



Moral Reasons for Individuals in High-Income Countries to Limit Beef Consumption

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Abstract

This paper argues that individuals in many high-income countries typically have moral reasons to limit their beef consumption and consume plant-based protein instead, given the negative effects of beef production and consumption. Beef production is a significant source of agricultural greenhouse gas emissions and other environmental impacts, high levels of beef consumption are associated with health risks, and some cattle production systems raise animal welfare concerns. These negative effects matter, from a variety of moral perspectives, and give us collective moral reasons to reduce beef production and consumption. But, as some ethicists have argued, we cannot draw a straight line from the ethics of production to the ethics of consumption: even if a production system is morally impermissible, this does not mean that any given individual has moral reasons to stop consuming the products of that system, given how miniscule one individual's contributions are. This paper considers how to connect those dots. We consider three distinct lines of argument in support of the conclusion that individuals have moral reasons to limit their beef consumption and shift to plant-based protein, and we consider objections to each argument. This argument applies to individuals in high beef-consuming and high greenhouse gas-emitting high-income countries, though we make this argument with a specific focus on the United States.

Keywords Animal agriculture · Food ethics · Climate change · Climate ethics · Animal ethics · Plant-based diets

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Introduction

There is an urgent global need to reduce greenhouse gas emissions. Food production, and the land use changes associated with it, are a significant contributor to total emissions (IPCC 2019). In light of this fact, there are increasing calls from experts and advocates to reduce the emissions associated with food production (IPCC 2019). In particular, there are calls to limit global beef production, which has an extremely high greenhouse gas and land use footprint, and is on pace to increase by up to 95% as global populations rise (Ranganathan et al. 2016; Poore and Nemecek 2018; Searchinger et al. 2019; Willett et al. 2019). Along with its negative environmental impacts, there is some evidence that high beef consumption is associated with increased health risks, and the treatment of cattle in some beef production systems raise animal welfare concerns (Endres and Schwartzkopf-Genswein 2018; Fischer 2019). Thus, we have multiple reasons—environmental, public health, and animal welfare—to be concerned with global beef production and consumption.

What do these negative environmental, public health, and animal welfare effects of beef production and consumption imply about the ethics of *individuals* consuming beef? It may be natural to assume that the multiple negative effects of beef production and consumption give individuals moral reasons to reduce their own personal beef consumption. But *how exactly* do these negative effects give individuals reasons to limit their individual consumption? As some ethicists have argued, we cannot draw a straight line from the ethics of production to the ethics of consumption: even if a production system has negative effects, and furthermore even if a production system is a morally impermissible system, this does not mean that any given individual has moral reasons to stop consuming the products of that system, given how miniscule one individual's contributions are (Budolfson 2016, 2019; Fischer 2019). In this paper, we do the work of connecting the dots from production to consumption: that is, we start from the negative environmental, public health, and animal welfare effects of beef production and consumption and get to the conclusion that individuals in high beef-consuming and high greenhouse gas-emitting high-income countries generally have moral reasons to limit their beef consumption and replace beef with plant-based foods.¹ We make this argument with a particular focus on the United States, though our general conclusion applies to a broader set of high-income countries.² However, it is worth noting that the specific negative and positive effects of beef production and consumption may vary somewhat across high-income countries; for example, beef production may have a more important economic role in some countries, meat processing workers may have better labor conditions in some countries, beef consumption may have a more important cultural role in some countries, and animal welfare standards may be higher in some countries than others. Thus, the exact set of moral reasons for and against beef production and consumption will vary across countries. However, common to all high beef-consuming and high greenhouse gas-emitting high-income countries is the environmental argument that it is important to limit beef production levels globally and that high beef-consuming and high

¹ When we claim that individuals “have moral reasons,” we mean that there are moral considerations that speak in favor of individuals limiting their beef consumption.

² We focus on the United States because this paper is an output of the Beef, Food Choices and Values Project (<https://bioethics.jhu.edu/research-and-outreach/projects/global-food/current-projects/beef-food-choices-and-values/>), an inter-disciplinary project focused on beef production and consumption as it occurs in the United States, where we are based.

greenhouse gas-emitting countries should do their part in this global effort by limiting per capita beef consumption.

Our argument proceeds as follows:

1. Cattle production is a significant contributor to emissions and other environmental impacts. Global beef production is on track to increase significantly by 2050, perhaps by 80% or more, and if it does grow at these rates, it will account for an unacceptably high level of allowable emissions. Beef production practices can be improved to reduce the emissions and other environmental impacts of beef production, but limits on production levels globally will also be necessary to meet targets for reductions in greenhouse gas emissions.
2. When consumed in high amounts, red meat is associated with increased mortality from cardiovascular disease and cancer as well as total mortality. In high-income countries with other sources of adequate nutrition, the healthiest level of beef consumption may be very little or no consumption.
3. Ethicists and animal welfare experts have identified welfare issues with some beef production systems. As concerns the United States in particular, some ethicists would argue that some, or even most, beef production systems in the United States typically treat cattle in ethically unacceptable ways.
4. Ideally, beef production would be largely replaced by crop production, not by the production of another animal-source food. Crop production is preferable from both animal welfare and environmental perspectives (with some important caveats).
5. The negative environmental, animal welfare, and public health effects of beef consumption and production matter morally. On various moral views, and in light of various moral considerations, these negative effects are morally bad or violate moral duties, and thus we have moral reasons to reduce these negative effects. Thus, the global community has collective moral reasons to limit beef production levels.
6. What counts as doing their part to limit global beef production will vary from country to country, and from population to population. For high beef-consuming and high greenhouse gas-emitting countries, arguably doing their part includes limiting or even reducing beef consumption. As concerns the United States in particular, it is the highest total consumer of beef, and the second highest per capita consumer, and thus arguably doing its part includes reducing beef consumption in the United States.
7. In light of the moral problems with aggregate beef production and consumption, individuals have moral reasons to limit their beef consumption and shift to plant-based protein.

It is the last step in the argument that is the main work of this paper. We consider three distinct lines of argument in support of the conclusion that individuals have moral reasons to limit their beef consumption and eat plant-based foods instead, and we consider objections to each argument. Our discussion is not meant to fully map the moral terrain; surely there are additional arguments for this conclusion, and objections to it.

Before jumping into our argument, first a methodological note: this paper does not focus on a particular reason individuals have to reduce beef consumption (e.g. climate change). Nor does this paper make an argument that employs a specific ethical principle, or relies upon a detailed theory of justice, or refers to a specific articulation of a human right. Rather,

in this paper we keep our focus broad: we consider multiple effects of beef production and consumption, which raise ethical concerns from many different ethical and value perspectives. This broader focus approach is intentional. Ethics arguments that employ a specific theory or ethical principle may not persuade those who do not accept that specific theory or principle; an ethics argument that does not assume a particular theory but instead shows how a conclusion follows from multiple value perspectives is more likely to persuade a broader audience, or so we are assuming.

Because our ultimate goal is to reach ethical conclusions that can inform policy, we are intentionally taking this broader, more ecumenical approach, which we think will persuade more people. Also, we think that this ecumenical approach is better from a normative perspective; public policy that is justifiable from a variety of moral perspectives is more broadly justifiable, and more likely to be justifiable to the kinds of diverse publics found in many high-income countries.³

Negative Effects of Beef Production and Consumption

Environmental Case for Limiting Future Growth in Beef Production

Impacts from climate change are already being felt across the globe, in the form of food insecurity, disease, displacement, and loss of livelihoods. As temperatures continue to rise, these impacts will continue to worsen. For decades, climate scientists and the global community at large have talked about the moral necessity of limiting global average temperature rise to less than 2 degrees Celsius (Nordhaus 1975); indeed, a more ambitious target of 1.5 degrees Celsius has been advocated by many, and was included in the Paris Agreement on climate change as an aspirational target. The Intergovernmental Panel on Climate Change has argued that avoiding a temperature rise above 1.5 C will require cutting emissions almost in half by 2030 and reaching net zero emissions by 2050 (IPCC 2018). While this is possible, it will require great efforts and there is no precedent for making such large changes in such a short period of time (IPCC 2018).

Meeting either of these targets will require substantial change across many sectors of the economy, and will require limiting emissions associated with agriculture and agricultural land use (IPCC 2019, Chapter 5, p. 480), given how significant these emissions are. Emissions from agricultural production constitute 14% of total emissions, and those associated with agricultural land use and land use change make up another 10%. Ruminants (i.e. cattle, goats, sheep) contribute a large share of overall agricultural emissions, perhaps half (Searchinger et al. 2019, p. 2), and therefore limiting these emissions is a particularly impactful way of reducing overall agricultural emissions.

³ While we aim to offer arguments that do not presuppose a single moral perspective, we recognize that others will raise objections to our arguments, and these objections will reflect certain moral perspectives and not others. For example, below we consider the Causal Impotence Objection, according to which our individual consumption patterns do not make a causal difference to the large-scale problem of animal agriculture, and therefore we do not have a moral obligation to change our consumption patterns; this reflects a certain kind of consequentialist perspective on our moral obligations. Engaging with objections like this that emanate from a particular moral perspective is not a repudiation of our ecumenical approach, but just an effort to address the objections that people in fact have.

As compared to other protein sources, “[m]eat from ruminants (beef, sheep, and goat is by far the most resource-intensive food. It requires over 20 times more land and generates over 20 times more GHG emissions than pulses per gram of protein. Relative to dairy, it requires four to six times more land and generates four to six times more GHG emissions per calorie or gram of protein ultimately consumed by people” (Searchinger et al. 2019, p. 76). The high land use associated with beef contributes to deforestation—as forests become pastures—in turn contributing to biodiversity loss. Beef production also has significant environmental impacts besides emissions and land use, requiring two to four times more water than other animal-source food (Ranganathan et al. 2016). Beef production creates air and water pollution, especially concentrated animal feeding operations, which keep large numbers of animals in a small space and often have inadequate waste management practices.⁴

Beef production levels, and thus these environmental impacts, are on pace to increase significantly. In a business-as-usual scenario, demand for beef and beef production are projected to increase significantly in the next three decades as the global population increases and as more populations rise out of poverty and want to buy more expensive foods such as beef. The World Resources Institute projects an 88% increase in demand for ruminant meat (meat from cattle, sheep, and goats) between 2010 and 2050 (Searchinger et al. 2019, p. 2), and Ranganathan et al. (2016) project that global consumption of beef could increase 80% from 2006 to 2050. If beef production does grow at these rates, it will account for an unacceptably high level of allowable emissions. For example, the World Resources Institute projects that in a business-as-usual scenario for growth in beef production, by 2050 agricultural emissions would be 70% of allowable emissions across the entire economy (Searchinger et al. 2019, p.24).

Improvements in beef production practices—such as using more efficient breeds, optimizing feeds, and improving pasture land management—could decrease the associated greenhouse gas emissions significantly (Mottet et al. 2017; Gerber et al. 2013). These are important steps. However, many researchers have concluded that these improvements are not sufficient; along with improving production practices, we also need to limit future beef production, in order to keep the food system’s environmental impacts within acceptable limits (Poore and Nemecek 2018; Willett et al. 2019).

An important caveat is that beef production systems can serve important ecological functions (for example, grazing cattle helps to maintain grasslands). Raising cattle is also an important source of income and nutrition for people across the globe; livestock are an important investment that provide income stability and food security, and livestock are able to withstand weather conditions that would cause crop losses, which will be increasingly important in the face of climate change (Steinfeld et al. 2006). According to the World Resources Institute and the Food and Agriculture Organization, “an estimated 1 billion people depend on livestock for food and family income, and for an estimated 100 million people in arid areas, grazing livestock is the only possible source of livelihood” (Ross et

⁴ It’s worth noting that dairy production, like beef production, is associated with significant greenhouse gas emissions, other environmental impacts, and animal welfare concerns. However, our arguments here focus just on reducing beef consumption, and not also dairy consumption. There may be somewhat different considerations at play with reductions in dairy consumption. For example, status quo levels of dairy consumption do not raise the same health concerns as beef consumption. Also, in the United States milk is a relatively inexpensive source of nutrition, thus significant reductions in milk consumption may have implications for nutritional security and for equitable access to adequate nutrition, especially in childhood. We have not explored these issues in our research and thus do not advocate reductions in dairy consumption here.

al. 2019). Thus, what is ideal from an environmental perspective, as well as an economic and food security perspective, is not the elimination of cattle production but a reduction in overall cattle production and greater use of ecologically preferable production methods. A reduction, rather than elimination, would still allow some people to make their livelihoods from cattle production and allow us to make use of non-arable grazing lands.

To limit future growth in global beef production, even as the global population increases significantly, global per capita beef consumption must be limited. This could be achieved by capping per capita consumption in countries (such as China) where per capita beef consumption is increasing, and reducing per capita beef consumption in high-consuming countries. Different levels of reduction are modeled and recommended in scientific work. For example:

- Hallstrom et al. 2015 conclude that if high-income countries replaced 75% of beef with pork and chicken, this would decrease greenhouse gas emissions from food by 25 to 35% and land use by 40% (Hallstrom et al. 2015).
- The World Resources Institutes considers shifting 10%, 30% and 50% of projected ruminant meat consumption to other meats and to plant-based proteins (soy and pulses) by 2050. They find, for example, that a 30% shift from ruminant meat to plant-based protein would close half of the GHG mitigation gap—that is, half of the gap between an unacceptably high business- as-usual agricultural emissions in 2050 and their goal for agricultural emissions in 2050 (Searchinger et al. 2019, pp. 82–83).
- The EAT-Lancet commission (Willett et al. 2019) constructed a “reference diet” that allows for optimal human health and could be produced for 10 billion people in 2050 while keeping the food system within proposed environmental limits. As compared to the average American diet, this reference diet includes significantly less animal-source food consumption. It recommends greater consumption of fruits, vegetables, pulses (beans, lentils, peas), nuts and whole grains. It includes only a small amount of beef (0–14 g/day), which is about one serving of beef per week. We calculate that this would represent around a 80% decrease in per capita beef consumption in the United States, given that per capita consumption of beef and veal was 26.09 kg/year in 2018 (OECD 2020).

In short: while there is debate over the acceptable and ideal level of beef consumption in high-income countries like the United States, from a climate and environmental perspective, there is a case for significantly lower consumption levels (perhaps on the order of 30–80% lower).

It is also important to note that from an environmental perspective, a shift from beef to primarily plant-based food is generally preferable to a shift from beef to other animal-source foods. Crop agriculture generally has lower environmental impacts than meat of all types, though there are some exceptions, and not all plant-based foods are a significant improvement over beef on all environmental dimensions (Poore and Nemecek 2018; Springmann et al. 2018).

Public Health Effects of Current Levels of Beef Consumption

Beef provides macro and micronutrients, such as protein, vitamins B6 and B12, iron, and zinc, and eaten in moderation, beef can contribute to human health. However, especially in the form of processed meats, red meat is associated with increased risk of obesity and non-communicable diseases such as cardiovascular disease, diabetes, and cancer, and increased mortality from cardiovascular disease and cancer as well as total mortality (Bouvard et al. 2015; Pan et al. 2012; Tilman and Clark 2014; You and Henneberg 2016). Thus, while beef consumption is an important source of nutrients and protein for some populations, particularly children under the age of five who are developing, in high-income countries with other sources of adequate nutrition, the healthiest level of beef consumption may be very little or no consumption (Willett et al. 2019, page 455).

However, whether reductions in beef consumption will have health benefits depends upon whether beef is replaced with healthier foods (e.g. legumes, fruits, and vegetables) or less healthy ones (e.g. processed foods high in added sugar). Some novel plant-based beef alternatives (i.e. Beyond Burger and Impossible Burger) have been promoted as healthier alternatives to beef, but the jury is still out on these claims.

Animal Welfare Concerns with Beef Production

Animal welfare experts and ethicists have also raised concerns with the welfare of cattle in some beef production systems (Endres and Schwartzkopf-Genswein 2018). In the United States, cattle typically spend the first six months of their lives (and up to 12–14 months) on ranches in cow/calf production systems. In these systems, calves and their mothers graze on pastures and typically have access to shelter to provide protection from the weather. These extensive, pasture-based systems generally raise fewer animal welfare concerns than other production systems that confine animals indoors, or pack them densely (Beaver et al. 2020; Mee and Boyle 2020). However, there are welfare concerns, in particular that animals may be exposed to extreme weather and to predators, and may have limited medical treatment because it is harder to track and handle cattle when they are in these systems (Endres and Schwartzkopf-Genswein 2018, pp. 16–17). Other welfare concerns are that animals may have painful procedures performed during this period (i.e. branding, castration, and dehorning), sometimes without adequate treatment during healing (Costa et al. 2019). Another welfare issue concerns rapid weaning, which is a source of stress for cattle (Lynch, McGee, and Earley 2019; de Souza Teixeira et al. 2021), and the common practice of separating calves from their mothers shortly after birth, which some object to on animal welfare grounds (Ventura et al. 2013).

In the United States, after the first six months of their lives (or up to 12–14 months), cattle are typically moved to feedlots, though some cattle remain on pasture-based systems for longer. Feedlots can be outdoor or indoor (i.e. shelters and barns); either way, cattle are more densely packed in feedlots than in extensive cow/calf systems. Welfare issues with feedlots include: cattle in outdoor feedlots may suffer from heat stress (Mader 2003; Sullivan and Mader 2018); feedlots may limit cattle's movement because of the density of animals (Macitelli et al. 2020); being in large groups can cause cattle stress and make them aggressive (Kondo et al. 1989); and both indoor and outdoor feedlots can be muddy, which increases injury, lameness, and disease in cattle (Terrell et al. 2014). The handling

and transport of cattle throughout their lives are also major welfare issues, since they can be a source of injury and major source of stress for cattle (Humane Farm Animal Care 2019; Maris Huertas et al. 2018; Schuetze et al. 2017).

Labor Concerns with Beef Production

Along with its negative environmental and public health effects, beef production can have negative effects on workers in the industry. In the United States, over 225,000 people worked in slaughtering, meat packing, and meat trimming in 2019 (BLS 2019a and b), and in 2019 meatpacking workers made an average of \$14.23 per hour and meat trimmers made an average of \$13.70, both less than \$30,000 a year (BLS 2019a and b), and jobs in meat plants pay 44% less than jobs in manufacturing (Stauffer 2019). Labor conditions for these workers are difficult and dangerous. Workers are subjected to long hours, fast line speeds that are difficult to maintain, and inadequate breaks. Workers often have to lift heavy loads, as cattle are very heavy, or work with sharp knives as well as dangerous machinery, and all at fast speeds. They are subjected to repetitive motions, with some workers making up to 30,000 of the same cuts in a shift (Compa 2004). Additionally, these cuts are made in close quarters, putting everyone in danger. They often have to work in extreme temperatures and on slippery floors and may be exposed to dangerous chemicals and pathogens (Stauffer 2019, GAO 2005, Compa 2004). Additionally, the work can cause psychological trauma including PTSD from the perpetration of and exposure to violence and death (Dillard 2008). And more recently, workers in meatpacking plants are at elevated risk for COVID-19.

These working conditions result in meatpacking being one of the most dangerous industries in the United States. Workers suffer from muscle strain, bruises, cuts, and repetitive use injuries as well as burns, fractures, crush injuries, amputations, and even death. Between 2013 and 2017, an average of eight workers died each year in the meat and poultry industry (Stauffer 2019). Workers are often pressured not to report their injuries and continue working, with a report from the United States Government Accountability Office finding significant underreporting of injuries (GAO 2016). Additionally, when workers do report their injuries they may be moved to lower paying positions, fired, or deported (Compa 2004) and may not receive any medical care or workers compensation, especially when they work for third-party contractors as many of the people who clean the plants do (Compa 2004, Waldman and Mehrotra 2017).

Many of the people who work in meatpacking are people of color: 35.3% of the workers were Latinx and 21.9% were Black in 2019 (BLS 2019c). Many are immigrants who may speak Spanish or other languages and may not receive training or other safety information in their primary language. The language barrier also makes reporting concerns or injuries more difficult. Additionally, some immigrants are undocumented and are hesitant to complain or report unsafe working conditions or injuries due to fear of deportation (Stauffer 2019; GAO 2016).

In short, workers in meatpacking plants in the United States endure working conditions that cause both short- and long-term physical and psychological pain and suffering. Any moral examination of beef production should include recognition of these conditions. However, it is worth emphasizing that reducing beef consumption and production will not solve this issue, as the unacceptable working conditions in the beef industry are not unique. There are similar conditions for those who work in pork and poultry plants as well as farmworkers

in plant agriculture (Doggett and Holmes 2018). Thus, these labor conditions give us reason to change meat processing practices so as to improve labor conditions, but do not clearly give us reason to limit or reduce beef production levels per se.

The Moral Case for Limiting Aggregate Beef Production and Consumption

Beef's Negative Environmental Effects Matter Morally

The negative effects of beef consumption and production matter morally on various moral views. Consider first the environmental effects of beef production. From a variety of moral perspectives, we have moral reasons to mitigate climate change (see, for example, Gardiner et al. 2010). First, climate change will cause severe harm to current and future generations, and thus insofar as we have basic moral obligations to prevent suffering, we have moral reasons to mitigate climate change. Second, many have also argued that climate change violates justice-based duties to current and future generations of people: that is, climate change represents a failure to fairly distribute the benefits and burdens of social cooperation across generations and across societies, and a failure to achieve a just distribution of resources, opportunities, and outcomes (Caney 2018, 2020).

Thus, as a global community, we have collective moral reasons (including justice-based reasons and other moral reasons) to mitigate climate change. As argued above, many experts have concluded that an important or even necessary part of this is reducing the greenhouse gas footprint of beef production, which will require both improvements in production practices and limits on beef production levels. This gives us collective moral reasons to limit beef production levels as an important and perhaps even necessary part of our efforts to mitigate climate change. High-income countries that have been high greenhouse gas emitters historically, and continue to be so, arguably have particularly demanding obligations to reduce total emissions; these countries have moral reason to do their part in the global effort to limit global beef production. What counts as doing their part to limit global beef production will vary from country to country, and from population to population. For those countries that are currently high beef-consuming countries, arguably doing their part includes reducing per capita beef consumption. The United States is a high beef-consuming country—as of 2018, it had the highest total consumption of beef and veal in the world, one of the highest per capita consumption levels, and has per capita consumption four times the global average (OECD 2020); thus doing its part includes reducing per capita beef consumption in the United States.

Beef's Negative Public Health Effects Matter Morally

Turning to public health effects, protecting and promoting public health is often viewed as morally valuable in itself. There are a variety of other moral considerations that often are employed to justify promoting population health (Faden et al. 2020, 2019). To take just one relevant consideration, many make a powerful case that promoting public health is a matter of justice (e.g., Powers and Faden 2006, 2019; Daniels 2008; Nussbaum 2006). For example, some have argued that justice requires that all people have equal opportunities

(such as educational and employment opportunities), but poor health undermines people's ability to take advantage of opportunities (Daniels 2008), and thus justice requires that a state promote public health in order to redress unjust inequalities in opportunity. Another example of the link between justice and health is posited by Powers and Faden (2006), who argue that the positive aim of social justice should be to ensure that everyone has a sufficient level of well-being, including health; meeting this aim requires promoting and protecting public health.

Beef Production's Negative Effects on Animals Matter Morally

When we consider the treatment of cattle in beef production, there are multiple moral perspectives from which this treatment is wrongful (Schlottman and Sebo 2018; Doggett 2018; Fischer 2019). Some would argue that we have moral obligations to give animals within our care good lives and to provide them with an adequate level of welfare. In production systems in which cattle welfare falls short, this obligation is violated and the treatment of animals is wrongful; this gives us reason to reduce the number of animals raised in these production systems, and to improve the treatment of cattle in them.

Some would argue that non-human animals have moral rights, and it violates the moral rights of animals to confine them, keep them in conditions that cause suffering, and kill them for food (Regan 1983). More modestly, even without attributing moral rights to animals, some would argue that it is morally impermissible to cause animals suffering or to kill them for food when we have other, nutritionally adequate food available (Rachels 2004; Fischer 2019). From this perspective, we have reason to stop raising cattle for food altogether—or at least, to stop raising them in conditions that cause them suffering, and to stop slaughtering them before their time (e.g. domestic cows have a lifespan of around twenty years, but cattle raised for beef are typically killed at around 18 months old).

It is important to emphasize that these arguments against raising cattle in welfare-deficit production systems and killing them for food apply also to raising laying hens, broiler chickens, pigs, and other animals (Fischer 2019). Thus, from the perspective of animal welfare, we have reason to replace beef with plant-based foods, and not to replace beef with other meats or other animal-source foods.

In short, there is a plausible initial case—from multiple, different moral starting points—that the negative environmental, public health, and animal welfare effects of beef production give us collective moral reasons to improve beef production practices, to reduce future growth in beef production, and likely also to reduce beef production relative to current levels. It is worth emphasizing again that while improvements in production practices to reduce their greenhouse gas footprint are important, many researchers have concluded that they will not be sufficient, and limits on beef production levels are also needed to keep the food system's environmental impacts within acceptable limits (Poore and Nemecek 2018; Willett et al. 2019). In addition, there may be tensions between improving animal welfare in beef production systems and minimizing their greenhouse gas footprint; whereas raising animals in extensive systems and reducing the use of feed lots arguably is better from an animal welfare perspective, some research suggests that extensive systems have a higher greenhouse gas footprint (Herrero et al. 2013; Garnett et al. 2017). Thus, there is no uniformly “best” beef production system that adequately addresses both the environmental and

animal welfare issues. We need not only to improve beef production systems but also to limit global beef production going forward.

What counts as doing their part to limit global beef production will vary from country to country, and from population to population. Plausibly, high-income countries that are high consumers of beef—paradigmatically the United States—have moral reason to reduce beef consumption by substituting beef with plant-based foods.

Gustatory and Cultural Costs of Reducing Beef Consumption

Along with the moral reasons to reduce aggregate beef consumption in a given high-income country, discussed above, there may also be reasons *not* to reduce aggregate beef consumption in that country. Two such reasons are that reducing beef consumption will entail gustatory and cultural loss for some, and it may threaten the livelihoods and identity of some who work in the industry.

Americans' beef consumption has declined since the 1970s, as poultry consumption has continued, but beef still has an important place in the American diet, with red meat contributing more than half of total meat intake (Daniel et al. 2011). Beef has an important place in American culture: beef is omnipresent, emblematic of culture, and tied to the history of westward expansion (Todd 2010; Specht 2019). Beef also, simply, has gustatory value: beef is an integral part of many dishes and many people find it delicious. Significantly reducing beef consumption may have some social, cultural, and gustatory costs. For example, if individuals limit their beef consumption to the level recommended by the EAT-Lancet report (14 g/day, or about one serving/week), this will remove beef as a daily part of their diets, and many people would lose out on gustatory fulfillment and socially valuable experiences eating beef. But insofar as current levels of consumption are imposing significant environmental costs on other people and reducing animal welfare, this does not amount to a compelling objection. Just as the smoker's interest in enjoying a cigarette does not entitle them to subject non-consenting parties to secondhand smoke, or the driver's enjoyment in driving a gas guzzling car does not justify driving it despite its environmental costs, the lover of beef's interest in cultural and gustatory fulfillment does not entitle them to subject non-consenting parties to the deleterious effects of climate change.

It is also worth emphasizing that even if beef consumption were reduced to one serving/week, there could still be holiday barbecues and the Sunday roast, and Americans could retain many socially and culturally meaningful experiences involving beef.

Economic Costs of Reducing Beef Production

Significant reductions in beef production levels would lead to the loss of jobs in the beef sector, including ranchers and their employees, and meat processing and packaging workers. Do we have moral reasons to prevent these losses? It is worth emphasizing that many ranchers and their surrounding communities do not merely view their work as a source of income, but as a vocation and as important to their identity. In some cases, ranching and ranches are woven into the lives of intergenerational families, and losing access to this form of work would be a significant loss.

Nonetheless, some vocations or forms of work have negative effects and impose harms on others. Consider coal mining, or the production of tobacco; many people were gainfully

employed in those industries, presumably some found such work meaningful, and these forms of work yielded economic benefits to those in the immediate surrounding areas (think, for instance, of ‘mining towns’ and their abandonment). However, the decrease in demand for coal or tobacco has eliminated a harm imposed on others—in the form of pollution and exposure to secondhand smoke. The reductions in coal and tobacco production were ultimately morally justifiable, even though these reductions led to costs for those who worked in those industries. One’s interest in enjoying well-paying and meaningful work, and in carrying on a family tradition, does not straightforwardly justify participation in an industry that has significant negative effects on others. That said, an interesting and important question, albeit one we cannot adequately address here, is what societal obligations there are to mitigate negative effects on ranchers and workers who would lose their livelihoods as a consequence of reduction in beef consumption.

We wish to emphasize that these concerns about economic loss are important, and our responses are not meant to be dismissive; there are genuine conflicting interests at play, and some people are going to lose a valued way of life and valued employment if we reduce production and consumption of beef, just as some people are going to lose out if we do not. It would be Panglossian to think that there are ways to adequately address the harms associated with beef production while also entirely avoiding these economic losses.

Linking Collective Moral Reasons with Individual Moral Reasons to Limit Beef Consumption

We have argued that it is plausible that the global community has collective moral reasons to reduce aggregate global beef production in order to reduce its morally problematic environmental, public health, and animal welfare effects, and that the United States has collective moral reason to reduce its beef consumption as part of this global effort. But the thesis of this paper is that *individuals* in the United States generally have moral reasons to limit their own beef consumption and to consume plant-based food instead. How do we get from these moral reasons in favor of an aggregate reduction in beef production and consumption to the conclusion that individuals in the United States generally have moral reason to shift their own personal consumption?

In this section, we consider three distinct lines of argument in support of this conclusion, and objections to each line of argument. The first is that individuals have moral reasons not to participate in or contribute to a morally bad system, and beef consumption and production at their current level is a morally bad system. The second is that the collective endeavor of reducing aggregate beef production and consumption is a morally good or even morally requisite endeavor, and we have moral reasons as individuals to participate in this collective endeavor by reducing our own beef consumption. And the third argument is that even if there is not a collective endeavor aimed at reducing beef consumption underway, we still have moral reasons to promote a collective endeavor of limiting beef production and consumption and to try to get this collective endeavor started.

Argument #1: You Have Moral Reason Not to Participate in a Bad System

Let us first consider the argument that you have moral reason not to participate in or contribute to a morally bad system, and beef consumption and production at their current and projected level is a morally bad system in virtue of its negative environmental, public health, and animal welfare effects.

Objection

Even if you are persuaded that aggregate beef consumption and production is morally bad at current and projected levels, you may also believe that this does not imply anything about the morality of your own personal beef consumption. After all, you, like all of us, are just one person in a country of hundreds of millions of people in a world with billions of people. Your individual actions—how much beef you eat—will not make a difference to how much beef gets produced, the size of the beef industry, how many cattle are raised and killed for food, or the contribution of beef production to climate change or other environmental or public health problems.

This objection, known as the Causal Impotence Objection, is well-documented in the ethics literature—in particular in animal ethics and environmental ethics, where the problems (i.e. global climate change, industrial animal agriculture) are so large that no individual can solve them or even make an appreciable difference (e.g., Sinnott-Armstrong 2005; Kingston and Sinnott-Armstrong 2018; Budolfson 2016, 2019; Fischer 2019). With climate change, for example, in order to have a 66% chance of keeping warming under 2 degrees Celsius, humanity must not exceed an all-time anthropogenic carbon budget of *a trillion tons* (Stocker et al. 2013, p. 27). Against the backdrop of that kind of number, the diet-related emissions of a single individual is vanishingly small. Even completely eliminating one's carbon footprint just does not seem to matter at all to the problem of climate change, given the scale of the challenge we are facing. Similarly, the argument goes, if an individual entirely gives up meat, this would be extremely unlikely to reduce the number of animals raised on farms and killed for meat: your individual purchases are very unlikely to make a difference to how much meat your grocery store orders from the distributor, and how much your grocery store orders from the distributor is unlikely to make a difference to how much they order...and so forth, all the way up the meat supply chain.

According to the Causal Impotence Objection: (1) each individual contribution to massive problems (like climate change) does not make a causal difference (as we have just been discussing), and so (2) there must not be any obligation to refrain from so contributing. Since individuals are each causally impotent to address these problems, the argument might continue, the only reasonable site of a moral obligation would be on collective agents, like nation-states or global corporations, who have the power for meaningful causal impact (Sinnott-Armstrong 2005), for example through policies that have a demonstrable effect (Somanathan et al. 2014). Given that *they* are the ones that can make a difference, surely *that is* where any moral burden should be placed.

Many ethicists reject the Causal Impotence Objection; to them, it seems like we each have an obligation to fight climate change and industrial animal agriculture (and other collective challenges), so we just need to look a bit harder to find the grounding of such an obligation.

Some respond to the Causal Impotence Objection by rejecting (1), the claim of causal impotence, whereas others reject (2) (see Nefsky 2011). Those who reject (1) argue that each individual contribution to massive problems (like climate change) *does* make a causal difference, if we think about making a causal difference in the right way. The basic idea, to follow philosopher Derek Parfit, is that it only seems as though our actions do not matter because we are failing to do the ‘moral mathematics’ correctly (Parfit 1984, pp. 37–86). A common version of this response is to focus on potential thresholds for causing harm, and then evaluate an agent’s action in terms of the likelihood of its causing a breach in that threshold (Norcross 2004; Kagan 2011). My individual beef consumption *is* just a drop in the bucket in terms of causing climate disruptions or harms to animals; but eventually, some drop will cause the bucket to overflow. There is always a chance, albeit a small chance, that your drop is the one that causes the bucket to overflow; there is always a small chance that your decision to buy beef does lead to more cattle being raised and killed for food in the future. Doing the moral math correctly, on this line of thought, means realizing that our actions have a small chance of causing significant harm—in other words, they have negative expected utility—and that matters morally.⁵

Another way of doing the moral math is to think in terms of your contribution to a massive harm as causing ‘statistical harm’. If the combined emissions of everyone on the planet causes millions of deaths and suffering for billions of people in the future, then even though you contributed relatively little to overall emissions, your share of those harms will be morally significant. According to philosopher John Nolt, doing this sort of math correctly entails that the average American is responsible for the suffering and/or death of one to two people as a result of their lifetime emissions (Nolt 2011). These responses are essentially arguing that our actions as individuals do make a causal difference to a large problem (e.g. our individual beef consumption makes a difference to climate change), if we think about it in the right way.

Other responses to the causal impotence objection take a different tack, and argue that our individual actions matter morally even if they do not make a causal difference. Here is a sample of two such views. Many people believe that character and virtue are important moral considerations, even if they are not the full moral picture. For example, philosopher Dale Jamieson has argued that both traditional and ‘Green’ virtues explain the morality of

⁵ Some ethicists disagree that our meat purchasing choices have any appreciable chance of reducing the number of animals raised and killed for food, and thus disagree that purchasing meat has negative expected utility (Budolfson 2019, Fischer 2019). For example, Budolfson (2019) argues that there is slack built into the meat supply chain—more product is purchased along the supply chain than will be sold—and this makes it unlikely that one individual’s decision to stop buying meat will send a signal all the way back up the supply chain and result in fewer animals being raised and killed for meat. For example, a grocery store orders more meat than they expect to sell, in order to keep the shelves full. One individual’s decision to stop purchasing meat from her grocery store has little chance of causing the grocery store to order less meat from the distributor; even if the grocery store did order less meat, it is unlikely that this would send a demand signal further up the supply chain and result in fewer orders being placed with farmers. In addition, Fischer (2019) asks us to consider what would actually happen if one person’s decline in purchases *did* send a signal all the way up the supply chain, and resulted in less meat being ordered from a particular farmer. What is this producer likely to do? Maybe they will search for other markets and even accept lower prices for their meat, which might stimulate *increased* demand for their products. More disturbingly, Fischer raises the possibility that producers will react to a reduction in orders of their products by looking for ways to cut costs, and end up using production practices that are worse for animal welfare. Fischer’s point is that individual consumers have a vanishingly small chance of sending demand signals that get heard by producers, producers may react in different ways to these signals, and when the dust settles there may be just as many animals raised and killed for food.

individual action against the backdrop of massive, collective problems. According to this view, a temperate or mindful person would not, for example, emit luxury greenhouse emissions or consume large amounts of beef, when doing so contributes to massive future harms (Jamieson 2014). By contrast, some philosophers have focused on the idea of complicity, arguing that one becomes morally complicit by participating in collective wrongdoing, whether or not one's contribution makes a difference (Kutz 2000; Schwartz 2017). Although complicity tends to be used in reference to individual actions, such that one intentionally chooses to become part of a clear case of wrongdoing, there is something attractive about the idea that there is a form of complicity that accounts for cases of acting together to do some wrong or cause some bad outcome.

Not everyone will be persuaded by these responses to the Causal Impotence Objection, and there is a burgeoning literature discussing further objections and defenses of these views (Budolfson 2019; Fischer 2019). We will not; however, wade through this literature any further, because our goal is not to offer any particular argument for or against a moral obligation to eat less beef. Rather, what we think this short canvassing of the debate makes plausible is that there are many different moral reasons you might have to eat less beef, despite the fact that your consumption really is just a drop in the bucket. These might be fairness-based reasons, virtue-based reasons, integrity-based reasons, the reason that your action has a small chance of causing significant harm, or some other reason we have not included here. Many of us cannot shake the feeling that we should not be part of massive harms, even when our individual actions probably make no difference to what happens, and it turns out that there are a variety of moral reasons vindicating this feeling (Rieder and Bernstein 2020).

It is important to note that if this suggestion is plausible, we still have not vindicated that anyone morally *must* eat less beef; rather, we have shown how it is the case that many of us have moral reasons to eat less beef. Another point worth noting is that if you accept the argument that you have moral reasons not to participate in or contribute to a morally bad system, and beef consumption and production at current levels is a morally bad system, then perhaps you have moral reasons to stop eating beef altogether, not just to limit your consumption significantly.⁶

Argument #2: You Have Reasons of Fairness to Participate in A Morally Good Collective Endeavor

Consider next the argument that reducing aggregate beef production and consumption is a morally good or even morally requisite collective endeavor, and you have moral reasons as an individual to participate in this good collective endeavor by reducing your own beef consumption.

There are different ways that this second argument could be filled out. As mentioned above, our moral reasons to undertake the collective endeavor of reducing aggregate beef

⁶ One could certainly draw on this argument to reach the conclusion that one has moral reason to completely eliminate the consumption of beef, or perhaps eliminate the consumption of animal products altogether. We do not explore this argument for because to secure these stronger conclusions, one would need to say more about the 'bad system' in question. In particular, one would need to either show that any level of consumption of beef or of animal products, itself, constitutes a bad system—and so one should not consume any beef, or any animal products—or one would need to show that consuming any amount of beef or any amount of animal products constitutes participating in a bad system.

production and consumption could be reasons of different sorts, including reasons rooted in duties to reduce suffering, or rooted in justice. Let us focus on the latter, justice-based reasons to limit aggregate beef production and consumption. Our consumption patterns are imposing significant burdens on the public in the form of elevated health care costs; our consumption patterns impose significant burdens on animals; and our consumption patterns impose significant burdens on living people and future generations from climate change and the unsustainability of agriculture—even though many living people and future generations have not enjoyed the benefits associated with consuming large amounts of beef. When burdens and benefits of behavior are distributed unfairly, there need to be changes in our collective behavior—for example, changes in policies, institutional practices, and consumption patterns—to remedy injustices that result from our collective behavior. Thus, we collectively have justice-based reasons to remedy the current unfair distribution of the burdens associated with current levels of beef production and consumption by changing our collective behavior in ways that reduce beef production and consumption.

There are various changes in our collective behavior that could accomplish this reduction in beef consumption. For example, we could implement a suite of new policies (e.g. stricter animal welfare and environmental regulations on animal agriculture, greenhouse gas emissions-based taxes on food, changes in government procurement to deemphasize beef) and institutional practices (e.g. institutions such as schools, prisons, and hospitals change the food offerings in cafeterias).

Another such change in our collective behavior is for sufficient numbers of us to voluntarily limit our own beef consumption, and thereby reduce aggregate beef consumption. The argument we are considering here maintains that individuals have moral reasons to participate in that collective endeavor of individuals voluntarily limiting beef consumption. In particular, individuals have fairness-based moral reasons to participate in it by limiting their own beef consumption. We often believe that people ought to ‘do their fair share’ of an important collective endeavor. When people exempt themselves from collective endeavors that are important, that seems unfair if for no other reason than that we are failing to do our part to bring about a better world. For example, we have fairness-based reasons to comply with widely observed water consumption restrictions during droughts even when they are not legally imposed and are thus “non-legal.” If we do not comply while others are complying, we are failing to do our part. Thus, if you fail to limit your own beef consumption, while others are limiting their beef consumption in an effort to reduce aggregate beef consumption and remedy injustices caused by beef production and consumption, then you are violating rules of fairness.

Objections

Some would question whether individuals actually *do* have fairness-based reasons to participate in this collective endeavor, since the endeavor is at such an early state of enactment. There is not widespread participation in the endeavor of limiting beef consumption, as of yet. That is, the case is not akin to the example of non-legal but widely observed water consumption restrictions during droughts. Instead, our practice of consuming beef is akin to a situation in which some people are (correctly) pointing out that people need to restrict their own water consumption so as to avoid disastrous consequences, but the majority of

people are not restricting their own water consumption. So, if individuals fail to limit beef consumption, they are not free-riding on the efforts of others.

In reply, some argue that there are fairness-based reasons to participate in morally worthy collective endeavors even when there is widespread noncompliance. Even if the majority of people are not restricting their beef consumption for the sake of the public good, many people are doing so, and one might think that their compliance generates obligations of fairness. Alternatively, one might point out that even though there is massive noncompliance, our consumption of beef still imposes negative externalities on present and future generations and on cattle, and this generates reasons of fairness to reduce our consumption, independent of the fact that there is massive non-compliance.

Argument #3: You Have Moral Reason to Help Establish Better Norms

So far, we have suggested that there are moral reasons to reduce beef consumption because our aggregate, collective production and consumption of beef is a morally objectionable endeavor, and people should not participate in morally objectionable collective endeavors. We have also suggested that there are moral reasons to reduce beef consumption because a collective reduction in beef consumption is a morally good endeavor, and there are reasons of fairness to participate in morally good collective endeavors and not just to freeride on them. However, we have also noted that there are objections to these arguments and at this point you may find the objections more compelling than the arguments themselves.

Our third argument highlights a distinctively different reason that individuals have to reduce their consumption of beef. As argued already, we have justice-based reasons to remedy the injustices associated with current and projected levels of beef production and consumption by changing our collective behavior in ways that reduce beef production and consumption. There are various changes in our collective behavior that could accomplish a reduction in beef consumption and production. Currently, we do not have norms in place that respond adequately to the injustices associated with beef consumption and production—that is, we do not have social norms that encourage us to reduce our beef consumption. Nor do we have adequate laws in place that attempt to achieve this. But in the absence of such norms and laws that ameliorate injustices, we have justice-based reasons to bring about such norms or laws. Thus, we have justice-based reasons to bring about laws and social norms that encourage lower beef consumption. And we have these reasons even if there is not widespread compliance with such norms. For instance, some argue we have ‘second-order’ duties or a ‘natural duty of justice’ to see to it that others, especially governments, realize principles of justice. Such reasons apply even when just laws or norms do not yet exist (Rawls 1971; Tan 2015; Caney 2020). While these authors have focused primarily on changing laws through political activism, a similar point applies to individual consumption choices.

While one individual’s consumption might not make a meaningful difference to the extent of climate change, your consumption habits *can* make a difference to those around you. If more individuals come to believe that their social circles are eating less beef and that members of their social circle think one *ought* to eat less beef, then this will have an effect (Wyker and Davison 2010). And, as social norms gain currency, they influence the behavior and attitudes of those subject to them; for instance, those subject to the norms are typically motivated, at least somewhat, to conform to them (see, especially, Bichierri 2006, 2016).

This is in part because most of us are inclined to conform to the expectations of others. We also benefit from having various social norms because they provide us with a ‘script’ or cues about what we ought to do in certain situations. For instance, imagine you wanted to see a movie but there was not a shared convention of waiting in line at the ticket counter. If you were trying to figure out how to do right by your fellow movie-goers in that situation, you would need to spend time thinking about what the appropriate or fair way to take your turn getting a ticket. The existing social norm that counts in favor of waiting in line; however, means that we tend to get into line and buy our ticket without spending this time and effort trying to figure out the right thing to do, and we can rest assured that others will do the same. Social norms make coordination easy. In stark contrast to buying a movie ticket, trying to figure out responsible food choices can be overwhelming. If there were more just conventions concerning the consumption of beef; however, we would not have to spend nearly as much time and effort figuring out the right thing to do; the social norms for limiting beef consumption would provide us with a script.

Moreover, the emergence of social norms on a sufficiently wide scale *would* make a meaningful difference to the extent of climate change. This is in part because more people would be motivated to limit beef consumption. But it would also make it easier for them to do so. For instance, the change in demand on the part of consumers that results from a change in social norms will, presumably, lead to a change in supply on the part of retailers; more affordable alternatives to beef will be in demand, supply chains will adjust accordingly, and more retailers will offer these alternatives.

Finally, the relevant social norms may also increase the likelihood that formal political institutions, such as state or federal legislatures, can enact effective legislation that makes a meaningful difference to beef production practices and consumption levels. This is for (at least) two reasons. First, in some cases, social norms play an important role in shaping the policy preferences of voters, such as in the case of tobacco use (Lazuras et al. 2011). Changes in policy preferences would, presumably, increase the likelihood of enacting the relevant laws in the first place. Second, once enacted, the success of laws importantly depends upon their congruence with existing norms. Citizens are less likely to obey and government officials are less likely to enforce laws when those laws are not ‘close’ to existing social norms. (Bichierri 2016, 145–146; Bichierri and Mercier 2014; Nyborg et al. 2019, 42–43). In other words, changes in social norms have the potential to make a meaningful difference to government attempts to enact successful policy.

In summary, we have reasons of justice to bring into effect social norms that affect how much beef we consume. If realized, such social norms would make meaningful differences to our consumption habits, and this in turn would make a meaningful difference to beef production and consumption and thus mitigate beef-related injustices to current and future generations. Such social norms would also be integral to the success of legislation by fostering support for policy or ensuring compliance once policy is enacted. Moreover, realizing such social norms would make it *less* burdensome on individuals to determine what justice requires of them vis-à-vis their consumption habits.

There is one last point about these social norms worth emphasizing: Once social norms encouraging limited beef consumption are established, consuming large amounts of beef would then be a case of free-riding—a *clear* case of failing to do your fair share. In other words, even if you are unpersuaded that you have reasons of fairness to limit your beef consumption now, we should collectively establish social norms about limiting beef con-

sumption, and once we do that, limiting beef consumption *will* be required given reasons of fairness.

Objection

A tempting objection to this third argument is that the collective endeavor of limiting beef consumption will fail to materialize, because too few people will actually limit their beef consumption. In the United States the primary drivers of food choice are price, quality, and taste, with health close behind (IFIC 2019)—not environmental or animal welfare reasons—thus it is unlikely that widespread reductions in beef consumption will take hold. And, the objection continues, if we assume that we only have moral reasons to help realize better norms or laws when our efforts have a high probability of success then individuals do not have moral reason to limit their beef consumption in order to help the (doomed) collective endeavor of limiting beef consumption.

In response to this objection, it is worth noting that some of the drivers of food choice cut in favor of shifts from beef to plant-based protein. Saving money and health concerns are motivators for reducing meat consumption for some people (Neff et al. 2018). Admittedly, the other primary drivers of food purchases—quality and taste—may be barriers to replacing beef with plant-based foods for many people. However, novel plant-based alternatives to beef, such as Beyond Burger and Impossible Burger, are increasingly similar to beef in taste, appearance, and texture. Sales of these novel plant-based meat substitutes are growing much faster than sales of meat in the United States (Cheng 2020). Thus, even if ethical values such as concern for environmental sustainability (or animal welfare or public health) will not, in and of themselves, reliably motivate people to limit beef consumption, the other primary drivers of food consumption may increasingly motivate shifts from beef to plant-based foods. Thus, the collective endeavor of voluntarily limiting beef consumption may have a good chance of materializing.

A deeper objection to this argument is that the collective endeavor of individuals voluntarily limiting their beef consumption is not a morally good endeavor—rather, it is a misguided or counter-productive endeavor—and thus we do not have moral reasons to promote this endeavor. There is significant skepticism of and criticism of calling on individuals to change their consumption patterns in order to improve production practices—so called “ethical consumerism” or “voting with your wallet”. In addition to the perennial concern that too few people will actually change their consumption patterns for ethical consumerism to be effective, there are other, more worrying concerns (see, for example, Maniates 2001; Jacobsen and Dulrsud 2007; Alkon and Guthman 2017, pp. 14–15). One is the ethical concern that ethical consumerism pins responsibility on individuals to solve problems (via changing their consumption practices) when it is governments that actually have responsibility to solve these problems (via enacting better policies). A related concern is that ethical consumerism will undermine calls for policy change, because ethical consumerism reinforces the ideology that individual consumers and not governments *should* solve these problems, or that ethical consumerism will undermine activism and political action, because it trains concerned people to see themselves as consumers whose best means of making change is to buy products, rather than as activists or citizens whose best means of making change is political action (Jacobsen and Dulrsud 2007; Alkon and Guthman 2017, pp. 14–15). These are deep, often-repeated concerns about the practical value and appropriateness of encour-

aging individuals to align their consumption choices with their ethical values. We do not have room to address them adequately here, except to note that encouraging individuals to change their individual behavior and encouraging individuals to engage in political activity are not mutually exclusive, and both can be pursued simultaneously; there is some empirical evidence that individual consumption change can have positive “spillover effects” and encourage other forms of political action (Carrico et al. 2017). Furthermore, there is some evidence (mentioned above) that changing social norms about individual behavior may pave the way for policy change.

What if Beef is Replaced With Other Animal-Source Food?

A final concern focuses on the likelihood that when encouraged to limit their beef consumption, not everyone will shift from beef to plant-based protein, but instead will shift from beef to other animal-source foods such as chicken or fish. We have argued that a large-scale shift from beef to plant-based foods, and a corresponding shift in production, would likely have significant environmental and animal welfare benefits. Assuming beef is replaced with healthier plant-based foods, this consumption shift would also yield public health benefits.

But what if some portion of beef production is replaced with production of other animal-source foods, instead of with plant-based foods? We should still expect significantly reduced emissions. Beef is responsible for more GHG emissions than any other foods regardless of if it is measured per kilogram, calorie, or protein content. For every 100 g of protein, beef results in 50 kgCO₂e while pork results in 7.6 kgCO₂e, fish (farmed) in 6.0, poultry in 5.7, and eggs 4.2 (Poore and Nemecek 2018). Beef also requires more land than most other animal-source foods, with only lamb and mutton requiring more, and has the most eutrophying emissions (Poore and Nemecek 2018; Ritchie 2020). Depending on which animal-source food production replaces a portion of beef production, we might see reduced freshwater use (e.g. if beef is replaced with poultry or eggs) or worsened freshwater use (e.g. if beef is replaced with pork or cheese) (Poore and Nemecek 2018; Ritchie 2020).

A shift from beef to other animal-source foods could be bad from an animal welfare perspective, depending on how these animals are raised. For example, our project’s modeling work suggests that a decline in beef consumption in the United States, in the absence of any shifts in consumer preferences, could result in a reduction in cattle raised and killed for food, but an increase in poultry and egg production (along with other increases in animal-source food production) (Mason-D’Croz et al. 2020). From the standpoint of animal welfare, how are we to think of a reduction in cattle but an increase in broiler hens raised and killed for food? Though hard data is hard to find, it is a reasonable assumption that in the United States, the majority of broiler hens are raised in confinement operations. In contrast, even calves who end up spending the last several months of their lives in feedlots may spend the first several months outdoors on rangeland, and some remain on rangeland for the bulk of their lives. Thus, it might be reasonable to conclude that cattle typically have a higher level of welfare than broiler hens over the course of their lives. Therefore, a large-scale shift from beef to chicken production in the United States would mean animals who have lower welfare on average are being raised for food, and more of them.⁷ Thus, the clearest moral

⁷ A considerable unknown in this line of reasoning is how chickens and cows compare on relevant capacities for sentience and cognition. Cows, as large mammals, may appear to have greater or more complex capaci-

case for reducing beef is when beef is replaced with plant-based food; if beef is replaced with animal-source food, then there are moral reasons for and against this consumption shift and the moral case is muddier.

Conclusions

This paper has offered three arguments for the conclusion that individuals in the United States have moral reasons to limit their beef consumption and eat plant-based protein instead. These arguments all trace back to the negative environmental, public health, and animal welfare effects of beef production and consumption.

But beef production is just one among many systems of production with negative environmental, animal welfare, and public health effects. If we have moral reasons to reduce consumption of beef because of its negative effects, would we not also have moral reasons to shift to climate-friendly transportation and energy options? And to limit consumption of other animal-source foods, when those foods are produced in ways that cause animals suffering and deny them a good life? And to limit consumption of other products that pose health risks (e.g. sugary drinks, alcohol, or tobacco) as part of a collective effort to reduce aggregate consumption and improve public health? And why limit our focus to environmental, public health, and animal welfare effects? Systems of production can be bad in other ways, too—for example, some laborers are forced to work long hours in dangerous conditions for low wages, in some cases actually treated as slaves; sometimes these laborers are children (Doggett and Holmes 2018; Polaris 2017). The arguments given above for limiting individual consumption of beef would seem to apply to individual consumption of these other goods, and thus to imply that we have moral reasons to dramatically alter our consumption patterns, likely requiring significant changes in lifestyle.

If we do have all these moral reasons, an important further question is which of these reasons place *obligations* on us. Are we morally obligated to reduce or eliminate consumption of all these products, or just some subset, or none at all? This gets to the important and complex issue of how demanding morality is: are we morally obligated to dramatically change our lifestyle, or does morality only require us to make more modest changes? We will not take up that thicket of hard moral questions here, but instead will just consider what this implies about our moral reasons to limit beef consumption. If morality is very demanding, and individuals are morally obligated to dramatically change their lifestyles, do they have moral reasons to prioritize reducing beef consumption? If morality is not this demanding, and we are only morally required to make more modest changes, is limiting beef consumption one of the changes we are morally required to make?

ties than chickens, and if this is correct, the suffering of the cow and that of the chicken may be so different as to offset, at least in part, the imbalance in numbers of animals affected. For example, the suffering of both mother cow and calf on separation is palpably observable, while chickens do not appear to exhibit similar affiliative emotions. It is, however, possible that the mental and emotional lives of chickens are quite complex. There is increasing evidence that crows have sophisticated capacities and that chickens themselves are not the “dumb” birds they have often been thought to be. As we learn more about the mental and emotional lives of both species, we may have additional reasons for thinking that the chicken for cows tradeoff is, from an animal welfare standpoint, unacceptable, even if the amount of time chickens suffer (typically 5–7 weeks to slaughter) is much less than that of beef cows (typically 18–20 months). The same sort of analysis applies as well to a pig for cow tradeoff.

These are complex issues warranting a longer discussion. Here we will just note that there is a plausible case for giving relatively high priority for limiting beef consumption. Limiting beef consumption addresses multiple problems at once (i.e. climate change, other environmental impacts of beef production, effects on animals, public health effects of beef production and consumption). Addressing climate change, including the climate impacts of agriculture, is urgent, requiring significant reductions in greenhouse gas emissions immediately. In addition, residents of high-income countries arguably have a special responsibility for climate change, given that we are more historically responsible for greenhouse gas emissions and are the biggest emitters now (Caney 2011; Moellendorf 2014). Thus, reducing beef consumption addresses multiple problems at once, including the urgent problem of climate change, which is a problem that high-income countries have a particular responsibility to address. All in all, this gives individuals in the United States and other high-income countries moral reason to limit beef consumption and to do so now.

In this paper, we have argued that individuals in the United States typically have moral reasons to limit their beef consumption and substitute beef with plant-based protein. We laid out the environmental, public health, and animal welfare effects of beef production and consumption, and explained some ways in which these negative effects matter morally. We gave three arguments that individuals typically have moral reasons to limit their beef consumption, and considered objections to these arguments.

Perhaps we have convinced you that you have moral reasons to participate in and do your part in the collective effort to reduce GHG emissions from the agricultural sector, improve human health, and reduce the suffering of farm animals, and we have even persuaded you these moral reasons provide good grounds for aggregate reductions in beef production and consumption. However, you might question whether *you* have to do *your* part by limiting your beef consumption. Could you not participate in some other way—for example, by donating money to organizations advocating vegetarianism, or by working to promote delicious plant-based alternatives that will entice people to shift from beef to plant-based protein? Getting a sufficient number of individuals to voluntarily limit their beef consumption will take a multi-pronged effort; why must everyone participate in this effort as someone who limits their beef consumption rather than as someone who induces other people to limit their beef consumption?

When it comes to GHG emissions, could you not reduce your GHG footprint by reducing consumption of other foods or goods besides beef, making sure to reduce your GHG footprint as much as limiting beef would? Are there not alternative things the beef lover can do that discharge what makes it morally important to eat less beef? Perhaps. We have argued that eating less beef should be a priority consumption change for individuals in the United States. However, our argument so far has not acknowledged or considered differences between people in how hard or costly it is for them as individuals to make certain changes. The details of *your* life matter when determining what *you* should focus on. Some people have health needs that make certain dietary changes harder for them—people who have allergies to many other protein sources or must eat a low carb diet, for example. For others, eating beef has significant cultural value, and limiting consumption would deprive them of valued cultural experiences. Some people just really love beef, and limiting their consumption would be a significant loss of pleasure. Thus, even though individuals in the United States typically have moral reasons to limit their beef consumption, it is a live option

that after taking extenuating circumstances into account, some people do not have all things considered reason to limit their beef consumption rather than to make other changes.

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Declarations

Conflicts of Interest/Competing Interests On behalf of all authors, the corresponding author states that there is no conflict of interest.

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