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Implications of the Ethanol Industry for Cow-Calf Producers

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Implications of the Ethanol Industry for Cow-Calf Producers

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Introduction

The ethanol industry in the United States has expanded very rapidly and is a major user of feed grain, especially corn. In 2011, some 40% of US corn production is expected to be used for ethanol production. At the same time as the ethanol industry was expanding, other market events were also occurring that collectively resulted in corn prices more than doubling from 2006 to 2010. Corn price increases, all else constant, directly reduce calf and yearling prices as these animals become more expensive for feedlots to feed. The result, cow-calf producers realize lower returns on their cow enterprise.

The purposes of this discussion are to:
1) Illustrate and assess the nature of trends in the United States ethanol industry
2) Overview the impacts of the trends on corn prices
3) Discuss the impacts of the ethanol industry expansion on cattle producers
4) Summarize implications

Ethanol Industry Trends

The United States ethanol industry was relatively small during the 1990s and early 2000s with annual production typically between 1.5 and 2 billion gallons (Figure 1). The industry began rapid expansion during the early 2000s, doubling from 2002 to 2006, doubling again by 2008. By 2010, ethanol production exceeded 13 billion gallon – a more than six-fold increase from 2002 – and industry expansion was continuing.

The reasons behind expansion of the ethanol industry are interesting and multi-faceted. Though details are well beyond the scope of this discussion, review of some of the expansion drivers is important. Ethanol industry growth was spurred by substantial economic profits during the early 2000s especially in 2005-06[2]. Crude oil prices were high and rising, supporting ethanol prices; corn prices were low; and margins for ethanol production were strong. US policy supported ethanol expansion by providing credits to ethanol-fossil fuel blenders, placing tariffs on ethanol imports, and establishing an upward ratcheting ethanol blending mandate. The economic and political environments strongly supported the ethanol industry into the mid 2000s. Times were good for ethanol producers.

Figure 1. US Ethanol Production, 1995 - 2011
(2011Preliminary)

Source: Renewable Fuels Association & own forecasts
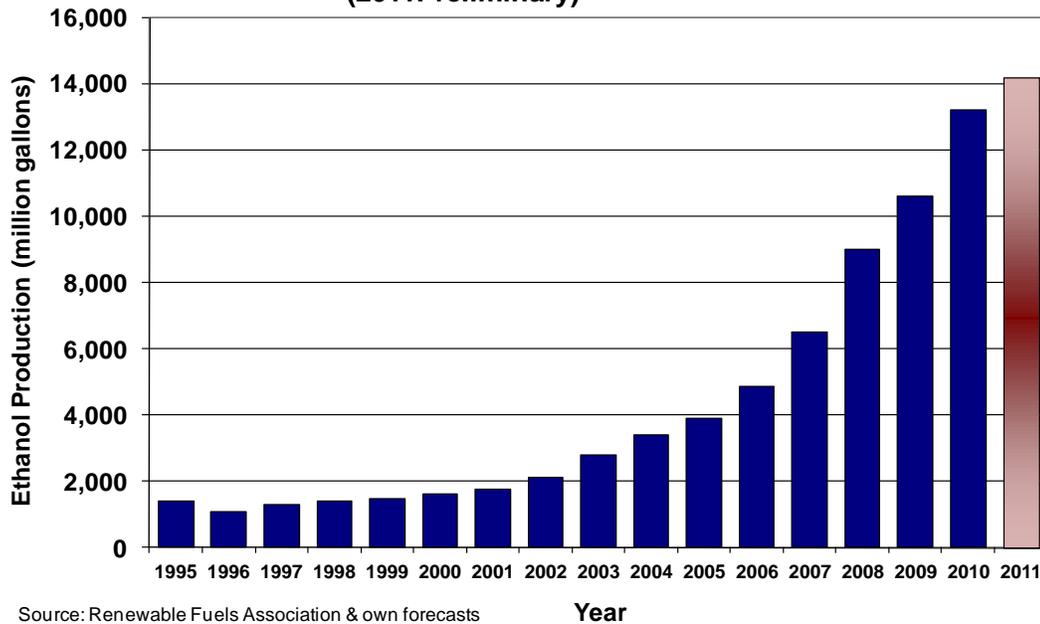
During the early phases of ethanol industry expansion, even into 2007, some began to question the sustainability of the industry and wondered whether it was expanding too rapidly to maintain profitability. Indeed, with the economic downturn of 2008-09, together with high corn prices and rapid reductions in crude oil prices, the ethanol industry faced dramatic losses and experienced a period of industry restructuring. A number of groups questioned the efficiency and wisdom of using corn for ethanol production as world food prices were soaring during 2003-08. Some questioned whether the United States ethanol policy was prudent. Certainly livestock producer organizations voiced concerns regarding the impacts of US ethanol policy on livestock feed prices.

The vast majority of ethanol produced in the United States uses corn as the feedstock for production. In 2007 the Great Lakes Commission reported 98% of ethanol was produced using corn. As ethanol production expanded, corn used in ethanol production followed suit. In 2003 11% of corn produced was going to ethanol production, by 2010 35% of corn was being used for ethanol, and projections for 2011 are that about 40% of corn produced in the United States will be used for ethanol production (Figure 2).

When a bushel of corn is used in ethanol production, the co-product distiller's grains are produced. About 17 pounds of dry distiller's grains are produced per bushel of corn used for ethanol production. Thus, roughly 30% of the feed volume of corn used in ethanol production is converted into another feed ingredient that is a partial substitute for corn. Distiller's grains tend to be best suited for use in cattle and dairy production relative to other livestock, especially when sold as wet distillers as much of the product is currently sold. The point is, when 40% of corn is used in ethanol production, this effectively is about a 28% reduction in feed volume availability (0.40 times 0.70).

Figure 2. Percentage of US Corn Production Used for Ethanol Production, 1995-2011 (2011 Forecasted)

Source: Ag MRC, USDA, & own estimates
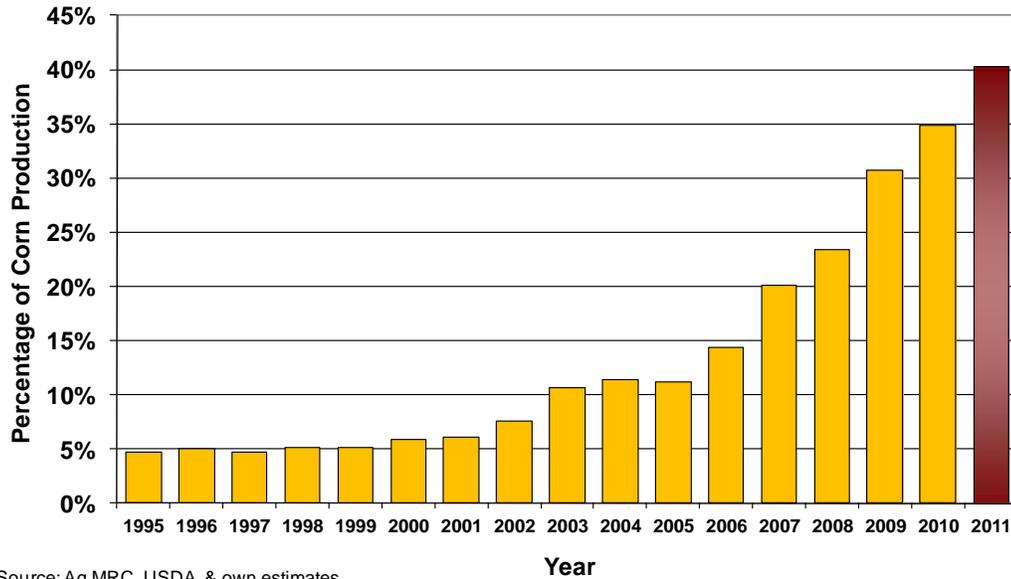
Corn Price Impacts

The increased demand for corn by the ethanol industry has had important impacts on corn prices. Corn prices mirrored ethanol production, rising rapidly as ethanol production increased (Figure 3). Another way to illustrate this relationship is provided in Figure 4 which illustrates the correlation between the percentage of corn used in ethanol production and corn prices by year. As ethanol production, and percentage of corn production used for ethanol, has increased, so have corn prices. A natural sentiment is to conclude that the corn price pattern observed is caused all by ethanol production. That is, there may be a tendency to conclude that the doubling in corn price from the early 2000s from $2/bu to more than $4/bu in 2008 and the nearly additional $1.50/bu increase in 2012 are because of increased ethanol production. However, this would assume that other corn market price determinants were all stable during this time period. They certainly were not. Isolating corn market price impacts associated with expanded ethanol production is not a simple task.

A couple of studies have estimated the magnitude of corn price increase associated with expanded ethanol production. In particular, Fortenbery and Park (2008) and Babcock and Fabiosa (2011) have estimated the impact of ethanol production on corn prices. The two studies have similar, but not identical, estimated impacts. The estimated impacts in Fortenbery and Park (F-P) are a little larger than those of Babcock and Fabiosa (B-F). My estimates of the corn price impacts associated with ethanol production, based on interpretation and extraction from these two studies, are provided in Table 1. I used the average of the two estimates when I had estimates based on both studies, and just those based on F-P when the others were not available. Corn prices would have been lower by about $0.40/bu in 2007-08, $0.80/bu in 2009-10 and today more than a $1.00/bu lower if ethanol production would not have expanded.

Figure 3. Corn Price and Ethanol Production, 1995-2011 (2011 Forecasted)
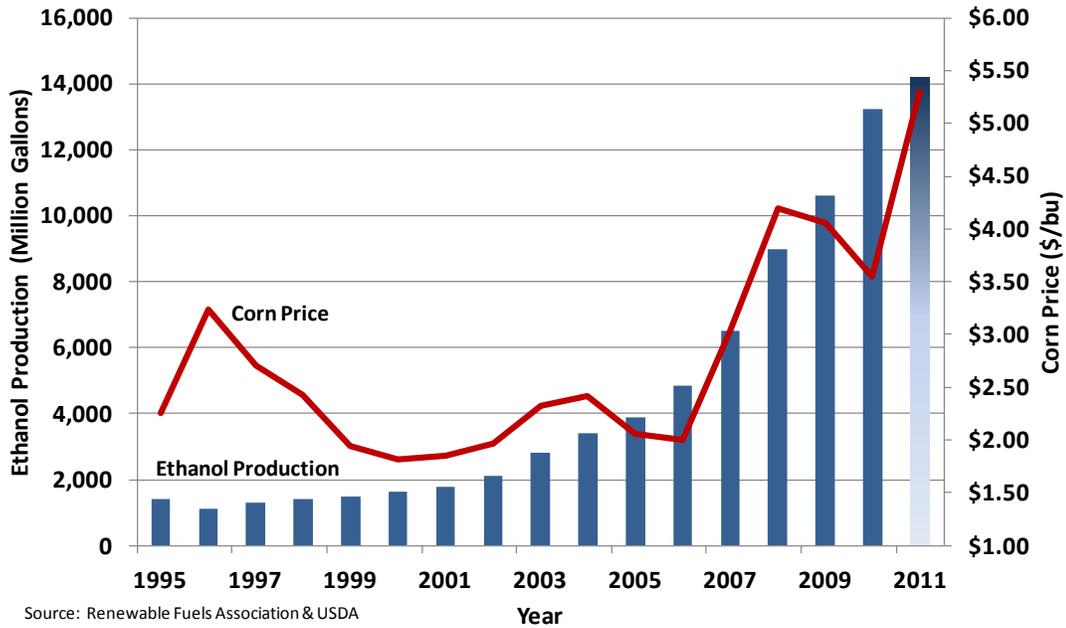

Source: Renewable Fuels Association & USDA

Figure 4 . Percentage of US Corn Crop going to Ethanol and Marketing Year Corn Price, 1995 - 2012 (2011-12 Forecasted)

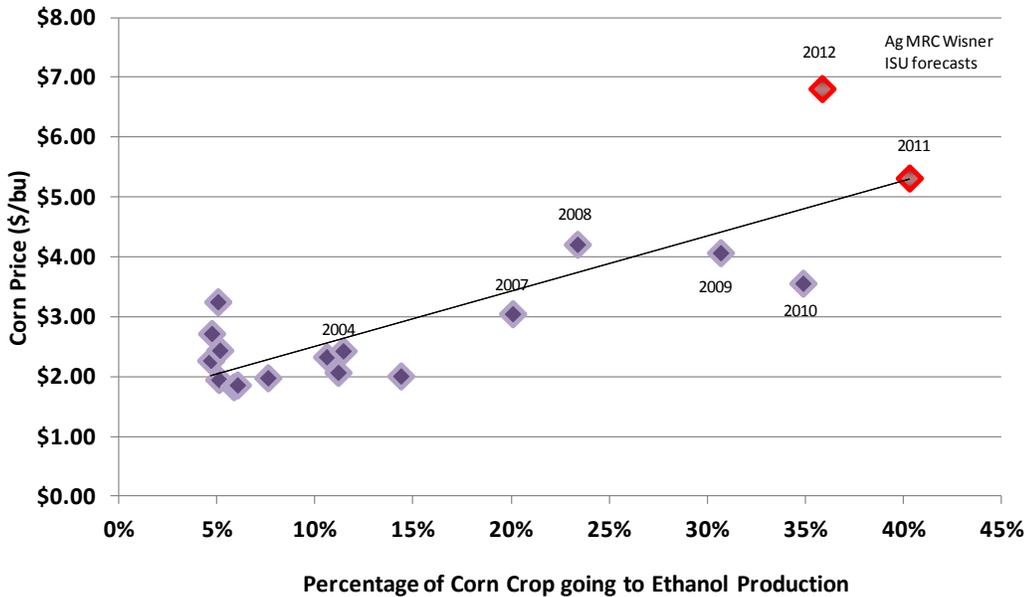Source: Own Calcuations from USDA data

Table 1. Estimated Impact on Corn Price of Ethanol Production

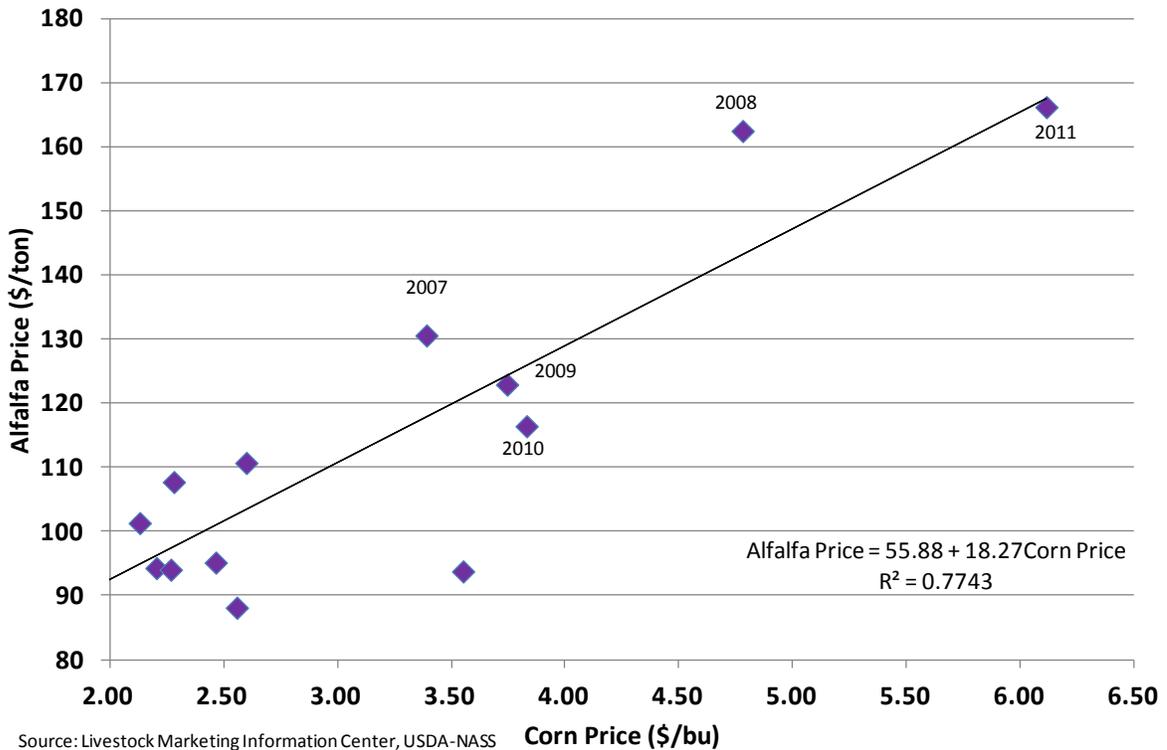| Marketing Year Sept 1 - Aug 31	Actual Avg. US Corn Price ($/bu)	Estimated No Ethanol Corn Price Using F-P ($/bu)	Estimated No Ethanol Corn Price Using B-F ($/bu)	Average Increase in Corn Price Due to Ethanol ($/bu)
2004-05	$2.06			
2005-06	$2.00			
2006-07	$3.04	$2.87	na	$0.17
2007-08	$4.20	$3.85	$3.80	$0.38
2008-09	$4.06	$3.42	$3.62	$0.54
2009-10	$3.55	$2.73	$2.78	$0.79
2010-11	$5.30	$4.18	$4.55	$0.93
2011-12*	$6.80	$5.57	na	$1.23

Note: F-P refers to Fortenbery and Park estimates and B-F refers to Babcock and Fabiosa estimates

Impact on Cattle Producers

As corn price increases, costs of cattle production increase as well. The first and most directly obvious impact is how increased corn price affects cost of gain in feedlots - more on this later. Another very important component is the relationship between corn price and forage prices. The relationship between corn and alfalfa prices is not perfect, but the pattern is apparent. In particular, as corn price increases, so does forage price because they are substitutes for farmers in allocation of planted acreages of each. Figure 5 illustrates the relationship between alfalfa hay and corn prices. When corn prices are in the $2.20/bu range, alfalfa prices have typically been around $90-110/ton. At a $4/bu corn price, alfalfa prices are likely to be $115-130/ton, and when corn prices approach $6/bu, expect alfalfa prices to approach $160/ton. Higher hay and forage prices adversely affect cow-calf producers from both revenue and cost perspectives of the income statement.

Higher hay prices result in higher costs of back-grounding calves and especially of maintaining cows during the winter and raising replacement heifers. A $1/bu increase in price of corn, say from $4/bu to $5/bu, results in about a 15-20% increase in hay price increasing costs of maintaining cows in the winter by roughly $12-$15 per cow per year. Add to that the additional costs of raising replacement heifers. An important counter point to keep in mind is that increased ethanol production and associated corn prices have increased the value of land that is capable of forage production, and indirectly increased grazing land values as well. So, there has been a wealth enhancing impact on land owners through higher land values as a result of ethanol production.

Figure 5. Alfalfa Price vs Corn Price, Annual Averages, 1995-Oct 2011

Alfalfa Price = 55.88 + 18.27Corn Price
$R^2 = 0.7743$

Source: Livestock Marketing Information Center, USDA-NASS

The income from sale of calves is even more greatly impacted by increased corn prices than are the costs of maintaining cows and raising replacement heifers. This is because as corn prices rise, feeding cost of gain by feedlots increases rapidly, resulting in feedlots reducing demand for calves and yearlings. Consider an example cattle feeding partial budget to illustrate how cost of gain changes in the feedlot as corn price changes. Table 2 below illustrates how feeding cost changes in the feedlot as corn price (and likewise alfalfa price) changes. These calculations assume an 85% corn and 15% alfalfa diet. A $1/bu increase in corn price, which is associated roughly with a $15/ton increase in alfalfa price, results in about a $60/head increase in cattle feeding cost of gain for yearlings.

How much of this cost increase is passed down to cow-calf producers in the form of lower prices for feeders? The answer is, most of it! Furthermore, the adjustment will happen very quickly when corn prices change!

Table 2. Illustration of How Cattle Feeding Cost of Gain Changes with Corn and Hay Prices.

Placement weight (lbs/hd)	Finish weight (lbs/hd)	Feed Conversion (dry matter)	Corn Price ($/bu)	Alfalfa Price ($/ton)	Feed Cost ($/head)	Change in Cost of Gain ($/head)
750	1300	6.00	$3.00	$110.00	$201.70	
750	1300	6.00	$4.00	$125.00	$262.83	$61.14
750	1300	6.00	$5.00	$140.00	$323.97	$61.14
750	1300	6.00	$6.00	$155.00	$385.11	$61.14
750	1300	6.00	$7.00	$170.00	$446.25	$61.14

Competitiveness with Other Proteins

How does expansion of ethanol production impact beef's competitive position in the United States market with competing meats, in particular pork and poultry? The short answer is, it hurts beef's competitive position. Despite the fact that ruminants may be better able to utilize distillers grains than other livestock, this is not enough to fully offset the fact that corn price is higher with ethanol production and cattle convert feed into meat less efficiently than hogs or chickens. For example, feed conversions are roughly 2.5 pounds of concentrated feed per pound of gain for chickens, 3.5 for hogs, and 6 for cattle. Cattle are more flexible in that they can also gain on cheaper forages, so as grain price increases, all else constant, more gain can be secured by feeding forages and less on grain in contrast to hogs and poultry. Nonetheless, the net result is, feeding cost of gain for commercial grain-fed cattle producers increases at a greater rate as corn prices increase than it does for hog or poultry producers.

Summary and Implications

Without question, expanded ethanol production has resulted in increased costs and reduced revenue for cow-calf producers in the short run. That is, costs of maintaining the cow herd, especially when feeding forages in the winter, and of raising replacement heifers increase as feed grain prices increase. In addition, prices for feeder calves decline as feed grain prices increase.

In the longer run, the industry adjusts to this reduction in profitability as beef cow herd size shrinks in response to these economic signals. This takes a few years as fixed assets in the industry make adjustments relatively slow. Though, the industry can contract more rapidly than it can expand. A smaller beef cow industry is actually likely to result with individual producers who are left in the industry being more profitable than they were prior to industry contraction. This is the result of several factors, the most important of which is increased prices for beef, fed cattle, and feeder cattle. This may be the silver lining of the ethanol

cloud, but there is a costly adjustment period and some producers ultimately exit the industry during this transition.

Another dimension of this costly adjustment is that the downstream segments of the beef production industry are already operating with excess capacity. That is, feedlot and packing facilities are most efficient when operated at capacity. Shrinking cow-herds cause excess capacity at these downstream players, increasing their costs in the short run. This excess capacity of downstream industry participants is also helping to support calf prices at higher levels in the short run at least until either the capacity is utilized more fully and/or downstream firms or plants exit the industry.

The end result of the increase feed grain prices associated with ethanol production in the long run is a smaller beef industry, restructuring of the industry with the most efficient producers growing in size and the least efficient exiting the industry, and higher beef and cattle prices.

What can you do?
1. Challenge federal policy supporting ethanol production including import tariffs, blender's credits, and blending mandates. This might make a little difference in public policy, but I doubt it will make a lot of difference. More importantly, even if successful, it would not likely result in much reduction in corn price as ethanol production is still likely to be profitable as long as crude oil prices are strong and only a portion of the corn price increase is due to the federal ethanol policy anyway. Your time may be better spent elsewhere.

2. Continue investment in technology development and adoption as well as more intensive management strategies that improve beef production efficiency. Higher costs can be partially offset with improved efficiency. However, such technology takes time and resources to develop and requires innovative attitudes of producers to explore and adopt. This strategy is essential for industry survival.

3. Invest in growing consumer markets for beef – expand global demand for US beef. This is a strategy that addresses trying to increase revenue for the industry. North America has a comparative advantage, even with higher feed grain prices, for producing the highest quality beef in the world. Higher feed prices reduce this comparative advantage some, but the comparative advantage is still here. An effective way to offset increased production costs is to grow demand for the product. Research out of Montana State University (Marsh 2003) suggests for example that an increase in the beef demand index from 50 in 1998 to 63 in 2004 increased fed cattle price by $10/cwt and feeder steer price by $14/cwt. Demand growth pays dividends to producers and is a worthwhile investment. However, growing demand successfully takes considerable strategic alignment and is much more complicated than simply increasing product advertising expenditures.

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