258	$22,577	$505,083
Oregon	$9,272	$44	$18,724	$1,453	$24,584	$36,425	$90,502
Pennsylvania	$76,378	$35,718	$164,151	$63,131	$21,030	$167,977	$528,382
Rhode Island	$0	$37	$396	$117	$8	$301	$860
South Carolina	$119,706	$32,656	$34,616	$16,582	$441	$5,118	$209,117
South Dakota	$172	$14,287	$22,434	$119,965	$82,819	$24,384	$264,061
Tennessee	$112,537	$18	$8,270	$12,517	$180	$21,072	$154,595
Texas	$331,180	$38,618	$129,680	$44,970	$639,767	$97,836	$1,282,051
Utah	$2	$0	$23,885	$40,272	$12,521	$25,588	$102,267
Vermont	$61	$187	$1,354	$164	$356	$43,048	$45,170
Virginia	$135,044	$73,136	$22,738	$20,275	$8,784	$31,006	$290,984
Washington	$17,699	$143	$33,406	$1,298	$29,482	$71,345	$153,373
West Virginia	$47,281	$12,246	$8,243	$423	$1,313	$3,913	$73,420
Wisconsin	$20,188	$37,253	$32,467	$29,365	$41,136	$373,281	$533,689
Wyoming	$1	$2	$83	$11,284	$16,558	$2,107	$30,035
Total U.S.	$4,681,655	$891,180	$2,357,093	$4,069,282	$2,969,425	$2,727,993	$17,696,627

Figure 15: Estimated Animal Feed Biofuels Support Policy Cost by State



Other Costs of Biofuels Support Policy

Even though biofuels support policy increases costs in the food production system, we could justify those costs if there were offsetting benefits. Included in potential benefits could be increased energy security, increased overall economic growth, reduced energy costs and economic equity and general welfare. The following sections will examine these arguments.

Does Biofuel Support Policy Promote Fuel Security?

Part of the rationale for biofuels is diversification of energy production to increase security of energy supply and increased U.S. energy independence[23]. Even a cursory examination of those claims shows that they are highly questionable.

Crop production is subject to natural forces of rainfall, disease and pests that can result in large year-to-year variations in production. In the last 17 years we have

[23] http://www.ethanolrfa.org/resource/facts/energy/

seen corn production variations of 10% or more in 7 years. Soybean production has varied 10% or more in 8 of those years.

To the extent that ethanol is replacing gasoline our petroleum sector will have lower incentives to add petroleum refinery capacity for the fuels that biofuels will replace. When the next large drop happens in corn and soybean production we will be short of both biofuel feedstocks. We may not have the petroleum refinery capacity to produce more fuels from increased oil imports needed to replace a lower biofuel feedstock supply. The only answer will be to import expensive refined fuels to replace the biofuels and petroleum products that we cannot make until the next harvest comes in. Or, we could mandate the use of feedstocks for biofuels in the face of a crop shortfall and create genuine food shortages at much higher costs and prices. Either solution leaves us more vulnerable on both food and fuel supply than we are today.

The combination of the current RFS and a crop failure could be devastating to the U.S. food and fuel production systems. Without substantial relief from the RFS requirements the supplies available for food production from a 10% reduction in corn and soybean yields could send food and ethanol prices to levels far beyond those in this study.

A drought that causes yields 10% below those used for Table 2 and abandonment of an additional 1 million acres of both corn and soybeans was simulated for the 2008/2009 crop year. This scenario causes ethanol production to drop from 9.8 to 9.0 billion gallons and methyl ester production to decline to only 200 million pounds. Corn prices, farm level, increase from $4.85 to $5.50 per bushel. Soybean meal prices increase from $400 to $500 per ton. Corn feed use declines from 5.7 to 5.4 billion bushels. DDGS production and feed use decline in line with ethanol production. Soybean meal feed use declines from 33 to 31 million tons. Meat, poultry and dairy production would also show sharper declines than those in Table 9.

Proponents of biofuels also claim that by increasing U.S. production of biofuels we can become more independent of imported oil[24]. It is true that biofuels may have some minor impact on oil imports. In 2007 ethanol production had the energy equivalent of about 3% of U.S. oil imports. However, the amounts of biofuels needed to make a significant difference in our strategic position on oil imports cannot be produced with todays, or prospective, feedstocks and technology.

The maximum gross biofuel production[25] from the **ENTIRE** 2007 U.S. grain and soybean crops would equal only 10% of U.S. petroleum use and 17% of our oil imports[26]. The **ENTIRE** 2007 world grain crop can supply the energy of only about 5% of global oil production. Of course, we can use only a small fraction of our food supply for fuel production. Biofuels made from food simply cannot replace enough

[24] http://www.ethanolrfa.org/resource/facts/energy/
[25] Not including the petroleum used to produce biofuels.
[26] Maximum U.S. corn/soy biofuel production is currently only 1.1% of global crude oil production.

petroleum fuel to make a significant difference in our vulnerability to oil import interruptions, oil supplies, or oil prices.

As long as we import any significant percentage of our oil consumption we will remain vulnerable to those who can interrupt those supplies. We will also need to remain vigilant in protecting our access to oil from the global market.

Longer term, biofuels from cellulose and other feedstocks not used for food may hold greater promise than food-based biofuels, but there are significant technological issues to be overcome. There are also major issues with alternative feedstocks competing with food crops, or forests and grasslands, for acreage. Even if we were to significantly convert forest land and other non agricultural land to biofuels we cannot make a significant dent in today's fuel supply requirements.

The realism of the new RFS has already been brought into serious question. On March 5, 2008, only 3 months after it was made law, the U.S. Department of Energy informed the Congress that it is unlikely that the 2022 RFS for cellulose-based ethanol can even be achieved[27].

In summary, fixed tax credits and RFS requirements increase both costs and potential price instability for both food and fuel. It is difficult to see how this policy results in increased security or any meaningful reductions in vulnerability to interruptions in U.S. oil imports. Cellulose-based ethanol faces many economic and technical hurdles before it makes any contribution to energy supplies. Even if we convert large amounts of land to cellulose biofuel production the yields are not high enough to have a significant effect on total energy supplies or prices.

Does Biofuels Support Policy Promote Economic Growth and Create Jobs?

Subsidies do not create wealth or value, they only redistribute it. If biofuels did not depend on significant public support this statement would have some merit. However, the over-expansion of biofuel production due to public financial support means that we are producing biofuels at total costs that are much higher than the market value of the petroleum fuels that are produced. In the process we destroy, not create, value in the rest of the economy.

According to a study from LECG[28], and cited on the Renewable Fuels Association Web site, in 2007 ethanol created $12.3 billion in household income. The study was sponsored and paid for by the RFA.

In this study's model used to estimate biofuel support costs increased costs from biofuels support policies for the rest of the economy during 2007 were about $24.5 billion. In other words, every $1.00 in extra household income created by ethanol support cost someone else in the economy about $2.00. This is precisely the result that would be expected from any industry that relies of high levels of subsides.

[27] http://www.dtnethanolcenter.com/index.cfm?show=10&mid=70&pid=11
[28] http://www.ethanolrfa.org/objects/documents/1537/2007_ethanol_economic_contribution.pdf

The job losses from biofuels policy for just Pilgrim's Pride alone (see page 29) are a stark statement that any benefits of biofuels expansion are coming at a high cost. The 1,100 jobs lost at Pilgrim's Pride are about the same number of employees at 30 ethanol plants, or 55% of the plants that will open this year.

The cost that biofuels policy is imposing on other sectors is a drag on the overall economy and result in lost economic growth and jobs in other sectors as well. We simply cannot subsidize our way into long term economic growth and job creation.

Does Biofuels Policy Reduce Energy Costs?

As has been pointed out in this study the total cost of ethanol is nearly double that of gasoline. Biodiesel costs are so high that production is declining, even with substantial Federal price support. Even excluding costs born by others, ethanol and biodiesel are both priced above the fuels they replace. Biofuels policy has in fact increased, not decreased, U.S. energy costs.

This point is illustrated by recent earnings ethanol producers. On March 12, 2008 VeraSun Energy, announced it latest sales and profits. From the Houston Chronicle:

"VeraSun Energy Corp. reported a diminished fourth-quarter profit as the company had to charge lower prices for the ethanol it produces while paying more for the corn used to make the alternative fuel.

Results still beat the expectations of Wall Street analysts, who had predicted a loss.

The ethanol producer's net income fell 81.4 percent to $4 million, or 4 cents per share, from $21.4 million, or 27 cents per share, a year earlier.

Its gross margin dropped to 9.9 percent from 27.9 percent in the fourth quarter of 2006[29]."

In summary, one of America's largest ethanol producers is struggling to pay the increased costs corn that biofuels policy helped cause. As the ethanol industry continues to increase capacity in the face of limited corn availability in the 2008/2009 crop year VeraSun's fortunes will further decline. So will those of food producers who are also victims of this same policy.

Is Federal Biofuels Policy Efficient and Equitable?

Biofuels alone, produced in a market-driven environment, would arguably result in a net gain to the U.S. economy. However, federal biofuels policy fails on two major criteria of any public policy; efficiency and equity.

Biofuel policy fails on efficiency grounds because the policy, by raising the prices of biofuel feedstocks (and other feed and food ingredients) to artificially high levels, increases costs to other users of those feedstocks. In effect, biofuels support policy

[29] Houston Chronicle, 3-12-08. http://www.chron.com/disp/story.mpl/ap/fn/5612536.html

takes biofuel feedstocks away from uses that the market places a relatively high value (food) and channels them into relatively lower value uses (liquid fuels)[30]. Costs are raised for all users of feedstocks, including even the biofuel users themselves.

By raising costs in the food and fuel sector biofuels policy forces consumers to spend less on non-food/fuel purchases if they are to maintain their real level of food and fuel consumption. There is a redistribution of purchasing power, income and jobs, but no net real gain after higher prices are taken into account.

On equity grounds biofuel support policy also fails. Costs of food and fuel production are increased, disproportionately affecting those least able to afford higher food and fuel costs. In effect, biofuels support policy acts as a regressive tax on the poor and grants a windfall gain to a relatively few large farmers.

Not only does this regressive tax affect the U.S., our biofuels policies have helped increase global food costs. The poorest of the poor around the world are the most heavily affected, and have no influence on the policies that are making them worse off. In perspective, according to a World Bank study the 500 pounds of grain required to fill the 25 gallon tank of a sports utility vehicle with ethanol could feed one person for a year[31].

Professors C. Ford Runge and Benjamin Senauer, of the University of Minnesota have studied global hunger and malnutrition for a number of years. Four years ago, before biofuels supports significantly affected feedstock prices, they projected the number of hungry and malnourished people decreasing from over 800 million to 625 million by 2025. In early 2007 they updated their study, taking into account biofuel effects. The revised study shows the number of hungry people climbing to 1.2 billion by 2025[32].

In effect, with this policy the U.S. is telling the world that we will hoard our food supply to fuel our automobiles.

Long Term Issues – The Food-Fuel Cost Link

Increasing energy prices have made biofuels into a significant source of demand for food commodities. Even without any government support we would be producing significant amounts ethanol from grain at today's $100 level of crude oil prices.

If real oil prices continue to escalate we may have some very difficult choices to make. Higher oil prices will attract increasing biofuels production capacity and further raise the price of food commodities used for both food and biofuel production. At

[30] If this is not a true statement then why do we need biofuel tax credits?
[31] World Bank. Biofuels: The Promise and the Risks
[32] C. Ford Runge and Benjamin Senauer. How Biofuels Could Starve the Poor. Foreign Affairs, May/June 2007

some point society may want to consider taxing, not supporting, food-based biofuel production. Even ignoring Federal supports, at $200 per barrel for crude oil corn might be worth $8-9 per bushel and soybean meal $700-800 per ton. At those prices U.S. food production would be curtailed and prices would rise at 2-3 times the current rate.

We need to debate the food-fuel link in light of not yesterday's relatively low energy costs and prices, but the current environment of higher costs and uncertainty. At some point public policy needs to address the potential issue that the energy sector could seriously compromise access to an ample and affordable food supply for the entire country.

Conclusions

U.S. biofuel support policy has achieved its goal of promoting increased production of ethanol and biodiesel. Both fuels are currently being produced much higher rates than marketplace forces alone would allow. The increased production rates are, however, coming at a heavy cost to the U.S. economy.

Driven in part by large biofuel tax credits, costs of feedstocks used to produce biofuels have increased to levels well beyond free market-based values. Increases costs are falling heavily on U.S. food producers, and biofuel producers themselves. Perhaps the greatest irony of our biofuels support policies is that biofuel producers have seen their once-generous profit margins erased by rising costs of corn and soybean oil. It was those very same biofuels producers who, with the help of crop producer associations, sponsored the current biofuels support policy.

Increased costs of biofuel feedstocks are slowly winding their way through the U.S. food production and marketing system. It is difficult to point to any one item and say that the retail price has been affected by a given amount. It is, however, an inescapable fact that we are paying for biofuels support policy at the gas pump, in the grocery store, and at restaurants. The invisible cost increases for food, while not significant for any one purchase, about doubles the total costs of corn and soybean based biofuels.

Even the President of the United States, a major supporter of biofuels, has admitted that there is a significant issue with food prices that is tied to ethanol. From a press conference on March 5, 2008[33]:

"President George W. Bush said Wednesday that the national drive toward ethanol production was also driving up the cost of corn and other foods, a problem he said needed to be addressed. … Bush has previously pointed out that the price of corn has been pushed up by competition from ethanol manufacturers and that this had raised costs for companies that raise beef and hogs on corn. But addressing a

[33] http://www.nytimes.com/2008/03/05/washington/05cnd-energy.html

conference on renewable energy on Wednesday morning, Bush said that this was also affecting the price that consumers pay for food."

Biofuels also fail to deliver on the promises of increased energy independence and security. In fact, our biofuels support policy will very likely reduce the reliability of both American's food and fuel supplies.

Biofuels themselves are also significantly more expensive because of federal policy. Ethanol costs, including costs born by other feedstock users, are nearly double that of gasoline.

Biofuels policy acts as a regressive tax on the poor. By increasing the costs of food and fuel and increasing incomes of a relatively few farmers the program makes a massive income and wealth transfer from the poor to the relatively rich. One as to ask if any public representative would knowingly vote for such a program.

Looking forward, we need to address the potential that increasing energy prices could pull significantly more food into fuel production. At some point public policy needs to address food production priorities relative to fuel. We may want, at a future point in time, consider taxing, not supporting, biofuels made from food.

In light of what we have learned from experience with biofuels supports we already need to reexamine the balance between the benefits and real costs. That balance would suggest that the policy price supports and use mandates need to be sharply reduced, or even eliminated.

The alarm bells on the unintended effects U.S. biofuels support policy are ringing loud and clear. Whether or not anyone in the Congress is listening seems open to serious question.