

ARE FOOD CHOICES DRIVING GLOBAL WARMING?

It turns out, eating locally grown produce can significantly reduce greenhouse gasses.

The Cheeseburger Footprint: Generating CO₂

Energy Use in the Food Sector, a 2000 report from Stockholm University and the Swiss Federal Institute of Technology researchers, concludes that the total energy use going into a single cheeseburger amounts to somewhere between about 7 and 20 megajoules (the range comes from the variety of methods available to the food industry).

If we split the food production and transportation uses into a diesel category, and the food processing (milling, cooking, storage) uses into an electricity category, it would look like this:

Diesel -- 4.7 to 10.8 MJ per burger

Electricity -- 2.6 to 8.4 MJ per burger

These energy figures can then be used to calculate carbon dioxide emissions, based on fuel. Diesel is straightforward. For electricity, we should calculate the footprint using both natural gas and coal, as their carbon emissions vary considerably. The results:

Diesel -- 350 to 800 grams of carbon dioxide per burger

Gas -- 416 to 1340 grams of carbon dioxide per burger

Coal -- 676 to 2200 grams of carbon dioxide per burger

for a combined carbon dioxide footprint of a cheeseburger of 1442 grams of CO₂ (at the low end, with gas) to 4340 grams of CO₂ (at the high end, with coal). Adding in the carbon from operating the restaurant (and driving to the burger shop in the first place), we can reasonably call it somewhere between 1.75 kilograms and 4.75 kilograms of energy-based carbon dioxide emissions per cheeseburger.

Then there's methane...

CO₂ is not the whole story. There's a little thing called **methane**. It's a greenhouse gas that traps about 23 times more heat per molecule than does carbon dioxide. It's also something that cattle make, in abundance.

By regulation, a cow must be at least 21 months old before going to the slaughterhouse; let's call it two years. A single cow produces about 110 kilos of methane per year in manure and "enteric fermentation," so over its likely lifetime, a beef cow produces 220 kilos of methane. Since a single kilo of methane is the equivalent of 23 kilos of carbon dioxide, a single beef cow produces a bit more than 5,000 CO₂-equivalent kilograms of methane over its life.

A typical beef cow produces **approximately 500 lbs of boneless meat**. If the typical burger is a quarter-pound of pre-cooked meat, that's 2,000 burgers per cow. Dividing the methane total by the number of burgers, then, we get about 2.6 CO₂-equivalent kilograms of additional greenhouse gas emissions from methane, per burger, or roughly as much greenhouse gas produced from cow burps (etc.) as from all of the energy used to raise, feed or produce all of the components of a completed cheeseburger!

That's a total of 4.35-7.35 kg of CO₂-equivalent per burger. If we accept the ~3/week number, that's 652-1103 kg of greenhouse gas per year for an average American's burger consumption. And for the nation as a whole?

300,000,000 citizens
* 150 burgers/year
* 4.35 kilograms of CO₂-equivalent per burger
/ 1000 kilograms per metric ton
= 195,750,000 annual metric tons of CO₂-equivalent for all US burgers

That's at the low end of the kg/burger estimate.

Carbon Facts

Product Size 1 Cheeseburger (130g)	
Amount Per Serving	
Kilograms CO ₂ Equivalent 3.08	
Kilograms CO ₂	.243
Kilograms CH ₄	.123
Total C: Energy Sources 243g	
Transportation	
Fossil Fuel (Diesel)	120g
Fossil Fuel (Gasoline)	48g
Electricity Production	
Fossil Fuel (Natural Gas)	75g
Fossil Fuel (Coal)	0g
Other	
Total C: Non-Energy Sources 2840gCO ₂ E	
Enteric Fermentation	81.0g (1864gCO ₂ E)
Manure	25.8g (656gCO ₂ E)
Other	5.2g (120gCO ₂ E)
Carbon/Product Ratio 23.7	
Localism Rating C+	
Sustainable Production Rating D+	
overall carbon code: orange	

Even with the lower claim of one cheeseburger per week, for an average American, the numbers remain sobering.

300,000,000 citizens
* 50 burgers/year (~Fast Food Nation)
* 4.35 kilograms of CO2-equivalent per burger
/ 1000 kilograms per metric ton
= 65,250,000 annual metric tons of CO2-equivalent for all US burgers

Those numbers are big, impressive, and probably meaningless.

So let's convert that to something more visceral. Let's compare to the output from a more familiar item: an SUV.

A Hummer H3 SUV emits 11.1 tons (imp.) of CO2 over a year; this converts to about 10.1 metric tons, so we'll call it 10 to make the math easy.

195,750,000 annual metric tons of CO2-equivalent for all US burgers
/10 metric tons of CO2-equivalent per SUV
=19.6 million SUVs

----or----

65,250,000 annual metric tons of CO2-equivalent for all US burgers
/10 metric tons of CO2-equivalent per SUV
=6.5 million SUVs

To make it clear, then: **the greenhouse gas emissions arising every year from the production and consumption of cheeseburgers is roughly the amount emitted by 6.5 million to 19.6 million SUVs.**

Will this information alone make a difference? Probably not; after all, nutrition info panels on packaged foods didn't turn us all into health food consumers. But they will allow us more informed choices, with no appeals to not knowing the consequences of our actions.

The Cheeseburger Footprint is about much more than raw numbers. It's about how we live our lives, and the recognition that every action we take, even the most prosaic, can have unexpectedly profound consequences. This article was meant to poke us in our collective ribs, waking us up to the effects of our choices.

This information was revised from information provided by Jamais Cascio – The Cheeseburger Footprint
http://www.openthefuture.com/cheeseburger_CF.html

