



# Domestic Livestock and Climate

Meat and Dairy Markets at Risk without Reason

# DOMESTIC LIVESTOCK AND CLIMATE

## EXECUTIVE SUMMARY

Page | 1

Reports from international organizations have focused media attention on the role potentially played by greenhouse gas (GHG) emissions associated with the production and consumption of livestock. Anti-animal agriculture advocates have used this to argue that livestock production should be severely regulated and taxed and that humans should sharply reduce or eliminate meat from their diets.

Much of the confusion about the role of livestock-related emissions is the result of attributing to livestock the deforestation to create pastures. However, deforestation causes a unique one-time carbon dioxide release from the burning and decomposition of woody vegetation. When calculating emissions intensity, one should apportion the emissions out over the accumulated animal products during the entire period of pasture use. In the case of many countries, this may be hundreds or thousands of years, so the emissions per kilogram of carcass weight approach zero.

Using a different methodology (i.e. one based on life cycle analysis) than the international organizations, the U.S. Environmental Protection Agency quantified the impacts of livestock production in the U.S. as accounting for 4.2% of all GHG emissions, far below the 18% and up range often cited. In fact, in countries like the U.S. and Canada, the emissions properly attributable to beef cattle are only 2.2 % of the total, with another 1.4% to dairy cattle.

The attack on livestock production and use has sometimes focused on the alleged adverse effects of methane emissions from ruminant animals (i.e. burping and flatulence) on the climate. However, high methane content in the atmosphere does not correlate with high livestock concentrations. Strong emitters seem to be wetlands in Siberia, humid tropical forests, and rice paddy fields in China. Livestock emissions are totally dwarfed by methane leaking from the massive clathrate deposits below the permafrost in Siberia, on continental shelves and in the deep ocean.

The livestock industry is already subject to carbon dioxide taxes, which allegedly represent the environmental costs of carbon dioxide emissions. Accordingly, it is very difficult to see, from a climate policy perspective, what additional rationale there would be for taxing meat.

Would regulating Canadian's meat consumption or browbeating meat-eaters reduce emissions? Not in an open economy. The meat would still be grown and exported.

People may individually choose a diet that they consider right for their nutritional, health and taste needs. Governments, however, have no justification in restricting or taxing the production or consumption of meat in Canada for climate reasons.

## CONTENTS

EXECUTIVE SUMMARY .....	1
Introduction .....	3
Accounting for Emissions .....	3
The Methane Issue .....	6
Taxing and Regulating Livestock Production and Consumption in Canada .....	7
Conclusion .....	8

Cover image licensed from Shutterstock.

# DOMESTIC LIVESTOCK AND CLIMATE

## INTRODUCTION

Page | 3

A number of reports from international organizations over the last 14 years have focused public and media attention on the role potentially played by greenhouse gas (GHG) emissions associated with the production and consumption of livestock. In 2006, the United Nations Food and Agriculture Organization (FAO) published a report entitled *Livestock's Long Shadow*, which estimated that livestock production accounted for at least 18% of global GHG emissions. The Intergovernmental Panel on Climate Change (IPCC), in its AR5 report published in 2014, focused on the methane emissions from livestock and estimated that the global warming caused by a tonne of livestock methane emissions over 100 years would be 28 times that of a tonne of carbon dioxide emissions.

Anti-animal agriculture advocates and vegans have used these reports and others to argue that livestock production should be severely regulated and taxed and that humans should sharply reduce or eliminate meat from their diets.

As is so often the case with issues concerning the science and economics of climate policy, the truth about the relationship between livestock, emissions and climate is far more complex than is presented in the media, and the findings of international organizations are sometimes far off the mark.

## ACCOUNTING FOR EMISSIONS

Much of the confusion about the role of livestock-related emissions is the result of an accounting problem, i.e. how to calculate the incremental, or additional, GHG emissions that are due to livestock production. Outside of the natural carbon cycle, there are only three sources of additional carbon dioxide emissions caused by agriculture and livestock husbandry. These were described by Professor Albrecht Glatzle<sup>1</sup> as:

---

<sup>1</sup> Glatzle, Albrecht. "Domestic Livestock and Its Alleged Role in Climate Change". <http://dx.doi.org/10.5772/intechopen.80389>

- *Fossil fuel consumption during production, processing and marketing, such as transportation, soil tillage, harvesting, and fertilizer manufacturing;*
- *Deforestation for reclamation of pasture and cropland; and*
- *Soil organic matter decomposition from degrading grasslands and arable lands, as determined by the difference of ecosystem carbon stocks before and after certain human interventions.*

The use of fossil fuels (mainly oil) in livestock production is sizeable, as it is in almost all industrial activities. Modern economies require transportation, and transportation with existing technology is 97% dependent on oil fuels.

Deforestation to create pastures causes a unique one-time carbon dioxide release from the burning and decomposition of woody vegetation. When calculating emissions intensity, one should apportion the emissions out over the accumulated animal products during the entire period of pasture use. In the case of European countries, this may be thousands of years, so the emissions per kilogram of carcass weight approach zero. However, in the published literature, emissions are either ignored (e.g. in most of Europe) or charged entirely to the year of their appearance into production, usually in developing countries.

In spite of ongoing deforestation in some areas, global forest and plant area has increased during the last 30 years due to rising carbon dioxide levels in the atmosphere. Studies published on the website of the U.S. National Aeronautics and Space Administration (NASA) found a 12.4% increase in the leaf area index over 33 years (1982-2015), and increasing carbon dioxide concentrations are responsible for 70% of the increase<sup>2</sup>. This is a huge greening of the planet due to carbon dioxide emissions.

Other agricultural GHGs such as methane and nitrous oxide also form part of natural cycles, like carbon dioxide. To get an accurate measure of the human-caused emissions from managed ecosystems, one has to subtract the baseline emissions from the respective pre-managed ecosystems. Not doing this leads to a systematic overestimation of the farm-borne non-CO<sub>2</sub> GHG emissions. Most scientific publications, in fact, ignore this and treat farm-borne methane and nitrous oxide emissions as 100% additional. The current reporting guidelines issued by the IPCC<sup>3</sup> have been responsible for the propagation of this methodological deficiency throughout the scientific literature.<sup>4</sup>

---

<sup>2</sup> National Aeronautics and Space Administration. Carbon Dioxide fertilization Greening Earth, Study Finds. 2016. Available from: <http://www.nasa.gov/feature/goddard/2016/carbon-dioxide-fertilization-greening-earth>

<sup>3</sup> Intergovernmental Panel on Climate Change Guidelines for national Greenhouse Gas Inventories. Agriculture, Forestry and Other Land Use. Vol.4, 2016;225:104-115.

<sup>4</sup> Glatzle, Albrecht. Ibid.

Using a different methodology (i.e. one based on life cycle analysis) than the IPCC, leading scientists in the United States, as well as the U.S. Environmental Protection Agency, have quantified the impacts of livestock production in the U.S. as accounting for 4.2% of all GHG emissions<sup>5</sup>, far below the 18% and up range often cited.

*“Breaking down the 4.2% EPA figure for livestock by animal species shows the following contributors: beef cattle 2.2%, dairy cattle 1.37%, swine 0.47%, poultry 0.08%, sheep 0.03%, goats 0.01% and others 0.04%. If all Americans practiced Meatless Mondays, we would reduce the U.S. national GHG emissions by 0.6%. A beefless Monday per week would cut total emissions by 0.3% annually.”*

Page | 5

The Mitloehner paper referenced above also notes that the U.N. FAO, in its 2006 report, did not account for “default” emissions. If domesticated livestock were reduced or even eliminated, the question of which “substitute” GHGs would be produced in their place has never been estimated. Humans would need alternative sources of protein and these would have to be grown. Further, livestock provide not only meat, dairy products and eggs, but also wool, hides, and many other value-added goods and services. Therefore, to estimate accurately the “footprint” of all livestock, “default” emissions for non-livestock substitutes need to be estimated and compared to livestock emissions.



*Image licensed from Shutterstock.*

---

<sup>5</sup> Mitloehner, Frank, Professor and Air Quality Specialist, University of California. White Paper 2017. <http://cattlewomen.org/wp-content/uploads/2017/12/Mitloehner> US Livestock GHG 06 28 2016.pdf



Much of the attack on livestock production and use has focused on the alleged adverse effects of methane emissions from ruminant animals (i.e. burping and flatulence) on the climate. Methane is a natural gas produced by many life forms and it also seeps naturally from marshes, oceans, tundra, oil seeps and coal seams. None of these natural sources can be measured. Unmeasured methane also seeps out of the growing municipal landfills and from leaky natural gas pipelines. Notwithstanding this, livestock has been singled out as one of the main “offenders”.

The IPCC, in its AR5 report, estimated that, even though methane has a short “residence” in the atmosphere of about 10 years, the global warming potential of methane over 100 years is no less than 28 times the global warming IPCC expect to be caused by an equivalent weight of carbon dioxide. One of the lead authors<sup>6</sup> of the report subsequently stated that:

*“If there is no “rate of change” (i.e. the quantity of the emissions by weight over time) then there is a one-off impact of only seven times the equivalent weight of CO<sub>2</sub>. Note that this should be counted only once – there is no accumulation as is the case for CO<sub>2</sub> and other long-lived gases.”*

There are a few empirical problems with this claim. As pointed out by Albrecht Glatzle:

*“High methane content in the atmosphere does not correlate with high livestock concentrations. Strong emitters seem to be wetlands in Siberia, humid tropical forests, and rice paddy fields in China. Livestock emissions are totally dwarfed by methane leaking from the massive clathrate deposits below the permafrost in Siberia, on continental shelves and in the deep ocean. Earthquakes and submarine volcanism can disturb and suddenly release methane from hydrates”.*

So whatever role is played by methane emissions from livestock production may be dwarfed by the methane from other sources.

---

<sup>6</sup> Professor Myles Allen, quoted by Barry Brill, March 30, 2019

Between 1990 and 2005, the world cattle population rose by more than 100 million head, according to FAO statistics. During this time, atmospheric methane concentration stabilized completely. These empirical observations show that livestock is not a significant player in the global methane budget.<sup>7</sup>

## TAXING AND REGULATING LIVESTOCK PRODUCTION AND CONSUMPTION IN CANADA

As is the case for so many ideas to reduce GHG emissions, the proposals that Canadians tax meat production and somehow curtail consumption can have large economic consequences.

Canada already has an extremely large and wide-ranging series of public policy measures in place that seek to reduce GHG emissions. Over 600 programs are now imposed by the federal and provincial governments to regulate behavior, to subsidize some activities and industries and tax and restrain others, to support research and development focused on renewable energy, to promote climate alarm, and to support the political activities of climate alarmist groups, among others. These measures include a balkanized carbon dioxide pricing regime that varies by province and includes direct levies, output-based fees imposed on industry and emissions trading systems whereby regulatory limits are placed on energy use and consumers required to purchase permits if they exceed the limits. As of January 1, 2020, the carbon dioxide pricing regime ranges from about \$23 per tonne of carbon dioxide equivalent in Quebec to \$40 per tonne in British Columbia, with most consumers paying about \$30 per tonne.

The combined effect of this multitude of emission-reduction measures is a large financial burden on the Canadian economy, and especially on Canadian industry, which must compete for market share with companies elsewhere that are not subject to such regulations and taxes. The carbon dioxide pricing component, in theory, raises the costs of all emissions-related activity so as to require consumers to include in their purchasing decisions the inherent cost of the (alleged) environmental “externality” of climate change. As this has already been done, it is very difficult to see, from a climate policy perspective, what additional rationale there would be for taxing meat. It seems clear that the rationale, if any, lies elsewhere, more in keeping with vegan and anti-agriculture thinking.

---

<sup>7</sup> Glatzle, Albrecht. Questioning key conclusions of FAO publications “Livestock’s Long Shadow” appearing again in “Tackling Climate Change Through Livestock” (2013). *Pastoralism: Research, Policy and Practice*. 2014;4:1.  
<http://pastoralismjournal.springeropen.com/articles/10.1186/2041-7136-4-1>



Canada's beef industry alone is the second-largest single source of farm cash receipts, and averaged \$8.9 billion annually over the 2013-2017 period. It directly generated an estimated 228,000 jobs, with every job in the sector yielding another 3.56 jobs elsewhere in the economy. The meat industry is also the largest component of the food processing sector, with annual sales of more than \$28 billion and providing direct employment for 66,000 people.

Would regulating Canadian's meat consumption or browbeating meat-eaters reduce emissions? Not in an open economy. Canada's agriculture exports totaled \$56 billion in 2016, with almost half of that livestock-related. If Canadians were forced to eat less meat, there would be no shortage of consumers in other countries more than willing to buy our products. The effects on global emissions of Canadian meat being eaten in Hong Kong is almost the same as that of meat eaten here (Actually, it is higher due to the emissions arising from the transportation of the meat to Hong Kong).

## CONCLUSION

Even if one accepted the thesis that human GHG emissions were the primary influence on climate, livestock-related emissions, especially in developed countries like Canada and the United States, play a much smaller role than has been estimated by international organizations. The role of methane emissions from livestock in particular has probably been vastly exaggerated.

People may individually choose a diet that they consider right for their nutritional, health and taste needs. Governments, however, have no justification in restricting or taxing the production or consumption of meat in Canada for climate reasons.



*Image licensed from Shutterstock.*

### *About the Author*

*Robert Lyman is an Ottawa energy policy consultant and former public servant of 27 years, a diplomat for 10 years prior to that. His complete biography can be read [here](#).*

### About

Friends of Science Society is an independent group of earth, atmospheric and solar scientists, engineers, and citizens who are celebrating its 16th year of offering climate science insights. After a thorough review of a broad spectrum of literature on climate change, Friends of Science Society has concluded that the sun is the main driver of climate change, not carbon dioxide (CO<sub>2</sub>).

Friends of Science Society

P.O. Box 23167, Mission P.O.

Calgary, Alberta

Canada T2S 3B1

Toll-free Telephone: 1-888-789-9597

Web: [friendsofscience.org](http://friendsofscience.org)

E-mail: [contact@friendsofscience.org](mailto:contact@friendsofscience.org)

Web: [climatechange101.ca](http://climatechange101.ca)

