Impact of High Corn Prices on Ethanol Profitability

Daniel O'Brien and Mike Woolverton, Extension Agricultural Economists
K-State Research and Extension

Robert Wisner, Biofuels Economist,
Ag Marketing Resource Center, Iowa State University

July 15, 2008

Ethanol production has been blamed for a wide variety of things; some true; some not true, such as the sharp increase in the price of breakfast cereals and the high price of bread. Bread and cereal makers readily admit the price increases are more due to rising energy costs than the cost of grain (wheat and corn). The extreme highs in wheat prices earlier this year were due primarily to U.S. and foreign weather problems rather than to ethanol.

It is true that ethanol production adds substantially to the demand for corn, although livestock feed is still the largest demand factor; and probably will be for at least a few more years. The USDA is projecting that through 2017, ethanol production will not surpass livestock feed as the largest source of demand for corn. However, some private analysts see ethanol becoming the largest source of corn demand within the next three or four years as the industry expands to meet the government mandated level of corn-based ethanol production.

U.S. ethanol production capacity has been projected to increase from about 8.4 billion gallons at the end of 2007 to about 11.4 billion gallons in calendar year 2009, based on the mandates from last year's energy legislation. That would increase corn demand by one billion bushels; from 3 billion bushels in the 2007-08 marketing year ending this August 31 to about 4 billion in 2008-09. Both the capacity expansion and the increase in corn usage are slightly in jeopardy due to lags in capacity of distribution and marketing facilities. Monthly U.S. ethanol production since 2005 is shown if Figure 1.

Industry Expansion and the Relationship of Corn Prices to Ethanol and Co-Product Values**.** Since early 2007 the changing relationship between cash corn prices and the total value of ethanol and its associated co-products is the key factor affecting the profitability of ethanol

production. Nebraska corn prices, the value of corn ethanol and associated ethanol co-products since early 2007 are given in Figure 2. Weekly Friday ethanol plant revenue and corn costs reports provided by USDA-NASS (National Agricultural Statistics Service) assume that Nebraska ethanol plants market distillers grain in wet form (i.e., wet distiller's grains or WDGs). Similar USDA-NASS reports of ethanol industry costs and gross returns are not currently available for the state of Kansas. However, Nebraska ethanol plants are similar to those in Kansas in terms of their geographic proximity to (a) west coast and mountain state blended fuel markets, (b) major cattle feeding areas that can use of distillers grains co-products in wet cake form, and (c) western Corn Belt influences on feedgrain markets.

Nebraska corn prices ranged from $3.41 to $4.16 per bushel during the February through June 2007 period, before declining to nearly $3.00 per bushel during late August-early September of last year. During this same period, the total value of ethanol and distillers grains in Nebraska on a per-bushel-of-corn basis declined from highs in the $7.50-$7.75 range in March to a low of $5.07 per bushel in late September. Over the following 8 months (early October 2007 through mid-June 2008), Nebraska corn prices climbed 136%, from $3.03 to $7.14 per bushel. Over this same period, ethanol product values increased 85%, from $5.17 to $9.56. The greater proportional increase in corn prices relative to the sum of ethanol product and co-product values signal the declining profitability of ethanol production during the 2007-2008 period – especially in the month of June, when corn prices rose sharply in response to weather and crop concerns.

However, profitability of ethanol production is highly unpredictable due to volatile prices of both corn and ethanol. From mid-June to mid-July 2008, wholesale prices of ethanol at Nebraska plants rose $0.13-$0.26 per gallon (from $2.54 on June 13 to $2.67-$2.80 during the period of June 20 through July 11). During this same period, cash corn prices in Nebraska climbed from $6.78 on June 13 to around $7.20 in late June-early July before dropping to $6.43 by July 11. As a result, the profitability of an average ethanol plant changed from negative to a moderate profit in a month's time. Using the Kansas ethanol plant profitability model, it is estimated that these market fluctuations caused the profitability of Nebraska ethanol plants to increase from a loss of $0.11 per gallon of ethanol produced on June 13th to a profit of 0.11 per gallon on July 11th.

Longer-term Ethanol Profitability. In the spring of 2006, ethanol producers enjoyed windfall profits as ethanol replaced MTBE as the primary oxygenate for use in gasoline to reduce air pollution in accordance with state and federal clean air rules and regulations. The profit incentive augmented by government supports in the form of an import tariff, blenders' tax credit, and a renewable fuels usage mandate, caused a building boom in the U.S. ethanol industry. New ethanol plants sprouted in corn fields throughout the Corn Belt, and U.S. ethanol production capacity soared.

Ethanol plant profitability models used by K-State Research and Extension indicate that during February through August of 2007, ethanol production was generally profitable in Nebraska as measured on a "per gallon of ethanol produced" basis (Figure 3). It should be noted that the ethanol plant cost efficiencies represented by the K-State ethanol plant models may or may not exactly match those of any individual ethanol plants due to size, management, location, corn procurement practices, transportation, or debt load issues. Based on these calculations, it is estimated that ethanol plant profits were as much as $0.40-$0.53 per gallon of ethanol produced at times during the mid-March through mid-May, 2007 period. This time of relatively high profitability coincided with ethanol prices ranging from $2.16-$2.29 per gallon, and with the cost of ethanol production ranging from $1.68-$1.75 per gallon. Ethanol profitability turned negative in mid-September 2007 when ethanol prices declined to $1.53 per gallon, $0.06 per gallon below the cost of ethanol production.

From early September through early November 2007, ethanol production costs exceeded selling prices, resulting in estimated net losses of from $0.02 to as much as $0.22 per gallon (in late September) for the Nebraska ethanol plants (averaging losses of $0.09 per gallon) (Table 2). From December 2007 through May 2008, ethanol prices and production costs both trended higher. During this time ethanol production returns ranged from a small loss of $0.01 per gallon to profits of $0.29 per gallon (averaging $0.13 per gallon during the December 2007 through May 2008 period). By mid-June 2008, ethanol production costs had risen to $2.64-$2.72 per gallon, with ethanol prices in the $2.78-$2.80 range. Average net returns ranged from $0.08 to $0.16 per gallon of ethanol produced.

Impacts of Ethanol Profitability. Since mid-2007, U.S. corn prices have trended strongly upward as domestic feed grain supply prospects have lagged behind demand. Also, a tightening of crop acreage availability in the U.S. and abroad has helped to push up prices. As a result, profit margins for ethanol production were reduced in the later part of 2007 to the degree that almost no new ethanol plant plans were announced in the U.S.. In fact, a number of ethanol plants on the drawing boards were cancelled before construction could begin, and work was halted on a few plants that were already under construction.

Operating ethanol plants again felt the pain of declining profitability if not outright losses in late May and June of 2008 with rising costs of corn. The astronomical price of crude oil has caused gasoline and ethanol price to rise, but corn prices rose more on a percentage basis. Some smaller plants that were having trouble with financing arrangements, have shut down or postponed their start-up dates. A recent article reported that 16 ethanol plants either were in bankruptcy or were preparing to file for bankruptcy (source article: "Business Advisor: 16 Ethanol Plants Filing Bankruptcy, Many More to Come.", DTN, June 20, 2008). The same article predicted many small and medium sized plants would soon be moth-balled until profit margins improved. Anecdotal reports from ethanol producers indicate that even large scale, efficiently run plants temporarily reduced corn grind and ethanol production at the peak of the corn market this spring.

Besides the price of corn, two other factors have significant impact on the ability of ethanol plants to remain profitable: (1) availability of corn within a reasonable distance and (2) the ability to sell distiller's grains wet. Historically high diesel fuel prices make hauling grain long distances expensive. The high price of natural gas makes it costly to dry distiller's grains. Ethanol producers that have ample local corn supplies and can sell wet distiller's grain to local livestock feeders have a distinct advantage.

Conclusion. The bottom line is that in 2008 and 2009, the profitability of U.S. ethanol production will remain volatile and highly sensitive to corn prices as well as prices of crude oil, gasoline, and ethanol. In the January through May 2008 period, U.S. Energy Department data indicate U.S. ethanol production was 41 percent higher than a year earlier. However, if returns had been as depressed as in June 2008 for an extended period, the increase would have been less.

If corn supplies tighten this summer and fall, the RFS (Renewable Fuels Standard) mandate will provide strong incentive to meet the production standards established by the December 2008 Energy Legislation. Since the legislation has mechanisms that insure enforcement, these RFS mandates will force ethanol into the fuel market at the required level and will allow ethanol plants to pay the corn price necessary to reach the prescribed production levels. Developments that could cause ethanol output to fall modestly below the mandates include changes in the mandates themselves, inadequate ethanol distribution and marketing capacity to absorb the increased production, or a sharp drop in crude oil and gasoline prices.

Figure 1.

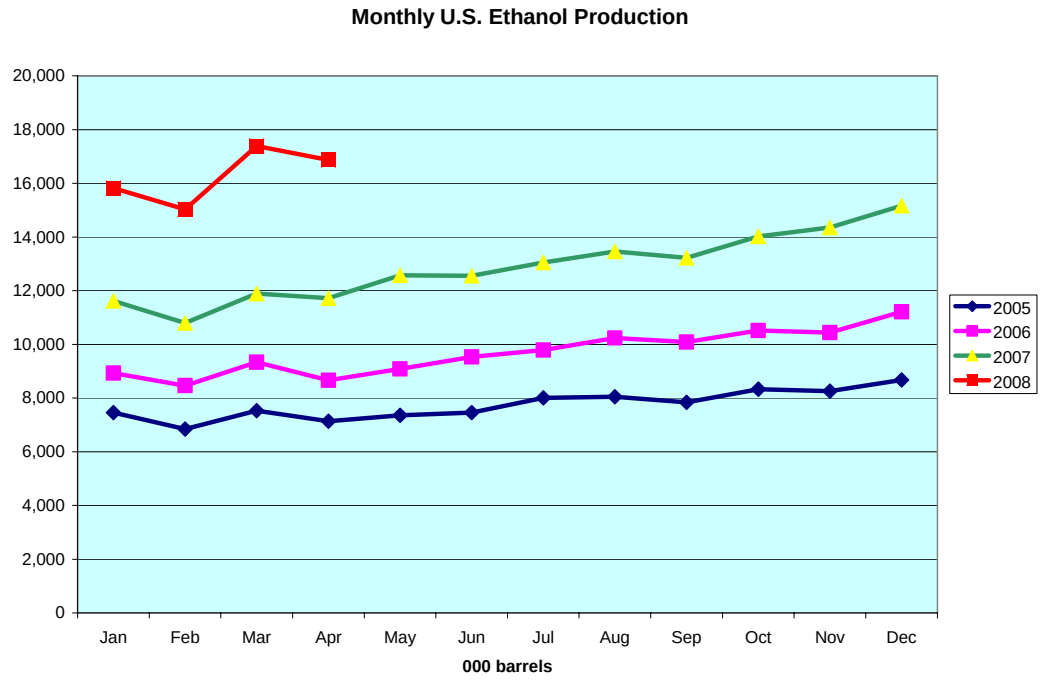

Figure 2.

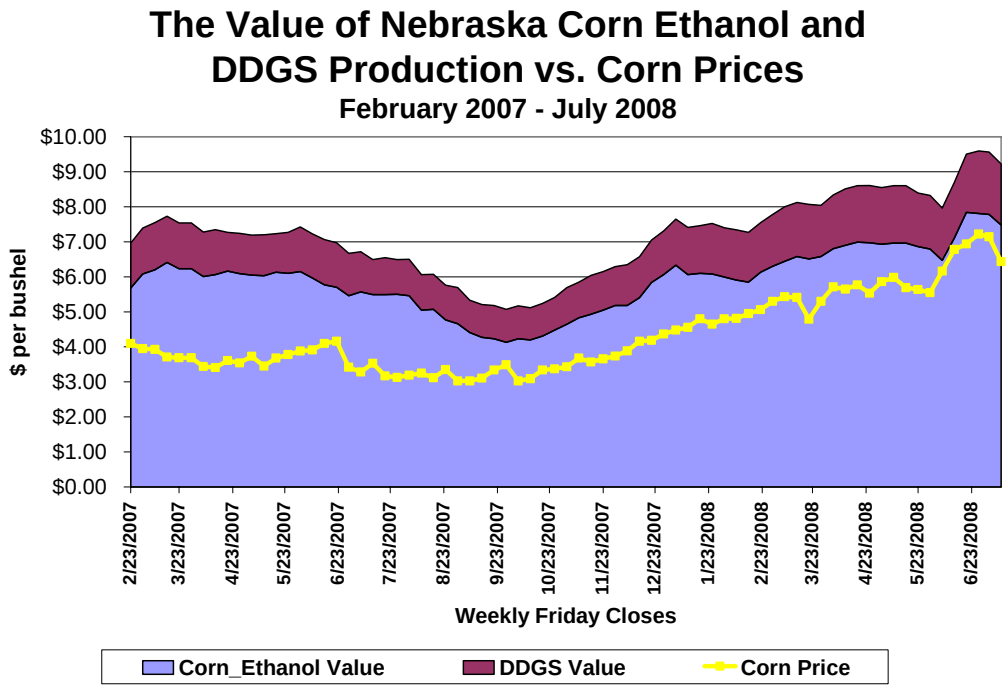

Figure 3.