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Global Warming and Agriculture

Cow/Calf Best Management Practices

If Canada is going to be able to fulfill its commitment to reduce greenhouse gases (GHGs) all industries are going to be expected to do their part. Environment Canada, based on methods developed by Agriculture and Agri-Food Canada, has determined that agriculture is responsible for 10% of Canada's greenhouse gas emissions. The livestock industry including manure management accounts for 37%, while farm fertilizer applications accounts for 42% of agricultural and agri-food processing greenhouse gas emissions. Fortunately many producers will discover that they've already made changes in their farm practices over the past decade that have dramatically reduced the production of on-farm greenhouse gases.

Since greenhouse gas emissions in agriculture can indicate a measure of inefficiency, there are management practice changes cattle producers implement that will increase efficiency, increase profitability and have a positive impact on greenhouse gas emissions. This factsheet will examine some of the Best Management Practices (BMPs) that can be implemented on your farm to reduce greenhouse gas emissions.

Improve Pasture Management

"Improving pasture management and quality will improve profitability, productivity and reduce GHGs," says Dr. John Basarab, a research scientist with the Western Forage Beef Group in Lacombe, Alberta. "Start with good pasture management. Keep your pasture quality high and make sure you don't overgraze them. There is a strong relationship between forage quality and methane emissions. Methane emissions increase by nearly 50% as you move cattle from good quality spring pastures to poor quality, more mature pastures in the fall."

"All the pasture work we've done shows that feeding cattle a vegetative, grass forage will reduce methane emissions to levels similar to those that we get in feedlots using very, very efficient diets," says Dr. Karin Wittenberg, Head of the Department of Agriculture at the University of Manitoba. "The other thing that is coming out loud and clear in the research is that even when you have as little as 25% legume in your forage you'll consistently get significant drops in methane production. It just improves the efficiency of fermentation so much."

Many prairie pastures were severely overgrazed due to the 2002 drought, but Basarab believes that even in normal years cow/calf operators have a tendency to put their cattle out to pasture too soon and leave them on too late. As a result pasture quality is degraded a little bit more every year. This is an important factor, not only for GHG reduction, but also for expanding the beef industry. In Alberta, forage production is a limiting factor for increases in the beef cow and grass cattle populations. Many forage specialists feel that increases in forage production will primarily come from improved management of tame pastures.

"Deciding how long to keep an animal in a pasture is a learned process," says Karin Wittenberg. "Movement should be timed by determining what is left for them to graze. This is where rotational grazing comes in. If you keep the pasture even, you get less weed encroachment, you get a healthy stand of your original species whether it is native or seeded species. When you have uneven growth the cattle go after the regrowth and use up a lot of energy trying to get to what they like to eat. Uneven growth lowers pasture productivity and causes frustrated animals."

Feed Balanced Diets

"Feeding your wintering cows a properly balanced diet is another way to improve profitability and reduce GHG emissions," says John Basarab. "We estimate that we could reduce greenhouse gas emissions by about 15% by feeding cattle a properly balanced diet. Test winter feeds for nutrient composition and balance the cow's diet for energy, protein, minerals and vitamins. Many producers do not test their winter feeds for nutrient composition and primarily just feed what's available. A study of cow-calf producers in Alberta in the late 1980s (Alberta Cow-Calf Audit) found that only one in five cattle producers were testing their winter feeds for nutrient composition. Ten years later that number had only increased to one in three."

Increase Calf Crop Percentage

Increasing the weaned calf crop percentage is another way to reduce GHG emissions. Alberta's 10-year calf crop, for example, is thought to average 84 to 85%. It is estimated that by using good management practices this could be increased to 89%, increasing farm profitability and producing a net per unit GHG emission reduction.

Select Bulls for Net Feed Efficiency

Selecting bulls for net feed efficiency is a longer-term solution for increasing profitability and reducing greenhouse gases. But what is net feed efficiency? Net feed efficiency is the variation in

feed intake that remains after the requirements for maintenance and growth have been removed. Like a golf score, a negative value is better and indicates a more efficient animal.

"For example, in a typical pen of feeder cattle on a finishing diet, there will be individuals in the pen that will eat three kilograms less feed per day than a pen mate for the same level of average daily gain at the same body weight," explains Basarab. "Animals may have the same weight gain but some will do it by eating three kilograms less feed per day. If we could select for this trait we could eliminate those animals that eat a lot but have poor growth rates. If we could select these animals we could actually reduce methane emissions as well. Calculations conducted by Dr. Erasmus Okine at the University of Alberta and later repeated by Australian researchers revealed that selection for low net feed efficiency (efficient animals) has the potential of reducing methane emissions by 15% and reducing manure, N, P and K production by 15 to 17%."

Manure Management

Only 6-7% of Canada's agricultural and Agri-Food processing GHG emissions come from manure management systems. Keeping cattle on pasture as long as possible, grazing good quality forages is one strategy for reducing GHGs emitted from manure. Only small amounts (1 kg methane/cow/year) of GHG are emitted from manure that is deposited directly on the soils by livestock.

"The jury is still out on which type of manure system is best for GHGs," Wittenberg says. "I've just compared stockpiles with compost and the GHG emissions from both were just about identical. We would never have guessed that but we found that what we are getting is a different ratio of N2O to CH4 than we expected. We do know that if we have manure crusting of some sort we have less movement of GHG into the atmosphere. What we don't know is if little GHG movement in storage means there is more in the field. That work is just being done now."

Manure can also be used as a substitute for inorganic fertilizer. Soil and manure tests should be done routinely to determine available N. This way the amount of nitrogen in the manure can be included when calculating a crop's nitrogen requirements to avoid over application.

Timing manure spreading operations also affects GHG emissions. Eliminating or minimizing fall and winter manure spreading reduces the amount of excess N available in the spring when N2O losses are the greatest. There is a large amount of uncertainty over which manure application methods are the best.

Remove Marginal Land from Annual Crop Production and Plant Buffer Strips

The expanding beef herd also gives producers a good reason to remove marginal land from crop production and seed it back to perennial vegetation. Planting these marginal or fragile lands to perennial cover will not only get rid of a cash drain by eliminating the need for inorganic nutrient inputs and tillage it also allows soil to build up organic matter and sequester carbon in the perennial vegetation. Hay and pasture lands are generally more effective than annual crops at storing carbon in the soil, and thus have relatively low GHG emissions. Well managed hay and pasture land also prevent soil erosion and protect water quality. Seeding forages in riparian areas along waterways also will act as buffer strips and prevent both surface and ground water borne nutrients from reaching waterways.

Streamline Operations to Minimize Fossil Fuel Consumption

Tim Nerbas operates a mixed farm with his parents and wife Diane near Waseka, Saskatchewan. Between them they crop 1500 acres of grains and winter 110 cows. They've implemented a variety of strategies to both streamline production costs and secondarily reduce GHG emissions.

" We're always looking for little low cost things we could do that puts more money in our pockets and would benefit the environment as well," Nerbas says. "I'm now trying to utilize swath grazing as a way to keep the cows grazing for a longer portion of the year. It minimizes our machinery, labor, and fuel cost during the winter. We don't have to bale the swaths, we don't have to truck the bales home and we don't have to start a tractor every day to haul the feed back out to the cattle. We move the animals to new swaths every three days by moving an electric fence powered by solar panels. This also definitely reduces the amount of manure that we bring back into our yard, although I don't know exactly how that works out in terms of GHG emissions."

Sources:

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