An Economic Analysis of Likely Impact of Ethanol Production and DDGS Availability for use in Broiler Rations on Corn Grain Price in Alabama

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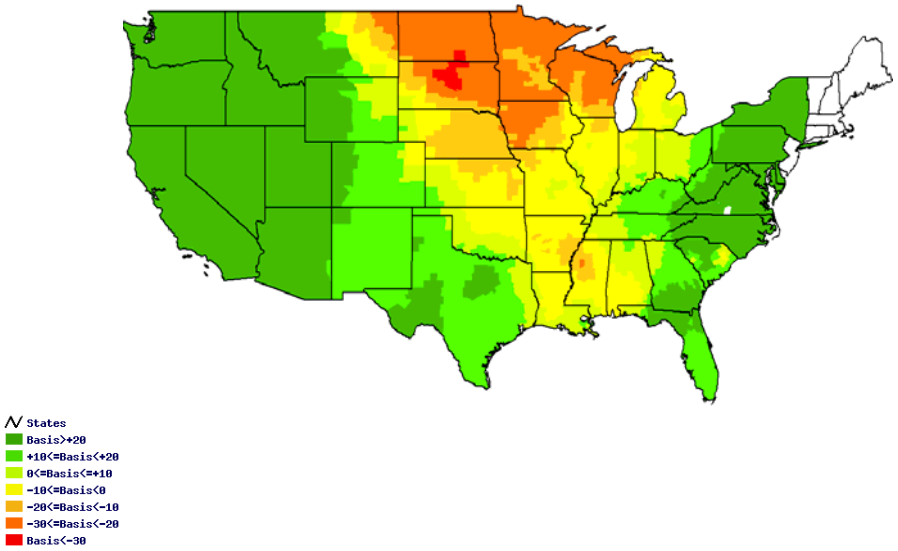

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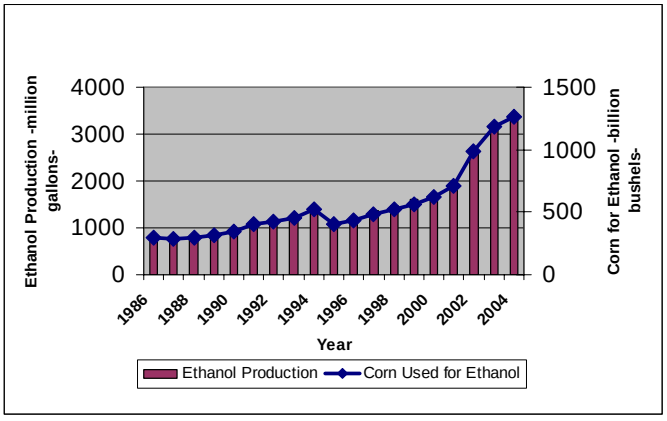
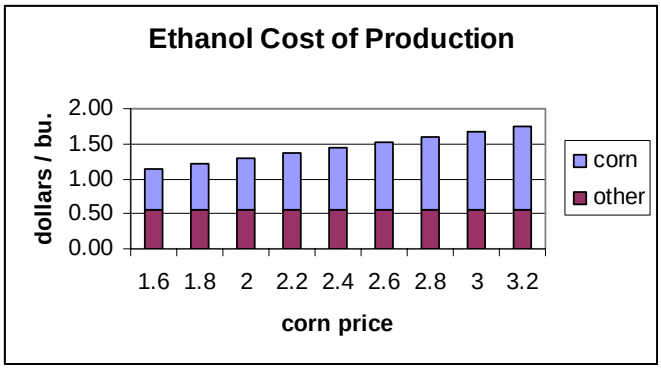
Background

In the US, a demand for corn exists both as a feed and as an ingredient in the manufacture of ethanol for fuel use. They are competing uses. A by-product of ethanol production, dried distiller's grain with solubles (DDGS), can be a feedstock for various kinds of livestock. Until recently, most of this DDGS was used in ruminant rations, especially for dairy cows. It is higher in protein (about 30% vs. 8% for corn) and high in energy as well. Recently, production of DDGS changed so that more of it was produced as a low-moisture, high quality product that could be used in the rations of monogastric animals such as hogs and poultry. According to experts, DDGS may replace up to 10% of the corn in broiler rations in the future. Both the demand for corn to produce ethanol and the resulting supply of DDGS for use in broiler rations have the potential to impact corn prices in Alabama.

US Ethanol Production

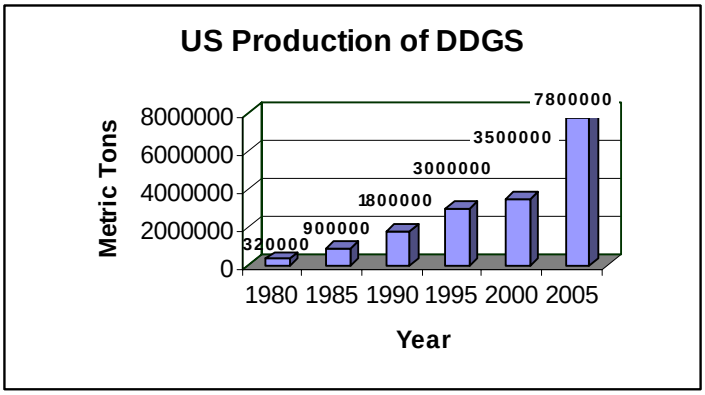
Total production of Ethanol in the US has steadily increased, and approached 4 billion gallons per year in 2004, the last year for which statistics are available. That level of production is expected to more than double over the next few years, increasing at the rate of 15-20% per year. Increased demand for corn due to expanded ethanol production is expected to significantly increase the average price of corn in the United States. Of course, these estimates are dependant on the price of corn and the price of crude oil. At $2 per bushel, total cost for ethanol production is about $1.30 per gallon.





Distiller's Dried Grains with Solubles (DDGS)

DDGS is a co-product of the distillery industries. Most (~98%) of the DDGS in North America comes from plants that produce ethanol for oxygenated fuels. The remaining 1 to 2% of DDGS is produced by the alcohol beverage industry.



Approximately 3.2 to 3.5 million metric tonnes of DDGS are produced annually in North America. Ethanol plants in Minnesota and South Dakota produce approximately 25% of this amount (850,000 to 900,000 tonnes) annually. Most of the ethanol plants in Minnesota and South Dakota are small, farmer-owned, and relatively new (less than 10 years old). These plants are utilizing new technology (e.g. batch fermentation) and improved quality control procedures to produce a higher quality DDGS compared to some older, larger, privately owned ethanol plants. In recent years, some regions of the U.S. have required the use of oxygenated fuels (e.g. ethanol-gasoline blends) to reduce air pollution from automobile emissions. Because of the increased demand for ethanol, the production of DDGS is expected to double within the next few years, further increasing the quantity of DDGS available for use in livestock feeds.

Theoretical Framework

In economic theory, the extent to which a change in price of a commodity affects quantity demanded is termed “elasticity”. Elasticity is simply the percentage change in Quantity divided by the percentage change in price. Elasticity measures the impact of a change in price on the amount of a commodity that will be purchased. The inverse of elasticity is “flexibility”. Flexibility is simply the percentage change in price divided by the percentage change in Quantity. Flexibility is a measure of the response of price to a change in the quantity demanded. In other words, if a new production technology reduced the need for a certain input used in a production process, economists would expect the price of that input to fall, holding everything else constant. Flexibility is simply the measure of how much that price would fall given the percentage change in input needed. Theoretically, all one would need to know to predict either the impact of increased demand for corn for ethanol production or the decreased demand for corn due to DDGS use in rations would be the flexibility of corn price in the US.

However, there is a second factor in the corn market in the US that must be considered. While corn is a fungible commodity, that is to say that one bushel of corn is very like any other, it is a fairly bulky, low-value product which is relatively expensive to transport. In the past, corn-using enterprises have tended to locate in or near corn production areas. The mechanism by which the price of corn is adjusted for local conditions of supply and demand is known as the “basis”. Basis is simply the difference between the local price and the price of corn on the Chicago Board of Trade (CBT). Regional differences in basis can commonly produce a 50-70 cent range in the price of corn across the US at the same point in time. During peak harvest, basis may be a negative 50 cents or more per bushel in the upper corn belt, but may be a positive 20-30 cents in the corn deficit areas of the southeast and far west (see corn basis map).

Any analysis of the likely impact of ethanol production and the resulting availability of DDGS for use in poultry rations must consider both these important factors.

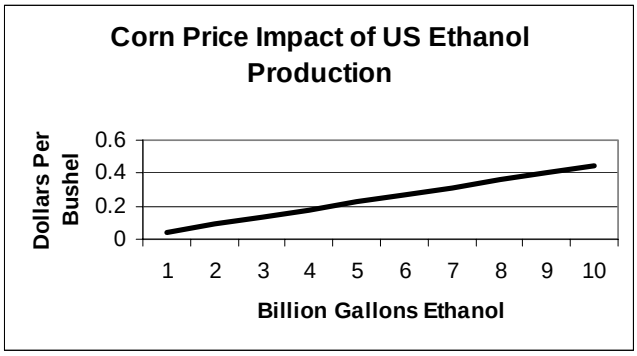
Methodology

A spreadsheet model of the corn market in Alabama was developed to estimate the likely impact of ethanol production and DDGS use on corn price. Variables included local, regional, and national estimates of corn supply flexibility. Three estimates of corn supply flexibility were necessary to estimate the impact of expanded ethanol production at the local or state level, the regional (Southeast US) level, and US level. In other words, location of an ethanol production facility in or near Alabama would naturally have a much greater impact on Alabama corn price than a similar plant located further away. Other variables included national corn supply and demand, which is in turn affected by demand for corn for feed and fuel uses. Finally, estimates of future Alabama broiler production were required to estimate the potential quantity of DDGS demanded for broiler rations. Model parameters included local, regional and national estimates of supply elasticity and flexibility, as well as estimates of local, regional, and national corn production. Local, regional and national supply elasticities were from various estimates published in Agricultural Economics literature, and corn production estimates were from USDA statistics from recent crop year. A "base" corn price of $3 per bushel was used in the analysis, and results using other "base" prices would be proportional to the ones presented. Using a "base" price of $2 per bushel would require results be reduced by 67.5%, while at $4 per bushel results would be 25% greater.

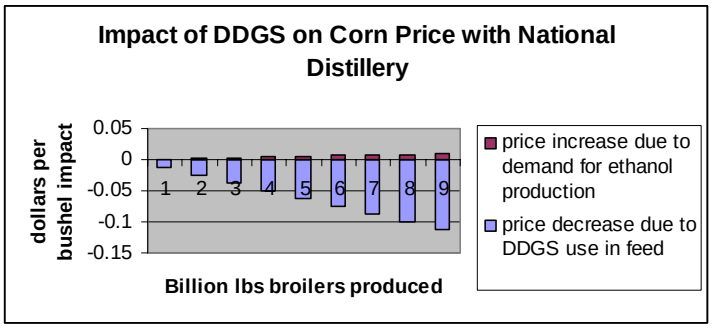
	Supply Elasticity	**Corn Prod (000 tons/yr)**
State	**0.1**	**644**
Region	**0.25**	**10808**
Nation	**0.5**	**336000**

Results

Estimates of the impact of ethanol production on US corn price have indicated that at current production levels the price of corn has been increased about 20 cents per bushel. If the current relationship between corn price and crude oil price holds, and if current tax incentives for ethanol production continue, most experts conclude that US ethanol production may exceed 10 billion gallons annually in just a few years. Holding everything else constant, such levels of ethanol production would imply about a 50 cent impact on US corn price. While this price impact is significant, for our analysis we hold it exogenous to the study, and consider only the ethanol price impacts that result in the production of DDGS used in Alabama poultry rations. In other words, for this study only the production of ethanol that results in the availability of DDGS used in poultry rations is considered.

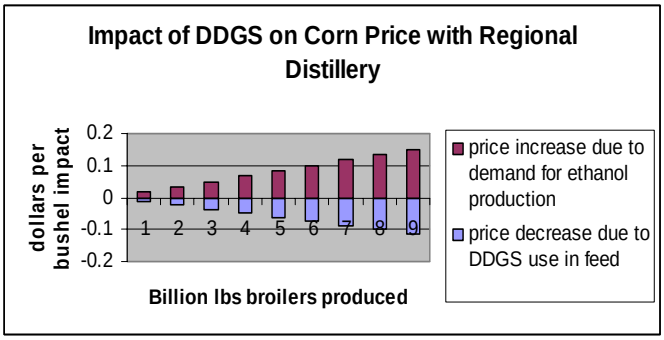


In such a case, the magnitude of these ethanol price impacts would greatly depend on the location of ethanol distilleries. Growers located near local distilleries would benefit most, and those whose farms are located far away would benefit least. If Alabama poultry integrators began using significant amounts of DDGS in broiler rations, logic would dictate that a reliable and relatively inexpensive supply of DDGS would be available. Given rising transportation costs, this would imply a relatively close ethanol production facility. To model the potential difference to Alabama grain producers of plants located nearby or further away, three simulations were required. The first assumed that no nearby ethanol plants were available. In this case it would be logical that the positive impact on corn price due to ethanol production would be less than the negative impact due to DDGS use.



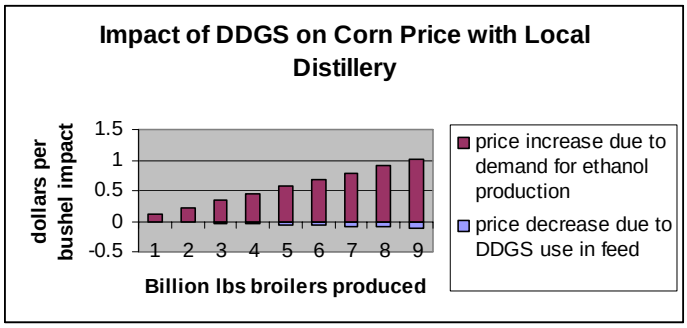
Model results conformed to this hypothesis. At current levels of broiler production in Alabama, use of 10% DDGS to replace corn and soybeans in broiler rations at a 30/70 ratio resulted in approximately a 5 cent per bushel decrease in local corn price due to DDGS and only a .4 cent per bushel increase due to ethanol production. Model results implied that even with broiler production much higher than at present, even double the current level, use of DDGS in rations would only result in an estimated 10 cents per bushel decrease in corn price.

When price impacts were estimated assuming a "regional" distillery, located somewhere in the Southeast US, demand for corn for ethanol production had a much larger impact on local corn price. In this case, the negative influence of DDGS use on corn price was more or less equally offset by the positive influence of ethanol production.



If a local distillery buying corn to make ethanol and supplying DDGS to the broiler industry to use in feed is assumed the price increase for ethanol production more than offsets the price decrease due to DDGS rations. This impact is simply due to the fact that more total grain would be consumed in the state.

We currently produce about 4 billion pounds per year, and at that rate, with a local distillery running enough ethanol to supply DDGS needs, we would see nearly a 50 cent price increase on $3 corn due to demand for corn for ethanol and about a 5-cent price decline due to decreased demand for corn due to its replacement by DDGS in the ration.



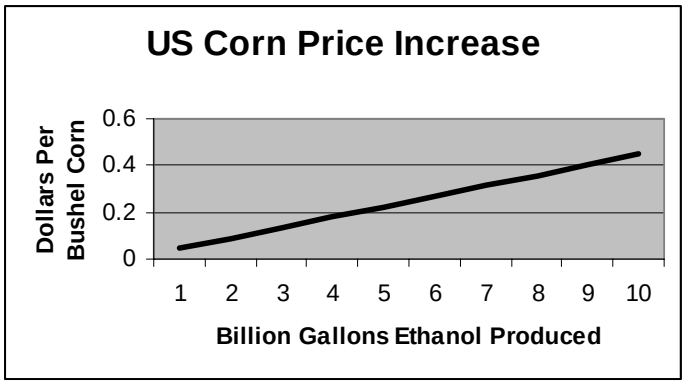
Since Alabama is a big corn deficit state, it is very unlikely that there will be a large ethanol plant located here. However, it is possible that we might get one in the region. If that happens, the price increase caused by demand for corn to make ethanol would be diluted somewhat. As you can see on the graph below, it would still be significant and would outweigh the price decrease caused by use of DDGS in rations.

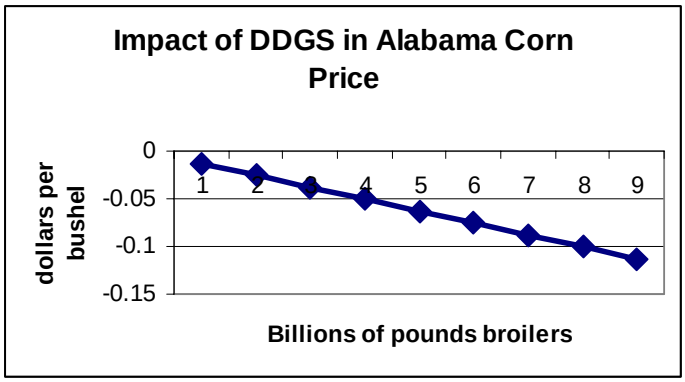
In this case, we would more or less break even, with the price increase from ethanol more or less offsetting the price decrease from DDGS use. Still, at reasonable broiler production rates we are only talking about 5-6 cents per bushel given a base corn price of $3 per bushel.

In summary, if we had local demand for corn reduced due to a supply of DDGS from a non-regional (National ethanol industry centered in the corn-belt) we could see the price of corn in Alabama significantly decrease. However, this scenario is not realistic because we assume in this model that only enough ethanol would be produced to supply DDGS for the Alabama poultry industry. In order for DDGS to be cheap enough to be attractive to integrators, given high transportation costs to Alabama from the corn belt, a tremendous quantity of ethanol would need to be produced. At present, demand for DDGS in the corn belt exceeds supply by about 100%. Corn belt distillers could produce twice as much ethanol without saturating the local market for DDGS. The outlook for Alabama grain producers in this case is that they would enjoy the benefits of increased demand for corn to some extent, but most of the benefit would be closer to the end users and be reflected in a fundamental change in the basis map.

The construction of a regional or local distillery could have more impact on Alabama producers. In this case not only are Alabama farmers much more likely to benefit from increased demand for corn for ethanol, poultry integrators are much more likely to find that DDGS can be economically incorporated into broiler rations. In this case, it is likely that any price decrease due to DDGS use will be at least equaled by a price increase due to ethanol production far in excess of the level needed to produce enough DDGS for a much higher level of broiler production than Alabama can environmentally sustain.

What is probably going to happen is that we will produce much more DDGS than required for feed purposes, and it will replace some corn in animal rations. However, the national price increase of corn due to increased demand in ethanol production will by far outweigh the price decline caused by use of DDGS in feed rations. If the US gears up to produce large amounts of ethanol from corn, the price impact will be significant and broiler producers will need cheap DDGS to keep costs contained. The current ethanol production rates at 4-5 billion gallons result in about 20-25 cents per gallon. It is risky to project price impacts at greater rates production, but it is probably safe to say that greater





rates of ethanol production will result in higher corn prices for Alabama corn producers. If DDGS is incorporated into broiler rations, without considering the increased demand for corn to produce the DDGS, there will probably a price impact. As shown on the accompanying graphs, the positive impact of US ethanol production will more than likely greatly outweigh the negative impact of DDGS use in broiler rations.

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