



FACT SHEET: Climate Change and Intensive Livestock Production

Of all types of agriculture, intensive livestock operations are the most damaging in terms of greenhouse gas (GHG) emissions. From a global perspective, the Food and Agriculture Organization of the United Nations (FAO) estimates that when one includes land-use changes and deforestation, livestock activities contribute 18 per cent of total anthropogenic greenhouse gas emissions.

By excluding land use changes and deforestation, the FAO data shows that of the total global emissions from livestock activities, 30% come from intensive systems, even though these systems account for only 16% of the total global production of meat, milk and eggs.

Globally 1.3 billion people are engaged in livestock production with almost 1 billion of them poor and solely dependent on livestock production for their livelihood. The livestock sector generates about 1.4% of the world's Gross Domestic Product and grew 2.2% per annum over the last decade. Unfortunately, 80% of this new growth is coming from industrial production systems in developing countries.

Canada's Performance

In 2006, gross GHG emissions have increased by 25% from 1990 levels, the baseline year for the Kyoto Protocol. This swell was driven mainly by increases in the number of animals produced

Greenhouse Gas Sources from Primary Agriculture in Canada (2006)

GHG Source Category	GHG Emissions (kt CO ₂ equivalent)
Agriculture Total*	62,000
<i>Enteric Fermentation</i>	24,000
Methane	
Beef Cattle	20,000
Dairy Cattle	2,900
Other Animals	1,000
<i>Manure Management</i>	8,000
Methane	
Swine	1,600
Beef Cattle	910
Dairy Cattle	630
Other Animals	130
Nitrous Oxide	4,800
<i>Agriculture Soils</i>	30,000
Nitrous Oxide	
Indirect Sources**	11,000
Synthetic Fertilizers	7,100
Crop Residue Decomposition	5,000
Pasture, Range, Paddock Manure	3,800
Manure Applied as Fertilizer	2,300

through intensive livestock systems such as cattle feedlots, confined hog and poultry operations and a shift to liquid slurry dairy systems.

Of all the Organization for Economic Cooperation and Development (OECD) countries, Canada, Spain and New Zealand have shown the largest increase in agricultural GHG emissions since 1990.

To make matters worse, OECD North America and OECD Pacific are the only developed regions forecasting a consistent increase in GHG emissions by 2020 in their agricultural sectors at 18% and 21% respectively. In both cases, the trend is largely driven by non-CO₂ emissions of methane and nitrous oxide from manure management and emissions from soils. Methane is 28 times more harmful as a GHG than CO₂ while nitrous oxide is 296 times more damaging.

Mitigating Misconceptions

Ruminant animals, such as cattle, sheep, and goats emit methane through a digestive process called enteric fermentation. Although they emit methane as they exhale, ruminants are essential to the food system as they are able to graze on land unsuitable for crop production and can convert the unusable plant materials into nutritious food and fiber.

Swedish scientists have found that organic production systems can reduce GHG emissions and also provide an extra benefit of sequestering carbon. From a life cycle perspective, beef cattle raised organically or on grass versus industrially-produced beef, resulted in a 40% reduction in GHG emissions and consume 85% less energy

The multiple benefits of feeding cattle no grain, moving to organic and holistic production systems and re-integrating livestock and forages into crop production systems are immense. These small scale, mixed, and diversified at the farm level production systems, improve the fertility of the soil and can thus sequester more carbon dioxide, while at the same time preserving and improving genetic biodiversity. They use less non-renewable resources and no synthetic chemicals which in turn improves water and air quality. An additional strength of these systems is that their high level of diversity significantly enhances farm resilience, making them more adaptive to climate change.

In Canada, cattle are predominantly raised on pasture then shipped to large feedlots to be finished with a mixed grain/forage diet. Most of the feedlots are located in southern Alberta. After slaughter, the processed meat is then shipped across Canada for retail and/or exported to countries such as the

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United States, Japan and Mexico, adding additional GHG emissions through transportation, distribution and refrigeration, or what is known as “food miles”.

A decentralized food system, that supports small and medium scale abattoirs and meat processing businesses, would improve local regional economies by retaining the wealth within these communities and contributing to rural revitalization.

Liquid manure

Another large source of GHGs is from the animals' manure. In industrial production systems such as cattle feedlots or liquid slurry systems for confined pigs, methane and nitrous oxide are released into the atmosphere when the manure is stored in large quantities and when it is applied on land as fertilizer. The barns for slurry systems have slatted floors that allow the feces and urine to drop into a holding pit below the barn. Water is then used to liquefy the waste and then the slurry is flushed into a large holding lagoon. This liquefied waste decomposes anaerobically (ie, without oxygen) and produces methane and nitrous oxide as by-products.

Furthermore, nitrogen from manure applied to agricultural fields is lost to the atmosphere through volatilization and subsequent re-deposition or leaching, erosion and runoff. As ammonia, this form of nitrogen undergoes further transformation in the environment to produce even more nitrous oxide. This is known as the “nitrogen cascade effect” whereby reactive nitrogen over-accumulates in our soil, water, atmosphere and coastal oceanic zones to exacerbate the greenhouse effect.

Concentrating so much manure in such a small area with feedlots, chicken factories and hog confinement systems creates an imbalance between the manure produced and the amount that can be used locally by subsequent crops as fertilizer.

Research has shown that composting dry manure with straw reduces GHG emissions and has other multiple environmental benefits such as breaking down the manure into a more stable organic form, adding more carbon to the soil, destroying pathogens and weed seeds, resulting in better surface water and groundwater quality. Well maintained solid manure composting systems can also lower ammonia emissions.

Do technological fixes help solve industrial production systems and lower GHG emissions?

No - A recent study conducted at the University of Saskatchewan determined that GHG emissions from liquid manure systems were significantly higher than emissions from solid manure, and the research also found that injecting liquid manure into the soil significantly increased nitrous oxide emissions.

Methane digesters that cover manure lagoons to capture methane and/or is burned to generate heat or electrical power may in fact emit more ammonia into the atmosphere and contribute to the nitrogen cascade effect. To make methane digesters more GHG friendly, costly ammonia stripping technology must be employed.

What Can You Do?

Environmental damage by livestock may be significantly reduced by lowering excessive consumption of livestock products. This is especially the case for wealthy countries such as Canada. The World Health Organization and Tufts University have consistently recommended lower intake of animal fat and red meat in developed countries.

When you eat meat, eggs and/or dairy products, chose them from non-factory sources. Use the Eat Well Guide at www.eatwellguide.org or Beyond Factory Farming's Local and Sustainable Food Listing to help find socially responsible farmers and retail locations. When you do purchase meat, be willing to pay slightly more for quality, which includes the price of environmental stewardship. Look for 100% grass finished beef, pastured pork, free range chickens, certified organic and humanely certified meat and dairy products.

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* Canada's Agriculture GHG inventory does not include the manufacturing, transportation, distribution and storage of food, crops, and animals; the manufacturing and application of chemical pesticides and fertilizers; the fossil fuels used to heat and cool farm buildings; and, the fossil fuels used to operate farm machinery.

** Indirect sources include: volatilization and redeposition; and leaching, erosion, and runoff.

Sources:

Livestock's Long Shadow, FAO, 2006

Environmental Performance of Agriculture in OECD Countries Since 1990, OECD 2008

Organic Farming and Climate Change, UNCTAD/WTO International Trade Centre 2007

Benefits of Re-integrating Livestock and Forages in Crop Production Systems, E. Ann Clark 2008.

Global Farm Animal Production and Global Warming: Impacting and Mitigating Climate Change, Gowri Konenswaren and Danielle Nierenberg 2008

Odour and Greenhouse Gas Emissions Resulting from Surface and Subsurface Land Applications of Solid and Liquid Manure, Agnew, J, Lague, C., Schoenau, J. 2008

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