Easy diet changes can lower carbon footprint, according to study

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Researchers led by the Stanford School of Medicine have identified a set of simple food swaps that can make a big difference in an individual's carbon footprint—without the need for a drastic dietary overhaul. The

suggestions include exchanges as easy as replacing beef with chicken in a burrito or selecting plant-based milk over dairy. If universally adopted, such choices would lower the U.S. dietary carbon footprint by more than 35%, the researchers found.

"Many people are concerned about climate change, but sweeping dietary change can be hard," says the study's lead author, Anna Grummon, Ph.D., an assistant professor of pediatrics and health policy. "Instead, we've identified simple, achievable substitutions—small changes—that can still produce a meaningful impact."

The researchers also assessed the health impacts of their suggested changes using the U.S. Department of Agriculture's Healthy Eating Index—which measures how healthy our diets are—and found that the changes stood to improve overall dietary quality for all demographics.

Grummon conducted the investigation, published Oct. 26 in *Nature Food*, with senior author Diego Rose of the Tulane University School of Public Health and Tropical Medicine.

To identify easy food substitutions that could have an outsized climate impact, the researchers merged data on food-related greenhouse gas emissions with a large, nationally representative survey on what people eat in the United States.

In each of four food groups—protein, mixed dishes, dairy and beverages—they identified foods that disproportionately contribute to greenhouse gas emissions. They then matched each of these foods to a similar option with a much lower carbon footprint to propose a swap and calculated what the impact would be both for an individual's carbon footprint and for the country's if the changes were made.

"The key was to find swaps that were culinarily equivalent," Rose said.

"By doing this, we think it will be pretty easy for people to adopt the new dishes, because they will be pretty similar to what they are currently eating."

The beef triple whammy

Substitutions in the categories of protein and mixed dishes stood to make the biggest impact, with a shift away from beef leading the way in both cases. Choosing ground beef for a hamburger, for example, means your patty will have a carbon footprint that's eight to 10 times higher than a chicken patty and around 20 times higher than a vegetarian patty.

On average, choosing chicken for a meal instead of beef reduces the greenhouse gas emissions needed to make the meal by an amount roughly equivalent to driving nine miles in a car. This might not seem like a lot on an individual level, but if everyone participated in these swaps it could have a substantial impact in the nation's dietary carbon footprint—potentially reducing emissions by the equivalent of hundreds of millions of passenger vehicle miles each day.

"Some foods, like beef, are damaging enough that an individual making a swap would see a big difference in their personal carbon footprint," Grummon said. "When those foods are popular, the differences really start to matter when added up across a population."

Beef, Grummon said, is particularly problematic for the environment for three reasons. First, cows produce high quantities of methane, a potent greenhouse gas, simply by digesting their food. Second, cows require a significant amount of land for grazing, driving clear-cutting of forests in many parts of the world.

Finally, cows have a much longer life cycle than poultry and other, smaller animals, which means their own lifelong dietary footprint is

much larger by the time they can be used for food.

"It's a triple whammy," Grummon said.

Hearts, minds and stomachs

Beef was just one of many swaps the team identified in a list that has something for everyone. Salmon is better than crab, for example, and pork is better than lamb (though chicken is better than pork). But the team wants to focus on encouraging consumers to opt out of the foods they most commonly eat that have the heaviest carbon footprint, as those have the biggest impact nationwide.

Grummon is already studying what kinds of educational campaigns can encourage people to make swaps with three major targets in mind: replacing beef and pork with chicken or vegetarian entrees, replacing cow's milk with non-dairy milk, and replacing juice with whole fruit. (Juice has a much higher carbon footprint than whole fruit as it requires much more fruit to be squeezed and tossed to create an equivalent serving.)

Grummon is conducting focus groups and surveys to see how adults aged 18 to 25 will respond to learning about the environmental impact these changes can have. As a health policy researcher, she knows that changing eating habits is notoriously difficult, but because her swaps tend to be easier and because young adults tend to be concerned with the climate crisis, she's optimistic that her message will take hold.

Grummon is excited, too, because the proposed changes will generally lead to healthier eating habits. The study's simulated diet shifts were associated with a 4% to 10% increase on the USDA's Healthy Eating Index. And higher index scores are linked to a lower risk of cardiovascular disease, cancers and other conditions.

"It's really a win-win," Grummon says. "If you are a person who wants to make a dietary change for either health or environmental reasons and you make the changes that we propose, you're likely to see the benefits you want."

More information: Anna H. Grummon et al, Simple dietary substitutions can reduce carbon footprints and improve dietary quality across diverse segments of the US population, *Nature Food* (2023). DOI: 10.1038/s43016-023-00864-0

Ty Beal, Big environmental gains from small dietary tweaks, *Nature Food* (2023). DOI: 10.1038/s43016-023-00878-8

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