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### Animal Agriculture and Climate Change

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## Animal Agriculture and Climate Change

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Earlier this year the prestigious EAT-Lancet Commission [called](#) on the world to eat less meat to slow climate change. Three other reports in the last year echoed that message, including two published in [Science](#) and [Nature](#), and [one](#) produced in partnership with two UN agencies and the World Bank. Even the normally cautious Intergovernmental Panel on Climate Change noted in its October [report](#) the “increasing agreement that overall emissions from food systems could be reduced by targeting the demand for meat and other livestock products.”

This marks a major change. The climate movement long ignored the inconvenient truth of meat’s greenhouse gas emissions — so much so that a hit documentary alleged a [Cowspiracy](#) between environmentalists and the meat industry. PETA activists grew so frustrated at Al Gore’s evasion of the issue that they [trailed](#) him in chicken costumes in a hummer, accusing him of being “too chicken to go vegetarian” (he later [went vegan](#), though it’s unclear what role the chicken costumes played).

A lot has changed since then. Major environmental groups, including [Greenpeace](#), the [Sierra Club](#), [National Resources Defense Council](#), [World Wildlife Fund UK](#), [World Resources Institute](#), and [Friends of the Earth](#), now encourage people to eat less meat. Even the [UN’s Environment Program](#) and the [World Economic Forum](#) have highlighted animal agriculture’s contribution to climate change, as did The New York Times in a major [feature](#) this week.

This is welcome news for the climate. Animal agriculture contributes a substantial share of greenhouse gas emissions — though the best estimates peg it at [14.5%-16.5%](#) globally, not 51%, as [some activists](#) claim based on one [unpublished study](#). (The US percentage is [lower](#), mainly because US total emissions are so large.) The Nature study’s authors [warn](#) that a global shift to a “flexitarian” diet is “essential” to keep temperature rises under the 2C cap by 2050.

This also sounds like welcome news for animals. Some animal advocates now argue that the global attention on climate change offers the best hope to end factory farming. So could we help farm animals by focusing more on the climate?

### The Law of Unintended Consequences

It’s complicated. The interests of environmentalists and animal advocates aren’t as aligned as we might wish. We need to be clear-eyed about the tradeoffs to ensure that planetary progress isn’t achieved at animals’ expense.

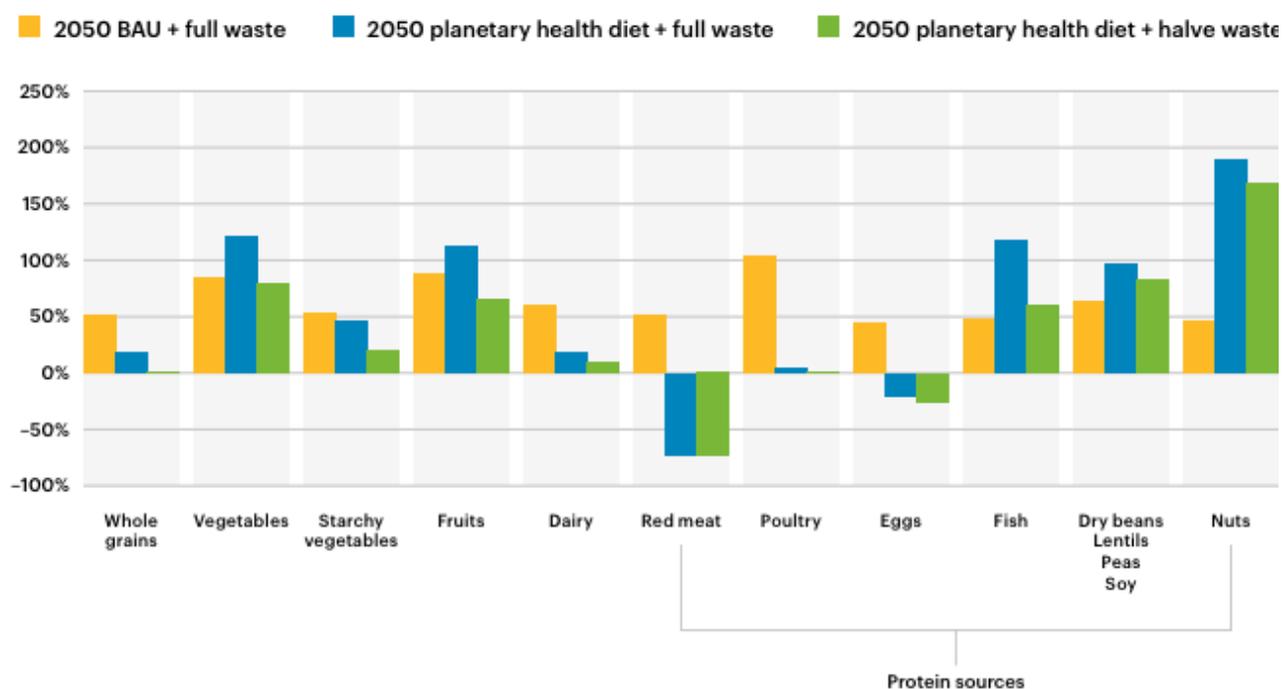
The starkest tradeoff is between the carbon footprint of different meats and the number of animals killed to make them. The [FAO](#) estimates that the 305M cattle slaughtered globally each year produce 5X more emissions than the 66.6B chickens slaughtered collectively do, while some models suggest the climate impact from the more than 1 Trillion fish slaughtered annually may be even smaller.

This has led some environmentalists to urge consumers to replace beef with [chicken](#) or [fish](#). For

example, this week's New York Times meat and climate [feature](#) notes, "Eating as a pescatarian, adding seafood to a vegetarian diet, can be a good compromise, and makes it easier to get protein into your meals. To keep some meat in your diet, try cutting back to one serving of red meat per week, replacing the rest with chicken, pork, fish or plant proteins."

This could result in many more animals suffering in factory farms. To produce as much meat as one cow takes about 185 chickens or 100 - 20,000 fish (depending on species), who will collectively spend 25 - 20,000 years in factory farms (vs. one cow spending up to a year in a feedlot).

Similarly, the much-touted EAT-Lancet's "planetary health diet" called for consuming less red meat but more fish. As a result, if the world adopted the recommended diet, by 2050 land farm animal numbers would fall by 10-15B relative to 2050 baseline projections — but farmed fish numbers would increase by 50-100B. Seafood companies are now [citing](#) the Lancet report to bolster their case.



*Predicted percent change in food production from 2010 to 2050 for the business as usual diet (BAU) with food waste, the EAT-Lancet recommended planetary health diet with food waste, and the recommended planetary health diet with food waste halved. Source: EAT Forum report summary.*

Even policies that don't explicitly call for more chicken or fish consumption could still have that effect. The UK Committee on Climate Change [models](#) that adopting a more climate-friendly diet would "reduce dairy, beef and lamb numbers by up to 46% and increase poultry and pigs by around a quarter," due to substitution effects. That would cause a net increase of 275M animals slaughtered annually in the UK alone. Institutional pledges to cut beef or food-related emissions by 20% or 50% will have a similar effect if institutions achieve their goals by replacing even a small portion of their beef with chicken.

A similar tradeoff exists between animals' carbon footprint and their treatment. Most methane-belching ruminants spend most of their lives on pasture, while almost all chickens don't. Within species, free-range [chickens](#) or [cattle](#) may generate higher emissions than their factory-farmed cousins.

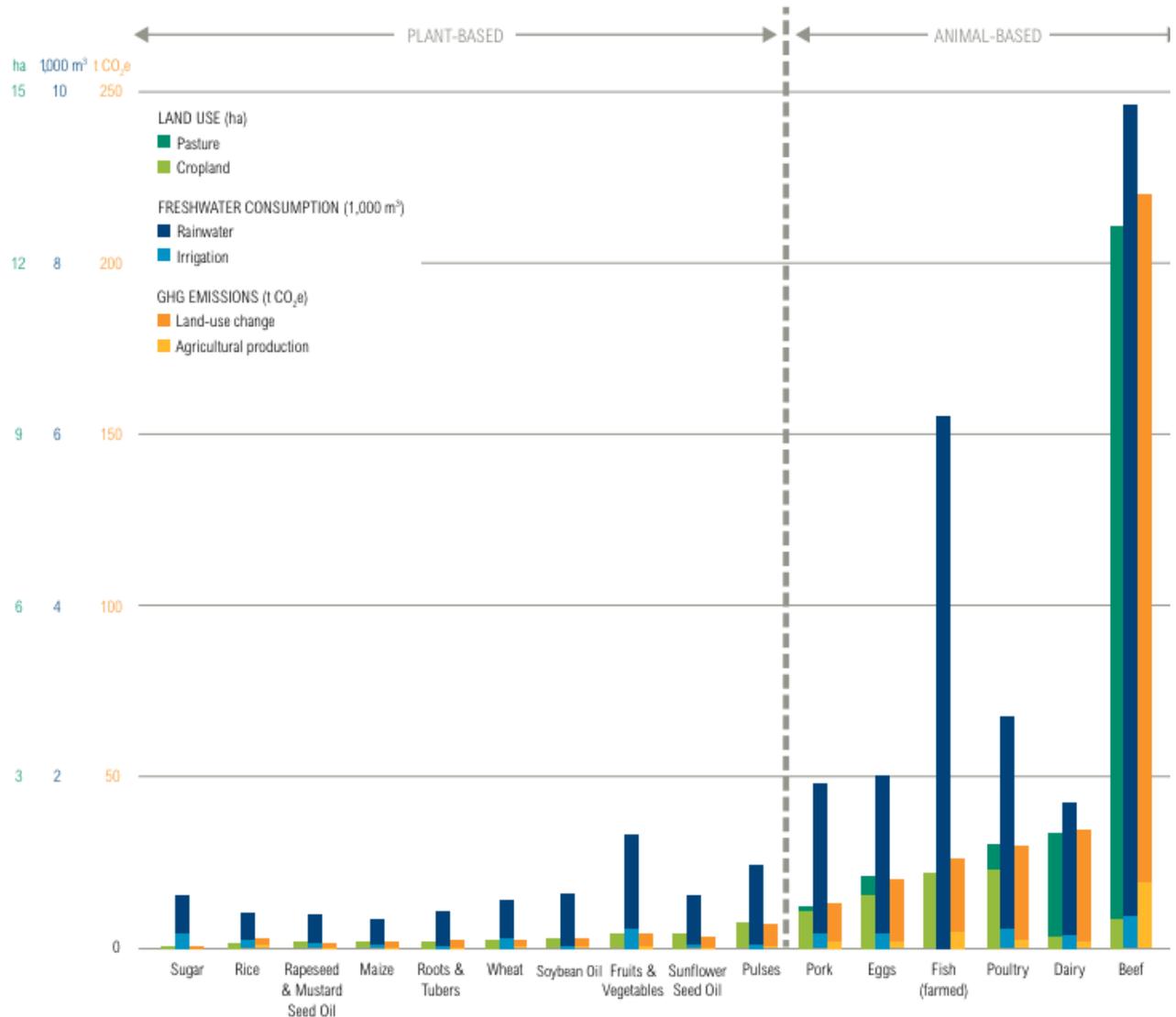
This has led some environmental groups to support confining animals more tightly. For instance, some now [promote](#) recirculating aquaculture systems, in which each fish can receive less than [one hundredth](#) of the space she'd receive in a traditional pond farm. The WWF even [questioned](#) McDonald's decision to go cage-free, because hens immobilized in battery cages take up less space and need less feed.

### **How to Engage**

So should farm animal advocates steer clear of climate advocacy entirely? I don't think so. Climate advocates, fresh off big anti-coal wins, will increasingly focus on meat whatever we do. Animal advocates should be part of that conversation, especially to emphasize the following points:

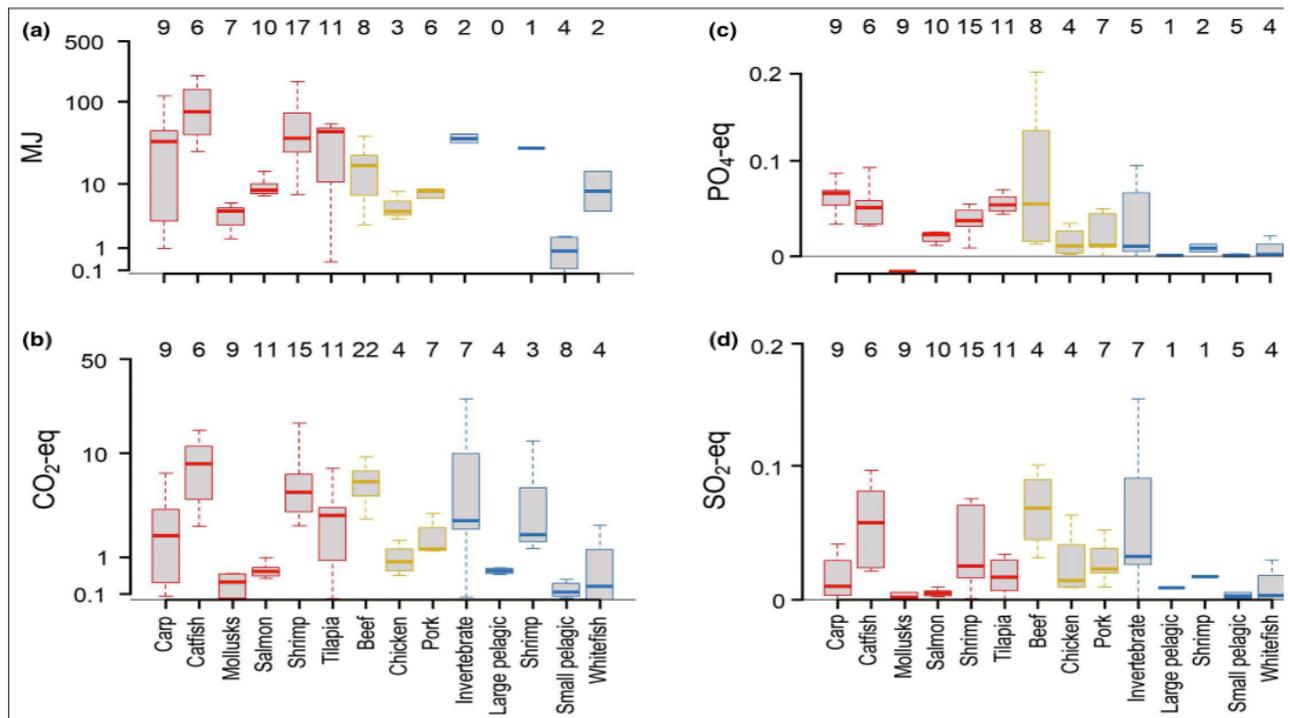
First, white meat's climate impact is often undercounted. Analyses of animals' climate impacts often count only direct production, in which ruminants' methane dominates. But once land use changes are factored in — for instance, clear cutting forests to grow feedstocks — chicken's impact looks much worse (though not as awful as beef's), as the graph below shows.

## PER MILLION KILOCALORIES CONSUMED



*Animal-based foods generally use more land and water, and emit more GHG emissions, than plant-based ones.  
Source: World Resources Institute 2016 [report](#), based primarily on GlobAgri model.*

Similarly, analyses of fish's carbon footprints often focus on low-carbon wild-caught fish common in Western diets, like cod, tuna, and pollock. But wild-caught fishing levels [hit a limit](#) two decades ago, so almost all marginal fish production comes from fish farming. And a 2018 [analysis](#) of 148 life cycle assessments of different animal products found that the world's most commonly farmed fish species (shrimp, carp, and tilapia) had protein-adjusted carbon footprints higher than pork, and in some cases even higher than beef (see chart (b) below).



**Figure 1.** (a) Energy used (MJ), (b) GHG emissions (CO<sub>2</sub>-eq), (c) eutrophication potential (PO<sub>4</sub>-eq), and (d) acidification potential (SO<sub>2</sub>-eq) associated with different production methods per 40-g protein produced. Aquaculture production methods are represented in red, livestock in yellow, and capture fish in blue. The thick horizontal line in the box represents the median impact; the box bounds the interquartile range (IQR); and the whiskers extend to include all data within 1.5 times the IQR. Outlier data points are not shown. Numbers above each box represent the number of studies included in each production category. Y-axis spacing is in log-modulus scale, but the labels are not.

*Energy demand (MJ), GHG emissions (CO<sub>2</sub>-eq), eutrophication potential (PO<sub>4</sub>-eq), and acidification potential (SO<sub>2</sub>-eq) associated with different production methods per 40-g of protein produced. Farmed fish are in red, land animals in yellow, and wild caught fish in blue. Source: 148 life cycle assessments summarized by [Hilborn et al \(2018\)](#).*

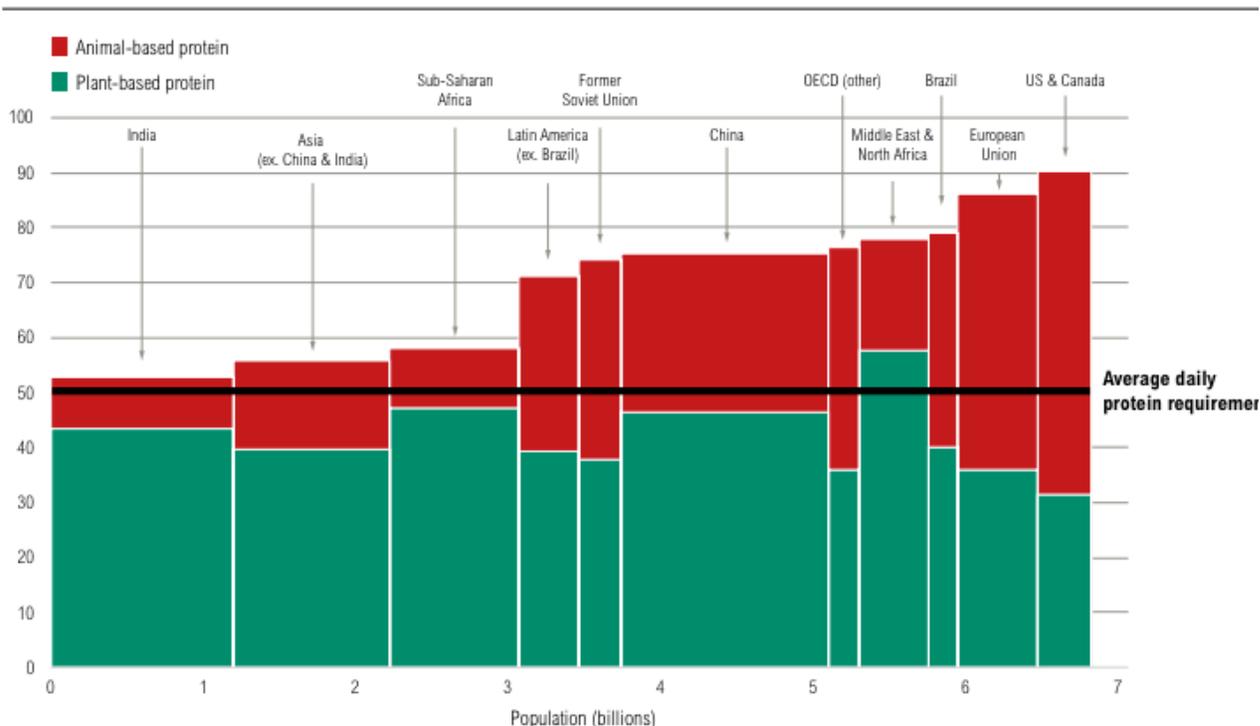
Second, chicken and fish farming do badly on other environmental outcomes. Both are water-guzzlers: just one egg takes 50-60 gallons of water to produce — twice as much as a serving of famously thirsty almonds. And as the graph above shows, most fish farming systems have similar [eutrophication](#) potential to beef production (i.e. they pump excess nutrients into waterways, causing algal blooms and dead zones).

White meat's environmental impacts are also typically more concentrated than beef's. While only about [11M](#) of the US' [94M](#) cattle are in feedlots at any time, almost all of the nation's [1.6B](#) broilers and [470M](#) egg laying hens and pullets are concentrated in factory farms. Just outside of Washington DC, almost a billion birds are raised on the Delmarva Peninsula every year. Based on USDA [averages](#), they likely generate about 28B pounds of manure and 380M pounds of nitrogen every year, causing [local environmental havoc](#).

Third, plant-based foods have the smallest carbon footprints of all. A 2016 [study](#) found that while global adoption of a reduced red meat diet could reduce food-related GHG emissions in 2050 by 29% relative to current projections, adoption of a vegetarian or vegan diet could reduce emissions by 63% and 70% respectively. Likewise, the EAT-Lancet report [noted](#) that, in its review of studies, "Diets that replaced ruminants with other alternatives, such as fish, poultry, and pork, also show reduced environmental effects, but to a smaller extent than plant-based alternatives." Even the New York Times' feature conceded that "a vegan diet does have the smallest climate footprint around."

And while "realist" environmentalists argue the world will never give up meat, the non-Western world's protein needs are already mostly met by plants (see below). Indeed, the same is true of traditional Western cuisine: in 1900, [two thirds](#) of US protein came from plants, not animals; today the reverse is true. New products may help plant-based proteins regain ground — see Impossible Food's new [nationwide rollout](#) at Burger King, Beyond Meat's [launch](#) at Del Taco, and Clara Foods' [Series B](#) round.

Figure ES-1 | **Protein Consumption Exceeds Average Estimated Daily Requirements in All the World's Regions, and is Highest in Developed Countries**  
g/capita/day, 2009



*The world beyond the US and EU already gets most of its protein from plants. Source: World Resources Institute 2016 [report](#), based on 2011 FAO data.*

Climate advocates face two broad paths to mitigate animal agriculture's impact on the planet. One path focuses narrowly on reducing red meat consumption, and will predictably lead to billions more chickens and fish suffering. The other path focuses on reducing all animal product consumption, and promoting plant-based alternatives, and will simultaneously reduce emissions, local pollution, and animal suffering.

Animal advocates should strongly advocate for the second path, as groups like 50by40, ProVeg, and the Good Food Institute are. The point of stopping climate change is to protect the world's current and future inhabitants, who include the world's animals. Indeed, the plight of the world's roughly 25K polar bears may have aided climate advocacy more than any human harm; saving them by mistreating and killing billions more farm animals would be a pyrrhic victory.