

GREEN MATTERS

A newsletter from the Alberta Environmentally Sustainable Agriculture Council

Local Options for a Global Issue

From AESA Council's Chair

by John Kolk,
Poultry Industry Council

WHAT'S INSIDE

Policy Q&A

GHGs and the Bottom-Line

Better Estimates,
Better Management

Council Profiles: Alberta Pork,
Alberta Beef Producers

Wetlands for Carbon Storage

Issue No.20, Summer 2004

It's easy to feel pessimistic when you look at the predicted consequences of climate change. For the Prairie Provinces, the expected changes include reduced water supplies, more drought, more forest fires, and more severe storms. And even if every person on the planet significantly reduces greenhouse emissions starting today, the impacts of our emissions up until today will still be felt for a century or more.

But for anyone who cares about the land and the coming generations, it's vital to put aside the pessimism and find practical, cost-effective options to address this issue. As it turns out, there are many such options in agriculture.

In Canada, agriculture generates an estimated 9% of the nation's greenhouse gas emissions, but actions by producers could reduce the country's total emissions by 20% or more. Economically sound practices like direct seeding, efficient fertilizer application, and balanced feed rations reduce net emissions of three major greenhouse gases—carbon dioxide, nitrous oxide and methane—and also protect water quality, enhance soil quality and conserve wildlife habitat. As well, there are potential economic opportunities for agriculture in converting products like grain and manure into bio-energy to replace fossil fuels.

Developing farm-friendly knowledge on these practices is essential. AESA is one of many agencies contributing to this. For example, through our Farm Based program, we have supported many local projects on practices that reduce emissions. We've also provided funding for greenhouse gas information bulletins, a workbook and booklets, held provincial forums, and contributed to research and research planning. All these efforts stress that good economics and good environmental stewardship are both essential for agriculture to thrive in the long-term.

Several articles in this issue of *Green Matters* look at other programs focusing on practical options for agriculture. These include the national Greenhouse Gas Mitigation Program, conducting producer-led extension activities, and the Model Farm Program



Peter Gamache/RTL

An Alberta field day demonstrates that direct seeding systems make agronomic and economic sense – and increase carbon storage.

that is developing a web-based calculator with an economics component to estimate emissions for individual farms.

Another article provides an overview of policy aspects of greenhouse gas emissions. In December 2002, Canada ratified its commitment under the 1997 Kyoto Protocol agreement. That commitment is to reduce the nation's emissions to 6% below 1990 levels by 2012. As well, the Alberta Government has developed its own strategy and timelines for reducing emissions.

Agricultural emissions are not regulated under this current round of Kyoto, and federal regulations governing aspects like carbon credit trading are still being developed. However, it appears that we will have to address the issue over the next decade—whether it's to take advantage of the potential economic opportunities that may be available for agriculture, or to prepare for “child of Kyoto” type regulation.

As we in agriculture try to deal with our sometimes overwhelming day-to-day economic concerns, tackling greenhouse gas emissions may seem like a low priority. But I believe the path to sustainability involves finding individual options that weave together all the threads of our lives—economics, water, soil, air, biodiversity, and community. And I find hope in the fact that many of the options that reduce net emissions from agriculture do in fact weave those threads together.

Q&A

Greenhouse Gas Policy

International, federal and provincial policies on greenhouse gas emissions all play a part in the regulations and opportunities that affect industries—including agricultural production and processing—in Alberta. Karen Haugen-Kozyra of Alberta Agriculture, Food and Rural Development gives us an overview of some of these policy considerations relevant to agriculture in this question-and-answer session.

When will the Kyoto Protocol come into effect?

There's a "double 55" trigger that brings Kyoto into force. That's when 55% of the nations who are signatory to the protocol have ratified their commitment and the nations who have ratified represent 55% of developed nations' emissions. The only country that can bring those emissions up to 55% is Russia. With Russia recently ratifying Kyoto, the protocol will come into effect in early 2005.

What is the Alberta Government's position on Kyoto?

The Alberta Government believes Kyoto is too stringent too soon. The targets and timelines in Alberta's strategy, *Albertans and Climate Change: Taking Action*, reflect what we think we can realistically achieve. Alberta is the province that has done the most work on developing actions to address climate change. It is investing in technology now so we can be better prepared to achieve the more stringent targets expected in Kyoto's second phase, from 2013 to 2018.

What lies ahead for Alberta's agricultural producers?

They need to be positioned to take advantage of the opportunities from these policy developments. Our department and other government agencies are talking to producers about the offset market and developing quantification protocols [methods to calculate how much soil carbon is stored or greenhouse gases are reduced by changing from one agricultural practice to another]. We're also working on strategies to help the industry adapt to climate change and to take advantage of bio-energy opportunities.

What is the current situation on trading offset credits?

Two kinds of credits will be available: credits for reducing emissions from a source (like a manure lagoon), and credits for removing carbon dioxide from the atmosphere, through practices like reduced tillage. Industries regulated under Kyoto may be interested in buying credits from unregulated sectors, like agricultural production, to meet their GHG emission targets.

The federal government is currently developing the legislative framework for Canada's emissions trading system, but the Kyoto criteria are dictating some of the rules. For example, emissions reductions must be:

- additional – your emissions are lower than before you changed your practice.
- real – they result from a demonstrable action.
- measurable – they can be measured with accepted methods and verified by a third party.
- clearly owned – the seller must have clear ownership rights.
- permanent – they will not be re-emitted later, or if they are there's a contingency plan in place.

“Although the rules for the offset market are not in place yet, speculators are buying now.”

Permanency is an issue for farmers because soil carbon storage is reversible due to either natural conditions or human actions. One issue is whether the farmer is liable if reversal occurs. The federal system might include temporary and permanent credits. A temporary credit would be like leasing—expiring after a short term, like a year, and costing less, but with no long-term liability if the carbon is released later due to a change in management practice.

In the federal system, the crediting period is 2008 to 2012 for this phase of Kyoto, with no credit for early action. However, the federal government is considering a pooling approach in which early



Ducks Unlimited Canada

and later adopters of practices that store soil carbon would share the risks and the costs, and the pool would market the offset credits.

What is the market like today for carbon offset contracts?

Although the rules for the offset market are not in place yet, speculators are buying now. The prices we're seeing are about \$1.50 per tonne of carbon dioxide equivalent in 2003-05, going to about \$7 in 2009-12, in forward stream contracts. AgCert Canada is an aggregator [an agency that buys credits from many farmers and then sells the credits] with about 150 Alberta farms currently under contract for hog lagoon management. For example, \$65,000 was paid to one producer for two years of management change. Other aggregators buying from Alberta producers are AgCheck Canada and GEM Co. Recently, TransAlta Utilities bought over 1 million tonnes of carbon credits from a Chilean hog production company—the largest agricultural deal of its kind in the world.

Any farmer signing a contract to sell carbon credits should have a clear understanding of the contract details especially such things as liability for reversal, risk, contract period, price and payment schedule.

**For more information call
Karen Haugen-Kozyra at 780-427-3067
or Kendall Tupker at 780-427-3615.**

Good for the Producer, Good for the Environment

“Emissions from the beef sector could be reduced in the range of 15 to 30% by balancing rations.”

“Many of the management practices that look after the producer and look after the soils and forages, also look after the greenhouse gases, and producers may already be doing a good job right now,” says Patricia Walker. “So we’re trying to make producers aware of how they are doing that, as well as how they could perhaps do it better, for their benefit and for the environmental benefits.”

Walker is working with the Canadian Cattlemen’s Association (CCA) on one part of the \$21-million Greenhouse Gas Mitigation Program for Canadian Agriculture. This federal program, operating from 2001-02 to 2005-06, has allocated \$15.3 million to raise awareness and promote adoption of agricultural practices that reduce greenhouse gas emissions or increase carbon storage. The CCA, Canadian Pork Council, the Dairy Farmers of Canada and Soil Conservation Council of Canada (SCCC) are leading this awareness effort. They are working with producer groups and others to deliver extension activities across the country.

Beef & the bottom-line

The CCA is delivering the program’s beef sector component. Walker says one of the main ways to reduce the intensity of greenhouse gas emissions from beef production is by improving production

efficiency. So the projects involve practices that are good for the bottom-line. She gives two examples:

• **Training in balancing rations:** “Emissions from the beef sector could be reduced in the range of 15 to 30% by balancing rations, because so many production efficiencies come out of that... [giving] you more beef per unit of input. So the emissions per input are generally reduced.” She adds, “The producers [at the training sessions] found it interesting to see, in many cases, how much money they were wasting because they were either overfeeding or didn’t have the right balance of minerals, vitamins or whatever so the feed wasn’t being used as efficiently.”

• **Demonstrating grazing of alfalfa stands:** About 80 sites in the four western provinces are demonstrating alfalfa grazing and the use of Alfasure. This product, developed by Dr. Merle Olson of the University of Calgary, allows cattle to eat a diet rich in alfalfa without the danger of bloat. Several factors in this project reduce net emissions per pound of beef produced. Alfalfa, as a perennial crop, is better than annual crops at storing carbon. Also, cattle eating this high quality forage produce less methane per pound of feed eaten, and the increased rates of gain achievable on alfalfa rations mean cattle take less time to reach market weight.



Canadian Cattlemen’s Association

One of the demonstration sites in the prairie-wide alfalfa grazing project.

Dollars & sense for crop producers

For crop producers, reducing greenhouse gas emissions makes great agronomic and economic sense, explains Peter Gamache of Reduced Tillage LINKAGES (RTL). RTL is working with SCCC on the soils and nutrient management component of the program in Alberta.

Gamache says, “It makes good sense to enhance carbon storage because of the economic advantage in terms of better soil quality and better nutrient cycling because we are sequestering carbon, that is, building our organic matter.” Practices like direct seeding and crop rotations that include forages and pulses increase soil carbon.

He adds, “The same can be said for nitrous oxide. As we become more efficient in utilizing the nitrogen we apply, less is lost to the atmosphere and more goes to crop production. So practices like applying nitrogen at seeding time and banding will reduce nitrous oxide losses and put more money in our pocket.”

Under this program, RTL has four major demonstration sites across Alberta where its agronomists have a variety of projects, including some in partnership with other agencies. As well, each of the five agronomists is running demonstration projects on local farms. Projects include such topics as direct seeding dos and don’ts, rotation options, liquid hog manure injection, and equipment demonstrations.

For more information, call Patricia Walker at 403-601-8991 or Peter Gamache at 780-422-7922.

Methane from cattle: the true story

Walker would like to set the record straight concerning those jokes about cattle and methane. “The methane from a cow is not mainly burps and it’s not mainly from the other end. Methane is generated in the rumen because that’s an anaerobic fermentation vat where the feed is being fermented. Some bacteria in the rumen produce methane as a by-product. That methane is absorbed into the bloodstream, goes through the bloodstream into the lungs, and then is exhaled. That’s where the bulk of the methane comes from. So we can put to bed the myth that cows are incredibly rude burping, farting creatures!”

Farm Emissions: Better Estimates for Better Management

At an AESA-sponsored forum in 2000, Alberta producers requested an on-farm tool so they could assess the effects of their own practices on greenhouse gas emissions. “Their argument was that they can’t manage what they can’t measure,” explains Jilene Sauvé.

Sauvé is a Climate Change Specialist with Alberta Agriculture, Food and Rural Development. She’s well aware of the difficulties in accurately measuring the fluctuations in net greenhouse gas emissions at the farm level. Emissions can vary greatly even over short distances and short time periods, due to differences in such factors as moisture, temperature and agricultural practices.

Creating a research road map

So, as a first step in responding to the producers’ request, Sauvé and other researchers developed a science plan for farm-level greenhouse gas assessment in 2003. Based on input from scientists across Canada, the plan outlines current knowledge on this issue, and prioritizes gaps in that knowledge.

Then in June 2004, researchers, policy specialists, producers and representatives from research funding agencies met to work on the next step. They laid the groundwork to develop a “road map” on how to fill the knowledge gaps.

Sauvé explains, “We have created a list of agricultural practices with the most potential to reduce emissions. Under each practice is a list of gaps that we feel need further research so we can recommend them as beneficial management

“Looking at greenhouse gases is just another way of looking at sustainability.”

practices.” With this information, funding agencies can request proposals from researchers for studies targeting those specific gaps. Such research could make invaluable contributions toward assessing and reducing emissions.

Many of the identified practices have other benefits like increasing production efficiency, protecting water quality and enhancing soil quality. “It’s really raising the awareness that we don’t want just greenhouse gas research; we want environmentally sustainable agriculture research. Looking at greenhouse gases is just another way of looking at sustainability,” notes Sauvé.

On-line calculator coming soon

But what about the producers’ need for farm-level greenhouse gas assessments? Well, Agriculture and Agri-Food Canada (AAFC) is working on that right now in its Model Farm Program.

The program, which has been underway for about four years, has a multidisciplinary team of about 30 researchers. They are measuring emissions from farming systems across Canada and using the collected data to develop computer models. By taking into account management practices, climate and soils, the models will be able to

estimate a farm’s current emissions, evaluate the effects of alternative practices including their economic feasibility, and identify sets of practices to reduce net emissions.

The researchers are developing two main modelling products. One is the Virtual Farm, a sophisticated, leading-edge computer model for use by scientists. The other is the greenhouse gas calculator, a simpler version for estimating emissions from commercial farms.

“The calculator will be on the Internet, available to anyone—whether it be a policy maker, scientist or producer—who has an interest in reducing greenhouse gas emissions from a farm,” notes AAFC’s Bobbi Helgason. AAFC expects to have a functioning prototype calculator within a few months.

Both modelling products take a whole farm approach. Helgason says, “Rather than looking at emissions from one source at a time, we want to follow nutrient flows across the whole farm so we have a better idea about how changing practices might affect *net* emissions across the entire farm landscape.”

She adds, “One example I often use is the planting of alfalfa. We know that planting perennial legumes can increase carbon storage in our soils. However, we need to keep in mind that ... those legumes will be fed to cattle, which will increase production of enteric methane [in the digestive system of cattle]. Some of those nutrients will be excreted in manure, and how we handle that manure will also affect greenhouse gas emissions.”

Like Sauvé, Helgason puts her work in a broader context. “In our development of this model, we are trying to provide a framework for describing farms across Canada. We hope this framework will help us to better understand carbon and nitrogen flows through agricultural ecosystems. ...So the Model Farm Program really is a long-term effort aimed not only at evaluating greenhouse gas emissions but also at other important environmental issues.”

For more information, contact Jilene Sauvé at 780-427-3347 or Bobbi Helgason at 306-975-6510

This laser system is measuring methane emissions from cattle in AAFC’s Model Farm research.



COUNCIL PROFILES

Alberta Pork

“We live in these places where our farms are, so a healthy environment is important to our families as well,” says Alberta Pork’s Paul Hodgman.

Alberta Pork is the organization representing all pork producers in the province. One of its four major objectives is “to ensure a sustainable, healthy environment for the public and ourselves.” Its other objectives relate to: delivering high quality, wholesome, safe food; caring for hogs; and helping pork producers to prosper.

As assistant general manager, Hodgman’s responsibilities include coordinating Alberta Pork’s diverse activities in research, extension and policy related to environmental considerations in the hog industry.

Alberta Pork supports and participates in research and extension on such important

topics as manure management practices to reduce odour and minimize nutrient losses to water bodies and the air. Examples of extension activities include: development and distribution of a Beneficial Management Practices manual with the latest information on environmentally sound practices for hog producers; and demonstration projects under the national Greenhouse Gas Mitigation Program.

As well, the organization has been instrumental in contributing to the development of the Alberta Environmental Farm Plan Company and its voluntary, confidential program that helps producers to identify and address the environmental strengths and risks on their own farms. Hodgman has been part of the initiative from its beginnings and is currently vice-chairman of its board.

Alberta Pork provided input during the recent reviews of Alberta’s Agricultural Operation Practices Act, which regulates confined feeding operations. Hodgman notes, “Alberta is the envy of other provinces in terms of the regulatory control on our industry. We have a body [the Natural Resources Conservation Board] that is responsible for approvals and enforcement, which is independent of industry

“...one of the ways you solve problems is to have fair, open and intelligent dialogue on the issues.”

and the Department of Agriculture. It is now operating in a manner that is serving the needs of both the public and the industry, in a very fair and thoughtful way.”

Alberta Pork’s Ambassador Program for communicating with the public also includes an environmental component. “We think one of the ways you solve problems is to have fair, open and intelligent dialogue on the issues,” says Hodgman. He adds, “We are developing a program called Farm to Fork®, which will be the banner to do a lot more issue-oriented activities in the community.”

Participation on AESA Council is yet another way that Alberta Pork is able to play a proactive, leadership role in addressing environmental issues. Alberta Pork is represented on Council by Dennis McKerracher, a hog producer in the High River area. For more information about Alberta Pork, visit <<http://albertapork.com/>>.

Alberta Beef Producers

“You can’t divorce sound environmental management from sound business management. To effectively manage and sustain the environmental resources they rely on, producers must also be economically sustainable,” says Ron Glaser, Public Affairs Manager for Alberta Beef Producers (ABP).

ABP represents all beef cattle producers in the province. Glaser says, “Our mission is to strengthen the sustainability and competitiveness of the Alberta beef industry.”

Within Alberta, ABP focuses on six main areas: policy, regulatory and legislative issues; animal health and research; issues related to confined feeding operations; promotional and educational programs; member relations; and environmental and animal care issues. ABP also contributes to national and international

“Many times you’ll see areas where the interests of producers align with the interests of society...”

beef promotion, market development, and research efforts.

Although the BSE issue has been its overriding concern during the past year, ABP is continuing its other work, including its environmental programs.

Glaser says, “One of our flagship programs is our Environmental Stewardship Award.” Each year, a committee of producers and representatives from environmental and non-government agencies selects the producer whose actions best exemplify environmentally sustainable cattle production. The winner is an ambassador on stewardship to the general public and other producers.

Another major accomplishment is the “Cows and Fish” organization, formally known as the Alberta Riparian Habitat Management Society. From humble beginnings around a coffee table over 10 years ago, it’s become a province-wide program funded by various agencies including AESA to improve the health of the “green zone” along the edges of streams and lakes, through extension, riparian health assessments and other activities.

Cows and Fish is founded on a partnership between ABP and Trout Unlimited Canada.

Both agencies saw that helping producers to enhance land management and forage production would also result in cleaner water and better habitat for fish and wildlife.

“Many times you’ll see areas where the interests of producers align with the interests of society and other groups,” notes Glaser. Most of ABP’s environmental activities are done in partnership, such as producing extension publications and allocating funds for community-based riparian projects.

The partnership with AESA Council is an important one. ABP represents Alberta’s beef sector on Council. Glaser says, “There are tremendous synergies there. Having linkages with AESA Council is really important in terms of developing programs and policies, as well as interacting with the broader farm/environmental community. AESA Council is ... helping to direct, manage and shape how a lot of these types of programs will look in the future. So it’s critical for us to have a voice at the table.”

Alberta Beef Producers is represented on Council by Erik Butters, a rancher in the Cochrane area. For more information on ABP, visit <<http://www.albertabeef.org/>>.

Wetlands: Another Part of the GHG Picture

“With a wetland, anything happening in the surrounding upland comes downhill and impacts that wetland.”

Recharging groundwater, maintaining water quality, providing habitat. Those are just a few of the societal benefits from wetlands. Now a prairie-wide initiative is collecting data that could add yet another benefit to the list—carbon storage.

Called the Agriculture and Wetlands Greenhouse Gas Initiative, its main goals are “to provide the first numbers for carbon sequestration and greenhouse gas emissions for prairie pothole wetland systems, and to relate those numbers to the practices in the uplands around the wetlands,” explains Dr. Rhonda McDougal, a research scientist with Ducks Unlimited Canada (DUC).

McDougal is coordinating this multi-agency, multidisciplinary initiative, which began in 2002. The results will help in painting a more complete picture of the nation’s greenhouse gas emissions needed for Canada’s international negotiations and in identifying agricultural practices that reduce emissions.

“Wetlands have always been part of the natural greenhouse effect and part of the carbon cycle balance,” explains McDougal. Like other plants, wetland plants lock up carbon in their tissues while they live. But dead plant matter at the bottom of a prairie pothole wetland can take a long time to

decompose and release the carbon. That’s because the sediments in pothole wetlands are typically anaerobic (oxygen-free), and oxygen is necessary for decomposition. As well, microbes involved in decomposing organic matter are inactive for about eight months of the year on the prairies because of the cold temperatures. Along with storing carbon, wetlands can also emit carbon in the form of methane under some conditions because some types of microbes adapted to anaerobic environments release methane.

The initiative, composed of five interlinked projects, is measuring organic carbon in soil and wetland sediments, and measuring emissions of methane, nitrous oxide and carbon dioxide. McDougal says, “One of the challenges for prairie wetlands is that no one has measured greenhouse gas emissions from them before. We don’t have tried and true methods for sampling.”

The researchers are monitoring about 100 wetlands over at least five years, as water levels and temperatures fluctuate with annual and seasonal variations. The sites represent a range of soil zones, climatic conditions and agricultural practices. McDougal says, “With a wetland, anything happening in the surrounding upland comes downhill and impacts that wetland.



Rhonda McDougal/Ducks Unlimited Canada

A student sampling soil by a greenhouse gas chamber (white cylinder inserted in the ground) next to a wetland near Camrose.

So we do our sampling in a transect that runs from the upland, whether it’s an agricultural field or a grassland, down through the zone of cattails and willows, and then through basin and up the other side.”

Along with monitoring individual wetlands, the researchers are also using flux towers to collect emission “footprints” from larger areas. In other Canadian studies, airplanes fitted with greenhouse gas sensors are attempting to collect emissions from entire regions. These three scales of measurement need to be brought together to create regional and national emission inventories.

McDougal hopes the initiative’s results will play a part in helping people adapt to the very serious impacts resulting from climate change over the coming decades. She says, “Climate change has already been happening for years, and it’s accelerating. And we need to do so much more to understand it and to cope. It’s going to be a question of learning how to cope with global rates of change in ecosystems that have never happened before in human experience.”

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Green Matters is the newsletter of the Alberta Environmentally Sustainable Agriculture (AESACouncil). AESACouncil consists of representatives from Alberta’s agriculture and food processing industry, environmental organizations and government.

AESACouncil’s vision is that Alberta has a thriving agriculture and food industry that is operating in an environmentally responsible manner. Its mission is to lead the agriculture and food industry in addressing environmental challenges. And its goal is to develop and deliver collaborative environmental stewardship initiatives that result in sustainable growth of Alberta’s farm, ranch and agri-food processing industry.

The purpose of *Green Matters* is to provide a forum for discussion of environmental issues in Alberta’s agriculture and food processing industry.

To subscribe to *Green Matters*, call 780-422-4385. *Green Matters* is also available online at <<http://www1.agric.gov.ab.ca>>.

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Alberta Environmentally Sustainable Agriculture Program