



**Testimony before the  
Committee on Agriculture, Nutrition and Forestry  
U.S. Senate**

Written statement provided  
by Frank Mitloehner, Ph.D.

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## **Animal Agriculture and Climate: Separating Fact from Fiction**

Thank you, Chairman Roberts, Ranking Member Stabenow and Members of the Committee, for inviting me today to discuss livestock and climate change.

As a professor of animal science and air quality specialist in cooperative extension in the Department of Animal Science at the University of California, Davis, much of my work revolves around studying the emissions of livestock in order to determine their contribution to air pollution and climate change. My position at UC Davis puts me in the leading agricultural state in America, where half of all U.S. produce and 20 percent of all dairy products are being produced. In addition, California is fourth in terms of beef production in the United States.

I speak throughout the world on animal agriculture, including debunking the myth that it poses the greatest environmental threat to our planet. There's a notion that globally, livestock produces more greenhouse gases (GHGs) leading to climate change than the entire transportation sector. This global comparison is then erroneously applied to the United States, and we are advised to eat less animal-source food (e.g., meat) to protect us from global warming and other environmental harm.

It's reminiscent of something Daniel Kahneman, a psychologist, behavioral economist and Nobel prize winner, once said. "A reliable way to make people believe in falsehoods is frequent repetition, because familiarity is not easily distinguished from truth."

In other words, the more we hear it, the more we believe it. And we hear it a lot.

It hits us from many directions, including Hollywood. For example, the actor Leonardo DiCaprio signed on last year as an investor and advocate of Beyond Meat, a plant-based protein company.

"Livestock production is a major contributor to carbon emissions," he said. "Shifting from animal meat to the plant-based meats developed by Beyond Meat is one of the most powerful measures someone can take to reduce their impact on our climate."

It also comes from some of our most trusted news sources – The Washington Post, The New York Times and the Guardian among them. They've printed articles and editorials espousing how detrimental animal agriculture is to Earth's well-being – even suggesting we should tax beef to deter people from eating it.

### ***GHGs: setting the record straight***

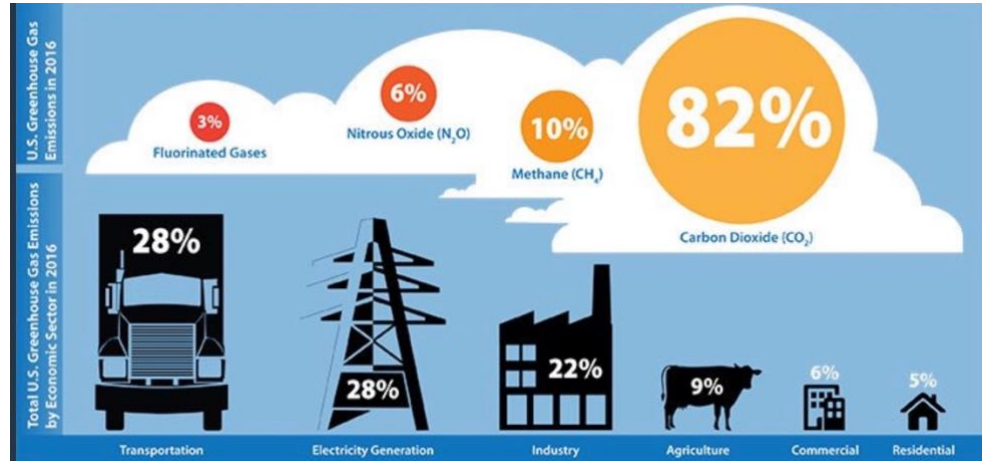
A healthy portion of animal agriculture's bad rap comes from the falsehood that livestock is *the major* source of GHGs. By way of background, GHGs – primarily carbon dioxide, methane and nitrous oxide – act as a ceiling or barrier that prevents the sun's radiant beams from dissipating into the universe after they hit Earth. The gasses trap the sun's heat, causing Earth to heat up like a giant greenhouse; hence, the name "greenhouse effect."

GHGs are not altogether nefarious. In fact, they have been with us since the beginning of time. As a matter of fact, Earth would be uninhabitable (i.e., too cold) without them. The problem today



– and the reason why GHGs have become part of our vernacular – is that we have an overabundance of GHGs, which is causing Earth to *overheat*.

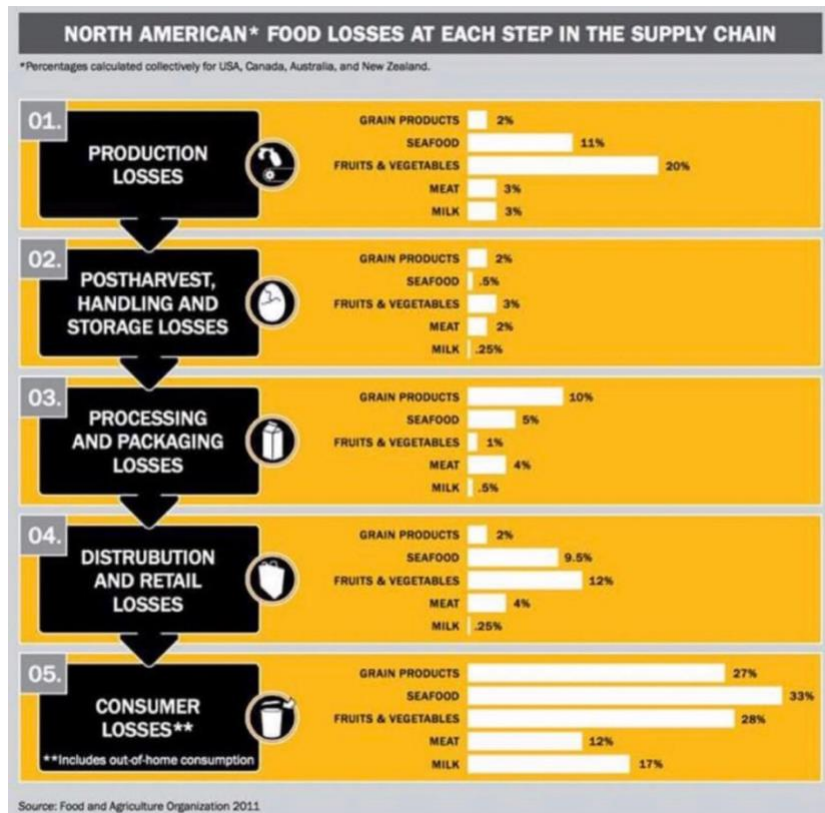
In the United States, we rely heavily on the Environmental Protection Agency (EPA) to supply us with GHG data. Based on EPA’s 2016 report, the following sectors/activities contribute to GHGs accordingly:



Source: EPA.gov

transportation – 28 percent, energy – 28 percent, industry – 22 percent and agriculture – 9 percent. The agricultural figure includes animal agriculture at 3.9 percent.

As an aside, it is worth noting if we could ever tackle the enormous problem of food waste in our country, we would see much lower GHG numbers for agriculture and our overall food supply chain. Forty percent of food produced in the United States goes to landfills, and that food waste is the largest contributor to agriculture’s carbon – and overall environmental – footprint. This unacceptable amount of wasted food ranges from the most perishable commodity, fruit and vegetables (50-plus percent), all the way to animal-sourced foods such as meat and milk (20 percent). It is also worth noting that the majority of the United States’ food waste does not occur at the farm level (i.e., producer) but at the consumer level.



Though agriculture’s contribution to GHGs is significant, it pales in comparison to other sectors, even with such a high amount of food waste. And as we have already established, extracting animal agriculture from the EPA’s agricultural figure shows a much lower number indeed. Information

such as that is very different from the popular belief that livestock – and therefore, our consumption of animal protein – should bear the brunt of the blame for climate change.

So, why the misconception?

### ***Casting a long shadow on the facts***

In 2006, the United Nations' Food and Agriculture Organization (FAO) published a global study titled "Livestock's Long Shadow." It stated, among other things, that livestock was contributing a staggering 18 percent to the world's GHG emissions. The FAO drew a startling conclusion: Globally, livestock was emitting more GHGs than all modes of transportation combined.

The claim was incorrect, having come about as the result of an error in the methodology used to gather data.

Whereas FAO used a comprehensive life-cycle assessment (LCA) when depicting livestock's GHG effect, it employed a different, simplified method of direct emissions only (tailpipe assessment) when looking at transportation. The details of this often-confused difference in methodologies between cows versus cars was recently described by the lead [FAO author](#).

As a result, transportation's impact was underestimated (and thus, livestock's relative impact overestimated) in an apples-to-oranges comparison.

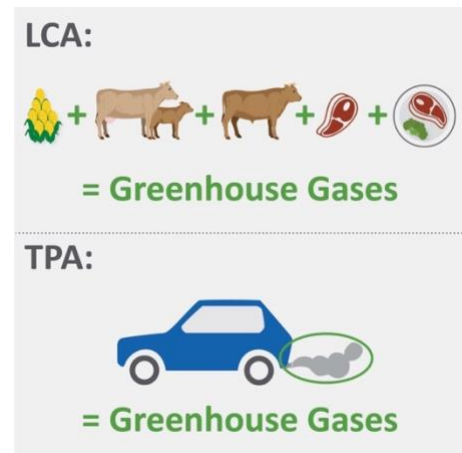
I pointed out the report's flaw during a speech to fellow scientists in San Francisco soon after it was published. An AP reporter who was in the audience put the story on the wire, which opened a floodgate of media calls and inquiries. The BBC's Richard Black pointed out the error in his article "[UN body to look at meat and climate link](#)." The story was published on March 24, 2010, and to its credit, FAO owned up to the mistake.

Several years later, I chaired the Livestock Environmental Assessment and Performance Partnership (LEAP), an FAO partnership committee. With the help of dozens of the world's leading experts, we now have global guidelines on how to conduct LCAs for all livestock and feed commodities. To this day, the "LEAP guidelines" are considered the "gold standard" for LCAs worldwide.

LEAP notwithstanding, FAO's claim that livestock was responsible for the lion's share of GHGs was the shot heard around the world. So much so, we continue to struggle to "unring" the bell. I believe that's due in part to misunderstanding and in part to special-interest groups using the (mis)information to further their agendas. Regardless, falsehoods do nothing to help us arrive at solutions to real and major climate change mitigation, and that is perhaps the biggest shame of it all.

### ***Giving up meat won't solve the problem***

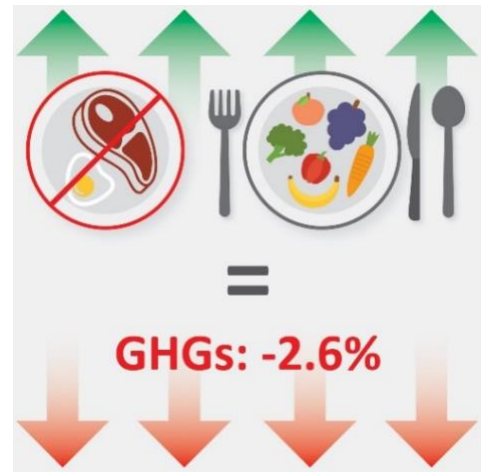
It's staggering how many people continue to think that merely giving up meat – even once a week – will make a significant impact on their individual carbon footprints.



A [study published in the Proceedings of the National Academy of Science \(PNAS\)](#) takes the argument to an extreme to demonstrate that it simply cannot.

The study – “Nutritional and greenhouse gas impacts of removing animals from U.S. agriculture” – supports and expands on evidence that livestock is responsible for a relatively small piece of the GHG pie in the United States.

Imagining for a moment that Americans have eliminated *all* animal protein from their diets, Professors Robin White and Mary Beth Hall demonstrated in 2017 that such a scenario would lead to a reduction of a mere 2.6 percent in GHGs throughout the United States. Subscribing to Meatless Monday only would bring about a 0.3 percent decrease in GHG emissions. A measurable difference to be sure, but far from a major one.



Incidentally, the solely plant-based agriculture hypothesized by Professors Hall and White would result in various negative results, economic and nutritional among them. For example, we would be able to produce 23 percent more food by volume, but the plant-based food would fall short of delivering essential nutrients to the U.S. population, they concluded.

### *We've come a long way*

According to the [United Nations Food and Agriculture's statistical database](#), total direct greenhouse gas emissions from U.S. livestock have declined 11.3 percent since 1961, while livestock production has more than doubled. This massive increase in efficiency and decrease in emissions have been made possible by the technological, genetic and management changes that have taken place in U.S. agriculture since World War II. Specifically, these include: efficiencies in reproduction; better health, brought about in part by vaccinations and advances in health care; the application of “high-merit” genetics; and more energy-dense diets.

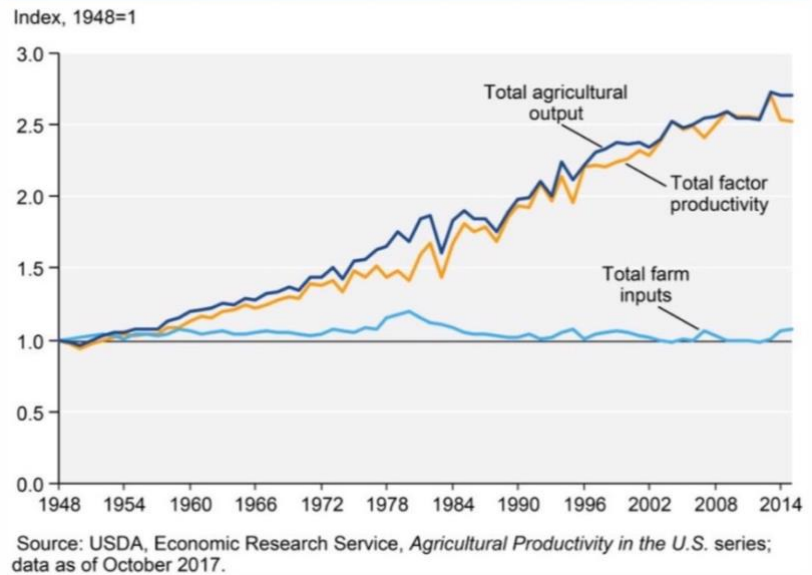
As a result, animal herds are at an historic low in the United States without a corresponding output level. For example, in 1950, there were 25 million dairy cows in the United States. There are 9 million presently, but today's herd produces 60 percent more milk than their ancestors did. Put another way, the carbon footprint of a glass of milk is two-thirds smaller today than it was 70 years ago.

Not so in much of the world, however. Case in point: In the United States, about 23,000 pounds of milk is produced per dairy cow each year. In Mexico, it takes up to five cows to produce the same amount of milk as one U.S. cow, and in India, it takes up to 20. These statistics point to the United States having the lowest GHG emissions per unit of milk of any country in the world. It's a similar story for other ruminant and non-ruminant animals that produce meat in the United States. In fact, emissions from all U.S. livestock species are much lower than those in Brazil, China, India and countries in the European Union, among others.

In 1970, there were 140 million head of beef cattle in the United States. There are 90 million today, but we are nevertheless producing the same amount of beef (24 million tons). We are experiencing this phenomenon in the swine industry as well, where we have seen a tripled pig crop and a concurrent 76 percent reduction in land use, a 25 percent reduction in water use and a nearly 8 percent reduction in GHG emissions since 1960.

U.S. agriculture is today the envy of the world, having improved the outputs while holding inputs steady.

**U.S. agricultural output, inputs, and total factor productivity, 1948-2015**



***Making good use of what we have***

Critics of animal agriculture suggest we could better use our farmland to grow crops (instead of raising animals) and thus reduce GHGs. To put the issue in perspective, think of the surface area of Earth as an 8½-inch-by-11-inch sheet of paper. One-fourth of that sheet is all land. Of that post-card-sized parcel representing all land, we have approximately the area represented by a business card, which is all agricultural land on which we produce food. However – and here’s the rub – not all agricultural land is the same. Two-thirds of the business card is “marginal” farmland. In other words, it is not conducive to growing fruits and vegetables due to poor soil nutrients and/or lack of moisture. Yet, we can use marginal agricultural land to raise ruminant livestock that is able to eat feed such as grasses that are inedible by humans and upcycle them to high-quality animal-based foods. And there’s more to consider.



***Why we need animal agriculture***

According to Professors Hall and White, “Removing animals from U.S. agriculture would reduce agricultural GHG emissions, at the same time creating a food supply incapable of supporting the U.S. population’s nutritional requirements.”

Many critics of animal agriculture are quick to point out that we could produce more pounds of food and more kcals per person if we raised only plants. What the argument fails to consider is

that there is a more robust and even sensible perspective on nutrition: Food security is not so much about producing enough calories, but essential micro- and macro nutrients.

It's hard to make a compelling argument for a calorie deficit in the United States, given the high rates of obesity that exist in children and adults, particularly in lower-income households. And it should go without saying that not all plant life is edible or desirable. Livestock is a way for us to value-add plant agriculture, both in terms of nutritional value and economic value.

***More to the problem than “meats” the eye***

Where the environment is concerned, foregoing animal-source food is not the panacea many would have us believe. Neither will it help us meet the food and nutritional issues that lie ahead.

The global population is on trend to reach nearly 10 billion people by 2050, representing an enormous food security and natural resource challenge. Meeting that challenge will require the world to produce both plant- and animal-based food and to produce them more efficiently, using high-quality and marginal agricultural lands.

But first, we need to examine the facts, not engage in hyperbole.