

Which one of these
contributes more to
Global Warming?



It's not the one that starts a car.

According to the United Nations Food and Agriculture Organization, the animal agriculture sector contributes to global warming even more than transportation does. Reducing the amount of meat, eggs, and dairy products in your diet is one of the most effective ways to reduce greenhouse gas emissions. Find out more about farm animal welfare, factory farming's environmental impacts, and what you can do to help.



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INTERNATIONAL**

Animal Agriculture and the Global Climate Crisis

The animal agriculture sector is the single largest contributor to greenhouse gas (GHG) emissions worldwide, responsible for 18%¹ to 51%² of anthropogenic emissions, measured in CO₂-equivalent. In nearly every step of meat, egg, and milk production, GHGs are released into the atmosphere. Mitigating and preventing the impacts of climate change require immediate changes in farm animal production and consumption patterns.

METHANE AND NITROUS OXIDE

- Methane has 72 times the global warming potential of CO₂ over a 20-year period.³ Nitrous oxide (N₂O) has 296 times the global warming potential of CO₂.⁴
- *Animal agriculture is the single largest emitter of anthropogenic methane, producing 37% of anthropogenic methane emissions globally.⁵ The animal agriculture sector is responsible for approximately 65% of N₂O emissions globally.⁶*
- Ruminant farm animals—such as cattle, sheep, buffalo, and goats—emit methane during digestion (enteric fermentation); farm animal manure also produces methane.⁷ Allowing these animals to graze on pasture, rather than fattening them on an unnatural grain diet in concentrated feedlots,⁸ as well as reducing the global population of ruminant animals, would assist in reducing methane emissions from enteric fermentation and manure.⁹
- In the United States, rising emissions from manure have been attributed to the shift towards rearing pigs and cows in large-scale facilities that use liquid manure management systems.^{10,11}
- Methane has a shorter life-span within the atmosphere (8 years), relative to CO₂ (100 years).¹² Reducing methane emissions would have a greater impact, in a much shorter time frame, than reducing CO₂ emissions alone.

CARBON DIOXIDE

- The animal agriculture sector is responsible for at least 9% of CO₂ emissions globally.¹³
- *The largest calculated sources of CO₂ from this sector result from the inputs and land-use changes necessary to maintain and feed the world's 65 billion farm animals.^{14,15}*
- Maintaining large-scale, intensive, industrial animal production facilities may emit 90 million metric tons of CO₂ per year¹⁶ as they can require substantial energy inputs. Energy expenditures in these industrial facilities differ significantly from those of much smaller-scale, extensive farms where animals are often raised outdoors.
- *As much as 80% of the global soybean crop is fed to cattle, pigs, chickens, and others animals used in agriculture.¹⁷ In addition to the resource inefficiency of converting vegetable protein to animal protein, the inputs of grain production also emit CO₂. Animal agriculture-related releases from cultivated soils alone may total 28 million metric tons of CO₂ annually.¹⁸*



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POLITICAL ACTION

- 1) ***All developed nations must measure emissions from intensive, industrial farm animal production facilities that confine animals indoors or in concentrated feedlots.*** At a minimum, such measurements should account for emissions resulting from energy usage and manure management at these large-scale facilities.
- 2) ***National strategies to reduce GHG emissions must specifically include reductions in methane from farm animals and their manure.*** Climate change poses significant threats to sensitive wildlife species and vulnerable human populations in low-lying nations over the next 25 years.¹⁹ A reduction in methane emissions is more likely to mitigate those impacts in this short time-frame than equivalent per capita reductions in CO₂ emissions alone.
- 3) ***Governments and civil society groups in developed nations must raise awareness about the health, climate, and other environmental benefits of reducing meat, egg, and milk consumption.*** A shift toward plant-based diets, particularly in developed nations, will reduce GHG emissions.^{20,21,22} Leading public health and nutrition experts have confirmed that such a shift can be achieved without compromising nutrition,^{23,24} and that a reduction in the consumption of animal products will likely lead to health benefits,²⁵ as well as other environmental benefits.²⁶
- 4) ***Developed nations must provide financial and technical support to developing nations' efforts to stop deforestation and promote reforestation.*** Deforestation, of which animal agriculture is a significant driver, destroys carbon sinks in addition to releasing billions of metric tons of CO₂ into the atmosphere.
- 5) ***All nations must prevent further intensification of their animal agriculture systems and support farmers practicing more humane and environmentally sustainable forms of agriculture.*** Technical assistance and financial incentives should support land-based outdoor pasture systems that allow animals to walk, exercise their limbs, and exhibit natural behaviors, and allow the land to serve as a carbon sink, as opposed to intensive systems that confine large numbers of animals indoors or on feed-lots and concentrate their manure.
- 6) ***Developed nations must reduce subsidies for crops grown to feed farm animals.*** Of the world's nearly 6.8 billion humans, almost 1 billion people are malnourished.²⁷ In addition to contributing to the climate crisis, feeding half the world's grain crops to animals raised for meat, eggs, and milk instead of giving it directly to humans is a significant waste of natural resources, including fossil fuels, water, and land.



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- ¹ Steinfeld H, Gerber P, Wassenaar T, Castel V, Rosales M, and de Haan C. 2006. Livestock's long shadow: environmental issues and options, p. xxi.
- ² Goodland R and Anhang J. 2009. Livestock and climate change: what if the key actors in climate change are cows, pigs, and chickens? WorldWatch. November/December, pp. 10-19.
- ³ Boucher O, Friedlingstein P, Collins B, and Shine K. 2009. The indirect global warming potential and global temperature change potential due to methane oxidation. Environmental Research Letters 4:1-5.
- ⁴ Steinfeld et al., op. cit., p. 82.
- ⁵ Steinfeld et al., op. cit., pp. 82 and 112.
- ⁶ Ibid., 103 and 114.
- ⁷ U.S. Environmental Protection Agency. 2009. Methane: sources and emissions. <http://www.epa.gov/methane/sources.html>. Accessed November 20, 2009.
- ⁸ U.S. Environmental Protection Agency. 1998. Inventory of U.S. greenhouse gas emissions and sinks: 1990-1996, p. 5-5..
- ⁹ U.S. Environmental Protection Agency. 1998. Inventory of U.S. greenhouse gas emissions and sinks: 1990-1996, p. 5-5.
- ¹⁰ U.S. Environmental Protection Agency. 2007. Inventory of U.S. greenhouse gas emissions and sinks: 1990-2005, p. 6-6.
- ¹¹ Ellis L. 2007. Environmental health and China's concentrated animal feeding operations (CAFOs): a China Environmental Health Project research brief. Woodrow Wilson International Center for Scholars.
- ¹² Boucher O, Friedlingstein P, Collins B, and Shine K. 2009. The indirect global warming potential and global temperature change potential due to methane oxidation. Environmental Research Letters 4:1-5.
- ¹³ Steinfeld et al., op. cit., pp. 85-6 and 272.
- ¹⁴ Steinfeld et al., op. cit., pp. 85-6 and 272.
- ¹⁵ Food and Agriculture Organization of the United Nations. FAO Statistical Database, FAOSTAT. <http://faostat.fao.org>. Accessed November 22, 2009.
- ¹⁶ Steinfeld et al., op. cit., p. 88.
- ¹⁷ Nierenberg D. 2005. Happier Meals: Rethinking the Global Meat Industry. Worldwatch Paper 171, September.
- ¹⁸ Steinfeld et al., op. cit., p. 92.
- ¹⁹ United Nations Intergovernmental Panel on Climate Change. 2001. Climate Change 2001: Synthesis Report (Summary for Policy Makers).
- ²⁰ Carlsson-Kanyama A, Gonzales AD. 2009. Potential contributions of food consumption patterns to climate change. American Journal of Clinical Nutrition 89: 1704S-1709S.
- ²¹ Baroni L, Cenci L, Tettamanti M, Berati M. 2007. Evaluating the environmental impact of various dietary patterns combined with different food production systems. European Journal of Clinical Nutrition 61: 279-286.
- ²² McMichael A, Powles J, Butler C, and Uauy R. 2007. Food, livestock production, energy, climate change, and health. The Lancet 370:1253-1263.
- ²³ Position of the American Dietetic Association. 2009. Vegetarian Diets. Journal of the American Dietetic Association 109(7):1266-1282.
- ²⁴ United States Department of Agriculture. 2009. Vegetarian Diets. http://www.mypyramid.gov/tips_resources/vegetarian_diets.html. Accessed on November 17, 2009.
- ²⁵ Position of the American Dietetic Association. 2009. Vegetarian Diets. Journal of the American Dietetic Association 109(7):1266-1282.
- ²⁶ Leitzman C. Nutrition ecology: the contribution of vegetarian diets. 2003. American Journal of Clinical Nutrition 78:657S-659S.
- ²⁷ Food and Agriculture Organization of the United Nations. 2009. The State of Food Insecurity in the World 2008 (Rome: FAO, p. 4).