

How Green Is Your Meat?

Calculating the greenhouse gas coefficient of commercial meat production



By [Michael Chandler](#) | June 26, 2009



Animal	GHG Emissions [Tg CO ₂ eq.]			GHG Emissions per lbs animal [Mg CO ₂ eq/1M lbs]	Relative Emissions
	Enter Ferm (CH ₄)	Manure Mgmt (CH ₄ & N ₂ O)	Total		
Poultry	0.0	4.5	4.5	277	1.0
Sheep/Lamb	1.0	0.4	1.4	356	1.3
Swine	2.0	21.3	23.3	1,121	4.1
Beef Cattle	100.2	9.1	109.3	1,741	6.3
Pasture Swine	2.0	1	3	144	0.5

It's more than the numbers

Image Credit: Eliza MacLean and Bill Beasley

I was thinking about what to throw on the grill this weekend when my friend Bill Beasley sent me an E-mail about the greenhouse gas (GHG) impact of various types of meat.

I had generally understood there was a “bovine flatulence problem” with eating beef and that it was better to choose chicken or lamb for the grill. But Bill had gone the extra mile to put numbers to the green house gas impact of commercially raised chicken as compared to Beef, Pork, and Lamb.

What he discovered made him decide to become a vegetarian...

Beef cattle produce methane (CH₄) mostly from enteric fermentation, meaning digestion (and flatulence), and a little from manure management (not free-range). Their total annual methane output in 2007 was 102.4 Terra-grams carbon dioxide equivalent (Tg CO₂ eq.)

Due to methane’s long shelf life (mixes well and hangs around longer), it is estimated that for equal quantities, it is 23 times more damaging to our atmosphere than CO₂. We have 96 million cattle to 300 million people in America, 3 humans per cow.

Comparing this to 2007 US transportation emissions and to our residential housing industry’s annual emissions one can summarize (again, just comparing CH₄ to CO₂ emissions)...

- Transportation CO₂: 1,887 Tg CO₂ eq.
- Residential CO₂: 341 Tg CO₂ eq.
- Beef cattle CH₄: 102 Tg CO₂ eq.

Our consumption of beef is equivalent to 30% of all residential GHG production, or 5% of all transportation GHG production!

So I’ll be cutting way back on the steaks and burgers this summer.

But what about other meats? Bill calculated the GHG contribution per pound of chicken, lamb, and pork from both the life cycle of the animal and the disposal of the manure.

As expected, poultry is the lowest GHG emitter, with 277 Mega-Grams eq./million pounds (Mg CO₂ eq/ 1M) lbs of meat. And beef cattle are the worst, with 1,741 Mg CO₂ eq/ 1M lbs of meat, so beef has 6.3 times the GHG impact of chicken.

Second on the list is lamb, with 356 Mg CO₂ eq/ 1M lbs of meat or 1.3 times the GHG impact of poultry. Most lamb is pasture raised, with very low methane production related to their manure, and virtually no antibiotics and pesticides involved. So, considering animal cruelty and the health of your family, that marinated, butterflied leg of lamb is looking pretty appetizing.

Pork barbeque, my local favorite here in NC, doesn't fare so well with 1,121 Mg CO₂ eq/ 1M lbs of meat, or 4.1 times the GHG impact of poultry. But this is largely due to the factory farm management process with over 90% of it's methane coming from the hog waste lagoons.

But many small [family farms](#) are now producing pasture-raised, antibiotic-free pork. If we assume that pork raised in this way has about twice the waste-related methane as lamb, then we can calculate that it would come in at 125 Mg CO₂ eq/ 1M lbs of meat, or half the GHG impact of chicken.

What to drink with it? Consider a glass of the [greenest beverage](#).

I can see the marketing slogan already:

“Pasture-raised pork, the *other* green meat.”