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Global warming – more on bio-fuels

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(Fifth in a Series)

In the previous article we discussed the greenhouse gas emissions from corn and biomass

(cellulosic) ethanol. If only the “direct” effects of producing ethanol on existing cropland are considered, ethanol produces fewer greenhouse gas emissions than gasoline. In this article we will examine the controversy over the “indirect land use” effects of using existing cropland for ethanol production. We will also examine the emissions from converting native ecosystems to ethanol production.

Native ecosystems

As the global ethanol industry expands, it is likely that native soils and ecosystems will be converted to farmland for bio-fuel production. In some parts of the world this process has already started. Estimates have been made of the impact on greenhouse gas emissions of producing ethanol on native ecosystems in different parts of the world. Three examples are shown in Table 1.

The carbon “debt” shows the soil carbon emissions created by transforming virgin land into bio-fuel production (the carbon emissions from this process were discussed in the previous article). Next, the

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Handbook updates

For those of you subscribing to the handbook, the following updates are included.

Monthly Swine Farrow to Finish Returns – B1-31
(2 pages)

Monthly Returns from Finishing Feeder Pigs – B1-34
(1 page)

Monthly Cattle Feeding Returns – B1-36 (2 pages)

Historic Hog and Lamb Prices – B2-10 (4 pages)

Historic Cattle Prices – B2-12 (4 pages)

Lean Hog Basis – B2-41 (1 page)

Feeder Cattle Basis – B2-43 (1 page)

Please add these files to your handbook and remove the out-of-date material.

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The world’s demand for food and feed and the world’s agricultural capacity to produce food and feed are roughly in balance. If large areas of agriculture’s production capacity are switched from food production to fuel production, either food shortages will arise or agriculture’s production capacity must expand. Production capacity can expand in two ways – through increased yields per acre or more acres. Although increasing yields is a powerful way to expand production, it tends to occur gradually over time. Agriculture’s production will expand more rapidly by increasing the land area under cultivation.

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percent of emissions “allocated to bio-fuels” represents the portion of the production that goes to bio-fuel production. For example, 39 percent of Brazilian soybean production is allocated to the oil used for bio-diesel production with the remainder allocated to soybean meal. The “annual repayment” represents the annual reduction in equivalent CO² emissions from using bio-fuels rather than gasoline to repay the carbon debt. The “repayment period” is the number of years required for the annual payment to repay the carbon debt.

For example, it will take 86 years of “annual payments” from palm biodiesel production to repay the “carbon debt” from converting tropical rainforest to palm biodiesel production. Only after the year 2094 (2008 + 86 = 2094) will the cumulative emissions from palm biodiesel production be less than those of gasoline.

Converting central US grasslands to corn ethanol production will require almost 100 years to repay the carbon debt (emissions) from converting grassland to corn production. Converting Brazilian grasslands to biodiesel production will require 37 years.

According to the calculations by Fargione et al., unless a way can be found of maintaining soil carbon, converting native ecosystems to bio-fuels production as a replacement for gasoline will not reduce greenhouse gas emissions.

Indirect emissions

It appears that, in general, bio-fuels produced on existing US farmland (discussed in our previous article) produces fewer emissions than gasoline while bio-fuels produced on converted land (Table 1) produces more greenhouse gas emissions.

However, the picture is somewhat more complex. Recent scientific research has focused on the indirect change in land use from using corn for energy instead of food. Changing land use from feed/food to fuel in one location may trigger a change in land use to feed/food in another location. For example, what is the indirect effect of converting an acre of Midwest from corn for feed and food production to corn for ethanol production?

Transitioning this acre of Midwest cropland may mean that somewhere in the world an acre of virgin land is converted to farmland for feed and food production to make up for the lost acre in the Midwest. Market prices are the mechanism causing this transition. Reducing the feed supply will raise feed prices which will provide an incentive to increase feed production somewhere else.

Table 2 shows the “indirect land use” changes from using farmland for fuel production rather than feed production. This change in land use triggers substantial greenhouse gas emissions. Table 2 is the same chart as shown in the previous article except that the indirect effect of carbon emissions from land use change is taken into effect. By including land use changes, corn ethanol produces 93 percent more emission than gasoline. Cellulosic ethanol produces 50 percent more.

The production of 15 billion gallons of ethanol (the current mandate for corn-starch ethanol) will cause a large shift in corn acres from feed production to energy production. This conversion from feed production to fuel production could trigger a large acreage shift of virgin land into farmland for feed production in other parts of the world.

Table 1. Greenhouse gas emissions for selected examples of bio-fuels production

	Palm Biodiesel in Indonesia/Malaysia (Tropical Rainforest)	Soy Biodiesel in Brazil (Cerrado Grassland)	Corn Ethanol in Central U.S. (Grassland)
Carbon Debt ^{1/}	702	85	134
Allocated to Bio-fuels (%) ^{2/}	87	39	83
Annual Repayment ^{3/}	7.1	0.9	1.2
Repayment Period (yrs) ^{4/}	86	37	93

^{1/} Carbon debt, including CO² emissions from soils and aboveground and belowground biomass due to habitat conversion (Mg CO² ha-1)

^{2/} Proportion of total carbon debt allocated to biofuel production

^{3/} Annual life-cycle GHG reduction from bio-fuels, including displaced fossil fuels and soil carbon storage (Mg CO² eha-1 yr-1)

^{4/} Number of years after conversion to biofuel production required for cumulative biofuel GHG reductions, relative to fossil fuels they displace, to repay the biofuel carbon debt.

Source: Fargione, et al. (2008)

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Table 2. Gasoline and ethanol greenhouse gas (GHG) emissions considering land use changes (grams of GHGs CO² eq. per MJ of energy in fuel)

Fuel Source	Making Feedstock	Refining Fuel	Vehicle Operation	Feedstock Uptake	Land Use Change	Total GHGs	Percent Change
Gasoline	+4	+15	+72	0	--	+92	--
Corn Ethanol	+24	+40	+71	-62	+104	+177	+93
Biomass Ethanol	+10	+40	+71	-62	+111	+138	+50

Source: Searchinger, et al. (2008)

Not so fast

While the logic used in the scenario above seems reasonable, other scientists raise questions about the underlying assumptions used to obtain these results. The analysis provides one scenario of what might happen, but this is not the only one. Other scientists have questioned whether global markets for agricultural commodities are as tightly coupled as is assumed in the previous analysis. And enhanced yields on both existing high-yielding land and marginally producing land need to be considered, as do biofuel sources other than food/feed grains. Further research is needed to assess to what extent a change of the proposed magnitude in one part of the world will trigger the projected response in another part of the world. The conversion of native ecosystems to agricultural production started well before the emergence of the bio-fuels demand.

Implications

Research to assess the indirect impact of converting agricultural production from food/feed production to fuel production is just beginning. Additional research is forthcoming to improve our understanding of this relationship and its impact. However, measuring the carbon loss from the conversion of the myriad of different types of ecosystems around the world is daunting.

The implementation of a world-wide carbon tax or cap-and-trade system, along with good data on carbon loss and gain under different land-use scenarios, will help balance the cost of carbon emissions with the need for food and fuel. Although this may seem like a distant goal, it does provide the framework for a viable solution.

As discussed in the previous articles, efforts to curb greenhouse gas emissions will impact the world our children and grandchildren will inherit. However, in the short term (present time to 2030), we will have little impact on global warming and will need to adapt to the climate changes that are coming. The next article will focus on how global warming may impact the production capacity of Midwest agriculture.

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2008 crop insurance decisions and dates

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Many producers think they need a large yield loss to collect a crop insurance indemnity payment. That's not necessarily true. The majority of all multi-peril crop insurance policies contain a replant option, as well as delayed and prevented planting provisions.

Crop Revenue Coverage (CRC), Revenue Assurance (RA) and Actual Production History (APH) products all include these provisions. Together, these three products reflect more than 90 percent of total coverage elected for Iowa's tillable acres in 2007.

If a producer thinks you might need to replant their corn or soybean crop, notify your crop insurance representative before replanting. This is a new requirement for 2008.

If they qualify, the replant option provides a payment reflecting 8 bushels of corn or 3 bushels of soybeans per acre, respectively. That's around \$40 per acre in 2008, since the spring base prices for both revenue and traditional APH products reflect record high crop prices.

These same products also have delayed and prevented planting provisions. In Iowa, late planting coverage begins June 1st for corn and June 16th for soybeans. These dates may be different in other states and for other crops. Acres planted on or after these dates receive a lower yield or revenue guarantee than those acres planted earlier. The coverage is reduced by 1 percent per day for each of the following 25 days until the crop is planted.

Dates to remember

May 31st – Final planting date for Corn
June 15th – Final planting date for Soybeans

Minimum areas must meet the 20-20 rule

However, to collect an indemnity payment on replant, delayed or prevented planting provision of crop insurance, a loss must occur on a minimum area of 20 acres in size or 20% of the insured unit. A unit could be a field or a farm – if you elected an optional whole farm or basic unit. An enterprise unit could also have been elected, which reflects all the corn acres or all the soybean acres grouped together in a particular county.

Biotech Yield Endorsement deadline

New in 2008 is the Biotech Yield Endorsement (BYE) implemented as a pilot program in four states – Iowa, Illinois, Indiana and Minnesota. Producers that qualify must plant at least 75% of their insured units of non-irrigated ground to qualifying corn hybrids.

In order to receive the premium discount, producers should contact their insurance representative regarding the completion of paperwork. This includes a completed and signed BYE Seed Dealer Certification Statement. Copies of purchase and return seed invoices that correspond to the certificate should be attached.

In addition, the producer also completes a signed BYE Insured's Certification Statement.

The final required documentation will be due at the time their acreage report is filed with the Farm Service Agency. In Iowa, that deadline is June 30th.

Value-added business success factors -- the role of local infrastructure and support

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

(last 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 local infrastructure and support for 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

Local and state support is generally available and relatively easy for farmer-owned commodity processing businesses to obtain. All of the businesses we interviewed took advantage of state and local support to varying degrees. State funds were often used to support feasibility analysis and business plan development. Local economic development organizations often provided the plant site and supporting infrastructure such as utilities or transportation access. Organizations with a vested interest in local economic development such as rural electric cooperatives or local economic development organizations frequently provided assistance ranging from low interest loans to office space.

Role of public support -- Up-front support from various sources can be critical during the initial phases of business development. Not only can state and local programs support a venture until appropriate working capital is secured, they are often the only source of funding for feasibility studies and business plan development.

While state and local assistance is an important part of the capitalization process, it was always much less than the funds contributed by investors. For example, one successful project received local site and infrastructure improvements valued in excess of \$1 million and several hundred thousand dollars in state assistance for organizational costs. However, investors contributed \$12 million in the initial equity drive. After the project experienced initial success, investors contributed another \$26 million in a second equity drive to finance expansion. While state and local support is part of the capitalization process, investor support was the key to project success.

Site selection -- Although state and local support is a small portion of overall capitalization, competition among communities offering location incentive packages should be encouraged. Some communities may be willing to make substantial infrastructure investments that could be significant to the success of the venture. For example, one successful venture formally solicited site proposals and received 28.

However, when considering state and local support for siting decisions, it is important that the potential economic development benefits don't cloud the decision making process of siting a new venture. Site selection needs to be viewed from a "business success" perspective rather than an "economic development" one. Site characteristics must be examined carefully and the benefits of various sites considered carefully. Selecting the proper site for business success can pay long-term benefits. So, first and foremost, the potential site must make sense from a business perspective. Economic development goals are secondary. Selecting a site for

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economic development purposes is of no value if the site cannot lead to business success.

Site selection can also become an emotionally charged issue. Business leaders and economic development professionals often appeared to be more interested in local development benefits of the business than its profit potential. Grower-members may insist that the facility is sited in their home community even though an alternate site is shown to be economically advantageous. This can make the site selection process very difficult. Regardless, site selection must be based on sound business judgment.

Once a location has been selected, on-going communications with project supporters and state and local oversight agencies is important. Regular communication can help to avoid unforeseen issues that may delay or slow construction. It may also help facilitate permitting and other procedural considerations.

Major funding for this research provided by the Agricultural Marketing Resource Center. Additional funding provided by Farmers Union Marketing and Processing Association Foundation, Co-Bank and Ag Ventures Alliance.

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Internet Updates

The following updates have been added to www.extension.iastate.edu/agdm.

Organic Crop Production Enterprise Budgets – A1-18

Using Financial and Production Records to Make Decisions – C1-41

Pricing for Profit – C1-55

Current Profitability

The following profitability tools have been updated on www.extension.iastate.edu/agdm to reflect current price data.

Corn Profitability – A1-85

Soybean Profitability – A1-86

Ethanol Profitability – D1-10

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