

Your food choices affect Earth's climate

Eating meat can have twice the 'carbon footprint' of consuming fruits, veggies and grains

By Janet Raloff
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Are you a meat-eater, vegan, or something in between? In this text, Janet Raloff discusses a study about how your diet can affect the Earth's climate. As you read, take notes on the effects that the production of certain foods has on the environment.

- [1] Every action has a cost. That's as true for driving a car as it is for growing food and delivering it to your dinner plate. A team of researchers has just tallied the costs of producing meat versus other types of foods for human diners. They find that meat production — from farm to fork — releases more climate-warming pollution that does producing fruits, vegetables, nuts and grains. A lot more.

Their calculations suggest that people could do a lot to slow global warming if they limited how much meat they eat.



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There are plenty of "costs" to producing any goods, including food. Sure, people pay money for the food as well as the fuel needed to get groceries to the store or restaurant. But those are just the most **visible** costs. Producing things also takes resources. For foods, this includes the water used to irrigate¹ crop fields. It also includes the fertilizer and chemicals that boost plant growth and fight pests. And don't forget the gasoline and diesel that fuel plows and also those trucks that take crops to market.

Along with those resources are wastes: pollution. Manure is one **obvious** pollutant associated with meat production. But there are others, including the air pollutants spewed by tractors that plow fields and the trucks that move feed to the animals and animals to the slaughterhouse. Peter Scarborough at the University of Oxford in England, and his colleagues decided to tally some of the less-visible pollution created by food production.

- [5] They focused on greenhouse gases. In the atmosphere, these gases trap heat from sunlight. Lately they've been trapping too much, causing a sort of mild, global fever. Overall, food production accounts for one-fifth of this type of pollution.

One greenhouse gas emitted through the production of our food is carbon dioxide, or CO₂. It's released by the burning of fossil fuels, such as gasoline and natural gas. They are used to power farm machinery, to take foods to market (and home), to store foods awaiting processing and to cook foods. The researchers also tallied methane. Fermentation² in the guts of ruminant³ livestock — mostly cows — releases this gas. And the scientists calculated the nitrous oxide released during the plowing and fertilizing of crop fields.

All three gases are important. CO₂ is the greenhouse gas released in the highest volume. But methane and nitrous oxide stay in the atmosphere far longer than CO₂ does. As such, they are more potent,⁴ molecule for molecule, in warming Earth's atmosphere.

A computer converted the methane and nitrous-oxide emissions for each person's diet into its carbon-dioxide "equivalent." That's the amount of CO₂ needed to warm Earth's atmosphere by the same amount as the methane or nitrous oxide would.

Switching from meat-rich meals to vegetarian ones would reduce the average meat eater's CO₂ equivalents — also known as its carbon footprint — by 1,230 kilograms (about 1.4 U.S. tons) per year, the new study calculated. Scarborough's team presented its findings in the July issue of *Climatic Change*.

How they calculated food's 'carbon footprint'

- [10] In the 1990s, a survey asked 65,000 adults what they typically had eaten throughout the past year. Scarborough's team fed those data into a computer. The researchers also included the amount of greenhouse gases linked with producing nearly 100 common foods. Then the computer matched those greenhouse-gas amounts to the mix of foods each person had reported eating.

Some people had eaten lots of meat. Others hadn't. Some had been big fish eaters. Others weren't. All people ate some plant-based foods, such as salads, grains, bread, beans or fruit. Some reported being vegetarians. That means they downed only plant-based foods with the exceptions of possibly eggs, fish or milk. Others, vegans, reported eating no meat, poultry, fish or dairy foods (including cheese, butter and yogurt).

The diet of someone whose meals included an average of 50 to 99 grams (1.8 to 3.5 ounces) of meat each day would be responsible for the daily release of 5.6 kilograms (12.4 pounds) of CO₂ equivalents,⁵ according to the new analysis.

Vegans would contribute only 2.9 kg (6.4 lbs) of CO₂ equivalents, the researchers calculated. Indeed, those vegans had the lowest diet-linked greenhouse-gas emissions. Vegetarians had the next lowest emissions, followed by people who ate fish but no red meat or poultry.

2. the process in which a substance breaks down into a simpler substance
3. an animal that brings its food up from its stomach and chews it again
4. **Potent (adjective):** having greater affect or influence
5. something that is equal to or corresponds to another value

Scientists don't expect many people will give up eating meat entirely. In fact, in England the trend has been in the opposite direction. The share of people there who consider themselves vegetarians or vegans fell from 5 percent in 2000 to just 2 percent by 2010. Over the same period, meat consumption climbed 7.8 percent — to 84.2 kg (186 lbs) per person.

- [15] U.S. data show that as of 2012, 4 percent of men and 7 percent of women considered themselves vegetarians. However, Americans continue to consume more meat than people in the United Kingdom and Europe. Each year the average American adult downs about 120 kg (265.7 lbs) of meat.

Still, the new study “demonstrates that reducing the intake of meat and other animal-based products can make a valuable contribution to climate change mitigation,”⁶ its authors conclude. And there's another advantage to reducing meat consumption, the researchers point out. Compared to meat, more plant-based food calories can be grown on a plot of land — and with less water and other resources. In places where many people are going hungry, as they are in large parts of the world, raising meat may make it harder to ensure that everyone gets enough to eat.

Beyond greenhouse gases

“I think it's interesting,” Danielle Nierenberg said of the new study. She's president of Food Tank, a food-policy organization based in Washington, D.C. Looking at greenhouse gases is important, she says. But, she adds, it's just one of many environmental costs of foods.

“The more we think about what we're eating, and food's role in sustainability or in climate change, that's a good thing,” she says. But, she adds, “more needs to be done to be sure that we're capturing everything.” By that she means scientists want to be sure that they are not missing important environmental “costs” of producing food.

Those costs may have to do with the resources. Some crops are water hogs, which can be a problem in areas with little rain. Others may require a lot of processing — using water and plenty of expensive energy — to clean, cook-up, package or deliver foods to grocery shoppers.

- [20] And then there are a range of less visible environmental problems. Animals may harden the soils, making the land less likely to soak up water when it rains. Often farmers rely on weed killers and pest killers to improve the size of their crop harvests. Many of those chemicals can be toxic to wildlife and people. Some fertilizers can pollute groundwater.⁷ Plowing fields can lead to erosion.⁸ That can diminish the fertility of soils.

Finally, Nierenberg notes, even for meat, “not all meat is created equal.” Some farmers pen cattle in feedlots to fatten them quickly. This requires feeding them an unnatural diet and releases a lot of animal wastes (poop and pee) into a small area. In contrast, some farmers graze their cattle on pastures. Allowing the animals to eat grass and over a broad expanse of land helps ensure that the soil is protected and that native plants are not trampled to death.

There can also be a similar range of environmental differences in the way plant-based foods are farmed. Some can be less wasteful and less polluting than others.

6. the action of reducing the severity of something
7. water held underground in the soil
8. the gradual destruction of something

Scarborough's team took a good first step in tallying costs, Nierenberg says. But, she argues, more details will be needed about how foods are grown to truly know which foods — or farm practices — take the biggest toll on Earth's total environment.

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Dictionary

consumption (*noun*) getting or using resources or goods

sustainability (*noun*) using natural resources in a way that does not harm or deplete them

obvious (*adjective*) easily understood or clear

visible (*adjective*) able to be seen

convert (*verb*) to change something from one form to another form

tally (*verb*) to count something

Name: _____

A **synonym** is a word that has the same or almost the same meaning as another word. (Example:
hot/burning)

INSTRUCTIONS: Read the words in the left-hand column. Then list at least two synonyms for each word in the right-hand column. Use one of the synonyms to write a complete sentence for each word.

consumption	Synonyms: _____ Sentence: _____ _____.
obvious	Synonyms: _____ Sentence: _____ _____.
visible	Synonyms: _____ Sentence: _____ _____.

Vocabulary A-Z

CONCEPT COMPLETION

DAY 4

(Page 1 of 1)

Name: _____

INSTRUCTIONS: Use what you know about the vocabulary words to complete the following sentences.

1. It's **obvious** that _____.
2. When something is **visible**, it _____.
3. The shopkeeper kept a **tally** of _____.
4. You might **convert** a _____.
5. Too much **consumption** can lead to _____.
6. **Sustainability** involves _____.