Stopping Livestock's Contribution to Climate Change

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I. INTRODUCTION

The issue of climate change is large and onerous. Almost every aspect of modern human existence involves some sort of greenhouse gas emission, and thus implicates the climate. The most commonly known contributors to climate change—car emissions, oil production, coal energy, and other energy sources—tend to be addressed in climate change law and policy. However, one great contributor to global climate change that has been largely ignored is livestock emissions. Emissions from livestock account for 14.5 percent of greenhouse gases that contribute to climate change.[1] Livestock accounts for 9 percent of all anthropogenic carbon dioxide emissions, 37 percent of methane emissions, and 65 percent of nitrous oxide emissions.[2] Methane has approximately twenty-three times the global warming potential of carbon dioxide and is currently responsible for 20 percent of global warming, and nitrous oxide has 296 times more global warming potential than carbon dioxide.[3] Livestock also creates 64 percent of the world's ammonia emissions, which cause other environmental harms. Thus, livestock is a major contributor to climate change, so any long-term efforts to mitigate climate change must address the issue of animal agriculture emissions. Fifty-five percent of livestock emissions derive from beef cattle, and the remaining 45 percent are from dairy cows, sheep, goats, and buffalo.[4] Without any

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[1] *Key Facts and Findings*, FOOD & AGRIC. ORG. OF THE U.N., http://www.fao.org/news/story/en/item/197623/icode [https://perma.cc/93HV-MH4Y].

[2] FOOD & AGRIC. ORG. OF THE U.N., LIVESTOCK'S LONG SHADOW: ENVIRONMENTAL ISSUES AND OPTIONS, at xxi (2006), http://www.europarl.europa.eu/climatechange/doc/FAO%20report%20executive%20summary.pdf [https://perma.cc/Y72F-2Z3A].

[3] Samantha Caputo, Towards a Reduction in Methane Emissions from Natural Gas in California: A Policy Brief on the Short-lived Climate Pollutant Strategy 5–6 (May 2016) (unpublished M.S. research paper, Clark University) (on file with Clark Digital Commons), https://commons.clarku.edu/cgi/viewcontent.cgi?article=1033&context=idce_masters_papers [https://perma.cc/F7JX-EVGB]; Food & Agric. Org. of the U.N., *supra* note 2.

[4] Maanvi Singh, *Gassy Cows Are Warming the Planet and They're Here to Stay*, Nat'l Pub. Radio: The Salt (Apr. 12, 2014, 5:06 AM),

intervention, projected population growth will exacerbate this issue because of the necessary increase in demand for food and thus animal products.[5] Although there have been some legislative efforts to combat these animal agriculture emissions, they still raise many issues for environmental law and policy advocates, particularly because agriculture has a very strong hold on the United States government. California has led the way through Senate Bill 1383, a bill regulating short-lived climate pollutants, which includes livestock pollutants. The bill is stringent enough that if the entire world adopted it, it would reduce the expected rate of global warming in 2050 by 50 percent.[6] Unfortunately, it does not seem like the rest of the country, let alone the world, will follow California's lead.

The largest difficulties with changing the status quo of animal agriculture are agriculture's strong historical hold in the United States and the strong cultural desire for animal products in the typical American diet. If climate change is to be significantly mitigated before perceptible and irreversible effects take hold, livestock emissions must be mitigated. Methods have been proposed, such as emplacing stricter regulations on emissions for these industries and utilizing technological advancements to make meat and dairy agriculture cleaner. While these efforts can and would help, the most sustainable way to permanently reduce livestock emissions would involve this type of legislation as well as lessening the production and consumption of meat and dairy.

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http://www.npr.org/sections/thesalt/2014/04/11/301794415/gassy-cows-are-warming-the-planet-and-theyre-here-to-stay [https://perma.cc/T8DY-LWU2].

[5] U.N. ENVTL. PROGRAMME, GROWING GREENHOUSE GAS EMISSIONS DUE TO MEAT PRODUCTION 3 (Oct. 2012) https://na.unep.net/geas/archive/pdfs/GEAS_Oct2012_meatproduction.pdf [https://perma.cc/V8HV-5JK4].

[6] Robert Monroe, *New California Law to Curb Climate Pollutant Emissions Based on Scripps Science*, UC SAN DIEGO NEWS CTR. (Sept. 19, 2016), http://ucsdnews.ucsd.edu/pressrelease/new_california_law_to_curb_climate_pollutant_emissions_based_on_scripps_sci [https://perma.cc/L2GE-JAZR].

II. BACKGROUND

Like any other animal, livestock create feces and emit gases through belches and flatulence. However, livestock's excretions are unique in that they also release massive amounts of methane into the atmosphere.[7] The average cow releases 70 to 120 kilograms of methane per year. This problem is then exacerbated by the consistent high quantity of meat and dairy consumption, particularly in the United States. Meat and dairy consumption is particularly great in the U.S. due to antiquated government subsidy programs, which give animal agriculture farmers financial incentives to breed more cows, thus creating more livestock. Animal agricultural farms will produce more livestock as long as meat and dairy remain in demand and inexpensive because of subsidies.[8] Consequently, there are more cows than there would be without this great financial support by the government. The world cannot indefinitely support the methane emissions from these hundreds of millions of cows, at least not without some innovation or change.

There are some current methods and technologies available to combat this issue, although they are not widely adopted. Cows naturally emit large amounts of gas because of their cud diets and because the bacteria in their stomachs breaks down cellulose and releases methane.[9] There is research that demonstrates that adding seaweed to cow feed can reduce methane emissions in cows by 99 percent.[10] Although this may seem like the perfect solution, there is not nearly enough seaweed to cover even a fraction of the amount of cows' feed that would be necessary to make a difference in the atmosphere.[11] Other methods for limiting livestock methane emissions include methane capture to fertilize other crops, producing biogas from

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[7] U.N. ENVTL. PROGRAMME, *supra* note 5, at 1.
[8] *Id.*
[9] Rebecca Rupp, *A Sprinkle of Seaweed Could Deflate Gassy Cows*, NAT'L GEOGRAPHIC, (Nov. 29, 2016), https://www.nationalgeographic.com/people-and-culture/food/the-plate/2016/11/seaweed-may-be-the-solution-for-burping-cows [https://perma.cc/8GHB-T793].
[10] *Id.*
[11] *Id.*

emission releasing manure, and clean manure composting.[12] These solutions are more attainable, but they still have many barriers—such as expense and technological feasibility, which are difficult to overcome without governmental support through legislation.[13]

Therefore, methane production from meat and dairy farms remains a large environmental issue. Although there are numerous barriers, some work has been done to combat this issue, including some legislation.

III. LEGISLATIVE EFFORTS

A. Federal Efforts: The Environmental Protection Agency

In 2010, the Environmental Protection Agency (EPA) issued a press release stating that the agency was moving towards promoting sustainable farm energy in order to address the problem of livestock greenhouse gas emissions.[14] The intention was to encourage livestock producers to reduce methane emissions and thus lower the industry's effect on the climate.[15] The EPA claimed to achieve this by introducing clean, renewable energy technology. The press release indicated that the EPA believed this would benefit farmers as well because it would make their business more efficient, and the EPA's assistance would make achieving the methane reductions more feasible.[16] To achieve this goal, the EPA and the U.S. Department of Agriculture planned to provide these farms with $3.9 million.[17]

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[12] CAL. AIR RES. BD., CAL. ENVTL. PROT. AGENCY, SHORT-LIVED CLIMATE POLLUTANT REDUCTION STRATEGY 3, 29, 66 (Mar. 14, 2017) https://www.arb.ca.gov/cc/shortlived/meetings/03142017/final_slcp_report.pdf [https://perma.cc/2X7C-9WQF].

[13] *Id.*

[14] Press Release, U.S. Envtl. Prot. Agency, EPA Administrator and Agriculture Secretary Team Up to Promote Farm Energy Generation Agreement Will Help Cut Greenhouse Gas Emissions (May 3, 2010), https://yosemite.epa.gov/opa/admpress.nsf/d0cf6618525a9efb85257359003fb69d/eddc8a628ce5e9b2852577180066c2d3!OpenDocument.

[15] *Id.*

[16] *Id.*

[17] *Id.*

The primary technology that the EPA planned to utilize for this venture was biogas.[18] Biogas is a gas that is primarily made up of methane. When emitted from manure management systems, it can be collected to produce energy, such as hot water, heat, and electricity.[19] Approximately 150 farms were utilizing such technology at the time of the press release, and the EPA estimated that its assistance could help about 8,000 other farms in the U.S. potentially capture and utilize biogas.[20] This could reduce the methane emissions by over thirty-four million metric tons of carbon dioxide equivalent—such reductions would be the same as removing 6.5 million passenger vehicles from the road for a year.[21] Additionally, this method would generate over 1,500 megawatts of renewable energy, which would further aid in reducing greenhouse gas emissions.[22]

Federal government efforts like this have great potential to immensely change the current system of livestock agriculture and stop its major contributions to climate change. This is an excellent example of the traditional command-and-control method of regulation, as the government would simply be implementing new technology in the agriculture industry and aiding them through the transition. Because the federal government can enact such change on a national level, it can reduce emissions quickly.

While federal action may have great advantages, there are also critical disadvantages. It is currently unclear how successful the program is, but there is evidence that the biogas technology has been implemented to more and more farms through the EPA under the Obama Administration.[23] However, now under the Trump Administration, and with Scott Pruitt, a climate change denier, as the head of the EPA, there is a huge risk of this program being significantly pulled back or eliminated completely. There has already been evidence of these attacks

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[18] *Id.*
[19] *Id.*
[20] *Id.*
[21] *Id.*
[22] *Id.*
[23] *Infographic: Celebrating 20 Years of Anaerobic Digestion*, U.S. ENVTL. PROTECTION AGENCY, https://www.epa.gov/sites/production/files/2016-05/documents/agstar_20th_infographic.pdf [https://perma.cc/6PHQ-ZBDM].

against former federal actions to combat climate change by President Trump pulling out of the Paris Agreement and the current attacks on Obama's Clean Power Plan.[24] [25] This demonstrates that while the federal government can implement great and immediate change, that change can be completely halted or even reversed in four years with a change in presidency or Congress. Therefore, during such a volcanic political climate, federal environmental efforts may not be the most lasting or effective method to address the issue of climate change. While federal support and effort is a great way to create such change and get the country behind the issue, dependence on such action may not be stable. Thus, state and local action is necessary for greater stability and continual efforts to reduce emissions.

B. State Efforts—California as an Example

1. California's Bill to Stop Short-Lived Climate Pollutants

There have been some legislative efforts made by regional governments to combat livestock emissions as well. One of the best and most recent examples is California's statute regulating short-lived climate pollutants. In 2015, California enacted Senate Bill 1383, which was passed to regulate short-lived climate pollutants, the most common of which is methane.[26] The bill mandates that methane emissions be reduced from meat and dairy livestock specifically, and that methane emissions overall be reduced by 40 percent by 2030. The bill requires that the Public Utilities Commission, the State Energy Resources Conservation and Development Commission, and the state board work together to create policies and plans of action to meet these

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[24] David Roberts, *There's a Huge Gap Between the Paris Climate Change Goals and Reality*, VOX (Nov. 6, 2017), https://www.vox.com/energy-and-environment/2017/10/31/16579844/climate-gap-unep-2017 [https://perma.cc/36A2-GN26].

[25] Lisa Friedman & Brad Plumer, *E.P.A. Announces Repeal of Major Obama-Era Carbon Emissions Rule*, N.Y. TIMES (Oct. 9, 2017), https://www.nytimes.com/2017/10/09/climate/clean-power-plan.html [https://perma.cc/593H-GMLX].

[26] S.B. 1383, 2016 Leg., 2015–2016 Reg. Sess. (Cal. 2016).

objectives.[27] The reasoning for the bill is methane's powerful warming abilities on the climate and the fact that it is thus more dangerous to the climate than carbon. Therefore, the legislature reasoned that if California is committed to reducing emissions enough to make a viable difference in climate change and set an example for the rest of the country, California must reduce methane produced in their livestock.

These reduction goals are extremely ambitious; if the entire world adopted the same objectives for livestock reductions, it would reduce expected warming of the planet by 2050 by 50 percent.[28] The California Air Resources Board (CARB) explains that although these short-lived climate pollutants, such as methane, only contribute 12 percent of all emissions, they are so powerful that reducing their emissions may help reduce the rate of climate warming by 40 percent.[29] CARB also decided to target livestock and animal agriculture because it accounts for 55 percent of all methane emitted.[30] Therefore, this action by California may prove to be one of the most effective plans to combat climate change. It would also produce more immediate reductions in climate change as the short-lived climate pollutants take effect more quickly than do typical pollutants such as carbon dioxide.

CARB proposes achieving these reductions through emission-capture technology.[31] However, much of the proposed reductions are contingent on research CARB has since been conducting, including consulting with livestock industry stakeholders and researching the operations of the meat and dairy industry.[32] Previous proposed reductions had been criticized for their potential to decrease jobs; however, the

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[27] *Id.*

[28] Monroe, *supra* note 6.

[29] Richard Nemec, *California Sets Nation's Strictest Oil/NatGas Methane Emission Rules*, Gas Intelligence (March 24, 2017), http://www.naturalgasintel.com/articles/109878-california-sets-nations-strictest-oilnatgas-methane-emission-rules [https://perma.cc/A9LE-EKNL].

[30] *Id.*

[31] *Id.*

[32] Sarah Duffy, *California Enacts Legislation Targeting Short-Lived Climate Pollutants*, Legal Planet (Sept. 21, 2016), http://legal-planet.org/2016/09/21/california-enacts-legislation-targeting-short-lived-climate-pollutants [https://perma.cc/VVY2-DE35].

program is purported to increase jobs because it does not diminish the animal agriculture business, but rather create new jobs to help enact and fulfil the plan's objectives.[33]

Senate Bill 1383 demonstrates how California is attempting to address the problem of climate change without reducing the animal agriculture industry's production or American consumption of livestock, but instead by attacking the issue on the back end and cleaning up the actual emissions. Senate Bill 1383 has numerous advantages, especially as the first piece of major environmental legislation since President Trump took office.[34] As the strictest methane regulation in the U.S., it provides an example for the rest of the states of what in climate legislation is possible.[35] It also demonstrates that legislation need not create drastic changes in the American lifestyle, nor does it demand any reduction in animal production or consumption. Thus, such a regulation may seem more appealing and feasible to more conservative states that generally oppose climate regulations. It may also be an example to other countries. California's regulation is particularly impressive because it puts such a great onus upon itself, as California produces 20 percent of the nation's milk.[36] Other states or countries, such as Argentina, with a huge animal agriculture industry may find such regulations more feasible and practical to implement.[37]

2. Assessing California's Attempted Solution to Livestock Emissions

As California produces one-fifth of the nation's milk and contains over five million cows, its dairy industry may

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[33] *See* Nemec, *supra* note 29.
[34] *Id.*
[35] *Id.*
[36] Ben Rosen, *A New California Law is Going After One of the Single Biggest Greenhouse Gas Emitters*, Bus. Insider (Sept. 20, 2016), http://www.businessinsider.com/california-regulating-cow-farts-greenhouse-gases-2016-9 [https://perma.cc/Q5F5-UNU6].
[37] *See generally* Leonardo Rossi, *From Dream to Nightmare*, Dev. & Cooperation (Sept. 10, 2015), https://www.dandc.eu/en/article/cattle-industry-argentina-changing-rapidly-not-better [https://perma.cc/ACG6-7NPQ].

drastically change to meet the new requirements imposed by S.B. 1383.[38] California plans to fund this initiative with a $90 million investment, $50 million of which come from the state's revenues from their cap and trade program.[39] In order to achieve the necessary emission reductions, these investments would have to utilize emission-trapping technology such as biogas or emplace more efficient measures. For example, the Environmental Defense Fund (EDF) has created methane leakage models which analyze the reduction of emissions by switching to newer, efficient natural gas-fueled technologies from current natural gas systems.[40] EDF could also aid in modifying the efficiency of power plants within these methane leakage models.[41] Therefore, there are technologies that have been and continue to be developed that would aid California in this transition, which is projected to take place by 2020.[42]

Although California's legislation is ambitious, it still may not create sustainable enough changes to address the climate change impacts from livestock emissions. First, even though mitigating the effects of California's five million cows by 40 percent is a large feat, there are approximately 100 million cows currently in the United States, 11.8 million of which are in Texas.[43] [44] Additionally, California is attempting to pave the way the rest of the country by creating such legislation, and the results could be immediate due to the nature of short-lived climate pollutants. These efforts may be undermined by

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[38] Rosen, *supra*, note 36.
[39] Lucy Nicholson, *California Law Targets Greenhouse Gases from Cows, Landfills*, CBS News (Sept. 19, 2016), https://www.cbsnews.com/news/california-climate-change-rules-on-cows-landfill-emissions [https://perma.cc/TQF2-EKYK].
[40] *The Climate Impacts of Methane: What Will It Take to Get Sustained Benefits From Natural Gas?*, ENVTL. DEF. FUND (Apr. 2012), https://www.edf.org/energy/methaneleakage [https://perma.cc/XWM5-MLBK].
[41] *Id.*
[42] S.B. 1383, 2016 Leg., 2015–2016 Reg. Sess. (Cal. 2016).
[43] *See generally* U.S. DEP'T OF AGRIC., OVERVIEW OF U.S. LIVESTOCK, POULTRY, AND AQUACULTURE PRODUCTION IN 2010 AND STATISTICS ON MAJOR COMMODITIES (2010), https://www.aphis.usda.gov/animal_health/nahms/downloads/Demographics2010_rev.pdf [https://perma.cc/8RAF-XF8F].
[44] Rosen, *supra*, note 36.

projected population increases, however, and the subsequent increase in food demand and production. By 2050, the world's population is projected to increase by one-third, adding over two billion mouths to feed.[45] The Food and Agricultural Organization of the United Nations projects that this would demand that food production increase by 70 percent, which would thus require a proportional increase in livestock production. By 2050, 170 million cows would be required to keep up with the population demands, so even a 40 percent reduction in the emissions of the potential 170 million cows across the country, would still bring us to the same emissions as the 100 million cows today. Therefore, livestock's carbon dioxide, methane, and nitrous oxide emissions would continue to be at dangerously high rates by 2050, which is the year advised that the world be nearly emission-free to avoid catastrophic changes in the earth's climate.[46]

Even though this notion is daunting, it is an indication that California's Senate Bill 1383 may not be the grand solution for the livestock problem and livestock consumption is still an environmentally problematic issue. Population growth and the continual consumption of meat and dairy will relentlessly demand more livestock. Therefore, reducing 40 percent, or even 90 percent, of livestock emissions may not ultimately make a significant environmental impact if the number of cows is doubled or tripled. This holds especially true because a lot of California's expected emission reductions are contingent on CARB's research, which has not yet proven that even 40 percent is feasible.[47] Therefore, although California's legislation is a step in the right direction to addressing this issue, it still may not ultimately solve it. If biogas technology and other emission trapping methods are improved, California's proposed efforts could be enough. Because the technology is not yet capable of capturing all livestock emissions, however, there would need to be other means to address the remaining emissions.

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[45] *2050: A Third More Mouths to Feed*, FOOD & AGRIC. ORG. OF THE U.N. (Sept. 23, 2009), http://www.fao.org/news/story/en/item/35571/icode [https://perma.cc/RF75-68CT].

[46] *How to Decarbonize the Built Environment*, ZERO EMISSIONS BY 2050, http://www.zeroemissions2050.org [https://perma.cc/8RYM-3SY7].

[47] Duffy, *supra* note 32.

Consequently, I propose it would be best to utilize a multitude of efforts in order to fill the emission gaps left by one method or one piece of legislation. Thus, one of the most effective ways to manage emissions would be by lessening the production and consumption of meat and dairy products. By reducing the production, the total number of livestock would decrease, thus lowering total livestock emissions. Animal products would be replaced with plant foods, reducing total agricultural emissions.[48] For example, a bowl of chili with beef produces 3,020 grams of carbon dioxide equivalent, while the same bowl with lentil soup would produce just 71 grams of carbon dioxide equivalent.[49] A switch to plant-based foods could drastically decrease methane emissions while also preventing job reduction by transitioning animal agriculture farmers to plant agriculture. This notion faces great cultural and political pushback, but without reducing the high-carbon, high-emission foods in the U.S. diet, especially dangerous emissions such as methane and nitrous oxide will continue to increase, despite mitigation efforts by California or even the EPA.

While the EPA's efforts did have great potential to create change, the notion that emissions will likely increase far past what technology can currently effectively mitigate still rings true. Changing food production would fill this emission gap, allowing for a sustainable method of emission reduction. I propose that California's Senate Bill 1383 should serve as an example to all other states and that other state legislatures should utilize similar efforts to reduce these dangerous emissions; it is important to note, however, that they should also recognize the need to reduce the production and consumption of animal products, and they should utilize more plant agriculture if the harsh effects of climate change are to truly be prevented.

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[48] *See, e.g.*, Jenny Jay, *Taking Climate into Our Own Hands*, EASY MEALS FOR THE PLANET (Nov. 8, 2017), https://meals4planet.org/2017/11/08/taking-climate-into-our-own-hands [https://perma.cc/9FUT-JB7A].

[49] *Id.*

IV. ISSUES PREVENTING CHANGE

A. Livestock Market Failures

The issue that plagues livestock agriculture, as it does numerous other industries contribute to climate change, is market failures. Market failures occur when industries do not accurately pay for their total "costs" of the pollutants that they release.[50] Typical businesses factor in the costs of labor, materials, and other expenditures; market failures are when an industry does not pay for certain costs or acts, such as the greenhouse gases businesses produce.[51] Animal agriculture farmers house thousands of cows for beef and dairy, and the costs of maintaining these animals are not accurately taken into account. The cows' production of carbon dioxide, methane, and nitrous oxide are not considered, but the effects are very real in terms of the climate.[52]

Market failures result in excessive emissions, and environmentalists continue to try to correct this.[53] Solutions that have been proposed, and enacted in many cases, are command-and-control models, carbon taxes, and cap-and-trade. Command-and-control is traditional governance and regulation, where the government singles out the parties that are the sources of the pollution and then dictates what they can and cannot do.[54] Carbon taxes charge businesses for polluting; a business or industry must pay a tax for each ton of carbon they release into the atmosphere, such as one hundred dollars per ton of carbon.[55] Cap-and-trade is a more complex system of regulation, in which there is a total cap on how much of a pollutant, such as carbon, can be emitted, and businesses are given certain credits, which they can then trade to other businesses.[56] These methods have been the most widely

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[50] David Hunter, Chris Wold & Melissa Powers, Climate Change and the Law 66 (2nd ed. 2006).
[51] *Id.*
[52] *See Key Facts and Findings*, *supra* note 1.
[53] *See generally* Hunter, Wold, & Powers, *supra* note 50.
[54] *Id.*
[55] *Id.*
[56] *Id.*

recognized tools to correct market failures. A carbon tax is a widely publicized solution, but it still is not utilized by any state or city in the United States. California, though, currently utilizes cap-and-trade.[57] Cap-and-trade works similarly to a carbon tax, but the cap is placed on the overall carbon emissions and businesses sell their excess emissions to other businesses. Through this method, California reduces emissions from major corporations, factories, and businesses.[58]

The livestock industry emits large amounts of greenhouse gases, most of which have more global warming potential than carbon.[59] Because so much of the world's emissions are from the livestock industry, there should be regulations in place to correct that market failure and make the animal industry internalize the cost of their pollutants. Many states, including California, do this with other emitting industries. One method of doing this is by regulating methane emissions with a beef or methane tax on both domestic and imported animal products.[60] Such a tax would account for greenhouse emissions and aligns with the environmentalists' notion that the polluter should pay for their emissions.[61] The proceeds from the tax could also be directed towards other environmental efforts, such as investment in low-emission foods like lentils, beans, and a variety of fruits and vegetables.[62] Subsidizing other foods and helping them become staples would help curtail meat and dairy consumption and lead to a more sustainable lifestyle. This approach would both reduce carbon emissions and require fewer technological advances to maintain a high-consumption lifestyle. This is controversial, however,

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[57] Melanie Mason & Chris Megerian, *California Legislature Extends State's Cap-and-Trade Program in Rare Bipartisan Effort to Address Climate Change*, L.A. TIMES (July 17, 2017, 9:15 PM), http://beta.latimes.com/politics/la-pol-ca-california-climate-change-vote-republicans-20170717-story.html [https://perma.cc/G5M2-CXCB].

[58] *Id.*

[59] Caputo, *supra* note 3, at 5.

[60] Marya Torrez, *Accounting for Taste: Trade Law Implications of Taxing Meat to Fight Climate Change*, 27 GEO. INT'L ENVTL. L.J., 61, 63 (2014).

[61] *Id.*

[62] *See Eat Smart. Your Food Choices Affect the Climate*, ENVTL. WORKING GROUP (Oct. 28, 2017), https://www.ewg.org/meateatersguide/eat-smart [https://perma.cc/9PBT-E3CR].

because the beef and dairy industry has a strong hold in government because of the size of the agricultural subsidies they receive, and such a change would face significant political opposition. Nonetheless, eventually removing these subsidies may be the first step to such a tax. Other methods, such as command and control, could help beef and dairy farms make their farms less pollutant heavy, but this would still face major opposition.

B. Agriculture's Political Holds

There is little discussion or mainstream environmental advocacy on this issue because of the strong influence the meat and dairy industry has in the American government. The USDA supports the meat and dairy industry in a variety of ways.[63] Meat and dairy receive 63 percent of agricultural subsidies in the U.S.; grains receive 20 percent; sugar, starch, and oil receive 15 percent; nuts and legumes receive 2 percent; and fruits and vegetables receive less than 1 percent.[64] The USDA describes foods as either commodity foods or specialty foods, and commodity foods receive large subsidies while specialty foods do not.[65] According to the USDA, fruits and vegetables are a specialty food, and thus farmers who grow basic foods such as tomatoes, oranges, or apples receive little or no assistance from the government.[66] The USDA instead gives the majority of their subsidies to commodity foods, and most of those subsidies go to five crops: wheat, soybeans, corn, cotton, and rice—and corn and soybeans are largely used as feed for livestock for meat and

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[63] *Agriculture and Health Policies in Conflict, How Food Subsidies Tax Our Health: Government Support for Unhealthful Foods*, PHYSICIANS COMM. FOR RESPONSIBLE MED., http://www.pcrm.org/health/reports/agriculture-and-health-policies-unhealthful-foods [https://perma.cc/VWD9-NREQ] [hereinafter *Government Support for Unhealthful Foods*].

[64] *Agriculture and Health Policies in Conflict, How Food Subsidies Tax Our Health: Introduction*, PHYSICIANS COMM. FOR RESPONSIBLE MED. (Oct. 28, 2017), http://www.pcrm.org/health/reports/agriculture-and-health-policies-intro [https://perma.cc/D53G-SBZ4].

[65] *Government Support for Unhealthful Foods*, *supra* note 63.

[66] *Id.*

dairy.[67] Therefore, a lot of the subsidy money goes to crops whose purpose is livestock feed. This money promotes the production and consumption of animal agriculture, and so it creates even more livestock emissions. Additionally, farmers who receive commodity crop subsidies are generally not allowed to grow specialty crops in addition to their commodity crops, thus worsening this problem by not allowing for the growth and consumption of less climate intensive foods.[68]

Milk and dairy products are also considered commodities and thus receive large financial aid from the USDA.[69] Between 1995 and 2009, the dairy industry received $4.8 billion in various subsidies.[70] Additionally, the USDA provides the livestock industry with numerous direct subsidies, which have granted livestock producers $3.5 billion between 1995 and 2009; in 2009 alone, the government also provided the industry $7 billion for weather and natural disaster loss.[71] The agriculture industry receives immense support from the government and thus makes it one of the cheapest options for consumers to choose. There are strong arguments to change the current subsidy system, such as by shifting many of the subsidies away from dairy and livestock and towards fruits and vegetables instead. The USDA asserts that dairy and meat are crucial parts of the U.S. economy, however.[72] The Food and Agricultural Organization of the United Nations (FAO) acknowledges that the global economy depends on animal agriculture, as livestock accounts for 1.3 billion people's livelihoods and 40 percent of the global value of agricultural output; despite this, FAO still recognizes that the livestock industry is not sustainable for the climate or human health and advocates for change.[73] The transition to other forms of agricultural output may have to be slow to maintain a stable

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[67] *Id.*
[68] *Id.*
[69] *Id.*
[70] *Id.*
[71] *Id.*
[72] Maggie Fox, *Do U.S. Food Subsidies Make People Fat?*, NBC NEWS (July 5, 2016, 3:04 PM), https://www.nbcnews.com/health/health-news/do-u-s-food-subsidies-make-people-fat-n604091 [https://perma.cc/G4NJ-8N8C].
[73] *Animal Production*, FOOD & AGRIC. ORG. OF THE U.N. (Oct. 28, 2017), http://www.fao.org/animal-production/en [https://perma.cc/GVX4-66UM].

economy, but if the most climate-intensive foods continue to be subsidized, carbon emissions will never be stopped and the climate will continue to worsen.

There is also a strong cultural component to meat-eating in the U.S., as shown by the fact that the U.S. eats more meat than almost any other country in the world.[74] This is largely because meat has historically been comparably cheaper in the U.S. than in other countries.[75] Therefore, America's culture has largely grown around the consumption of large quantities of meat. This cultural norm makes lessening meat production and consumption harder.

V. EFFORTS TO MITIGATE CONSUMPTION

Much like the transition from coal-powered energy to renewable energy, there must be a transition from animal based agriculture and consumption to plant based agriculture and consumption. There are many parallels that can be drawn between the two efforts, as both coal and livestock produce significant amounts of emissions that affect the climate.[76] [77] Additionally, there are cleaner and more healthful options to turn to. The biggest difference between the transition from coal to renewable and animal farming to plant farming, however, is the demand in the lifestyle change. Animal consumption is tied to culture and identity, especially for Americans, and thus any lifestyle change from an animal-based diet to a plant-based diet would receive heavy pushback. Although completely eliminating meat and dairy from the American diet is likely not necessary, reducing meat consumption would still receive pushback.

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[74] Dan Charles, *The Making of Meat Eating America*, NPR: THE SALT (June 26, 2012, 3:03 AM), http://www.npr.org/sections/thesalt/2012/06/26/155720538/the-making-of-meat-eating-america [https://perma.cc/E5PT-26R4].

[75] *Id.*

[76] *Carbon Pollution: An Urgent Threat from Coal*, SIERRA CLUB, http://content.sierraclub.org/coal/burning-carbon-pollution-and-climate-disruption [https://perma.cc/7FSJ-Z4BV].

[77] *Id.*

A. Stopping Subsidies—Encouraging More Low-Carbon Farming

One of the potentially most effective and sustainable methods of reducing livestock production and consumption would be to remove or heavily reduce the federal subsidies to meat and dairy producers. These subsidies were originally intended to prevent these farms from going out of business during times of hardship and natural disaster.[78] While they were first put in place during the Great Depression to try and prevent a similar disaster, this financial support from the government currently seems unnecessary. These subsidies have existed for so long and have made meat and dairy plentiful in the American diet for decades, however, which makes them socially and politically difficult to remove.

At the same time, the fruit and vegetable farmers do not receive any subsides. Because they receive no government aid, produce farmers face difficulties producing or competing anywhere near the same level as animal agriculture farmers. Therefore, the livestock industry is being paid to churn out more meat and more dairy, which means more cows exist. At the same time, farmers of sustainable foods, such as lentils, potatoes, and apples, receive no help. The lack of support also makes these industries more susceptible to natural disasters.[79] Without change to these subsidies, therefore, it is difficult to see how plant-based foods can be produced at nearly the same rate required to replace these animal products.

One method of political advocacy that may prove to be effective in changing the government's subsidy priorities is produce farmers banding together. Ferdinand Hoefner, a policy director for the National Sustainable Agriculture Coalition, which advocates for such farms stated, "We've locked up food production with policy that says, 'Though shalt not grow fruits

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[78] Arthur Allen, *U.S. Touts Fruits and Vegetables While Subsidizing Animals that Become Meat*, WASH. POST (Oct. 3, 2011), https://www.washingtonpost.com/national/health-science/us-touts-fruit-and-vegetables-while-subsidizing-animals-that-become-meat/2011/08/22/gIQATFG5IL_story.html?utm_term=.ffd390553f99 [https://perma.cc/5VZ4-NMSV].

[79] See *Id.*

and vegetables.'"[80] If there were greater support for produce farming and policy advocacy for their protection and in support of their product, more subsidies could be given to these farmers and diverted from animal agriculture.

Additionally, there is little support for these animal agriculture subsidies amongst politicians, but there have been no outspoken efforts to change the status quo due to fear of unpopularity. Marion Nestle, a professor of Food Science and Public Health at New York University argued "[e]verybody agrees that direct subsidies to big farmers ought to be stopped, but nobody wants to say he was against subsidies if he's campaigning in Iowa. It's a locked-in system."[81] Therefore, the idea of removing this century-old subsidy is politically unpopular, especially in states where such agriculture makes up a large amount of the economy. As discussed earlier, some suggest emplacing a "methane" or "livestock" tax, but such a proposition would likely receive similar opposition.

Thus, removing the meat and dairy subsidies does not seem like the most viable option for the near future. Reductions are still necessary if these emissions are to be addressed, however. Policy advocates may therefore consider turning to the private sector to advocate for this transition from animal-based diets to plant-based diets.

B. Example: The Natural Resources Defense Council (NRDC)

In order to create a culture of climate-healthy diets, some environmental organizations have taken initiative to advocate for less meat and dairy on a private level, rather than attempting to undo animal agriculture's hold on the government.[82] NRDC, one of the largest nonprofit environmental law and policy organizations, has an entire section of their Food and Agriculture Program dedicated to

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[80] *Id.*

[81] *Id.*

[82] "Livestock and Climate Change" Sujatha Jahagirdar, Case Study Research—Interview Questions, (September 29, 2017).

lessening retail meat purchases.[83] [84] NRDC's goal is to reduce the use and demand for climate-intensive foods, and thus, lessen the production.[85] NRDC believes that reducing the consumption of beef can reduce beef's impact on the climate.[86] The organization works with meat providers, instead of producers, and it negotiates with them to buy more produce and fewer animal products. It does so by demonstrating consumer trends and convincing retailers that consumers want more produce and fewer meat-intensive meals.[87] Although the U.S. remains one of the most meat consuming countries, its meat consumption has declined since 1976.[88]

NRDC claims that they have taken this approach because of the strong hold animal agriculture has on the U.S. legislature and they believe this is one of the best and most effective way to effectuate change in livestock emissions.[89] Rather than advocate for legislation and face an adverse political climate with poor odds, NRDC has gone directly to the sellers of animal products and demonstrated why it is advantageous to sell less meat.[90] NRDC believes their approach has been successful because each provider that switches from meat and dairy to plant foods lessens emissions and is a step in the right direction towards making lasting cultural changes.[91] An advantage with this approach is that its support comes from both sides of the political spectrum; many conservatives support these efforts for health benefits because red meat is bad for one's health, and

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[83] *Sujatha Jahagirdar: Policy Specialist, Food and Agriculture Program*, NAT. RES. DEF. COUNCIL, https://www.nrdc.org/experts/sujatha-jahagirdar [https://perma.cc/C3N9-PKWQ].
[84] *Id.*
[85] Sujatha Jahagirdar, *Less Beef Less Carbon*, NAT. RES. DEF. COUNCIL: EXPERT BLOG (Mar. 22, 2017), https://www.nrdc.org/experts/sujatha-jahagirdar/less-beef-less-carbon [https://perma.cc/EGM4-RU65].
[86] *Sujatha Jahagirdar: Policy Specialist, Food and Agriculture Program*, *supra* note 83.
[87] Jahargirdar, *supra* note 85.
[88] Charles, *supra* note 74.
[89] Jahargirdar, *supra* note 82.
[90] *Id.*
[91] *Id.*

they thus advocate for lower consumption to improve public health.[92]

NRDC's private sector effort demonstrates an alternate method of advocacy other organizations may want to utilize as it seems to be one of the most effective ways to lessen meat consumption and thus production. If retailers try to sell less meat and are successful in selling plant-based meals, they will likely continue to do so and thus lessen meat consumption. Such success could prompt other restaurants and retailers to include more plant-based options at the expense of meat-based options due to the demand and to remain competitive. This could be a great consumer- and market-based solution to livestock's impact, especially because major increases in vegetarianism and veganism in recent years have benefitted the planet.[93] [94] Thus, informing retailers of this demand would decrease the sales of meat and dairy, and consequently the production, despite the government's heavy support for the meat and dairy industry.

C. Education

For effective policy change regarding livestock to be implemented, education on how the meat and dairy industry contribute to global warming needs to be circulated amongst law and policy makers, as well as the general public. Understanding how something seemingly natural—cows—can devastate the climate is crucial towards gaining support because meat and dairy are often taken for granted as a necessity. In modern history, meat and dairy have become part of the average diet, even though it has been a scarcity for the majority of human existence. In fact, studies strongly advocate that lessening and minimizing meat consumption is essential to a healthful diet.[95] [96]

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[92] *Id.*

[93] *See Veganism Has Grown 500% Since 2014 in the U.S.*, RISE OF THE VEGAN (June 25, 2017), https://www.riseofthevegan.com/blog/veganism-has-increased-500-since-2014-in-the-us [https://perma.cc/BJ78-BNGN].

[94] *See Vegetarianism in America*, VEGETARIAN TIMES (Apr. 16, 2008), https://www.vegetariantimes.com/uncategorized/vegetarianism-in-america [https://perma.cc/47P3-XLBS].

[95] LIVESTOCK'S LONG SHADOW: ENVIRONMENTAL ISSUES AND OPTIONS, *supra* note 2.

Greater awareness of animal products' status as non-necessities and better documentation of livestock's environmental impact, which is often ignored because of complexities in measuring, may be able to create better and more stringent policies regarding animal agriculture.[97]

A major reason to better educate both policy makers and the populace is to combat the culture of high meat and dairy consumption.[98] More education on the environmental impact of this diet on the world would make consumers more mindful of their impact and could lead to them reducing their consumption. There are numerous organizations aiming to spread this awareness, such as Sustainable Works, which is an environmental organization in Santa Monica that aims to spread awareness on environmental issues and heavily emphasizes the impact of animal agriculture. Another avenue for education is online. Websites such as Bon Appétit Management Company's EatLowCarbon.org present information in a clear, easy, and fun way to educate people on how what they eat impacts the climate through the utilization of quizzes and scores.[99] Even though these organizations are providing excellent education on this issue, this information needs to be more widely spread if consumers are going to choose less meat and dairy options at a fast and large enough rate to significantly reduce livestock's impact on the planet. Additionally, if more people care about the issue then politicians may be forced to take a stance and create policy regarding the issue. Therefore, education would provide a powerful tool for the populace to make great change.

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[96] Allison Aubrey, *Death By Bacon? Study Finds Eating Meat is Risky, Key Facts and Findings*, NPR: THE SALT (Mar. 12, 2012, 5:15pm), http://www.npr.org/sections/thesalt/2012/03/12/148457233/death-by-bacon-study-finds-eating-meat-is-risky [https://perma.cc/G7MY-GCRF].

[97] Henning Steinfeld, *Livestock and Global Change*, FOOD & AGRIC. ORG. OF THE U.N., http://www.fao.org/wairdocs/lead/x6130e/X6130E02.htm [https://perma.cc/98P8-URXY].

[98] *See* Charles, *supra* note 74.

[99] *See Eat Low Carbon*, BON APPÉTIT MGMT. CO.: EAT LOW CARBON, http://www.eatlowcarbon.org [https://perma.cc/F9YK-S9NN].

D. Lab-Grown Meat

Another option that more recent technology may allow us to utilize in place of livestock meat is lab-grown meat. Lab-grown meat is essentially meat, or any animal product from milk to leather, that can be grown in a lab with cell cultures instead of breeding and raising animals on an agricultural farm.[100] The benefit to doing this is that we can still produce and consume animal products, but we cut out the harmful effects of methane, carbon, and nitrous oxide that come with raising animals. This science has been developed recently, but in 2013, the first lab grown hamburger was served outside of a lab, and it is said to taste and feel remarkably like traditional meat.[101] Although there would still be backlash from animal agriculture farmers and their stakeholders, lab-grown meat does provide a possible solution to appease consumers if they are unwilling to forsake animal products such as meat and dairy.

The issue with this method, however, is that because it is still a developing science, there is not much investment into its research and so such production would currently be expensive to mass produce.[102] Still, proponents of the idea remain optimistic and believe that lab-grown meat will gain greater popularity within a few years, entering both supermarkets and mainstream restaurants.[103] Another issue that could hold back lab-grown meat from replacing animal agriculture is a stigma surrounding it; many people find the concept of lab-grown meat repulsive because of a notion that it is unnatural and thus unappetizing.[104]

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[100] *About*, NEW HARVEST (Sept. 9, 2016), http://www.new-harvest.org/about [https://perma.cc/N9LU-QPF7].

[101] Marta Zaraska, *Lab-Grown Meat is in Your Future, and It May be Healthier Than the Real Stuff*, WASH. POST (May 2, 2016), https://www.washingtonpost.com/national/health-science/lab-grown-meat-is-in-your-future-and-it-may-be-healthier-than-the-real-stuff/2016/05/02/aa893f34-e630-11e5-a6f3-21ccdbc5f74e_story.html?utm_term=.8878df407fb1 [https://perma.cc/376Q-FADS].

[102] *See* Isha Datar & Daan Luining, *Mark Post's Cultured Beef*, NEW HARVEST (Nov. 3, 2016), http://www.new-harvest.org/mark_post_cultured_beef [https://perma.cc/H8TQ-G26J].

[103] *See* Zaraska, *supra* note 101.

[104] Eliza Barclay, *Heck No or Let's Go? Your Thoughts on Lab Grown Meat*, NPR: THE SALT (Aug. 6, 2013),

There is also a strong trend towards eating all-natural, organic, and locally grown food, and the concept of lab-grown meat, although helpful in lessening many environmental harms, cuts against this trend, which could make many consumers averse to the idea.[105]

Despite these obstacles with lab-grown meat, I suggest that this form of technological solution to climate change is worth investing in because if even a fraction of meat and dairy consumers switched to lab-grown products, livestock's impact on the environment would be significantly lessened. This method, which would reduce meat consumption generally, has other benefits, such as saving water and promoting individual health.[106] This holds true not only for meat and dairy, but also for chicken, fish, eggs, leather, or fur, which would therefore lessen both a multitude of environmental problems and address animal rights issues.

VI. CONCLUSION

Livestock accounts for 14.5 percent of all greenhouse gas emissions.[107] This is too large of a contribution to climate change to be ignored, but it still does not seem to be one of the mainstream targets of climate change activists. Action is therefore necessary, and the work done by California regarding short-lived climate pollutants and the proposed action by the EPA in 2010 represents valiant efforts on the part of advocates and legislators. These efforts need to be further expanded, however. EPA's genuine efforts towards finding solutions to climate change are currently at risk because of the current administration, as climate change policies are being chipped away. California's Senate Bill 1383, on the other hand, demonstrates the great change possible on the state level to stop livestock air pollutants, and it would be beneficial if it were adopted by other jurisdictions. California's plan still leaves large

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https://www.npr.org/sections/thesalt/2013/08/06/209495866/heck-no-or-lets-go-your-thoughts-on-lab-grown-meat [https://perma.cc/NYD8-JE6M].

[105] *Id.*

[106] Zaraska, *supra* note 101.

[107] *Key Facts and Findings*, *supra* note 1.

emission gaps, however, and it would still ultimately leave over half of livestock emissions in the atmosphere.

Consequently, there needs to be a multitude of efforts to address this issue, both through legislation and through reduction in meat and dairy consumption to ensure the maximum reductions in greenhouse gases. Animal agriculture subsidies continue to create a strong barrier to both methods, and they will likely continue to do so if they remain in place. Therefore, it is likely that there will need to be an upheaval of this long-held government policy, as well as cultural and social change through eating more plant-based diets or investing in and switching to lab-grown meat. Although these efforts face great obstacles, movement towards both would ultimately prove fruitful because livestock emissions contribute so much to climate change. If the hundreds of thousands of tons of methane, carbon dioxide, and nitrous oxide produced by cows could be stopped, or even significantly lowered, global warming would be lessened and thus save the world from the ever-devastating current and future effects of climate change. Therefore, the issue of livestock emissions should be attacked both through legislation and other means to reduce the maximum amounts of methane, carbon dioxide, and nitrous oxide as possible from animal agriculture.