



hog operations

AND GREENHOUSE GASES

Disclaimer

The primary purpose of this Alberta Agriculture, Food and Rural Development publication titled *Hog 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, this document should not be considered the final word on the area of practices that 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.

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

Today's food and agriculture system faces ever-widening challenges as it 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 that 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 GHGs exist, it is equally important to recognize that the science is maturing. With maturing science, 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.

GHG issues were brought to the forefront through Canada's involvement with and subsequent ratification of the Kyoto Protocol in December of 2002. In addition, the Kyoto Protocol came into force on February 16, 2005. Canada is now required to reduce its GHG emissions by six percent below its 1990 GHG emissions by 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 within a slim profit margin. Simply put, GHG emissions represent a loss of production efficiency that translates into higher costs and lower profits. Conversely, minimizing GHG emissions can translate into reduced costs, higher productivity, and increased profits.

Short-Term Opportunity

Regulation of GHG emissions in the energy, manufacturing, and chemical industries has the potential to raise agricultural input costs. This is also creating a demand for agricultural GHG carbon or "offset" credits as a means to compensate for rising costs. Opportunities exist for the agricultural sector to create offset credits by implementing certain management practices to reduce or remove GHG emissions. In Alberta, as of March 2005, there will be a provincial demand for offset credits because new coal plants are required to offset their GHG emissions to equate to emissions from natural gas fired plants.

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 GHG 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, incentives will be 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.

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 under the Kyoto Protocol exist, management practices that reduce or remove GHG emissions from agricultural sources and the resulting positive effects will showcase due diligence from the farm gate right 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.

GHG management may not be seen as a high priority when agricultural producers already have a full plate. However, after a closer look at the information, one may well come to see that the GHG issue is more about reframing existing knowledge under a new umbrella. Many of the management strategies associated with the reduction and removal of GHGs 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 GHG emission reduction targets has channeled new research dollars into the agricultural industry. As the science community continues to research new technologies and strategies, this research may increase the suite of management practices currently available to agricultural producers.

What Greenhouse Gases are Produced by Agriculture?

The main GHGs emitted by agriculture are carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O) (Figure 1). While carbon dioxide is the main gas emitted by other industries, methane and nitrous oxide warm the atmosphere 21 and 310 times more than carbon dioxide, respectively. In agriculture, the majority of on-farm carbon dioxide emissions comes from:

- fuel combustion for heating farm buildings, farm machinery, and
- intensive tillage regimes
- summerfallow when soil organic matter is decomposing

The primary on-farm sources of methane emissions include:

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

The primary on-farm sources of nitrous oxide emissions all involve soil nitrogen management:

- wet soils containing nitrogen fixing plants like alfalfa or pulses
- manure nitrogen application
- commercial nitrogen fertilizer application