



## Going Vegan Reduces Your Environmental Impact

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“A vegan diet is probably the single biggest way to reduce your impact on planet Earth, not just greenhouse gases, but global acidification, eutrophication, land use and water use.”<sup>1</sup>

- **Joseph Poore, Environmental Science Researcher, University of Oxford**

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Animal agriculture is one of the largest contributors of human-made greenhouse gas emissions, deforestation, water pollution, and air pollution. With so many alternatives available, it's easier than ever to make choices that help the environment.

Take, for example, the vegan Beyond Meat Burger. A 2018 report from the University of Michigan's Center for Sustainable Systems found that a quarter-pound Beyond Burger is nearly identical nutritionally to a quarter-pound beef burger but generates 90% less greenhouse gas emissions, requires 46% less energy and 99.5% less water, and uses 93% less land compared to the production, packaging, and distribution of U.S. beef.<sup>2</sup>

### Air Pollution

The air pollution caused by animal agriculture significantly contributes to greenhouse gases. It also leads to premature deaths and environmental racism.

## Greenhouse Gases

A 2018 study from *Science* found that meat and dairy production creates 56-58% of agriculture's greenhouse gas emissions, while providing only 18% of calories and 37% of protein.<sup>18</sup> A 2021 study from *Nature Food* confirmed these figures, finding that animal agriculture is responsible for 57% of agriculture-related greenhouse gas emissions.<sup>14</sup>

Calculations by *Our World in Data* (2020) show that producing 100 grams of protein from peas emits 0.4 kilograms of carbon dioxide equivalents while producing 100 grams of protein from beef emits almost 90 times as much. Even when comparing emissions from the lowest-impact meat and dairy producers to the highest-impact plant producers, plant-based protein sources consistently have a smaller carbon footprint.<sup>7</sup>

Multiple reports have found that a vegan diet has the most potential for reducing greenhouse gas emissions:

- A 2020 study in *Nature Sustainability* found a high carbon opportunity cost of animal agriculture such that the land displaced by animal foods has the potential to sequester 152.5 gigatons of carbon (GtC) in living plant biomass (if people switched to eating vegan). Ruminant animal pastures for meat and dairy account for 72% of the carbon while animal feed croplands make up the other 28%. This amount of carbon represents the past decade of fossil fuel emissions and the researchers considered it comparable to the reductions necessary to limit global warming to 1.5°C.<sup>6</sup>

- A 2022 report in *PLOS Climate* found that if animal agriculture were phased out over the span of 15 years, greenhouse gas emissions could stabilize for 30 years and offset 68% of carbon dioxide emissions through the remainder of this century. The resulting greenhouse gas reductions would provide half of those necessary to limit global warming to 2°C.<sup>15</sup>
- A 2019 *Lancet* report compared models of change in food production and found that a shift to plant-based diets could reduce food-related emissions by up to 80% by 2050.<sup>4</sup>
- A 2019 report from *Scientific Reports* found that vegan diets have the greatest potential for reducing greenhouse gas emissions, by up to 35 to 50%.<sup>5</sup>

Smaller shifts toward a plant-based diet also can have large impacts on the environment:

- A 2022 report from the UN's Intergovernmental Panel on Climate Change emphasized a shift towards plant-based diets as a major opportunity to limit greenhouse gas emissions.<sup>3</sup>
- A 2020 report from the Center for Sustainable Systems at the University of Michigan estimated that replacing half of all animal-based foods with plant-based foods could result in a 35% decrease in diet-related emissions in the U.S. That would result in reducing roughly 224 million metric tons of emissions annually by 2030, the same amount as 47.5 million passenger vehicles.<sup>12</sup>
- On a global scale, a 2023 analysis in *Nature Communications* found that replacing 50% of animal-sourced foods with plant-based alternatives would reduce agricultural and land-based emissions by 31% by 2050, while also increasing food security.<sup>20</sup>
- A 2024 report from *Science Advances* found that a global shift towards the EAT-Lancet Planetary Health Diet, a flexitarian diet, by 2050, would make the goal of limiting global warming to 1.5°C feasible.<sup>21</sup>

In contrast, eating locally does little to change the impact of various diets. Hannah Ritchie, PhD, of Our World in Data, writes, "Greenhouse gas (GHG) emissions from transportation make up a very small amount of the emissions from food, and what you eat is far more important than where your food traveled from."<sup>19</sup>

## Premature Deaths

A 2023 report in *Nature Communications* found that changing to a vegan diet would reduce global agricultural emissions by 84% to 86%. The researchers estimated that if these changes were made by 2030, the reduction in air pollution would prevent approximately 236,000 premature deaths per year.<sup>17</sup>

## Environmental Racism

Hog and dairy farms produce enormous waste, which is stored in lagoons and then sprayed on fields. In 2017, the Sierra Club reported:<sup>16</sup>

If waste is sprayed too often, it saturates the soil and leaks into the aquifer and nearby rivers and streams. The practice also aerosolizes fecal matter, creating toxic particulates that get blown onto nearby homes, accompanied by a terrible stench that drives residents indoors. A majority of those homes belong to African Americans, who have had their property drenched in hog waste for decades and their wells polluted, too.

For 30 years, their complaints about the effect on their health and quality of life have mostly fallen on deaf ears at the [North Carolina] statehouse—making this a clear case of environmental racism with quantifiable human cost.



The Sierra Club quotes residents living near hog waste lagoons:

[Hog waste] comes over here just like it's raining. That's what we inhale if we're outside, and it comes inside the house because you can't keep that odor out. We don't have cookouts or family get-togethers like we used to, because we don't know when the odor is gonna come. When it's really hot, it burns your eyes.

## Water

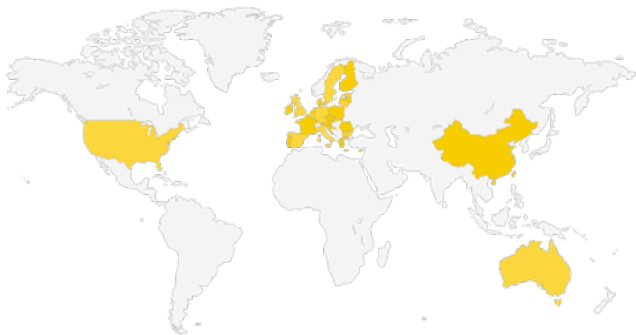
A 2013 report from *Water Resources and Industry* found that while 783 million people worldwide don't have access to clean drinking water, animal agriculture uses nearly 1/3 of drinking water available.<sup>8</sup> For example, a 2024 report in *Communications Earth & Environment* points out that the Colorado River is of critical importance for 40 million people but persistent overuse in recent decades has depleted its large reservoirs; of the Colorado River's direct water consumption, 46% goes to growing hay for cattle.<sup>22</sup>

A 2016 study from *Science of the Total Environment* compared a normal diet from a number of cities in the Mediterranean region with a healthy Mediterranean, pescatarian, or vegetarian diet. It found that the healthy vegetarian diet had the lowest water footprint, with a reduction of 30-53% compared to the typical Mediterranean diet.<sup>9</sup>

A 2016 systematic review published in *Public Library of Science* looked at a variety of common, sustainable diets compared to the standard Western diet. They found that vegan diets use the least amount of water and that diet changes can reduce water use by 50%. This review also found that greenhouse gas emissions and land use could be reduced by as much as 70-80% by a vegan diet.<sup>10</sup>

## Land

A 2018 report from *Science* found that, worldwide, meat and dairy production uses 83% of farmland but provides only 18% of calories and 37% of protein. Even "low-impact" beef uses 36 times more land than do peas. The same study showed that if everybody stopped eating meat and dairy products, farmland use could be reduced by 75%, an area equivalent to the size of the U.S., China, Australia, and the European Union combined.<sup>18</sup>



A 2019 report published by *Lancet* found that nearly two-thirds of all soybeans, corn, and barley crops, and about one-third of all grain crops, are used to feed animals.<sup>4</sup>

A 2018 report in the *Proceedings of the National Academy of Sciences* compared the land use of each individual animal-based food item in the U.S. food system with that of a nutritionally comparable plant-based alternative. Replacing all animal-based products could sustain 350 million additional people. The report also found that an amount of land that can produce 100 grams of protein from plants can produce only 60 grams of protein from eggs, 50 grams from chickens, 25 grams from dairy, 10 grams from pigs, and 4 grams from beef.<sup>11</sup>

A 2017 study from *Climatic Change* found that if the entire U.S. population replaced beef with beans, up to 692 square kilometers (42% of U.S. cropland) would become available.<sup>13</sup>

## Summary

Animal agriculture is not a sustainable system and your environmental footprint can be drastically reduced on a plant-based diet!

Please see [veganoutreach.org/vegan](http://veganoutreach.org/vegan) to learn how you don't need animal foods to be healthy or to have high-protein, satisfying meals.

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