



cow/calf operations

AND GREENHOUSE GASES

Disclaimer

The primary purpose of this Alberta Agriculture and Food publication entitled *Cow/Calf Operations and Greenhouse Gases* is to assist producers in implementing greenhouse gas management practices.

It is important to be aware that while the authors have taken every effort to ensure the accuracy and completeness of this document, it should not be considered the final word on the area of practices it covers. Producers should seek the advice of appropriate professionals and experts as the facts of individual situations may differ from those set out in this document.

All information (including descriptions or references to products, persons, websites, services or publications) is provided entirely “as is” and the authors make no representations, warranties or conditions either expressed or implied, in connection with the use of, or reliance upon, this information. This information is provided to the recipient entirely at the risk of the recipient and, because the recipient assumes full responsibility, the authors shall not be liable for any claims, damages or losses of any kind based on any theory of liability arising out of the use of, or reliance upon, this information (including omissions, inaccuracies, typographical errors and infringement of third party rights).

Acknowledgements

Alberta Agriculture and Food gratefully acknowledge the following for their assistance in the development of this document:

Agriculture and Agri-Food Canada, Alberta Environment, Western Forage and Beef Group, Canadian Cattlemen’s Association, The Greenhouse Gas Mitigation Program for Canadian Agriculture and N. Lee Pengilly, writer.

Front page photo credit: Debbie Webster

contents

- 1 Linking Greenhouse Gases to the Farm Gate: What Makes Sense?
- 2 What Greenhouse Gases are Produced by Agriculture?
- 4 What is the Greenhouse Gas Contribution from Agriculture in Alberta?
- 4 What Greenhouse Gases are Produced by the Livestock Sector in Alberta?
- 5 How Can the Cow/Calf Sector Help to Address Greenhouse Gas Emissions?
- 6 Are You Familiar with These Terms?
- 8 How to Use this Booklet
- 9 Management Practices that Reduce Greenhouse Gases and/or Sequester Carbon
- 10 Section 1: Herd Health
- 11 Section 2: Grazing Management
- 20 Section 3: Feed Management
- 24 Section 4: Manure Management
- 28 Endnotes and References

Linking Greenhouse Gases to the Farm Gate: What Makes Sense?

Today's food and agriculture system faces ever-widening challenges as it responds and reacts to policy changes, market trends, new research, technologies and growing regulatory pressures. Industry leaders, in partnership with other stakeholders, government agencies, public representatives and the scientific community have all recognized the issue of greenhouse gases (GHGs) will continue to play an increasing role in management decisions at the farm gate. Although it is important to recognize uncertainties associated with the science surrounding greenhouse gases exist, it is equally important to recognize the science is maturing. With that maturation, policies at the local, provincial and federal level will unfold and impact future management decisions. As producers know, keeping an eye to the horizon as new information becomes available is a fundamental component of managing a successful business.

Greenhouse gas issues were brought to the forefront through Canada's involvement with, and subsequent ratification of, the Kyoto Protocol in December 2002. The Kyoto Protocol came into force on February 16, 2005. Canada was then required to reduce its emissions by six percent below its 1990 greenhouse gas levels within the period 2008-2012. However, several additional drivers have reframed this issue into one that has significance to both producers and agri-food processors as day to day business activities are carried out.

Production Efficiencies

Most agricultural activities operate with a slim profit margin. Simply put, greenhouse gas emissions represent a loss of production efficiency that translates into higher costs and lower profits. Conversely, minimizing greenhouse gas emissions may translate into reduced costs, higher productivity and increased profits.

Short-Term Opportunity

Regulation of greenhouse gas emissions in the energy, manufacturing and chemical industries has the potential to raise agricultural input costs. However, this is also creating a demand for agricultural greenhouse gas carbon or "offset" credits as a prospective means to compensate for these rising costs. Opportunities exist for the agricultural sector to create offset credits by implementing certain management practices to reduce or remove greenhouse gas emissions. In Alberta, as of January 2006, a provincial demand for offset credits will be available as regulated industries look for the opportunity to invest in offset credits as a way of meeting their Kyoto commitment.

Stewardship

Stewardship and sustainability go hand in hand on any agricultural operation that is planning for long-term viability. Many of the management practices that address emissions have a direct link to appropriate stewardship on agricultural production bases. Through the Canada-Alberta Farm Stewardship Program, in conjunction with the Alberta Environmental Farm Plan (AEFP) Company, financial incentives are provided to agricultural producers who adopt certain management practices that mitigate or minimize negative impacts and risks to the environment by maintaining or improving water, land, air quality and biodiversity.

For more information contact the Alberta Environmental Farm Plan Company, 1-866-844-2337 (www.albertaEFP.com).

Due Diligence

Due diligence is the level of judgment, care, prudence, determination and activity that would reasonably be expected of a person under particular circumstances. Like all major industries, agriculture continues to come under close public scrutiny. Although no specific compliance requirements for primary producers exist under the Kyoto Protocol, management practices that reduce or remove greenhouse gas emissions from agricultural sources and the resulting positive effects will showcase due diligence from the farm gate through the industry as a whole.

Adaptation

Weather plays a key role in how agricultural producers adapt or change their management practices to maintain productivity and sustainability. The impact of climate variability, along with changes in markets, environmental, societal and economical conditions will impact management decisions for crops, livestock, water, pests and diseases. The agricultural industry has a history of adaptation and innovation – a legacy that has producers well positioned to make the best decisions for their land, their families and their businesses. There is little choice but to respond and adapt to change, no matter what the source. Both agricultural sustainability and prosperity depend upon it.

Greenhouse gas management may not be seen as a high priority when agricultural producers are already dealing with a “full plate.” However, after a closer look at the information, one may well come to see the greenhouse gas issue is more about reframing existing knowledge. Many of the management strategies associated with the reduction and removal of greenhouse gases from the atmosphere also protect the environment, improve production efficiencies and may offer a return on investment. In addition, Canada’s ratification of the Kyoto Protocol and commitment to meet greenhouse gas emission reduction targets has channeled new research dollars into the agricultural industry. As the science community continues to research new technologies and strategies, this information may increase the suite of management practices currently available to agricultural producers.

What Greenhouse Gases are Produced by Agriculture?

The main greenhouse gases emitted by agriculture are carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O) (Figure 1). Greenhouse gases differ in how long they remain in the atmosphere as well as in their ability to absorb energy (heat) and re-emit energy. This is known as the global warming potential and each greenhouse gas has a different value. While carbon dioxide is the main gas emitted by other industries, agriculture is unique in that most of the greenhouse gas emissions result from methane and nitrous oxide. These greenhouse gases have global warming potentials of 23 and 296 respectively.¹ This value is measured by comparing each gas relative to carbon dioxide and is referred to as the carbon dioxide equivalent (CO₂e).

In agriculture, the majority of on-farm carbon dioxide emissions come from:

- on farm energy use (e.g. operating equipment and heating buildings)
- intensive tillage regimes
- summerfallow and overgrazing

The primary on-farm sources of methane emissions include:

- digestive processes (enteric fermentation) from ruminant livestock (cattle, sheep, goats)
- anaerobic (in the absence of oxygen) respiration of organisms in riparian areas
- manure storage systems (stockpiled solid, liquid storage)

The primary on-farm sources of nitrous oxide emissions all involve nitrogen management practices that include:

- production of nitrogen fixing crops and forages (e.g. alfalfa and pulses)
- manure application
- inorganic fertilizer application
- water logged soils that create anaerobic conditions