



C E N T E R F O R

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1200 Pennsylvania Ave., NW.,
Washington, DC 20460

Docket No. EPA-HQ-OAR-2008-0508

To Whom It May Concern:

The Center for Food Safety (CFS) and its Cool Foods Campaign, along with its sister organization the International Center for Technology Assessment (ICTA), submit the following comments on the proposed rule, "Mandatory Greenhouse Gas Reporting Rule" under the Environmental Protection Agency. 73 Fed. Reg. 16606 (April 10, 2009).

The Center for Food Safety (CFS) is a non-profit public interest and environmental advocacy membership organization established by its sister organization, International Center for Technology Assessment, for the purpose of challenging harmful food production technologies and promoting sustainable alternatives. CFS also combines multiple tools and strategies in pursuing its goals, including litigation and legal petitions for rulemaking, legal support for various sustainable agriculture and food safety constituencies, as well as public education, grassroots organizing and media outreach.

The Cool Foods Campaign of the Center for Food Safety is a public advocacy campaign that

educates people about the connections between agriculture and food and their contribution to global warming. The Campaign has conducted extensive scientific data analyses of greenhouse gas (GHG) emissions from all aspects of the U.S. food system including animal waste and animal production. The aim of the Campaign is to inform people about the impact of their food choices across the entire food system and create lifestyle changes to reduce global warming. Our campaign seeks solutions to the problem of global warming, and focuses on agricultural practices, including animal waste, that can reduce and reverse this trend.

The International Center for Technology Assessment (ICTA) is a non-profit, bi-partisan organization committed to providing the public with full assessments and analyses of technological impacts on society. Recent history is filled with profound technological changes and scientific discoveries--in such fields as telecommunications, nuclear power and weaponry, computers, pesticides, car and air travel, modern medicine, genetic engineering--that have permanently altered our communities, countries and ecosystems. These innovations demonstrate that technology is among the most powerful, and often destructive, agents of social change in modern times. ICTA was formed to assist the general public and policymakers to better understand the potential implications of technology on society.

ICTA is devoted to exploring the economic, ethical, social, environmental and political impacts that can result from the applications of technology or technological systems. Using this holistic form of analysis, ICTA provides the public with independent, timely, and comprehensive information about the potential impacts of technology. Equally as important, ICTA is the country's primary legal organization fighting megatechnologies and technocracies. Using legal petitions, comments, and litigation ICTA is at the forefront of the battles to limit genetic engineering, end the patenting of life, address greenhouse gas emissions, protect animals from abuse in research and agriculture, and halt deforestation.

Most relevantly and specifically, ICTA filed the rule-making petition with EPA that began the EPA's Clean Air Act (CAA) endangerment process, back in 1999. On April 2, 2007, in *Massachusetts v. EPA*, 549 U.S. 497 (2007), the Supreme Court found that greenhouse gases are air pollutants covered by the CAA. The Court held that the Administrator must determine whether or not emissions of greenhouse gases from new motor vehicles cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare, or whether the science is too uncertain to make a reasoned decision. In making these decisions, the Administrator was required to follow the language of section 202(a) of the Clean Air Act. On April 17, 2009, EPA made the *Proposed Endangerment and Cause or Contribute Findings for Greenhouse Gases under the Clean Air Act*.

BACKGROUND

On December 26, 2007 former President Bush signed the 2008 Consolidated Appropriations Act, which authorized funding to the EPA to “develop and publish a draft rule not later than 9 months after the date of the enactment of this Act and a final rule not later than 18 months after the date of enactment of this Act, to require mandatory reporting of GHG emissions above appropriate thresholds in all sectors of the economy of the United States.”¹ The Act further delegated the EPA to use its existing authority under the Clean Air

Act to develop a mandatory greenhouse gas (GHG) reporting rule. Under section 114 (a)(1) of the Clean Air Act, the Administrator has the authority to require certain persons on a one-time, periodic or continuous basis to keep records, make reports, undertake monitoring, sample emissions, or provide such other information as the Administrator may reasonably require. Within this rule, “The Agency is further directed to include in its rule reporting of emissions resulting from upstream production and downstream sources, to the extent that the Administrator deems it appropriate.”ⁱⁱⁱ

The proposed mandatory reporting rule builds upon the already existing *Inventory of U.S. Greenhouse Gas Emissions and Sinks* prepared by the EPA’s Office of Atmospheric Programs in coordination with the Office of Transportation and Air Quality. The annual report details historical U.S. and current emissions of carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), HFCs, PFCs, and SF₆. The inventory is annually submitted to the Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC) as part of its reporting requirement.ⁱⁱⁱ The *Inventory* is a reliable source of sector-based emissions within the U.S. and has been crucial to highlight the growing increase of GHG emissions within the United States, and the sources of such emissions.

On April 24, 2009, the proposed rule was published in the Federal Register (www.regulations.gov) under Docket ID No. EPA-HQ-OAR-2009-0171, with public comments open until June 23, 2009.^{iv} CTA and CFS applaud EPA for taking regulatory action to address climate change through the endangerment process and through this proposed mandatory reporting rule. While we support the establishment of a mandatory GHG reporting rule, we have several comments regarding the entities which are required to submit data as well as the established threshold for reporting. Since CFS and its Cool Foods Campaign are focused on food and agricultural GHGs and their relationship to climate change, our comments will focus on these sectors in the proposed rule. We greatly appreciate the opportunity to submit comments to the EPA on this very timely and urgent matter.

CENTER FOR FOOD SAFETY COMMENTS

I. Introduction

CFS and ICTA believe that the establishment of a mandatory GHG reporting rule is the next logical step in reducing and mitigating greenhouse gas emissions in the United States. Increasing scientific evidence demonstrates that the warming of our atmosphere is “unequivocal” as the Intergovernmental Panel on Climate Change (IPCC) noted in their 2007 Fourth Assessment Report. In the same report, the IPCC noted the change in GHGs more confidently than ever before. They further asserted that, “The atmospheric concentration of carbon dioxide in 2005 exceeds by far the natural range over the last 650,000 years (180 to 300 ppm) as determined from ice cores.”^v Further, “The atmospheric concentration of methane in 2005 exceeds by far the natural range of the last 650,000 years (320 to 790 ppb) as determined from ice cores.”^{vi} And finally, “The combined radiative forcing due to increases in carbon dioxide, methane, and nitrous oxide...and its rate of increase during the industrial era is *very likely* to have been unprecedented in more than 10,000 years.”^{vii}

In short, what the IPCC found is that the levels of GHG emissions in our atmosphere today

are greater than anytime in at least 10,000 years and, in most cases, more than we have seen naturally in 650,000 years. The IPCC also made very clear that the increased levels of greenhouse gas emissions were not from “natural cycles” and specifically stated, “Global atmospheric concentrations of carbon dioxide, methane, and nitrous oxide have increased markedly as a result of human activities since 1750 and now far exceed pre-industrial values.”^{viii} The EPA has acknowledged the contributions of the IPCC and continues to evolve its actions to reflect the scientific basis that recognizes the important need to reduce greenhouse gas emissions to avert potential climate change impacts.

The most recent GHG inventory submitted to the UNFCCC estimated that total U.S. GHG emissions were 7,054.2 million metric tons of CO₂e in 2006. Overall emissions have increased by 15 percent since 1990.^{ix} This finding from the EPA, as well as the crucial findings of the IPCC and additional science, clearly demonstrates that we must act now to reduce and mitigate greenhouse gas emissions, largely the result of human activities, to prevent the worst effects of climate change in the future. Requiring that entities that emit a significant portion of GHG emissions report their emissions is a crucial component of any effective attempt at reducing emissions. Without accurate information on sources of emissions within the United States and globally, our nation will be less effective in controlling emissions and reducing them overall. CFS and ICTA commend the EPA for initiating the process to create a mandatory reporting rule.

II. Establishment of the Reporting Threshold

In the proposed rule, the EPA has chosen to apply the mandatory reporting requirement to, “downstream facilities that emit GHGs (primarily large facilities emitting 25,000 tpy of CO₂ equivalent GHG emissions or more) and to upstream suppliers of fossil fuels and industrial GHGs, as well as to manufacturers of vehicles and engines.”^x According to the EPA, this threshold will capture between 85-90% of the total national U.S. GHG emissions, from approximately 13,000 facilities. However, the EPA also acknowledges that “most emission sources from the agriculture sector would not be covered by the rule, with the exception of livestock operations with GHG emissions from manure management systems that meet or exceed the threshold of 25,000 metric tons.” Under such a definition, the EPA estimates that fewer than 50 very large livestock operations would meet such threshold and be required to report emissions.^{xi}

CFS and ICTA believe that the proposed threshold for mandatory reporting is too high to accurately gain a comprehensive understanding of emissions within the United States, particularly within the agriculture sector. The aim of mandatory reporting is to create an accurate and reliable database of emissions sources in the United States, which can be used to promulgate regulations or encourage legislation to reduce emissions. To achieve this goal, the EPA should strive to gather as much information from various sectors about emissions sources. While the overall rule would cover a significant portion of domestic emissions, it would not cover a significant portion of agricultural emissions, since the EPA notes that only about 50 farms would be covered.

CFS and ICTA recommend that the threshold for reporting should be lowered to 10,000 tons of CO₂e to capture an accurate scope of emissions from all sectors. In particular, CFS believes that establishing a 10,000 ton threshold for the agricultural sector is especially important to better understand sources of emissions within this sector, which have

continued to increase in recent years and are usually emitted from a large number of small sources. In fact, according to the IPCC, “The global increases in carbon dioxide concentration are due primarily to fossil fuel use and land use change, while those of methane and nitrous oxide are primarily due to agriculture.” As the IPCC concludes, our food and agricultural systems are contributing significantly to the increase in GHG emissions in the atmosphere every year, particularly in the form of CH₄ and N₂O emissions.

While much of the climate change discussion has focused on CO₂, it is also crucial to consider CH₄ emissions— 21 times as potent as CO₂—and N₂O emissions—310 times as potent as CO₂.^{xii} Globally, agriculture accounts for 60% of all human-induced N₂O emissions and 50% of all human-induced CH₄ emissions.^{xiii} Estimates of food and agriculture GHG emissions, as a percent of total emissions, range between 14% to nearly one-third of all global emissions.^{xivxv} Furthermore, the United Nations Food and Agriculture Organization estimates that animal agriculture accounts for 18% of global GHG emissions.^{xvi} By comparison, the entire transportation sector emissions account for a little over 13% of total GHG emissions globally.^{xvii}

In the United States, the EPA has estimated that the agricultural sector’s emissions have climbed considerably since 1990. Between 1990 and 2007, CH₄ emissions from agricultural activities increased by 11 percent, while N₂O emissions increased by 5 percent.^{xviii} The continued increase in agricultural emissions coupled with the notable potency of most agricultural emissions are cause for concern and action. Only through accurate reporting of agricultural emissions sources can the EPA and policymakers have a clear sense of the actions needed to reduce agricultural emissions. Reducing the threshold for mandatory reporting to 10,000 tons of CO₂e will help to increase the number of agricultural entities reporting emissions, which will increase understanding for effective and efficient policymaking.

While CFS and ICTA recognize that adopting a 10,000 ton threshold would require a much larger number of entities to report their emissions, we also acknowledge that political precedent has been set for doing so, especially within the agricultural sector. Recently, policymakers have already begun to consider variable emission levels within the agriculture sector when considering thresholds for regulation and standards. In the current legislation “American Clean Energy and Security Act” (H.R. 2454) in the House of Representatives, policymakers have proposed a different standard for the agricultural sector. The bill, which proposes to implement a “cap and trade” initiative, sets standards for the uncapped sector-- including agriculture-- to be delegated by the EPA administrator.^{xix}

Under the current legislation, the bill would require that the EPA Administrator publish “an inventory of categories of stationary sources that consist of those categories that contain sources that individually had uncapped greenhouse gas emissions greater than 10,000 tons of carbon dioxide equivalent”.^{xx} The bill would then require the Administrator to establish standards and promulgate regulations for each sector of the uncapped emissions sources greater than 10,000 tons of CO₂e. Congress has recognized the unique emissions associated with agriculture by requiring such a list and setting the threshold for reporting and standards at 10,000 tons of CO₂e. CFS and ICTA encourage the EPA to do the same with their mandatory reporting rule to accurately capture the breadth of emissions in the agriculture sector.

III. Reporting Manure Management Emissions

In the proposed rule, the EPA establishes that large scale farms with manure management systems emitting greater than 25,000 tons of CO₂e would have to report their emissions. The EPA defines a manure management system as,

“A system that stabilizes or stores livestock manure in one or more of the following system components: uncovered anaerobic lagoons, liquid/slurry systems, storage pits, digesters, drylots, solid manure storage, feedlots and other dry lots, high rise houses for poultry production (poultry without litter), poultry production with litter, deep bedding systems for cattle and swine, and manure composting.”

The definition also explicitly includes the treatment of wastewaters from manures and further, “does not include components at a livestock operation unrelated to the stabilization or storage of manure such as daily spread or pasture/range/paddock systems.”^{xxxi} CFS and ICTA appreciate the comprehensive definition of “manure management systems” that the EPA has adopted which will include a wide variety of systems utilized for various animals. Further, CFS and ICTA believe that the EPA is accurate in not requiring pasture/range/paddock systems to be included within the manure management system, based on the current sources of CH₄ and N₂O in relation to agricultural emissions, as discussed below.

In the United States, the majority of GHG emissions from manure management are from CH₄ – 44 Tg compared to 14.6 Tg of N₂O in 2007 according to the EPA.^{xxii} Notably, these CH₄ emissions account for a 45% increase since 1990, with the large majority being from swine and dairy cow manure, where emissions increased 51 and 60 percent. It is likely that these emissions increases are a direct result of confined animal feeding operations’ (CAFO) manure lagoons. The EPA acknowledges “the general trend in manure management, particularly for dairy and swine (which are both shifting towards larger facilities), is one of increasing use of liquid systems.”^{xxiii}

The implications of these shifts have clearly been significant for CH₄ emissions. The EPA notes, “When livestock or poultry manure are stored or treated in systems that promote anaerobic conditions (e.g. as a liquid/slurry in lagoons, ponds, tanks, or pits), the decomposition of materials in the manure tends to produce CH₄. When manure is handled as a solid (e.g., in stacks or drylots) or deposited on pasture, range, or paddock lands, it tends to decompose aerobically and produce little or no CH₄.”^{xxiv} Given that the majority of manure management emissions in the United States are from CH₄, and that the storage of manure in confined systems has created the rise in emissions, CFS and ICTA support the EPA’s definition of “manure management systems” to include these types of facilities and to exclude pasture, grassland and paddock lands. Requiring the reporting of such emissions will enable greater understanding of emissions sources which can assist in creating legislation and regulations to reduce such emissions. CFS and ICTA applaud the EPA for choosing to include manure management in the proposed rule, since it is the fifth largest source of CH₄ and N₂O emissions in the United States.^{xxv}

IV. Failure to Consider Enteric Fermentation Emissions

In the proposed mandatory GHG reporting rule, the EPA fails to consider the reporting of emissions from enteric fermentation in the United States. CFS and ICTA believe that such an omission is a significant shortfall of the proposed rule, and recommends that the EPA introduce mandatory reporting methods for measuring enteric fermentation emissions in the final rule.

Enteric fermentation is a biological process involving microbial fermentation that occurs during the digestive processes of animals, especially ruminant animals such as cattle, sheep, and goats. A byproduct of this process is CH₄ which is either exhaled or eructated. The large rumen and fore-stomach indicative of ruminant animals contributes greatly to enteric fermentation emissions, and thus ruminant animals are the major contributors of methane. In the United States, 95% of all CH₄ emissions from enteric fermentation are from beef and dairy cattle. Enteric fermentation emissions increased by 4.3% between 1990 and 2007, and between 2005 and 2007, beef and dairy enteric fermentation emissions continued to climb. **Enteric fermentation is now the single largest source of CH₄ emissions in the United States.** As a result, CFS and ICTA believe it is an important contribution to climate change and should be considered a notable area for emissions reporting and reductions. Such reductions will only be possible when accurate reporting of emissions is achieved through the mandatory reporting rule.

There is ample research available which has measured CH₄ emissions from various types of cattle operations and animals that will enable the EPA to develop its reporting standard.^{xxvi} Accurate reporting would help to enable appropriate reductions in CH₄ emissions from enteric fermentation. While reducing the number of ruminant animals in the United States would have a direct effect on reducing CH₄ emissions associated with enteric fermentation, there are also a number of other methods available to reduce enteric fermentation emissions. In general, dairy cattle produce the largest amount of methane emissions followed by beef cattle. Other animals such as sheep, goats, horses and swine produce significantly lower amounts of methane. Factors influencing CH₄ emissions include, “dietary factors such as type of carbohydrate in the diet, level of feed intake, level of production, digestive passage rate, presence of ionophores, degree of saturation of lipids in the diet, environmental factors such as temperature and genetic factors such as efficiency of feed conversion.”^{xxvii}

Research suggests that diet can play the most significant role in reducing CH₄ emissions from enteric fermentation. Scientific studies demonstrate that the addition of fats in the diet from natural sources including sunflowers, alfalfa, and coconut can reduce emissions.^{xxviii} In general, studies have found that such additions can reduce CH₄ emissions by about 20%.^{xxix} Additional research demonstrates that cattle fed feedlot diets, often rich in corn and soy rather than forage, have higher rates of emissions. One study found that, CH₄ production was 20% higher in beef steers from a feedlot where they were fed low forage to grain diet compared to steers on a high forage to grain diet.^{xxx} Recent reports suggest that farmers are beginning to recognize the benefit of changing cattle diets to reduce CH₄ emissions, and that the food industry is encouraging the grazing of cattle on natural forages to do so.^{xxxi}

Further research suggests that grazing management can play a similar role in reducing CH₄ emissions from enteric fermentation. Grazing on high-quality forage, made possible through

maintenance of soil fertility through proper grazing management, reduced CH₄ emissions up to 22% in beef cattle in one study.^{xxxii} “The reduction in CH₄ emission was related to better digestibility of high quality forage, which resulted in better efficiency of utilization, as was observed in higher average daily gain.”^{xxxiii} In short, feeding cattle their natural diets of grass and forage was effective at reducing CH₄ emissions that are elevated on an intensive feedlot diet. Accurate reporting of enteric fermentation emissions, coupled with information regarding the feed and management system associated with various animal production systems will help to identify ways to reduce enteric fermentation emissions. CFS and ICTA encourage the EPA to consider this information in the context of their decision and to recognize that reductions in CH₄ emissions associated with enteric fermentation—the largest source of CH₄ emissions in the United States—can only be achieved through considerable reporting.

V. Conclusion

CFS and ICTA commend the EPA for their progressive efforts to implement a mandatory GHG reporting requirement in the United States. In doing so, they are enabling an effective reporting of emissions that will lead to greater understanding of emissions sources and foster legislation and regulations that will help make real reductions in GHG emissions. Yet, without a stringent threshold for reporting emissions, the EPA will fail to gain an accurate portrait of GHG emissions in the United States, particularly those in the agricultural sector. Since agricultural emissions sources are often from a large number of small sources, they will fail to be monitored under the proposed rule. CFS and ICTA recommend that the EPA implement a 10,000 ton CO₂e threshold for reporting to ensure the highest quality data is collected through the mandatory reporting rule.

CFS and ICTA further commend the EPA for considering manure management within the reporting rule. As the fifth largest source of CH₄ and N₂O emissions in the United States, manure management is a notable contributor to GHGs. As well, it is clear from the EPA’s own analysis that the increase in such emissions are clearly from the large scale CAFO style manure management systems that the EPA is proposing must report their emissions. CFS and ICTA applaud this type of reporting, which will enable efficient reductions in manure emissions in the future.

While the EPA has considered manure management they have clearly failed to consider the most major source of CH₄ in the United States- enteric fermentation, mostly from beef and dairy cattle. Failure to require that enteric fermentation emissions are reported will prevent real and considerable reductions in emissions from enteric fermentation in the future. Effective solutions already exist to reduce enteric fermentation emissions, but an accurate understanding of where emissions are coming from and the types of management systems associated with such emissions will enable quicker dissemination of effective strategies.

CFS and ICTA thank the EPA for their considerable work on their previous climate change efforts and their future initiatives to enable better understanding of emissions and effective strategies for reducing emissions. We appreciate the effort to comment on the proposed rule.

Respectfully Submitted,

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ⁱ 74 Fed Reg. at 16454.

ⁱⁱ Id.

ⁱⁱⁱ 74 Fed Reg. at 16455.

^{iv} 74 Fed Reg. at 16448.

^v Intergovernmental Panel on Climate Change. (2007). *Summary for Policymakers. In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. Pg. 2.

^{vi} IPCC (2007), 3.

^{vii} IPCC (2007), 3.

^{viii} Borger, J. (2008, February 26). Feed the World? We are fighting a losing battle, UN admits. *The Guardian*. Retrieved June 1, 2009 from:

<http://www.guardian.co.uk/environment/2008/feb/26/food.unitednations/feb/26/food.unitednations>

^{ix} 74 Fed Reg. at 16455.

^x 74 Fed Reg. at 16452.

^{xi} United States Environmental Protection Agency. *Proposed Mandatory Greenhouse Gas Reporting Rule Fact Sheet*. Retrieved June 8, 2009 from:

<http://www.epa.gov/climatechange/emissions/downloads/ProposedRule-FactSheet.pdf>

^{xii} U.S. Environmental Protection Agency. (2009). *Draft U.S. Greenhouse Gas Inventory Report: Executive Summary*. Pg. ES-3. Retrieved June 5, 2009 from:

<http://www.epa.gov/climatechange/emissions/downloads09/07ES.pdf>

^{xiii} Smith, P. et al. (2007). *Agriculture. In Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, L.A. Meyer (eds)], Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. Pg. 499.

^{xiv} IPCC (2007b), 5.

^{xv} Bellarby, J., Foeroid, B., Hastings, A., Smith, P. (2008). *Cool Farming: Climate impacts of agriculture and mitigation potential*. Greenpeace International. Pg. 5.

^{xvi} Steinfeld H., Gerber, P., Wassenaar, T., Castel, V., Rosales, M., & de Haan, C. (2008). *Livestock's Long Shadow- Environmental Issues and Options*. Food and Agriculture Organization of the United Nations. Rome, Italy.

^{xvii} IPCC (2007b)

^{xviii} U.S. Environmental Protection Agency. (2009). *Draft U.S. Greenhouse Gas Inventory Report: U.S. Greenhouse Gas Emissions and Sinks: U.S. 1990-2007: Agriculture*. Retrieved

<http://www.epa.gov/climatechange/emissions/downloads09/07Agriculture.pdf>

^{xix} H.R. 2454. American Clean Energy and Security Act.

^{xx} H.R. 2454. Title VIII- Additional Greenhouse Gas Standards. Part A- Stationary Source Standards:Sec.811 Standards of Performance (a)Uncapped stationary sources. Pg. 590.

^{xxi} 74 Fed Reg. at 16706.

^{xxii} US EPA (2009) Draft U.S. Greenhouse Gas Inventory Report: Agriculture.

^{xxiii} US EPA (2009) Draft U.S. Greenhouse Gas Inventory Report: Agriculture.

^{xxiv} US EPA (2009) Draft U.S. Greenhouse Gas Inventory Report: Agriculture.

^{xxv} USA EPA(2009) Draft U.S. Greenhouse Gas Inventory Report: Executive Summary.

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- ^{xxvi} For example, see: Phetteplace, H.W., Johnson, D.E., & Seidl A.F. (2001). Greenhouse gas emissions from simulated beef and dairy livestock systems in the United States. *Nutrient Cycling in Agroecosystems*. 60: 99-102.; Mitloehner, F., Trabue S., Koziel J. (2006). *Volatile Fatty Acids, Amine, Phenol, and Alcohol Emissions from Dairy Cows and Fresh Waste*. Final Report submitted to the California Air Resources Board., and; Kebreab, E., Clark K., Wagner-Riddle, C., & France, J. (2006). Methane and nitrous oxide emissions from Canadian animal agriculture: A review. *Canadian Journal of Animal Science*. 86: 135-157.
- ^{xxvii} Kebreab, E., Clark K., Wagner-Riddle, C., & France, J. (2006). Methane and nitrous oxide emissions from Canadian animal agriculture: A review. *Canadian Journal of Animal Science*. 86: 135-157.
- ^{xxviii} Kebreab et al (2006), pp. 142.
- ^{xxix} McGinn, S.M., Beauchemin, K.A., Coates, T. & Colombatt, D. (2004). Methane emissions from beef cattle : effects of monensin, sunflower oil, enzymes, yeast, and fumaric acid. *Journal of Animal Science*. 82:3346-3356.
- ^{xxx} Boadi, D.A. et al. (2004). Effect of low and high forage diet on enteric and manure pack greenhouse gas emissions from a feedlot. *Canadian Journal of Animal Science*. 84: 445-453.
- ^{xxxi} Kaufman, L. (2009, June 4.) Greening the Herds: A New Diet to Cap Gas. *The New York Times*. Retrieved June 9, 2009 from: http://www.nytimes.com/2009/06/05/us/05cows.html?_r=2&ref=science.
- ^{xxxii} DeRamus, H.A., Clement, T.C., Giampola, D.D. & Dickison, P.C. (2003). Methane emissions of beef cattle on forages: efficiency of grazing management systems. *Journal of Environmental Quality*. 32:269-277.
- ^{xxxiii} Kebreab et al (2006), pp. 143.