



An HSUS Fact Sheet

Greenhouse Gas Emissions from Animal Agriculture

Greenhouse gases (GHGs) absorb infrared radiation and cause the greenhouse effect, which warms the Earth.¹ GHGs are both natural gases, such as carbon dioxide, water vapor, methane, and nitrous oxide, as well as human-made gases, including chloro- and hydro-fluorocarbons.²

The 2007 Nobel Peace Prize-winning organization,³ the Intergovernmental Panel on Climate Change (IPCC), has found that the over-accumulation of these natural and human-made gases since the Industrial Revolution has caused anthropogenic global warming. Global warming is responsible for a range of climate-related events, such as more extreme weather occurrences including increased flooding and drought, as well as melting of Arctic ice and the loss of plant and animal biodiversity as a result of changes in temperature.⁴

According to the Food and Agriculture Organization of the United Nations (FAO), the animal agriculture sector—which includes the production of feed crops, the manufacturing of fertilizer, and the shipment of meat, eggs, and milk⁵—is responsible for 18% of all GHG emissions, measured in carbon-dioxide equivalent.⁶

In fact, the farm animal sector annually accounts for:

- 9% of human-induced emissions of carbon dioxide (CO₂),⁷
- 37% of emissions of methane (CH₄), which has more than 20 times the global warming potential (GWP) of CO₂,⁸ and
- 65% of emissions of nitrous oxide (N₂O), which has nearly 300 times the GWP of CO₂.⁹

Farm Animals in the United States

Nearly 10 billion land animals are raised for meat, eggs, and milk annually in the United States,^{10,11} with many of them confined in the nation's approximately 18,800¹² concentrated animal feeding operations (CAFOs).¹³ Typical factory farms intensively restrict animals in large, overcrowded, and barren sheds, denying them the ability to engage in most of their natural behavior.*

Greenhouse Gas Emissions and Factory Farms

Farm animal waste and other aspects of the animal agriculture sector generate GHG emissions, as well as ammonia¹⁴ and other airborne pollutants.¹⁵

Carbon Dioxide. CO₂ is considered the most powerful GHG as it has the most significant direct-warming impact on global temperature as a result of the sheer volume of its emissions.¹⁶ CO₂ is released from the burning of fossil fuels, such as coal and petroleum, and deforestation and other land-use changes that remove vegetative cover. Animal agriculture produces CO₂ in a number of ways:

- **High-Energy Feed.** Factory-farmed animals are typically fed high-energy crops such as corn, which is dependent on large amounts of chemical fertilizer.¹⁷ The FAO estimates that the production of fertilizer for feed crops may emit 41 million tonnes[†] of CO₂ per year globally.¹⁸
- **Fueling Factory Farms.** Intensive confinement operations require vast amounts of fossil fuel-based energy to cool, heat, and ventilate the facilities, and energy is also used to operate farm machinery to cultivate and harvest feed crops, resulting in at least 90 million tonnes of CO₂ annually worldwide.¹⁹

* For more information on factory farming and its impacts, visit www.hsus.org/farm/resources/research/.

† One tonne is one metric ton, or 1,000 kg (approximately 2,205 lb).

- **Processing and Packaging.** Slaughtering animals and packaging and transporting animal products emit several tens of millions of tonnes of CO₂ every year.²⁰
- **Deforestation.** Forests are important carbon sinks, sequestering carbon and preventing it from reaching the atmosphere. Deforestation for animal agriculture—both for clearing land for feed crops and for grazing—may release 2.4 billion tonnes of CO₂ worldwide annually.²¹
- **Feed Crop Cultivation.** Like forests, soils are also carbon sinks, and cultivating land for feed crops releases up to 28 million tonnes of CO₂ per year globally.²²
- **Desertification.** Grazing of pastures can cause the once fertile soil to dry and releases up to 100 million tonnes of CO₂ into the atmosphere annually.²³

Methane. CH₄ has 23 times the GWP of CO₂,²⁴ and its concentrations have increased by 150% since 1750.²⁵ According to the FAO, animal agriculture is responsible for 35-40% of anthropogenic CH₄ emissions.²⁶ Ruminant animals such as cows and goats, and, to a lesser extent, monogastric animals such as pigs release methane during digestion of grasses and feed in a process called enteric fermentation.²⁷ Methane is also released by manure as it decomposes.²⁸ Between 1990 and 2006, methane emissions from pig and dairy cow manure in the United States increased by 34% and 49%, respectively.²⁹ This increase, according to the U.S. Environmental Protection Agency, is a result of the shift toward confining pigs and cows in larger facilities using liquid manure management systems,³⁰ or manure lagoons.

Nitrous Oxide. N₂O has nearly 300 times the GWP of CO₂.³¹ Global farm animal production, including growing feed crops, accounts for 65% of global N₂O emissions.³² N₂O can persist in the atmosphere for up to 150 years and is present in far greater quantities than ever before, with its concentration in the atmosphere now 16% larger than in 1750.³³

Reducing the CO₂, CH₄, and N₂O Footprints from Animal Agriculture

Most strategies to control GHGs from animal agriculture have focused on very technical solutions, such as generating energy from farm animal manure³⁴ or manipulating the animals' diets.³⁵ These technologies, however, do little to address the problems inherent in industrial animal agriculture.

A better strategy—for the environment, climate change mitigation, human health, and animal welfare—is reducing our overall consumption of animal products and making more climate-friendly food choices, a recommendation made not only by animal advocacy, food safety,[‡] and environmental organizations,^{36,37,38} but also by public health advocates,³⁹ climate scientists,⁴⁰ and policy makers.⁴¹

There is no question that the meat, egg, and dairy industries contribute significantly to greenhouse gas emissions. The Humane Society of the United States, the nation's largest animal protection organization representing 1 in 30 Americans, encourages each individual to take important, daily steps to mitigate the devastating effects of climate change:

- **Reduce:** Every day, millions of animals are killed for human consumption. If each one of us cuts back on our consumption of animal products by just 10%, approximately 1 billion animals would be spared a lifetime of suffering each year and the impacts of industrialized animal agriculture would be diminished.
- **Refine:** Not all foods have the same impacts on animal welfare or the environment. Each industry has its own abusive practices, and some are much crueler and destructive than others. Refining our diets by avoiding conventional factory-farm products helps diminish animal suffering and protect the environment.
- **Replace:** The consequences of choosing vegetarian options are enormous—for public health, environmental integrity, and, of course, the animals.

¹ Climate Institute. 2007. Climate change. www.climate.org/topics/climate-change/index.html. Accessed July 30, 2008.

² Climate Institute. 2007. Climate change. www.climate.org/topics/climate-change/index.html. Accessed July 30, 2008.

³ Nobel Foundation. 2007. The Nobel Peace Prize for 2007. October 12.

http://nobelprize.org/nobel_prizes/peace/laureates/2007/press.html. Accessed July 30, 2008.

[‡] To learn about the Center for Food Safety's Cool Foods campaign, please visit www.coolfoodscampaign.org.

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