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prices, profitability and supply/demand

The following spreadsheets have been updated on the AgMRC Renewable Energy web site, http://www.agmrc.org/renewable_energy/.

prices

- midwest ethanol prices
- ethanol basis
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- fuel vs. grain (monthly)

profitability

- ethanol profitability
- corn profitability
- biodiesel profitability

supply/demand

- corn/ethanol balance sheet
- soy oil biodiesel balance sheet
- soybean balance sheet
- distillers grains balance sheet



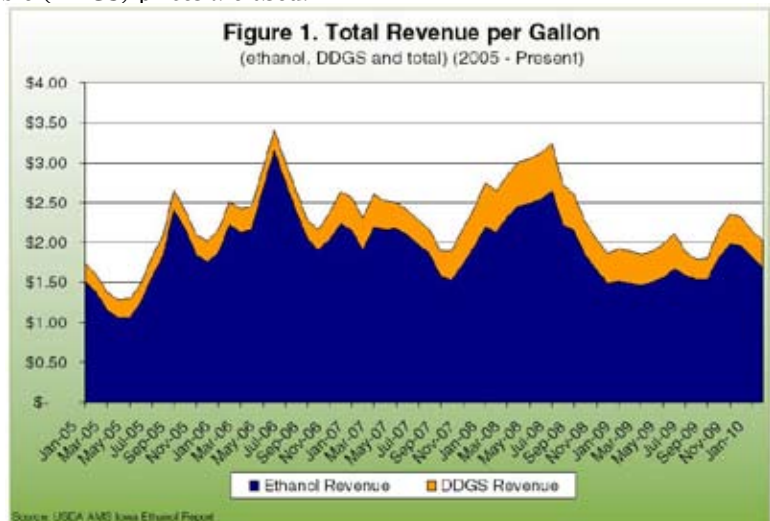
Iowa Corn Ethanol Supply Chain Profitability

by Don Hofstrand, Co-director, Agricultural Marketing Resource Center, dhof@iastate.edu

In this article we will examine the corn ethanol industry supply chain and the profitability of this supply chain over the last five years. The corn ethanol supply chain is composed of two major segments – ethanol production and corn production. We integrate these two segments into a supply chain because corn is by far the largest production input currently making up 65 percent of the total cost of producing ethanol. We will see that the profitability of the supply chain varies greatly. The allocation of these profits/losses between the corn producer and the ethanol producer also varies greatly.

The monthly revenue from ethanol production over the last five years is shown in Figure 1. In this analysis the spot ethanol and distillers dried grains and soluble (DDGS) prices are used.

Revenue has been quite volatile and is currently substantially below the peaks that occurred in mid-2006 and mid-2008. The great majority of the revenue is composed of income from the sale of ethanol. Although the sale of the ethanol production co-product of DDGS is significant, it makes up a relatively small fraction of total revenue. The other co-product of ethanol product is carbon dioxide (CO₂). Although some corn ethanol plants sell carbon dioxide to the soft drink industry, most facilities simply vent it into the atmosphere. The carbon dioxide emissions do not increase atmospheric levels because it is part of the natural carbon cycle. This carbon dioxide originates from the atmospheric carbon used for plant development from the process of photosynthesis by the corn plant.



The cost of producing ethanol, when corn is priced into the analysis at its cost of production, is shown in Figure 2. Based on the cost estimates used in the analysis, the cost per gallon of ethanol has risen from just under \$1.50 per gallon to over \$2.00 per gallon of ethanol. The blue and orange sections are the cost of producing corn. The dark blue represents cropland cost (cash rent) and the orange represents all other production inputs such as seed, chemicals, fertilizer, fuel, machinery, etc. (less any government payments). As can be seen, the cost of producing corn has increased significantly over the five year period and has been the driver of the ethanol supply chain cost increase.

The light blue section represents the cost of natural gas to operate the ethanol

facility. This cost has generally declined over the period as natural gas prices have declined. The other ethanol production operating (variable) costs such as chemicals, electricity, water and other costs have been held constant in the analysis. Ethanol facility fixed costs such as depreciation, interest on debt and labor costs are represented by the green section.

When the total revenue and total cost figures are combined, a picture of periods of high supply chain profitability interspersed with periods of breakeven (or small losses) emerges as shown in Figure 3.

The mid-year revenue peaks of 2006 and 2008 were periods of high profitability for the corn ethanol supply chain. However, declining ethanol prices and increasing corn production costs have

resulted in roughly a breakeven period throughout 2009 and into 2010.

The allocation of these profits between corn production and ethanol production is shown in Figure 4. The profit line from Figure 3 is replicated in Figure 4 (dark blue line) and shows the period of high profitability and breakeven. The light blue line shows the ethanol producer's profits and the orange line the corn producer's profits. During the 2006 peak, the corn ethanol industry was rather small and, although ethanol prices were very high, corn prices remained low. The profits accrued at the ethanol producer level. These large profit margins stimulated a rapid expansion of the corn ethanol industry. So, when the ethanol revenue peak of 2008 occurred, the profits were bid into higher corn prices due to the increased demand for corn from the expanded ethanol industry. The allocation of profits was opposite from that experienced in the mid-2006 revenue peak.

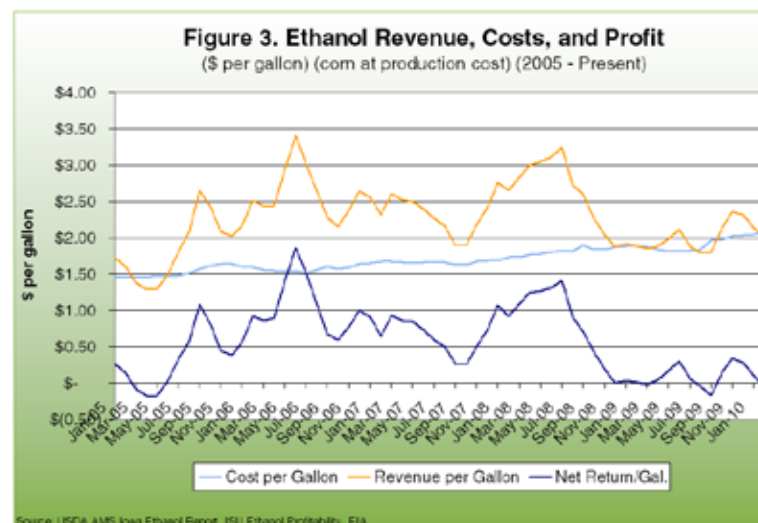
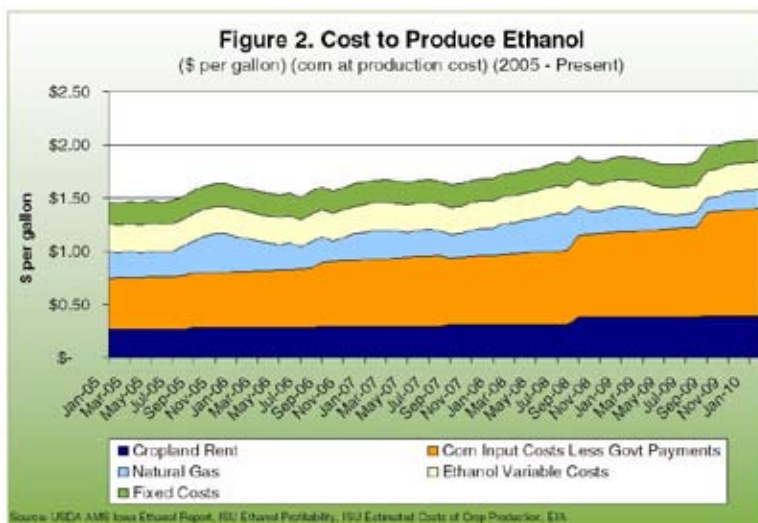
The large corn producer profits were quickly translated into higher cropland cash rental rates and higher production input costs (especially fertilizer). This resulted in the increase in supply chain costs shown in Figure 2.

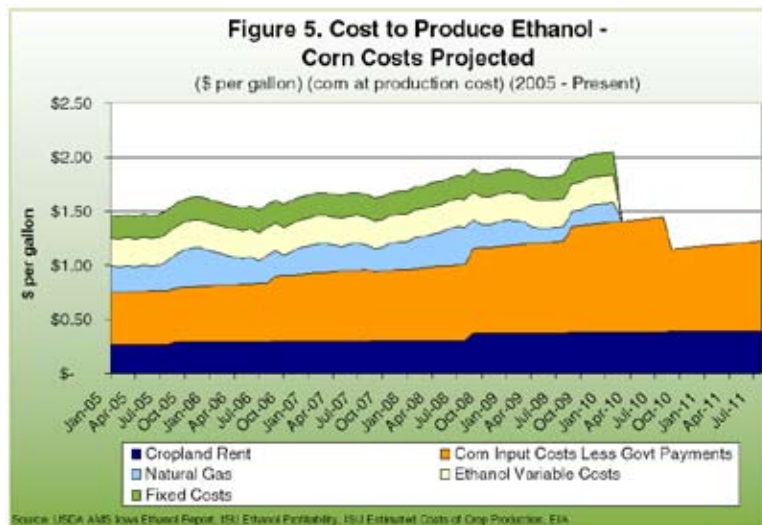
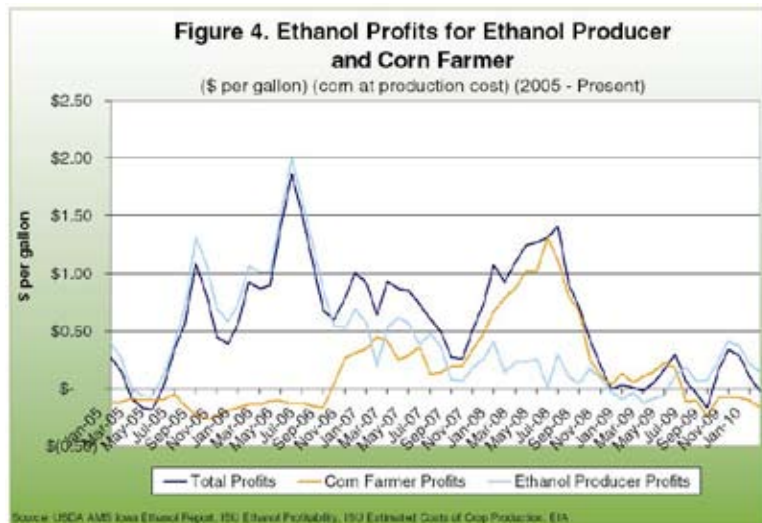
During 2009 and into 2010, the corn ethanol supply chain has fluctuated between periods of profits and losses. During the first part of last year, corn price was high enough to allocate small profits to the corn producer and small losses to the ethanol producer. During the last half of last year and into 2010, it appears as though the situation has been reversed.

Future supply chain profitability
Near term

During late 2010 and 2011 the corn ethanol supply chain cost of production is expected to drop as shown in Figure 5. Corn production input costs (especially fertilizer) have declined from their lofty levels of the 2010 corn crop. Also, natural gas prices are expected to stay moderate in the future.

However, much uncertainty exists as to whether this will translate into profit-





ability for the corn ethanol supply chain. Although crude oil prices are relatively strong, concerns exist as to whether ethanol prices will continue to follow gasoline prices. Evidence is emerging that we may be rapidly approaching the ethanol “blending wall”. The blending wall is a limit on the amount of ethanol that can be blended with the nation’s gasoline. Current law dictates that gasoline sold in the U.S. cannot contain more than 10 percent ethanol, except for the very limited E-85 market.

The U.S. Environmental Protection Agency is currently assessing the safety of increasing the maximum blend amount. They recently announced that they are considering raising the maximum to 15 percent for newer motor vehicles. They originally stated that they

would make a final decision by early summer. The decision was recently postponed to late summer.

Although flex-fuel vehicles can burn up to an 85 percent blend of ethanol to gasoline, the limited number of flex-fuel vehicles and the limited number of E85 fuel stations greatly limits the amount of ethanol that can be merchandized in this fashion. Moreover, ethanol price must be at a significant discount to gasoline to incentivize flex-fuel drivers to purchase E85 due to its lower Btu content.

So, the blend wall is a significant threat to the profitability of the corn ethanol supply chain. It is exacerbated by the limited ethanol storage capacity of most ethanol producers. Ethanol producers are required to move ethanol into the transportation fuels system rapidly

because of this limited storage capacity. If the blending wall creates an ethanol glut in the marketplace, ethanol producers have limited ability to hold inventories off of the market to smooth-out the impact of the excess. This could cause a rapid drop in ethanol price, thereby pushing the corn ethanol supply chain into the red. Initially the losses would accrue to ethanol producers. However, as ethanol facilities close down and cause corn demand to decline, at least a portion of these losses will be passed on to corn producers in the form of lower corn prices.

Whether we are actually reaching the blend wall is still an uncertainty. However, even the threat of reaching the blending wall heightens the need to push the wall back by allowing higher blends of ethanol in gasoline.

Long term

If long-term corn yield trends continue to increase corn production as expected, excess supplies of corn may build up in future years if the corn ethanol industry is not allowed to expand through higher blending rates. These excess corn supplies would need to be absorbed by increased livestock feeding and/or increased corn exports. A significant corn price decline may be needed to achieve this.

However, if a significant expansion in the ethanol blending limit occurs, ethanol production capacity will continue to expand resulting in increased corn demand. This may result in a tightening of corn supplies with corn prices being bid up to breakeven levels for ethanol producers. Any profits will be passed on to corn producers. The corn producer profits generated from strong corn prices and increased corn yields will be bid into higher cash rental rates and land values.



Evaluating the Effect of State Ethanol Production Subsidies in the Upper Great Plains

Dr. Gregory McKee, Department of Agribusiness and Applied Economics, North Dakota State University, Dr. Gary W. Brester and Joel Schumacher, MS, Department of Agricultural Economics and Economics, Montana State University

The U.S. ethanol industry has received subsidies from Federal and State governments in recent years. Federal ethanol tax credits were first established by the Energy Tax Act of 1978 and remain the most significant subsidy for the ethanol industry. In recent years, the value of this subsidy has ranged between 1/3 and 1/6 of per gallon ethanol prices. State subsidies are generally smaller than Federal subsidies.

Federal and State legislatures have considered reducing ethanol subsidies because of budget deficits or changes in policy goals. In this report, we discuss the possible effects of reductions in State ethanol subsidies in Minnesota, South Dakota, North Dakota, and Montana. For purposes of this report, these states are collectively referred to as the Upper Great Plains (UGP). Because of smaller operating margins, it is likely that smaller ethanol plants using older technology are most likely to be affected by the loss of State ethanol production subsidies. Plants of this capacity probably experience zero or negative returns-over-variable costs and negative profits more frequently than larger plants (McKee, Brester, and Schumacher, 2010). In this article, we calculate the effect of ethanol plant shutdowns on corn prices near those production facilities. We then calculate the likely combined effect of corn price changes and State ethanol subsidy reductions on corn producer surplus.

Changes in corn basis using a spatial equilibrium model

A potential shutdown of ethanol plants would cause changes in local corn supply and demand conditions. Specifically, some local corn prices would decline in response to the loss of local markets. These lower prices would cause some producers to reduce corn production and increase the production of alternative crops. In addition, other nearby markets would experience an increase in corn

availability which would lower prices in those markets.

A spatial arbitrage model of grain trade in the UGP is used to estimate the impact on local/regional corn prices if one or more ethanol plants ceased operations. The model provides a framework for assessing the impacts of localized structural changes on cash grain markets. The model estimates the extent of price impacts and measures the spatial diffusion of these impacts across markets in response to production shortfalls, disruptions in grain transportation flows, and changes in the demand for corn.

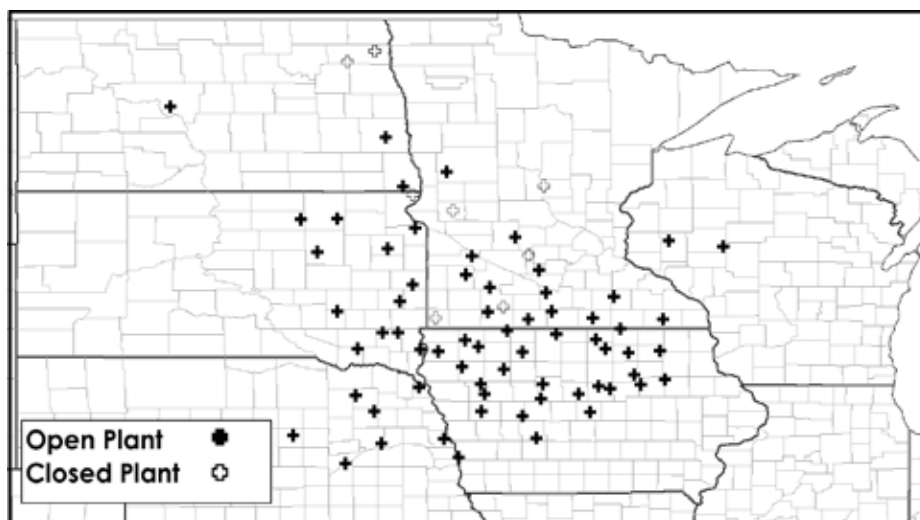
Based on McKee, Brester, and Schumacher (2010), we assume that 8 smaller, older ethanol plants (those with capacities less than 30 million gallons/year in Minnesota, South Dakota, and North Dakota) may close in the absence of State subsidies. For these 8 plants, the model considers supply and demand conditions that would exist at other plants that continue to operate within a 200 mile radius of each of the shuttered plants (65 in total). These plants serve as the basis for corn demand and price competition as shown in figure 1.

Using an historical database of cash prices, 896 cash markets within 200 miles of any of the 73 ethanol plants in this region were identified. Daily price data from these 896 markets were collected from January 1999 through December 2008. From these daily values, average prices for each location were computed.

Corn prices decline at closed plant sites because of associated demand losses. Some nearby ethanol plants also experience declines in corn prices because, as purchasers of corn, they face fewer competitors. Comparing these lower prices to the baseline model provides an estimate of corn price impacts resulting from the 8 plant closures (table 1). In general, corn prices are lowered by between \$0.05/bushel to \$0.18/bushel. Along with direct corn price reductions at each closed plant, minor spillover impacts occur at nearby ethanol plants. However, these were generally small -- about \$0.01/bushel.

The map presented in figure 2 illustrates the estimated impact from plant closures in the region. The most significant impacts occur where: (1) plants are in relative close proximity of each other, and/or (2) few competing plants exist to serve

Figure 1. Ethanol plants in the analysis



as a demand buffer. Because changes did not occur in Central North Dakota and Wisconsin, these areas are not shown in figure 2.

Table 1. Change in Local Corn Price Due to Plant Shutdowns

State (cents)	City	Corn Price Decline
MN	Plant 1	-16
MN	Plant 2	-18
MN	Plant 3	-12
MN	Plant 4	-9
MN	Plant 5	-9
ND	Plant 6	-5
ND	Plant 7	-11
SD	Plant 8	-14

Corn producer surplus in the absence of state ethanol subsidies

The economic well-being of some corn producers would be negatively affected by the elimination of state-level ethanol subsidies. One method of measuring this reduction is by calculating changes in producer surplus.

Producer surplus as a measure of producer well-being

The shutdown of an ethanol plant reduces corn demand at that particular location. Corn that was used “locally” must now be transported to more

distant locations. Thus, the local corn basis widens as the difference between a terminal market price and a local price increases. The decrease in local corn prices causes producers to reduce corn production and increase the production of other crops. In addition, lower corn prices are realized for corn that continues to be produced in such areas.

The concept of producer surplus is used to estimate the impacts of a reduction in local demand on corn producers. Producer surplus refers to the phenomenon that, at any given market price, some (but not all) producers would be willing to produce corn even if prices were lower than those currently offered by the market. Essentially, aggregate producer surplus is the difference between an industry’s total revenue and total variable costs of producing a product. Note that this is not synonymous with profit because measures of profit must necessarily include costs which do not vary with output (i.e., fixed costs). Decreases in producer surplus represent an aggregate reduction in the economic well-being of producers within a sector of an industry.

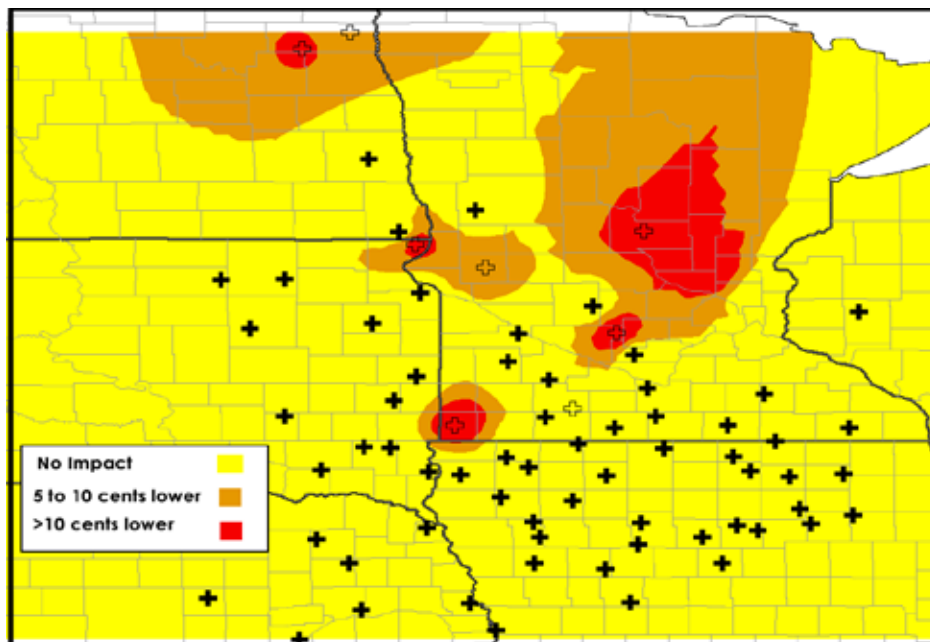
Estimating changes in corn producer Surplus in the upper great plains

The closure of 8 plants in the UGP re-

gion will reduce local corn prices at each site from \$0.05/bushel to \$0.18/bushel depending upon plant location. Additional “spillover” effects would occur at 6 additional plants as local prices at each would decline by \$0.01/bushel. Therefore, we use an estimate of long-term corn prices at each of the 14 affected plants as the initial corn price for each plant. Furthermore, we assume that the initial quantity of corn demanded is the amount of corn that is demanded by each plant if they were operating at full capacity. For smaller plants (those less than 30 million gallons of annual capacity), we calculate corn usage based upon a conversion rate of 2.6 gallons of ethanol per bushel of corn. For larger plants, we use a conversion rate of 2.8 gallons of ethanol per bushel. The reduction in corn price is then applied to the initial price to arrive at a new, lower price at each plant location. The new equilibrium quantity is calculated for each plant using the slope of a supply function based on a short-run, own-price elasticity of supply of corn estimate of 0.57 (Babcock, 2008). This process is repeated for each of the 14 affected plants and results in an estimated loss of corn producer surplus of approximately \$9.4 million. This represents a reduction of about 0.25% of the total value of corn production in the four-state region.

Changes in corn producer surplus in Minnesota. The loss of State ethanol subsidies could cause some plants in Minnesota to experience negative returns-over-variable costs for extended time periods. Based on age, size, and plant efficiencies, it is possible that 5 Minnesota ethanol plants may cease operations. In addition, the spillover effects of these shutdowns could slightly reduce corn prices at two additional plants. The combination of these effects would cause a reduction in Minnesota corn output of 1.2 million bushels which is a 0.1% decrease in total corn production for the state. Lower corn production and local prices would reduce Minnesota’s corn producer surplus by \$5.7 million. This represents a 0.19% reduction of the total value of Minnesota corn production.

Figure 2. Corn price impact from plant closures



Changes in corn producer surplus in North Dakota. The loss of State ethanol subsidies could cause 2 North Dakota ethanol plants to cease processing operations, and the reduction in demand for corn by these plants would have a small, negative effect on the price of corn at one other North Dakota plant. The combination of these effects would cause a reduction in North Dakota corn production of 400,000 bushels which is a 0.14% decrease in total corn production for the State. Lower corn production and local prices would reduce North Dakota's corn producer surplus by \$1.8 million which represents 0.23% of the total value of the state's corn production.

Changes in corn producer surplus in South Dakota. The loss of State ethanol subsidies could cause the shutdown of 1 South Dakota ethanol plant, but would not lead to additional spillover effects on corn prices at other regional plants. The shutdown would reduce corn production in South Dakota by 240,000 bushels (a 0.04% decrease in total corn production for the State). Lower corn production and local prices would reduce South Dakota's corn producer surplus by \$1 million (which is 0.07% of the total value of South Dakota's corn production).

Changes in corn producer surplus in Iowa. The loss of UGP state-level ethanol subsidies could cause spillover effects on corn prices at three ethanol plants in Iowa. That is, these plants would have less competition for regional corn inputs, which would lower corn prices at those plants. The price declines, however, are small (about \$0.01/bushel). In turn, Iowa's corn production would decline by 150,000 bushels (a negligible amount of the State's 2008 production of 2.2 billion bushels). Lower corn production and local prices would reduce Iowa's corn producer surplus by \$700,000.

Summary

The loss of state ethanol production subsidies may cause some small ethanol production facilities in the Upper Great Plains to cease operations. A spatial arbitrage model of grain trade in the UGP is used to assess the effects of facility shutdowns on cash corn markets. In general, corn prices decline by between \$0.05/bushel to \$0.18/bushel in markets near shuttered facilities. Minor spillover impacts occur at nearby plants as well (about \$0.01/bushel). This price decline causes producers to reduce corn production and increase the production of other crops. We estimate that declines in cash corn prices cause a \$9.4 million decline in corn producer surplus.

Note that at least some of this producer surplus would be transferred to providers of transportation services. That is, although corn production is estimated to decline by about 2 million bushels in this region, the demand for transportation services for the remaining production will increase as corn is transported to more distant locations.

Perhaps a larger issue involves the potential reduction of Federal ethanol production subsidies. These subsidies have already declined from \$0.54/bushel to \$0.45/bushel. Budgetary or policy changes could cause further reductions. The loss of a significant portion of these subsidies could cause larger, newer production facilities to struggle to generate positive returns-over-variable costs. Of course, if some plants shut down, ethanol prices may increase to those plants with low enough cost structures to continue production. But, one would expect significant reductions in national corn prices and local basis changes as the result of such a restructuring. The modeling approach outlined above provides a methodology for considering the economic impacts of further reductions in Federal ethanol production subsidies.

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Value-added Business Success Factors -- The Role of Financial Structure and Performance

April 2010

by Don Senechal, Founding Principal, The Windmill Group, F. Larry Leistriz, Professor, Department of Agribusiness and Applied Economics, North Dakota State University, Nancy Hodur, Research Scientist, Department of Agribusiness and Applied Economics, North Dakota State University

(Second in a series of six)

There has been a surge of interest in farmer-owned business ventures that seek to capture additional value from commodities past the farm gate. Some of these ventures have been very successful, some marginally successful, and some have failed. Supported by funding from the Ag Marketing Resource Center at Iowa State University, we conducted in-depth interviews with farmer-owned businesses to determine the key factors that influenced the relative success or failure of these ventures. A better understanding of why some ventures succeeded while others failed provides valuable insight for the success of future farmer-owned businesses. This article focuses on the role of financial structure and performance on business success.

Research method

To identify factors having the greatest impact on the success or failure of farmer-owned business ventures, a cross-section of seven farmer-owned commodity processing businesses formed since 1990 in North Dakota, South Dakota and Minnesota were selected. Extensive interviews were conducted with individuals who played, or continue to play, an important role in the formation and operation of the business. This included leaders in the formation of the business, key members of the management team, selected board members, lenders, local leaders and others.

Research results

While the necessity of sufficiently capitalizing the business would seem to be obvious, its importance cannot be overstated. The business must be sufficiently capitalized to withstand cash flow risks during the first few years of operation. Market down-turns, crop failure and production issues can all challenge a new organization. So the business plan must allow for adequate reserves. Once the firm begins to show a profit, it is important to retain a sufficient portion of the

earnings to build the business' reserves to enable it to survive future challenges. Market down-turns, crop failures and production issues can challenge even a well established business, making an appropriate business reserve critical for new start-ups. Members' desires for payouts must be weighed against the needs of the business for reserve funds.

Financial reserves

The business plan must provide for sufficient operating capital to carry the organization through the start-up period. Enterprises that were not successful often cited the lack of operating capital as a significant contributing factor.

Further, plant start-ups often require some fine-tuning before reaching planned capacity. Also, markets typically take time to develop. Without sufficient working capital, a glitch in production, marketing, or an industry wide disruption could prove fatal.

If the business does not build sufficient financial reserves, its only recourse when confronted by a downturn is another equity drive to raise more money from its members. Several of the unsuccessful businesses we interviewed reported having undertaken such fund raising efforts. But the efforts met with limited success given the business's recent history of substantial losses. On the other hand, some of the successful businesses conducted subsequent equity drives to finance expansions. These business's histories of making substantial payments to grower-members were credited with contributing to the success of subsequent capitalization efforts.

Lender issues

The financial partner (lender) must be sufficiently invested in the business to have an incentive to stay the course over the long term. Without that incentive, they may want out at the first sign of trouble. Two businesses were financed by a consortium of rural banks, with a

USDA loan guarantee. Thus, the risk to any individual lender was relatively small. Under these circumstances, it appeared that the lenders may not have critically evaluated the project and were quick to get out when problems occurred. If the financial institution is not sufficiently vested in the business, it may withdraw if a downturn leads to the need for additional funding.

Organizational structure

Organizational structure may have an impact on some lenders' decisions to finance cooperatives. Some characteristics of the closed cooperative model may be perceived as weaknesses of the organizational form. Because of expanded access to capital through non-farmer investors, fewer restrictions on membership delivery and commodity purchases, and simplified structures for distribution of earnings, some lenders saw the limited liability company (LLC) or corporation (subchapter C) as a preferred organizational structure. In fact, all of the enterprises examined were either a LLC or a corporation. Some were organized as LLCs, while others had started as a closed cooperative and had since converted to a LLC or corporation. One chief executive officer we interviewed cited the need for a stream-lined decision making process as critical in the decision to convert from a closed cooperative to a corporation.

Several lenders questioning the wisdom of siting processing facilities in remote rural areas. They expressed concern that the facility's potential for resale may be less than if it were located in or near a regional trade and service center.

(Next article - Strategic planning and implementation)

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New Energy Economics: Removing Ethanol Subsidy Increases Risk

By: Cole Gustafson, biofuels economist, NDSU Extension Service

At the recent annual meeting of the Renewable Fuels Association, three legislative priorities were outlined for 2010. These were removing the blend wall, encouraging the Environmental Protection Agency to reconsider its calculation on indirect land use and keeping the industry's ethanol subsidy, which is commonly known as the blenders' tax credit.

The blenders' tax credit is a key issue because the program is set to expire on Dec. 31, 2010, unless Congress decides to extend it. Presently, the ethanol blenders' credit is 45 cents per gallon. It used to be 51 cents per gallon but was reduced after Jan. 1, 2009.

Extension of the ethanol subsidy is highly questionable. Just recently, Congress failed to extend the biodiesel tax credit. While many factors impact the profitability of biodiesel production, this certainly is one reason why the nation isn't producing any biodiesel at the moment, as all existing production facilities are idled. Rising federal budget deficit pressures also will make it challenging for Congress to extend either the biodiesel or ethanol tax credit.

To determine the importance of the ethanol blenders' credit to individual ethanol plant profitability and bankruptcy risk, a simulation model was constructed and calibrated with average monthly revenue and cost data for a typical Iowa 100 million gallons per year ethanol plant from 2005 to the present. These data are updated monthly by the Agricultural Market Research Center at Iowa State University.

... and justice for all

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The study focused on a plant's ability to pay operating, labor, financing and property tax expenses. If these expenses are not paid, an ethanol plant is not viable long term because suppliers, employees, lenders or local governments would force the firm into bankruptcy for not meeting its financial obligations.

From January 2005 to the present, average returns over those expenses listed above averaged 52 cents per gallon of ethanol produced. At this level of profitability and known price risks in the industry, the simulation model calculated that the risk of bankruptcy was 3 percent. Given that there are 200 ethanol plants nationwide, this would imply six bankruptcies. This compares with the actual rate of more than a dozen bankruptcy filings in 2009. However, a number of those failures are back in operation after financial restructuring. Therefore, this benchmark was assumed to validate the model as being reflective of industry experience.

The next step was to ascertain the impact of removing the subsidy. This was modeled by deducing 45 cents per gallon from gross revenue for each gallon of ethanol sold. It is unknown how the benefit of the blenders' tax credit actually is shared among blenders, gasoline consumers and ethanol plants. Increasingly, ethanol plants and blenders are jointly owned by the same petroleum company. Recent studies from Cornell and Purdue also find that ethanol plants capture most of the subsidy. Therefore, the total amount of the subsidy was directly deducted.

The model results from January 2005 to the present show returns over the expenses listed were reduced to 7 cents per gallon when the blenders' tax credit subsidy was removed. The risk of bankruptcy rose to 52 percent. This is a 16-fold increase from baseline conditions and jeopardizes an ethanol plant's financial well being.

The 16-fold increase is large for two important reasons. First, the denominator of the equation is small, so any increase in bankruptcy risk will be of significant magnitude. More importantly though, the ethanol business is highly competitive and generally operates on thin margins. During the past five years, the costs examined in this study constituted 77 percent of total gross revenue. Consequently, any cost increase or reduction in revenue has a substantial impact on bottom line profits.

One fixed cost excluded from the analysis was depreciation. For the typical plant in this study, depreciation averages 12 cents per gallon. If the blenders' credit is not extended and industry returns are only 7 cents per gallon, plants do not have sufficient cash flow to rebuild or replace equipment as it wears out. Eventually, ethanol plants will have so much dilapidated equipment that they will be unable to function. Moreover, this poses an even greater threat in the future as many plants are striving to increase efficiency and undertake even greater new investment cellulosic technologies. Sufficient profits and residual cash flow would not be available internally to finance the adoption of these technologies.

The Ag Marketing Resource Center Renewable Energy Newsletter is available on-line at:
http://www.agmrc.org/renewable_energy/