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Opportunities for pork producers: manure, digesters and energy

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There are many arguments that one might subscribe to leading to a position that government action addressing climate change is misdirected. These arguments include:

- Some scientists and opinion leaders state that the climate is not changing or that any changes are short term or that changes are exaggerated or that humans are not responsible for the changes.
- Major economies such as China and India have announced that their priority is economic development, not efforts to reduce emissions of greenhouse gases.
- Attempts to reduce emissions through an action such as Cap & Trade will increase energy costs and in turn hurt US consumers and the economy.
- Countries that have had a Cap & Trade program in place have not had a demonstrable impact on emissions.
- And others.

Regardless of the arguments being made, change is in the air. As I write this, the Waxman-Markey climate change bill has passed the House and action is now turning to the Senate. In a parallel track, there is an announcement today that the EPA granted California's waiver request from December 2005, allowing 14 states to move forward with new greenhouse gas standards for motor vehicles. As Cap & Trade is debated in the senate, there are concerns on the impact on agriculture. While some farm groups say that farm costs will increase substantially, the Environmental Protection Agency says the average cost per household will be comparatively small. USDA press secretary Caleb Weaver said on Wednesday (July 22) that USDA is working on an economic analysis and planned to announce the results soon.

Considering our glass as half full or half empty, I tend to see this glass as half full. And as such, I believe several opportunities will be presented to agriculture. First, this increased focus on energy will prompt pork producers to become more efficient consumers of our increasingly scarce supply of fossil fuels. I am confident that producers who focus on energy cost will find some low hanging fruit and thereby reduce their cost of production. A second opportunity will be that producers can receive payments for reducing methane emissions from manure storage. This can take place by capturing methane emissions from a covered lagoon or from a digester. A digester is a large, heated tank which manure passes through. And a third opportunity is that farmers will probably be able to receive payments for switching to conservation tilling. Of the reduced tillage methods, strip tilling appears most promising.

These payments are made in the form of what are called carbon offsets (or carbon credits). One carbon offset represents the reduced emission of one metric ton of carbon dioxide or its equivalent in other greenhouse gases (greenhouse gases are those gases which absorb and emit radiation within the thermal infrared range). So, for a digester, the number of offsets will reflect the reduced methane emission that is now being captured. For reduced tillage, the number of offsets will reflect the amount of CO2 that is thought to be not escaping into the atmosphere as occurs with conventional tillage.

Digesters are not without their challenges, however. There are approximately 100 digesters on dairy farms in United States and opinions range from enthusiastic to extremely pessimistic. The challenges seem to revolve around cost containment in the construction phase, variability in gas production and low price received for electricity that is generated. We are aware of 10 digesters at swine farms, several of which are struggling for the same reasons and the fact that swine manure tends to be more dilute than dairy slurry (Table 1). It may be that as we have become more efficient on formulation and conversion of feed to gain, we leave less carbon in the manure that might serve as a building block for methane. So, while using manure to generate renewable energy is a promising venture, there are issues that need to be better understood.

Receiving payment for switching to strip tillage reflects a desire to use soil as a carbon sink. Plants acquire carbon (through CO2) from the atmosphere through photosynthesis. Plants convert CO2 to organic carbon as they produce stems, leaves and roots. The life cycle results in the accumulation of decomposing plant tissue both above and

Table 1: List of swine digesters in operation in United States

Farm/project name	City	County	State	Digester type	Status	Year operational	Animal type	Population feeding digester	Biogas end use(s)
Classic Farms			SD	Mixed farm	Operational	2008	Swine	27,000	Electricity
Geerlings Hillside Farms Oversized Hog Facility	Hamilton	Allegan	MI	Complete mix	Operational	2008	Swine	16,000	Electricity; boiler/furnace fuel
Danny Kluthe Farm	Dodge	Colfax	NE	Complete mix	Operational	2005	Swine (wean-to-finish)	8,000	Cogeneration
Pine Hurst Acres	Danville	Northumberland	PA	Complete mix	Operational	2004	Swine	4,400	
Wyoming Premium Farms 2	Wheatland	Platte	WY	Complete mix	Operational	2004	Swine	18,000	Electricity
Wyoming Premium Farms 1	Wheatland	Platte	WY	Complete mix	Operational	2003	Swine	5,000	Electricity
Premium Standard 1	Dalhart	Dallam	TX	Unknown	Operational	2002	Swine	108,000	
Premium Standard 2	Dalhart	Dallam	TX	Unknown	Operational	2002	Swine	10,000	
David High		Schuykill	PA	Vertical Plug Flow	Operational	1998	Swine	1,200	Cogeneration
Rocky Knowll Swine Farm	Lancaster	Lancanster	PA	Horizontal Plug Flow	Operational	1985	Swine (farrow-to-finish)	1,000	Cogeneration

below ground and thereby produces a significant amount of soil organic carbon. Soil organic carbon constitutes more than twice as much stored carbon as that of earth's vegetation and "storing" carbon in soil serves one way to stabilize atmospheric CO2.

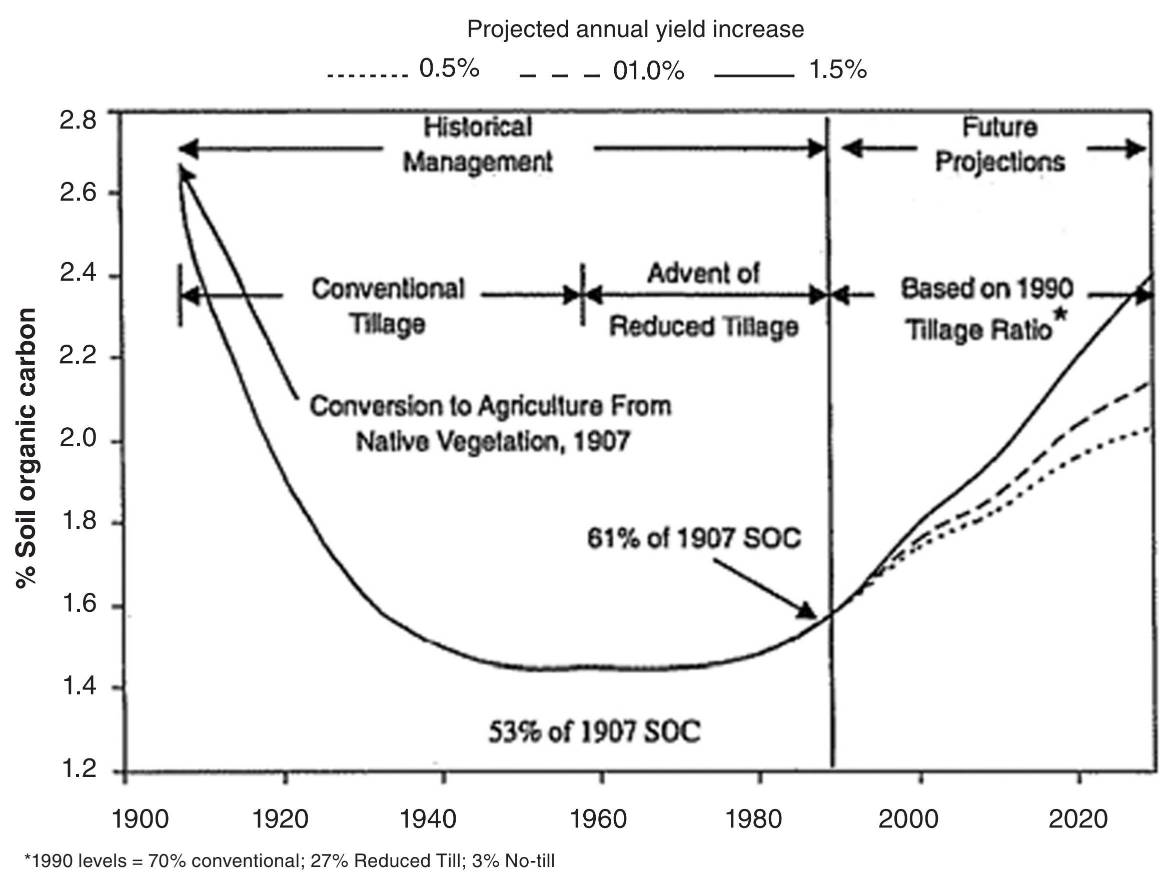
Soil organic carbon constitutes more than twice as much stored carbon as that of earth's vegetation and "storing" carbon in soil serves one way to stabilize atmospheric CO2. However, over the last 100 years, significant topsoil has been lost due to erosion and frequent tillage practices have reduced soil carbon level to less than half the native value. Soil conservation practices have improved recently and soil carbon has recovered somewhat (figure 1). Building reserves of soil carbon often also increases the potential productivity of these soils. Furthermore, many of the measures that promote carbon sequestration also prevent degradation by avoiding erosion and improving soil structure. Consequently, many carbon conserving practices sustain or enhance future fertility, productivity and resilience of soil resources. While there have been valid concerns raised about how much reduced tillage increases soil C, the preponderance of evidence supports the conclusion that adoption of reduced tillage would increase soil C, relative to conventional tillage, in most US cropland soils.

Using assumptions described by Nowatzki and co-workers (2008), strip-till is at breakeven (without including the benefits of less soil erosion) at a Carbon price of approximately $18.81 / tCO2e assuming 0.6 tCO2e / acre (appendix 5). `http://www.ag.ndsu.edu/pubs/ageng/machine/AE-1370/ae1370.htm`

Carbon is currently trading at $0.95 / ton CO2e on the Chicago Climate Exchange (CCX). This is off from a peak of approximately $7.00 / ton in May'08. If federal cap and trade legislation is enacted, it will no doubt drive up the value of carbon offsets, some suggesting to around $10.00 within 1-2 years. This would help make digesters more attractive and also encourage reduced tillage.

So while negotiations and politics play themselves out, pork producers and swine veterinarians can anticipate change and consequently, opportunities. We want to stay informed on these opportunities and take advantage accordingly.

Figure 1: Measured and predicted changes in soil organic carbon of a prairie soil throughout the period of cultivation (Donnigan et al 1998).



Production