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CORN, COWS, AND CLIMATE CHANGE: HOW FEDERAL AGRICULTURAL SUBSIDIES ENABLE FACTORY FARMING AND EXACERBATE U.S. GREENHOUSE GAS EMISSIONS

Trevor J. Smith*

Abstract:

As people around the globe grapple with the realities of an ever-warming planet, Americans, too, are coping with some of the attendant consequences of climate change: severe droughts, storms, and wildfires to name just a few. In response, Americans are evaluating their personal and collective contributions to the climate crisis. Notwithstanding President Trump's unilateral move in June 2017 to withdraw the United States from the Paris Agreement, the international community is pressing forward with comprehensive strategies to mitigate anthropogenic sources of atmospheric carbon. Despite their best efforts, however, most of these actions focus on the energy and transportation sectors while largely ignoring the most significant, though lesser acknowledged, climate culprit of them all: industrial animal agriculture (or "factory farming").

Like many of its international counterparts, the United States currently has no broad-based plan to mitigate carbon emissions from its livestock industry. However, if Americans can garner the political will to prioritize the climate impacts of animal agriculture, any effective emissions-reduction strategy must be multi-faceted. The strategy must address the underlying drivers of factory farming and not just livestock-related emissions. This necessarily requires an overhaul of federal crop subsidies that provide livestock producers with a glut of cheap feed grains—corn and soy, specifically—that enable them to produce meat well below its true cost. Shifting federal subsidies away from commodity crops and toward a broader array of fruits, vegetables, and nuts (or "specialty crops") could level the playing field between commodity crop and specialty crop production. Additionally, shifting federal subsidies to specialty crops could catalyze a change in consumer choices away from carbon-intensive meat and toward more carbon-neutral, plant-based alternatives.

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INTRODUCTION

Climate scientists overwhelmingly agree that our planet is warming, and that humans are primarily to blame.[1] Earth's average temperature increased between 0.4 and 0.8 degrees Celsius during the past 100 years.[2] As a result, the polar ice caps are melting, sea levels are rising, oceans are acidifying, habitats are shrinking, and severe weather events are intensifying.[3]

There are no indications these distressing trends will decelerate anytime soon. The Intergovernmental Panel on Climate Change (IPCC)—an international body of scientists that assesses the research on climate change and advises policymakers[4]—"recently predicted that average global

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1. *Scientific Consensus: Earth's Climate is Warming*, NASA, https://climate.nasa.gov/scientific-consensus/ [HTTPS://PERMA.CC/RXJ7-DEKM] (last visited Mar. 12, 2019).

2. *See Global Warming: News, Facts, Causes & Effects*, LIVESCIENCE, https://www.livescience.com/topics/global-warming [https://perma.cc/M5JV-EEP4] (last visited Mar. 12, 2019).

3. *See*, *e.g.*, *How Climate is Changing*, NASA, https://climate.nasa.gov/effects/ [https://perma.cc/M74U-MMW8] (last visited Mar. 12, 2019) (detailing some of the predicted long-term impacts of climate change, including: lengthened frost-free seasons, more droughts and heat waves, stronger and more intense hurricanes, sea level rise of one to four feet by 2100, and an ice-free Arctic).

4. *About the IPCC*, INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, https://www.ipcc.ch/about/ [https://perma.cc/NFG3-KALS] (last visited Mar. 12, 2019).

temperatures could increase between 1.4 and 5.8 degrees Celsius by the year 2100."[5] In light of this startling prediction, the 2015 Paris Agreement, an outgrowth of the original 1992 United Nations Framework Convention on Climate Change (UNFCCC),[6] set an ambitious goal of "strengthen[ing] the global response to the threat of climate change by keeping a global temperature rise this century well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius."[7]

The temperature hike over the last fifty years is largely attributable to a handful of anthropogenic activities, such as the burning of fossil fuels, land clearing, and agricultural practices.[8] However, despite the efforts of the international community to stave off rising temperatures, they have ignored the largest contributor of greenhouse gas emissions: animal agriculture. Nearly all of the focus has been on reducing carbon emissions from the energy and transportation sectors while "neglecting agriculture generally and livestock production in particular."[9]

In its seminal 2006 report, *Livestock's Long Shadow*, the United Nations Food and Agriculture Organization (FAO) conducted a broad assessment regarding the magnitude of greenhouse gas emissions attributable to livestock production.[10] "The FAO estimated that livestock production was responsible for 18% of global [greenhouse gas emissions]

5. *See* LIVESCIENCE, *supra* note 2.

6. *See About the Secretariat*, U.N. FRAMEWORK CONVENTION ON CLIMATE CHANGE SECRETARIAT, https://unfccc.int/about-us/about-the-secretariat [https://perma.cc/8W4H-NPXE] (last visited Mar. 12, 2019).

7. *The Paris Agreement*, U.N. FRAMEWORK CONVENTION ON CLIMATE CHANGE SECRETARIAT, https://unfccc.int/process/the-paris-agreement/the-paris-agreement [https://perma.cc/UT3Q-3CJT] (last visited Mar. 12, 2019).

8. *See* LIVESCIENCE, *supra* note 2.

9. *See* Debra L. Donahue, *Livestock Production, Climate Change, and Human Health: Closing the Awareness Gap*, 45 ENVTL. L. REP. NEWS & ANALYSIS 11112, 11113 (2015) (citing ROB BAILEY ET AL., CHATHAM HOUSE: ROYAL INST. OF INT'L AFFS., LIVESTOCK—CLIMATE CHANGE'S FORGOTTEN SECTOR: GLOBAL PUB. OPINION ON MEAT AND DAIRY CONSUMPTION 12 (2014)).

10. FOOD & AGRIC. ORG. OF THE U.N., LIVESTOCK'S LONG SHADOW: ENVTL. ISSUES AND OPTIONS xxi (2006), http://www.fao.org/docrep/010/a0701e/a0701e00.HTM [https://perma.cc/D4NM-AUPV] (last visited Mar. 12, 2019).

in carbon dioxide equivalent,"[11] which may not seem too hefty on its face. Importantly, though, livestock accounted for 35-40% of all anthropogenic sources of methane and 65% of nitrous oxide—two highly potent greenhouse gases.[12] Based on these figures, the report concluded that livestock's contribution to climate change exceeded that of the global transportation sector.[13] According to the FAO's more recent calculations from 2013, total emissions from global livestock represent 14.5% of all anthropogenic greenhouse gas emissions.[14] Most scientists concur that livestock's share of total greenhouse gas emissions globally is in the 14-18% range.[15]

Increasing numbers of scientists warn that in order to avoid surpassing the internationally-recognized two-degree temperature-rise threshold, nations must make significant short-term reductions in all greenhouse gas emissions, with a primary focus on reducing methane emissions from livestock production.[16] Despite this clarion call, of the 40 developed countries listed under Annex I of the UNFCCC,[17] only Bulgaria and France had established a quantitative reduction target for livestock-related emissions in 2015.[18]

Like the vast majority of developed countries, the United States also lacks a comprehensive strategy to mitigate

11. Donahue, *supra* note 9, at 11112 (citing LIVESTOCK'S LONG SHADOW, *supra* note 10, at 112, tbl. 3–12 at 113, 114, 272).

12. *See id*., *supra* note 9, at 11112.

13. *See id*., *supra* note 9, at 11112.

14. *Key Facts and Findings*, FOOD AND AGRIC. ORG. OF THE U.N., http://www.fao.org/news/story/en/item/197623/icode/ [https://perma.cc/8RHH-2BW4] (last visited Mar. 12, 2019). To access the full 2013 report, *Tackling Climate Change Through Livestock: A Global Assessment of Emissions and Mitigation Opportunities*, *see* http://www.fao.org/3/a-i3437e.pdf [https://perma.cc/R7D6-EVZU].

15. *See* Donahue, *supra* note 9, at 11113.

16. *See id*., *supra* note 9, at 11113.

17. *See id*., *supra* note 9, at 11113. The UNFCCC divides countries into three main groups—Annex I, Annex II, and Non-Annex 1 Parties—according to differing commitments. Annex I Parties include the industrialized countries that were members of the Organization for Economic Co-operation and Development in 1992, plus countries with economies in transition, including the Russian Federation, the Baltic States, and several Central and Eastern European States. *See Parties and Observers*, U.N. FRAMEWORK CONVENTION ON CLIMATE CHANGE SECRETARIAT, https://unfccc.int/parties-observers [https://perma.cc/D4YC-QBGQ] (last visited Mar. 12, 2019).

18. *See* Donahue, *supra* note 9, at 11113.

emissions from animal agriculture. Livestock is the number one source of methane emissions in this country, and "[c]attle are the main contributor to the [livestock] sector's [greenhouse gas] emissions."[19] Despite this reality, the United States Environmental Protection Agency (EPA) has been severely underestimating livestock-related emissions. Livestock operations across the country reportedly emit almost twice what the EPA attributes to them in its recent inventories.[20] To its credit, the EPA maintains a list of voluntary measures the livestock industry can employ to reduce its carbon footprint.[21]

But voluntary action is no substitute for comprehensive federal regulation. If the United States and other nations do not begin to implement stringent regulatory schemes aimed at reducing greenhouse gas emissions from livestock, scientists warn that agriculture-related emissions *alone* will almost reach the full two-degree target emissions allowance by 2050.[22] The U.N. cautions that "even with ambitious supply-side mitigation in the agricultural sector, without radical shifts in the *consumption* of meat and dairy products, growth in agricultural emissions will leave insufficient space within a two-degree carbon budget for other sectors"[23] like energy or transportation. Although it is theoretically possible to decarbonize energy supply, complete reductions are not feasible in the livestock part of the agricultural sector because of the biological realities of ruminant digestion—farm animals release excessive amounts of methane. (*See infra* Part I.) Therefore, to achieve significant reductions in emissions from animal agriculture, we must focus on demand-side reductions by encouraging greater consumption of a diverse array of

19. *See id*., *supra* note 9, at 11113 (citing Pierre J. Gerber et al., Food & Agric. Org. of the United Nations, *Tackling Climate Change Through Livestock: A Global Assessment of Emissions and Mitigation Opportunities* 15 (2013)).

20. *See* Scot M. Miller et al., *Anthropogenic Emissions of Methane in the United States*., 110 PROCS. NAT'L ACAD. SCI. 20018, 20020, 20022 (2013).

21. *See Sources of Greenhouse Gas Emissions*., U.S. ENVTL. PROT. AGENCY, https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions [https://perma.cc/2PCA-FCP9] (last visited Mar. 12, 2019).

22. *See* Donahue, *supra* note 9, at 11114 (citing Bojana Bajzelj et al., *Importance of Food-Demand Mgmt. for Climate Mitigation*, 4 NATURE CLIMATE CHANGE 924, 924 (2014)).

23. *Id*. (quoting BAILEY ET AL., *supra* note 10, at 12).

specialty crops[24]—like fruits, vegetables, and nuts—and other plant-based foods.

In the following sections, I provide a general overview of greenhouse gas emissions from agriculture and livestock production in the United States, explaining why the animal agriculture sector is the leading source of greenhouse gas emissions. I then examine the multibillion-dollar federal agricultural subsidies programs, which have led to the cost of meat being artificially low and have prioritized commodity crop production—the vast majority of which is used as livestock feed—over other fruits and vegetables. This is the result of efforts by the agribusiness lobby that has commandeered a once well-intentioned welfare program for small farmers. Finally, I suggest that one potential way to mitigate livestock-related emissions in the United States is to redirect federal agricultural subsidies, particularly crop insurance subsidies, away from industrial commodity crops and toward a broader array of fruits, vegetables, and specialty crops. In theory, allowing these specialty crops to fairly compete in the market could, in turn, encourage consumers to buy more affordable—and less carbon-polluting—fruits and vegetables while simultaneously weaning themselves off of commodity-crop fed and more carbon-intensive meat.

I. GREENHOUSE GAS EMISSIONS FROM AMERICAN ANIMAL AGRICULTURE

Agriculture is the largest use of land in the United States.[25] A 2012 study from the United States Department of Agriculture (USDA) estimated that land used for agricultural purposes, including cropland, grassland pasture and range,

24. *See generally* § 101 of the Specialty Crops Competitiveness Act of 2004, 7 U.S.C. § 1621, and amended under § 10010 of the Agricultural Act of 2014, Public Law 113–79 (the "Farm Bill"), defines specialty crops as "fruits and vegetables, tree nuts, dried fruits, horticulture, and nursery crops (including floriculture)". For a full list of specialty crops, see *What is a Specialty Crop?*, U.S. DEP'T OF AGRIC., https://www.ams.usda.gov/services/grants/scbgp/specialty-crop [https://perma.cc/4MCB-8P4C] (last visited Mar. 12, 2019).

25. DANIEL P. BIGELOW & ALLISON BORCHERS, U.S. DEP'T OF AGRIC., MAJOR USES OF LAND IN THE UNITED STATES, 2012, at 3, 4 (2017), https://www.ers.usda.gov/webdocs/publications/84880/eib-178.pdf?v=0 [https://perma.cc/K78C-LWU9] (last visited Mar. 12, 2019).

grazed forestland, land in farmsteads, and the area occupied by farm roads and lanes, totaled 1.18 billion acres, or 52.5% of the United States' total landmass and about 63% of the landmass in the lower 48 states.[26] Of the country's 2.3 billion total acres, roughly 380 million acres are used as cropland, 655 million acres as grassland pasture and range, and 130 million acres as grazed forestland.[27] Because of agriculture's dominant footprint across the national landscape, even relatively minor changes in agricultural practices when broadly implemented can have substantial impacts on the sector's overall contribution to climate change.

The EPA estimates that emissions from agriculture account for nearly 8% of annual U.S. greenhouse gas emissions.[28] At first glance, this may appear rather insignificant, particularly when juxtaposed with energy-related activities, including electricity generation and transportation. Indeed, the energy and transportation sectors are the primary sources of the country's anthropogenic greenhouse gases, accounting for over 84% of total emissions.[29] But upon closer inspection, agriculture is the primary climate-impacting culprit because of the outsized radiative effects of methane and nitrous oxide as compared to carbon dioxide. This may come as a surprise to many Americans.

While energy-related activities primarily emit carbon dioxide through the burning of fossil fuels, "crop and livestock greenhouse gas emissions consist largely of nitrous oxide and methane," both of which are notoriously potent greenhouse gases.[30] The average global warming potential of nitrous oxide and methane is, respectively, 265-298 times and 28-36 times that of carbon dioxide over 100 years.[31] Thus, while the energy

26. *See id*.

27. *Id*. at 4 tbl. 1 (Agricultural and nonagricultural uses of U.S. land, 2012).

28. U.S. ENVTL. PROT. AGENCY, INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS, 1990–2015, at 5–1 (2017), https://www.epa.gov/sites/production/files/2017-02/documents/2017_complete_report.pdf [https://perma.cc/42QY-SXVT] (last visited Mar. 12, 2019).

29. *Id*. at 3–1.

30. *See* Peter Lehner & Nathan A. Rosenberg, *Legal Pathways to Carbon-Neutral Agriculture*., 47 ENVTL. L. REP. NEWS & ANALYSIS 10845, 10846 (2017).

31. *Understanding Global Warming Potentials*, U.S. ENVTL. PROT. AGENCY, https://www.epa.gov/ghgemissions/understanding-global-warming-potentials [https://perma.cc/MB29-DC6Q] (last visited Mar. 12, 2019).

and transportation sectors combined emit 97% of the nation's carbon dioxide,[32] their climate change impacts are outweighed by the agriculture sector's contribution of 35% of the nation's methane emissions and 80% of its nitrous oxide emissions.[33] Put into perspective, in 2015, agricultural emissions of methane and nitrous oxide were the equivalent of 520 million metric tons of carbon dioxide—or the carbon emissions from 111 million automobiles in an average year.[34]

The vast majority of agricultural greenhouse gas emissions are inextricably linked to one conspicuously problematic behemoth—industrial animal agriculture (also colloquially called "factory farms" or "concentrated animal feeding operations" (CAFOs) in federal environmental statutes). Meat and dairy production account for nearly 80% of all the agricultural emissions in the United States.[35] According to EPA studies, the top three sources of U.S. agricultural emissions are (1) soil management, (2) enteric fermentation, and (3) manure management,[36] which directly or tangentially relate to intensive livestock production.

Soil management generally refers to various practices

32. U.S. ENVTL. PROT. AGENCY, *supra* note 28, at 3–1.

33. *Overview of Greenhouse Gases: Methane Emissions*, U.S. ENVTL. PROT. AGENCY, https://www.epa.gov/ghgemissions/overview-greenhouse-gases [https://perma.cc/G65B-BQV6] (last visited Mar. 12, 2019); *Overview of Greenhouse Gases: Nitrous Oxide Emissions*, U.S. ENVTL. PROT. AGENCY, https://www.epa.gov/ghgemissions/overview-greenhouse-gases [https://perma.cc/Y4WC-6H26] (last visited Mar. 12, 2019).

34. *See* Lehner & Rosenberg, *supra* note 30 (comparing the EPA's 2015 inventory of greenhouse gas emissions from the agricultural sector with typical passenger vehicles, which emit about 4.7 metric tons of carbon dioxide annually); *see also Greenhouse Gas Emissions from a Typical Passenger Vehicle*, U.S. ENVTL. PROT. AGENCY, https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle [https://perma.cc/7XUH-DL23] (last visited Mar. 12, 2019).

35. *See* Lehner & Rosenberg, *supra* note 30, at 10848, n.27 (calculating that the collective emissions from enteric fermentation, manure management, and nitrous oxide emissions from agricultural soils devoted to feed crop production and grazing are responsible for 405.1 MMT carbon dioxide eq. annually, or 78% of total U.S. agricultural emissions).

36. *See* Lehner & Rosenberg, *supra* note 30, at 10846–47. Agriculture also produces carbon dioxide emissions from on-farm fossil fuel combustion and from the energy inputs to produce pesticides and fertilizer. *See generally* CLAUDIA HITAJ & SHELLYE SUTTLES, U.S. DEP'T OF AGRIC., TRENDS IN U.S. AGRICULTURE'S CONSUMPTION AND PRODUCTION OF ENERGY: RENEWABLE POWER, SHALE ENERGY, AND CELLULOSIC BIOMAS (2016), https://www.ers.usda.gov/webdocs/publications/74658/60128_eib159.pdf?v=42593 [https://perma.cc/VH4M-BA6G] (last visited Mar. 12, 2019).

designed to improve crop yield—like fertilization—and is responsible for "48% of all U.S. agricultural emissions and 93% of all U.S. nitrous oxide emissions."[37] From 1990 to 2015, 74% of these nitrous oxide emissions came from cropland (as opposed to grazed grasslands).[38] Notably, over three-quarters of all harvested cropland in this country is devoted to feed crop production.[39] "This cropland is often cultivated more intensely than cropland growing human food, with the result that feed crop production can emit more nitrous oxide per acre than the production of crops for human consumption."[40]

The second largest source is enteric fermentation, which accounts for 32% of the nation's agricultural emissions and 25% of its total methane emissions.[41] Enteric fermentation is the scientific term for the normal digestive processes of ruminant animals (primarily cows and sheep), during which microbes resident in an animal's digestive system ferment the plants and grasses consumed by the animal.[42] The fermentation process produces methane as a byproduct, which the animals "exhale" and "eructate" (or, in pedestrian terms, "burp" and "fart") into the air.[43]

Manure management is the third major category, releasing approximately two million tons of nitrous oxide and methane emissions annually[44] and accounting for 16% of the nation's total agricultural emissions.[45] Factory farms produce the bulk

37. *See* Lehner & Rosenberg, *supra* note 30, at 10846–47 (citing U.S. ENVTL. PROT. AGENCY, *supra* note 28, at 5–2, 5–21, 5–22).

38. *See id*., *supra* note 30, at 5–24, tbl. 5–15.

39. *See* BIGELOW & BORCHERS, *supra* note 25, at 20, 24 tbl. 6 (USDA estimated that of the 308 million acres of harvested cropland in 2012, approximately 237 million acres were used for feed crops, while only about 61 million acres were used for food crops).

40. *See* Lehner & Rosenberg, *supra* note 30, at 10847.

41. *See* U.S. ENVTL. PROT. AGENCY, *supra* note 28, at 5–2, tbl. 5–1.

42. *See id*., *supra* note 28, at 5–3.

43. *See id.*

44. *See* R. Jason Richards & Erica L. Richards, *Cheap Meat: How Factory Farming is Harming Our Health, the Environment, and the Economy*, 4 KY. J. EQUINE, AGRIC., & NAT. RESOURCES L. 31, 41 (2012) (citing DAVID KIRBY, ANIMAL FACTORY: THE LOOMING THREAT OF INDUSTRIAL PIG, DIARY, AND POULTRY FARMS TO HUMANS AND THE ENVIRONMENT xiv (St. Martin's Press 2010)).

45. *See* Lehner & Rosenberg, *supra* note 30, at 10847 (citing U.S. ENVTL. PROT. AGENCY, *supra* note 28, at 5–2, tbl. 5–1).

of these manure-based emissions.[46] The numbers could be significantly reduced if the livestock were allowed to spread out over larger geographic areas and in smaller herds, but that practice is not consistent with standard factory farming operations.[47] Instead, factory farms typically house upwards of hundreds of animals in a single shed or warehouse-like structure, and the manure is collected in waste "lagoons."[48] These lagoons produce substantially more emissions than would be produced by the same number of animals if they were less confined or permitted to freely roam.[49] According to the EPA, "[w]hen livestock or poultry manure are stored or treated in systems that promote anaerobic conditions (e.g., as a liquid/slurry in lagoons, ponds, tanks, or pits), the decomposition of the volatile solids component in the manure tends to produce [methane]."[50] Alternatively, the EPA recommends as an emissions-reducing measure that manure be handled as a solid (e.g., in stacks or drylots) or deposited on pasture, range, or paddock lands, as it tends to decompose aerobically and produce little or no methane.[51]

II. THE INFLUENCE OF FEDERAL FARM SUBSIDIES ON INEXPENSIVE MEAT PRODUCTION

Meat consumption in the U.S. is expected to rise through 2019.[52] According to data from the USDA's National Agricultural Statistics Service, the average American consumer ate 217.75 pounds of red meat and poultry in 2018,[53]

46. *See* Lehner & Rosenberg, *supra* note 30, at 10847.

47. *See* Richards & Richards, *supra* note 44, at 41 (citing KIRBY, *supra* note 44, at xiv, 73).

48. *See id.*, *supra* note 44, at 33, 41.

49. *See id.*, *supra* note 44, at 41 (citing KIRBY, *supra* note 44, at 73).

50. U.S. ENVTL. PROT. AGENCY, *supra* note 28, at 5–9; *see also* U.S. ENVTL. PROT. AGENCY, *supra* note 21 (providing a caveat that while handling manure as a solid or depositing it on pasture rather than storing it in a liquid-based system such as a lagoon would likely reduce methane emissions, it may actually increase nitrous oxide emissions).

51. U.S. ENVTL. PROT. AGENCY, *supra* note 28, at 5–9.

52. *See* Lester Aldrich, *USDA Sees Total Meat Consumption Rising Through 2019*, ZIA COMMODITIES (May 25, 2018), http://ziacommodities.com/usda-sees-total-meat-consumption-rising-2019/ [https://perma.cc/PM23-8EUT] (last visited Mar. 12, 2019).

53. *See id.*

slightly less than the previous record of 221.9 pounds in 2004, but far surpassing average consumption 35 years ago at 181.4 pounds.[54] In 2019, "total red meat and poultry consumption could rise to 217.78 pounds, a 0.03-pound, or 0.01%, gain from [2018]."[55] In 2018, domestic meat production surpassed 100 billion pounds for the first time, "as livestock owners expand[ed] their herds on the back of cheap feed grain."[56] Given America's swelling appetite for meat, if the country is going to make any real progress toward mitigating the significant climate-change impacts of animal agriculture, it must first address the underlying financial drivers that are helping enable the production of inexpensive meat.

In addition to gaping loopholes in federal environmental and animal-protection laws for industrial animal agriculture operations,[57] some of the primary enablers of factory farming are federal agricultural support programs for commodity crops, based on the Farm Bill. The Farm Bill is a multi-year, omnibus legislation passed roughly every five years that creates and reauthorizes federal programs dedicated to, among other things, crop insurance, soil conservation, commodity price guarantees, and food assistance to low-income earners.[58] Today, the federal government doles out about $20 billion annually in "farm safety net" programs, with about 60% of that funding devoted to just three commodity crops—corn, soybeans, and wheat.[59] In short, these federal subsidies effectively keep the prices of commodity crops artificially lower

54. *See* Megan Durisin & Shruti Singh, *Americans Will Eat a Record Amount of Meat in 2018*, BLOOMBERG (Jan. 2, 2018), https://www.bloomberg.com/news/articles/2018-01-02/have-a-meaty-new-year-americans-will-eat-record-amount-in-2018 (last visited Feb. 13, 2018).

55. Aldrich, *supra* note 52.

56. *See* Durisin & Singh, *supra* note 54.

57. *See*, *e.g.*, Emily Kenyon, *Enough of This Manure: Why the EPA Needs to Define the Agricultural Stormwater Exemption to Limit the "Runoff" from the ALT Court*, 92 N.Y.U. L. REV. 1187 (2017) (discussing the lax federal regulatory regime of water pollution generated on CAFOs); *see also* Rachel Walker, *Blood on the Hands of the Federal Government: Affirmative Steps That Promote Animal Cruelty*, 4 J. ANIMAL L. & ETHICS 183 (2011) (discussing broad exemptions for farm animals in federal cruelty to animals statutes).

58. *See generally The 2014 Farm Bill*, http://www.thefarmbill.com [https://perma.cc/UMX3-N7KC] (last visited Mar. 12, 2019).

59. *See* Lehner & Rosenberg, *supra* note 30, at 10862, 10868.

than true market value; farmers are thereby encouraged to overproduce, which floods the market and allows livestock producers to buy up surplus grains at (or even below) their production cost to use as animal feed. Low-cost feed reduces production costs for meat and translates to lower prices, arguably enticing consumers to buy more affordable meat.[60]

To fully understand the current farm subsidies system in the United States and its influence on low-cost meat production, it must be viewed in its historical context. Federal farm support programs began in the late 1920s in response to the unstable economic conditions in the agricultural sector caused by the Great Depression and the 1930s Dust Bowl.[61] The first iteration of the Farm Bill emerged in the late 1940s during the post-World War II economic boom. Two decades later, at the behest of the newly emerged agribusiness lobby, Congress dramatically expanded the subsidies program to include direct price deficit payments.[62] Below is a synopsis of some of the key developments in the history of agricultural subsidies over the past 90 years. The section highlights some of the major policy shifts that have essentially handed industrial farming—and, thereby, industrial animal agriculture—the economic advantage over smaller, less intensive, and less polluting farms and producers.

A. The Great Depression and the New Deal

During the 1920s, "[t]he farm crisis was 'triggered not by too little food, but by too much.'"[63] Overplanting, coupled with advances in mechanization and soil input, led to vast

60. Notably, though, artificially depreciated feed costs are countered by the increase in corn and soybean costs associated with conversion to biofuel. *See* Arnold W. Reitze, Jr., *Biofuel and Advanced Biofuel*, 33 UCLA J. ENVTL. L. & POL'Y 309, 333–334 (2015) (noting that "[t]he mandated use of ethanol for fuel and the billions of dollars provided in government subsidies benefits the corn producers and to a lesser extent soybean farmers, but livestock and poultry farmers complain that the demand for corn-based ethanol increases their costs for feed corn").

61. *See* Anthony Kammer, *Cornography: Perverse Incentives and the United States Corn Subsidy*, 8 J. FOOD L. & POL'Y 1, 8 (2012).

62. *Id*. at 13.

63. William S. Eubanks II, *A Rotten System: Subsidizing Environmental Degradation and Poor Public Health with Our Nation's Tax Dollars*, 29 STAN. ENVTL. L. J. 213, 218 (2009) (quoting DANIEL IMHOFF, FOOD FIGHT: THE CITIZEN'S GUIDE TO THE NEXT FOOD AND FARM BILL, 33 (Watershed Media 2007)).

overproduction of most crops, and prices began to dramatically fall.[64] In response, Congress first approved large-scale direct subsidies to farmers in 1929 with the passage of the Agricultural Marketing Act.[65] In an effort to stave off a deflationary spiral of food prices, the Act authorized the newly created Federal Farm Board to spend $500 million to stabilize prices through direct lending to farmers and government buy-outs of surplus crops.[66] Ultimately, the bill was unable to stop crop prices from falling; by 1933, "the price of corn registered at zero and grain elevators refused to buy any surplus corn."[67]

In 1933, as part of President Franklin Roosevelt's New Deal agenda, Congress passed the Agricultural Adjustment Act. The Act set mandatory price supports for corn, cotton, and wheat that offered farmers government-sponsored loans to make up the difference between production costs and market prices, "making sure the price of a commodity never deviated too far from its parity price relative to farmers' expenses."[68] In addition, the Act authorized the government "to extend loans to farmers to grow additional staple commodities, such as corn, during good years," which the government would store and release later when crop yields were low.[69] The Supreme Court struck down parts of the 1933 Act, but Congress passed the 1938 Agriculture Adjustment Act after President Roosevelt's infamous 1937 court-packing plan, successfully instituting the farm subsidy policies first introduced in the 1933 legislation.[70] Importantly, the 1938 Act established the basic framework for all subsequent Farm Bills and is still the prominent policy backdrop for current commodity programs and farm income supports.[71]

64. *See id*. at 218–19.

65. *See* Kammer, *supra* note 61, at 9.

66. *See id*.

67. *See* Eubanks, *supra* note 63, at 219.

68. Kammer, *supra* note 61, at 10.

69. *Id*.

70. *See id*.

71. *See* Kammer, *supra* note 61, at 11; *see also* Eubanks, *supra* note 63, at 221–22.

B. The Post-War Rise of the Multi-Year Farm Bill and the Big Ag Lobby

In the initial post-World War II years, federal farm policy continued to focus on combating rural poverty and mitigating the inclination for overproduction in impoverished agricultural communities.[72] To achieve those goals, Congress continued to appropriate funding "through a combination of direct assistance programs, subsidies for farmers who agreed to take land out of production, and by making farm credit more readily available."[73] However, in the decades that followed the War, many of the original "programs designed to save the family farm had the unintended consequence of lavishing the greatest benefits on the largest producers."[74] Smaller farms were increasingly consolidated into "larger, more industrial operations."[75] Between 1945 and 1970 the total number of farms in United States precipitously dropped from nearly 6 million to around 2.5 million.[76] Meanwhile, the average farm size more than doubled.[77]

The sharp decline of small farms in the post-war decades can be traced to the concomitant scientific advances in agriculture during that same period. Specifically, the huge strides in plant-breeding/hybridization technology during the Green Revolution[78] coupled with the development of new pesticides and herbicides during the mid-20th century led to increased crop yields and predictably rapid price declines, "reminiscent of the farm crisis during the Great Depression."[79] However, during this newer farm crisis the government did not

72. *See* Kammer, *supra* note 61, at 11.

73. *Id.*

74. Eubanks, *supra* note 63, at 221–22 (quoting DENNIS KEENEY & LONI KEMP, INST. FOR AGRIC. & TRADE POL'Y', A NEW AGRICULTURAL POLICY FOR THE UNITED STATES 8 (2003)).

75. *See* Kammer, *supra* note 61, at 11.

76. *See The Number of Farms Has Leveled Off at About 2.05 Million*, U.S. DEP'T OF AGRIC. (2017), https://www.ers.usda.gov/data-products/chart-gallery/gallery/chart-detail/?chartId=58268 [https://perma.cc/KLM3-FWN5] (last visited Mar. 12, 2019).

77. *See id*.

78. For a brief synopsis of the Green Revolution, see *Green Revolution*, THE ENVTL. LITERACY COUNCIL, https://enviroliteracy.org/food/food-production-supply/green-revolution/ [https://perma.cc/695X-K7Y9] (last visited Mar. 12, 2019).

79. *See* Eubanks, *supra* note 63, at 222.

step in to protect the small farmers. Instead, the newly established large, industrial farms were able to weather the depressed market while further consolidating their land holdings by purchasing foreclosed smaller farms at bargain prices.[80]

In addition to expanding their financial power in the post-war decades, these large farms also joined forces with one another to create the first agribusiness lobby, and they leveraged their new political power to influence the policy priorities of the various Farm Bills during this period.[81]

The Food and Agriculture Act of 1965 was the first omnibus multi-year farm legislation and continues to serve as Congress' basic template for food policy.[82] As one legal scholar notes, the concept of the multi-year Farm Bill was "to provide policy-makers with opportunities to make regular, comprehensive changes to food and agriculture policy, but instead [it] provided more frequent intervals for lobbyists to influence the legislation."[83] For example, the 1965 Act established mandatory acreage allotments, planting restrictions, and marketing quotas,[84] all of which disproportionately favored large farms.

C. The 1970s Food Crisis and the Ensuing Subsidies "Spigot"

Global crop production severely declined in the early 1970s, leading to an international food crisis that set the stage for arguably the most significant shift in farm policy since the Great Depression.[85] Capitalizing on the alarming food insecurities worldwide, Congress passed the 1973 Agriculture and Consumer Protection Act.[86] One of the most notable parts of this transformative bill was the creation of a system of target prices and deficiency payments, whereby commodity producers received direct payments from the federal government "anytime the market price fell below the

80. *See id.*

81. *See id.*

82. *See* Kammer, *supra* note 61, at 13.

83. *Id.*, *supra* note 61, at 11.

84. *See* Kammer, *supra* note 61, at 13.

85. *See id.*, *supra* note 61, at 14.

86. *See id.*

Congressionally specified target price."[87]

This new system of price guarantees was one piece of a larger policy agenda of the Nixon administration to massively expand American commodity production—even to the point of overproduction. President Nixon's Secretary of Agriculture at the time, Earl Butz, vociferously advocated for farmers to "get big or get out" and to "plant from fencerow to fencerow",[88] "arguing that overproduction and a resultant drop in the price of commodity grains would increase exports" abroad.[89] While subsidies had been included in every Farm Bill since its first iteration in 1933, the dramatic change under the 1973 Act from loans to deficiency payments was "'revolutionary'" because "'the new subsidies encouraged farmers to sell their [commodity crops] at any price, since the government [and thus taxpayers] would make up the difference.'"[90]

Agribusiness specifically lobbied for the shift to deficiency payments with the express goal of "ensur[ing] a steady supply of cheap commodity crops that they could trade internationally and process into value-added products"[91] like ethanol or high-fructose corn syrup.[92] With this major agribusiness-friendly shift firmly enshrined in federal legislation by 1973, some of the largest "grain processors, namely Cargill and Archer Daniels Midland (ADM), exerted considerable influence over the Farm Bill drafting process and actually wrote large industry-favorable portions of the Farm Bills in the 1980s."[93] Indeed, deficiency payments for covered commodity crops—i.e., corn, soy, and wheat—remained a central component of every subsequent Farm Bill through its 2008 iteration.

The 2002 and 2008 Farm Bills built upon the Nixon administration's original model and offered additional support to commodity farmers in the form of direct payments.[94] On top

87. *See* Kammer, *supra* note 61, at 15.

88. *See* Eubanks, *supra* note 63, at 224 (citing IMHOFF, *supra* note 63, at 38).

89. *See* Kammer, *supra* note 61, at 15.

90. *See* Eubanks, *supra* note 63, at 226 (quoting MICHAEL POLLAN, THE OMNIVORE'S DILEMMA: A NATURAL HISTORY OF FOUR MEALS 52 (The Penguin Press 2006)).

91. Eubanks, *supra* note 63, at 226 (quoting IMHOFF, *supra* note 63, at 39).

92. *See* Kammer, *supra* note 61, at 15, 24.

93. Eubanks, *supra* note 63, at 226 (citing IMHOFF, *supra* note 63, at 39 ("Cargill and Archer Daniels Midland were essentially writing the Farm Bills.")).

94. *See* Kammer, *supra* note 61, at 20.

of the deficiency payments that had been carried over into every Farm Bill since 1973, these direct payments handed commodity producers an additional fixed amount on a per-bushel basis, regardless of annual fluctuations in price or yield.[95] That is, the government guaranteed to pay farmers a certain, fixed amount "regardless of how much they actually planted or how much they would sell their crops for."[96] For example, even if market prices rose above the Congressionally established floor, under the 2002 Farm Bill, "farmers were guaranteed $2.60 from 2002-03 and $2.63 from 2004-2007 per bushel of corn under the deficiency payment system, on top of which they would receive an additional direct payment[] of 28 cents per bushel."[97] So if a bushel of corn in 2007 sold for $2.50, the farmer would receive an additional $0.41 per bushel from the government—a deficiency payment of 13 cents, plus a direct payment of 28 cents per bushel.

All told, through the early 2000s, when the deficiency and direct payments were added to the other commodity subsidies like the marketing loan program and crop insurance program (*see infra* Part II.d.1), the federal agricultural support system cost taxpayers billions of dollars.[98] Shockingly, in a single decade between 1997 and 2006, American taxpayers spent $172 billion on commodity subsidies.[99] And even more surprising, agribusiness continued to receive billions in tax dollars despite earning record profits at their megafarms: "[i]n 2005 alone, when pretax farm profits were at a near-record $72 billion, the federal government handed out more than $25 billion in aid [to big farms], almost 50 percent more than the amount it [paid] to families receiving welfare [in the United States that year]."[100]

95. *See* Kammer, *supra* note 61, at 21–22.

96. Brad Plumer, *The $956 Billion Farm Bill, In One Graph*, WASH. POST, Jan. 28, 2014, https://www.washingtonpost.com/news/wonk/wp/2014/01/28/the-950-billion-farm-bill-in-one-chart/?utm_term=.413d5cf78ef1 [https://perma.cc/2ERF-HDX7] (last visited Mar. 12, 2019).

97. Kammer, *supra* note 61, at 22.

98. *See* Eubanks, *supra* note 63, at 227.

99. Dan Morgan et al., *Farm Program Pays $1.3 Billion to People Who Don't Farm*, WASH. POST, July 2, 2006, http://www.washingtonpost.com/wp-dyn/content/article/2006/07/01/AR2006070100962.html [https://perma.cc/TG5Q-L2ZJ] (last visited Mar. 12, 2019).

100. *Id*.

D. Current Farm Bill Programs: The "Farm Safety Net"

The most recent iteration of the Farm Bill—the Agriculture Act of 2014 (more commonly referred to as the 2014 Farm Bill)—made some modest cutbacks in agricultural subsidies but still appropriated over $134 billion for crop insurance and commodity programs over the next 10 years.[101] Notably, meat producers do not receive any direct financial support under the 2014 Farm Bill (and did not under the pre-2014 program), but they remain eligible for emergency and disaster relief,[102] which totaled $9.8 billion from 1995 to 2016.[103] Ninety billion dollars was allotted for crop insurance—$7 billion more than the previous law's allocation; meanwhile, $44.4 billion was earmarked for commodity programs—$14 billion less than before.[104] Even more federal money was appropriated in the 2014 Farm Bill for subsidized loans to commodity farmers.[105] Collectively, these federal support programs are referred to as the "farm safety net".[106] Each of these three categories—crop insurance, commodity programs, and the marketing loan program—is examined in turn below.

1. Crop Insurance

The bulk of the subsidies for "farm safety net" programs go to crop insurance. For decades, farmers have been able to buy federally subsidized crop insurance in case their crops fail or prices abruptly decline. The 2014 Farm Bill expanded the crop insurance subsidies by adding $7 billion to prior allocation in

101. *See* Plumer, *supra* note 96.

102. *See* Donahue, *supra* note 9, at 11119 (citing DENNIS A. SHIELDS, CONG. RES. SERV., FARM COMMODITY PROVISIONS IN THE 2014 FARM BILL (P.L. 113–79) (2014).

103. *See EWG's Farm Subsidy Database*, ENVTL. WORKING GRP., https://farm.ewg.org/progdetail.php?fips=00000&progcode=total_lea&regionname=theUnitedStates [https://perma.cc/P5SJ-6SE2] (last visited Mar. 12, 2019).

104. *See* Plumer, *supra* note 96.

105. *Id.*

106. *See* Lehner & Rosenberg, *supra* note 30, at 10862. The "farm safety net" also includes conservation payments, which are outside the scope of this paper. The 2014 Farm Bill budgeted $57.6 billion over ten years for conservation—$4 billion less than the previous law. *See* Plumer, *supra* note 96. In short, conservation programs are designed to pay farmers to grow on less land and "to help [them] protect against soil erosion and to use ecologically friendly methods like drip irrigation." Plumer, *supra* note 96.

order to cover "the deductibles that farmers have to pay before the insurance kicks in."[107] Additionally, the federal government agreed to pay 65% of the farmers' insurance premiums.[108]

The two primary categories of crop insurance are yield protection and revenue protection.[109] As their names suggest, "[y]ield protection covers farmers when their yield falls below a certain percentage of the expected yield," as calculated from historical yields, while "[r]evenue protection covers farmers if their revenue falls below a certain percentage of expected revenue".[110] The lion's share of federal spending on crop insurance premium subsidies supports revenue protection plans.[111] "For example, $5.5 billion of the $6.7 billion spent on subsidies in 2012 was for revenue protection premium subsidies."[112] Notably, only a handful of select crops qualify for revenue protection insurance.[113]

While "[p]roponents of the current crop insurance system often portray it as a safety net for farmers in the case of natural disaster", it goes well beyond that.[114] "[I]n addition to protecting farmers from crop losses—routine or not—its use of revenue guarantees also ensures that covered crops" like corn, wheat, and soybeans remain profitable despite a drop in prices.[115] Moreover, relying on a study by the American Enterprise Institute (AEI),[116] the Environmental Working

107. *See* Plumer, *supra* note 96.

108. Tamar Haspel, *Farm Bill: Why Don't Taxpayers Subsidize the Foods That are Better for Us?*, WASH. POST (Feb. 18, 2014), https://www.washingtonpost.com/lifestyle/food/farm-bill-why-dont-taxpayers-subsidize-the-foods-that-are-better-for-us/2014/02/14/d7642a3c-9434-11e3-84e1-27626c5ef5fb_story.html?utm_term=.143a64eb6037 [https://perma.cc/UCW7-K9HB] (last visited Mar. 12, 2019).

109. Ann Jaworski, *Encouraging Climate Adaptation Through Reform of Federal Crop Insurance Subsidies*, 91 N.Y.U. L. REV. 1684, 1691 (2016).

110. *Id*. at 1691–92.

111. *See id*. at 1692.

112. *Id*.

113. *Id*.

114. Lehner & Rosenberg, *supra* note 30, at 10862.

115. *Id*.

116. *See* Anton Bekkerman et al., *Where the Money Goes: The Distribution of Crop Insurance and Other Farm Subsidy Payments*, AM. ENTER. INST. (Jan. 9, 2018), https://www.aei.org/publication/where-the-money-goes-the-distribution-of-crop-insurance-and-other-farm-subsidy-payments/ (last visited Mar. 12, 2019).

Group (EWG) argues that a disproportionate amount of these crop insurance subsidies go to the wealthiest farm operators.[117] AEI reports that "[t]he top 10 percent of farms," measured by crop sales, "received almost 70 percent of all crop insurance subsidies," and "[t]he top 2 percent received 30 percent of all premium subsidies—about $50 an acre, or four times more than the average crop insurance subsidy recipient receives."[118] And "[u]nlike traditional commodity subsidies, there are no payment limits, means testing or transparency requirements for recipients of crop insurance subsidies."[119] As EWG argues, "[t]his means that growers and farm businesses can receive unlimited taxpayer subsidies via the crop insurance program even if they are billionaires."[120]

2. Commodity Programs

"This section [of the 2014 Farm Bill] includes a variety of programs to shield [commodity] farmers against sharp fluctuations in [corn, wheat, and soybean] prices."[121] The most prominent policy change for commodity programs in 2014 was the elimination of fixed direct payments (as described above).[122] In place of direct payments, the Farm Bill boosted the variable payments to farmers and landowners "when crop prices or revenue declines."[123] Farmers must "choose between Price Loss Coverage (PLC) and Agricultural Risk Coverage (ARC) and receive payments when price (for PLC) or revenue (for ARC) drops below" the Congressionally set threshold.[124] Together, PLC and ARC distribute "more than $4 billion each

117. Scott Faber, *Have Farmers Been Forgotten by Washington?*, ENVTL. WORKING GRP. (Jan. 9, 2018), https://www.ewg.org/agmag/2018/01/have-farmers-been-forgotten-washington#.WpICGyPMwWo [https://perma.cc/XCM8-2VST] (last visited Mar. 12, 2019).

118. *Id*.

119. Colin O'Neil, *Are Billionaires Getting Crop Insurance Subsidies? We Still Don't Know*, ENVTL. WORKING GRP. (Apr. 28, 2016), https://www.ewg.org/agmag/2016/04/are-billionaires-getting-crop-insurance-subsidies-we-still-don-t-know#.WpIEkCPMwWo [https://perma.cc/EEY5-TS4P] (last visited Mar. 12, 2019).

120. *Id*.

121. Plumer, *supra* note 96.

122. *See* SHIELDS, *supra* note 102, at 1.

123. *Id*.

124. Haspel, *supra* note 108.

year" to farmers.[125]

3. Marketing Loan Program

The 2014 Farm Bill also continued a marketing assistance loan program.[126] This program has been "[a] key part of federal farm subsidies since the New Deal" era.[127] It was initially designed to give farmers "short-term financing to pay farm expenses before crops were sold", but even the CATO Institute, a self-branded libertarian think tank,[128] once concluded that "[the marketing assistance loan program] has morphed into simply another multi-billion-dollar subsidy program."[129] "Under the original system, the government extended loans to farmers to allow them to pay operational expenses before harvest, and after the crops were sold, farmers would then repay the government."[130] However, because the only penalty farmers faced for not repaying the loans was that they had to forfeit their crops to the government, over time farmers stopped repaying during years when crop prices were low.[131] Furthermore, "[o]n top of this de facto subsidy, taxpayers also bear the expense of maintaining the government's commodity stockpiles."[132] Between 1995 and 2010, these programs cost taxpayers an estimated $77.1 billion in additional subsidies to commodity farmers, averaging about $4.8 billion in annual transfers to corn producers alone.[133]

125. Lehner & Rosenberg, *supra* note 30, at 10863.

126. Donahue, *supra* note 9, at 11119.

127. Kammer, *supra* note 61, at 23.

128. *CATO's Mission*, CATO INST., https://www.cato.org/mission [https://perma.cc/R4W6-ZMCX] (last visited Mar. 12, 2019).

129. CHRIS EDWARDS & TAD DEHAVEN, FARM SUBSIDIES AT RECORD LEVELS AS CONGRESS CONSIDERS NEW FARM BILL, CATO INST. 6 (Oct. 18, 2001), https://object.cato.org/pubs/briefs/bp70.pdf.

130. Kammer, *supra* note 61, at 23–24.

131. *See id*., *supra* note 61, at 24.

132. *Id.*

133. *See id.* (citing *EWG's Farm Subsidy Database*, ENVTL. WORKING GRP., http://farm.ewg.org/ [https://perma.cc/PVP3-B32K]) (last visited Mar. 13, 2019).

III. MAKING THE CONNECTION: COMMODITY SUBSIDIES AND CHEAP MEAT

Industrial animal agriculture facilities have been some of the biggest indirect beneficiaries of our nation's commodity crop subsidies. In his book *Meatonomics*, economist David Simon aptly summarizes the direct nexus between federal commodity subsidies and cheap-meat production:

> It may come as little surprise, but the handful of farmers who consistently harvest the most greenbacks from crop subsidies, research shows, are livestock producers. The reason: corn and soybeans are the main items on the menus for livestock, accounting for the majority of feed ingredients in factory farms (where virtually all [U.S.] farm animals are raised). This makes factory farms the biggest consumers of these subsidized commodities, and they buy most of the corn and soybeans grown in the United States.[134]

The sheer volume of meat generated by factory farms in this country is staggering. An estimated 82% of cattle currently sold in the United States are raised on feedlots[135] (i.e, on "factory farms")[136], and the total number of farm animals being housed at these industrial facilities has been steadily increasing over the past few decades. Between 2002 and 2012, the number of livestock animals on the largest factory farms

134. DAVID ROBINSON SIMON, MEATONOMICS: HOW THE RIGGED ECONOMICS OF MEAT AND DAIRY MAKE YOU CONSUME TOO MUCH—AND HOW TO EAT BETTER, LIVE LONGER, AND SPEND SMARTER 81 (Conari Press 2013).

135. NAT'L AGRIC. STAT. SERV., CATTLE: JANUARY 1 CATTLE INVENTORY UP 1 PERCENT, U.S. DEP'T OF AGRIC. '1 (Jan 31, 2018), https://downloads.usda.library.cornell.edu/usda-esmis/files/h702q636h/c534fr214/z316q364w/Catt-01-31-2018.pdf [https://perma.cc/QT8T-RW6L].

136. A "factory farm" is another term for a large concentrated animal feeding operation (CAFO). According to the USDA's definition, "[a] CAFO is an [animal feeding operation] with more than 1000 animal units (an animal unit is defined as an animal equivalent of 1000 pounds live weight and equates to 1000 head of beef cattle, 700 dairy cows, 2500 swine weighing more than 55 lbs., 125 thousand broiler chickens, or 82 thousand laying hens or pullets) confined on site for more than 45 days during the year." *Animal Feeding Operations*, NAT. RES. CONSERVATION SERV., U.S. DEP'T. OF AGRIC., https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/plantsanimals/livestock/afo/ [https://perma.cc/Y9BS-XYGZ] (last visited Mar. 13, 2019).

rose by 20%, while "[t]he total number of livestock units[137] on factory farms increased from 23.7 million in 2002 to 28.5 million in 2012."[138] More specifically, the average size of a cattle feedlot (with a capacity of 1,000 or more head of cattle) increased by 13.7% over a five-year span, from 3,800 in 2007 to more than 4,300 in 2012.[139] A recent USDA inventory estimates that as of January 1, 2018, there were 14 million cattle and calves being fattened on feedlots, up 7% from 13.1 million in 2017, while across the country there were 94.4 million cattle and calves both on and off feedlots as of January 1, 2018, up 1% from 93.7 million from 2017.[140]

What accounts for this continuous growth? Factory farms are able to continue to expand their (already massive) production capacities in large part because they save billions of dollars each year in operational expenses by purchasing heavily subsidized corn and soybeans at prices below what it actually costs to grow them.[141] Between 1996 and 2005, industrial livestock facilities saved an estimated $3.9 billion annually by buying discounted feed.[142] A 2006 report by the Institute for Agriculture and Trade Policy estimated that poultry and pig producers' overall costs would be 7 to 10% higher if they paid feed farmers the true market price of their crops.[143]

137. "A 'livestock unit' is a way to measure different kinds of animals on the same scale based on their weight—one beef cattle is the equivalent of approximately two-thirds of a dairy cow, eight hogs, or four hundred chickens." *See Factory Farms Continue to Dominate U.S. Livestock Industry*, FOOD & WATER WATCH (May 27, 2015), https://www.foodandwaterwatch.org/news/factory-farms-continue-dominate-us-livestock-industry [https://perma.cc/X9BJ-B7QR] (last visited Mar. 13, 2019).

138. *See id*.

139. *See id*.

140. *See* NAT'L AGRIC. STAT. SERV., *supra* note 135, at 1.

141. *See* DOUG GURIAN-SHERMAN, CAFOS UNCOVERED: THE UNTOLD COSTS OF CONFINED ANIMAL FEEDING OPERATIONS, UNION OF CONCERNED SCIENTISTS 3 (Apr. 2008), https://www.ucsusa.org/sites/default/files/legacy/assets/documents/food_and_agriculture/cafos-uncovered-executive-summary.pdf (estimating that between 1996 and 2005, CAFOs saved an average of $3.86 billion each year in feed costs because of federal grain subsidies).

142. *See id*. at tbl. ES–1 at 6.

143. R. Dennis Olson, BELOW-COST FEED CROPS: AN INDIRECT SUBSIDY FOR INDUSTRIAL ANIMAL FACTORIES, INST. FOR AGRIC. & TRADE POL'Y (June 2006), https://www.iatp.org/sites/default/files/258_2_88122_0.pdf [https://perma.cc/DKA6-Y6GG] (last visited Mar. 12, 2019).

While these artificially low feed prices certainly increase profit margins for livestock producers, the benefits are also passed on to consumers by increasing both the availability and affordability of meat.[144] For example, McDonald's sells about 550 million Big Macs annually in the United States.[145] *Meatonomics* author David Simon assessed the true price of a Big Mac if it included costs taxpayers already contribute through federal agricultural subsidies.[146] He concluded that each burger should cost an additional $0.70—a 15% hike over its average retail price in the United States of $4.56 in 2013.[147]

IV. SHIFTING SUBSIDIES TO SPECIALTY CROPS

As examined above, one of the most glaring problems with the Farm Bill is that "[t]axpayers heavily subsidize corn and soy, two crops that facilitate the meat and processed food we're supposed to eat less of, and do almost nothing for the fruits and vegetables we're supposed to eat more of."[148] Certainly, there is no guarantee that if the federal government stopped subsiding commodity crops American consumers would buy fewer Big Macs (or meat products in general) just because of a modest 70-cent price increase per burger. But perhaps consumers would be inclined to opt for less carbon-polluting—and more nutritious—fruits, vegetables, and grains if these foods were also subsidized and could better compete with propped up meat products.

Because most cropland in the United States is not used to grow fruits, vegetables, and grains for human consumption, a shift in consumer choices regarding meat products could

144. *See* Kammer, *supra* note 61, at 27.

145. Sean Alfano, *Big Mac Hits the Big 4-0*, CBS NEWS (Aug. 24, 2007), https://www.cbsnews.com/news/big-mac-hits-the-big-4-0/ [https://perma.cc/45CA-TVC5] (last visited Mar. 13, 2019).

146. *Each Time McDonald's Sells a Big Mac, We're Out $7*, MEATONOMICS (2013), https://meatonomics.com/2013/08/15/each-time-mcdonalds-sells-a-big-mac-were-out-7/ [https://perma.cc/FE3B-LZH2] (last visited Mar. 13, 2019) (citing SIMON, *supra* note 134).

147. Simon argues that a Big Mac's true cost is $12.00 (250% above its average market price of $4.56), which includes an additional $0.38 for animal cruelty, $0.67 for environmental losses, $0.70 for agricultural subsidies, and $5.69 for healthcare costs. SIMON, *supra* note 134..

148. Haspel, *supra* note 108.

influence farmers' crop choices.[149] "Only about 2 percent of U.S. farmland is used to grow [specialty crops], while 59 percent is devoted to commodity crops."[150] For example, in 2013, of the 336 million acres of cropland planted in the U.S., roughly 95 million acres were used to grow corn.[151] And of the corn used domestically in 2017, less than 12% was actually used for food, seed, and industrial uses, while 44% was used for animal feed.[152]

In theory, consumer pressure may be able to discourage farmers from planting heavily subsidized commodity feed crops and, instead, encourage them to grow a broader spectrum of specialty crops that could be harvested for direct human consumption. A 2013 report from the Union of Concerned Scientists "use[d] an economic model developed by Purdue University's Global Trade Analysis Project to predict how U.S. farmers would respond to various shifts in eating habits."[153] The report found "that if Americans ate fruits and vegetables at USDA-recommended levels—increasing consumption by 173 percent over current levels—U.S. farmers would grow 88 percent more of these foods."[154] "Conversely, if meat and dairy consumption fell to levels recommended by the Harvard University School of Public Health, farmers would grow less corn and other grains used as livestock feed—8 million acres less."[155]

149. Most domestic cropland is used to grow animal feed. *See* Jaworski, *supra* note 109, at 1703.

150. *Less Corn, More Fruits and Vegetables Would Benefit U.S. Farmers, Consumers and Rural Communities*, UNION OF CONCERNED SCIENTISTS (Oct. 22, 2013), https://www.ucsusa.org/news/press_release/less-corn-more-fruits-and-vegetables-0378.html#.WsKjNWbMwWo [https://perma.cc/AL7F-PKT3] (last visited Mar. 13, 2019).

151. Jaworski, *supra* note 109, at 1703–04.

152. *Corn Usage by Segment 2017*, NAT'L CORN GROWERS ASS'N, http://www.worldofcorn.com/#corn-usage-by-segment [https://perma.cc/9W58-GH2B] (last visited Mar. 12, 2019).

153. *Less Corn*, *supra* note 150.

154. *Id.*

155. *Id.* (noting that if beef *and dairy* consumption fell to recommended levels, farmers would grow about 8 million acres less of corn and other feed grains). In 2017, beef cows made up 77% of the 41.1 million total cows in the United States: 31.7 million beef cows and 9.4 million dairy cows. NAT'L AGRIC. STAT. SERV., *supra* note 135, at 1. By extension then, beef cows consumed roughly three-quarters of all the grains fed to cattle, or about 6 of the 8 million total acres-worth feed crops fed to American cattle.

Notably, though, "[i]f Americans increased their consumption of fruits and vegetables to levels recommended by federal dietary guidelines, production of these crops would require an additional 13 million acres of [crop]land."[156] While at first glance this may seem an impossible task, on closer inspection, a modest shift away from commodity crop production could result in relatively huge increases in land available for fruit and vegetable cultivation. By one estimate, "a 1 percent decrease in the 160 million acres of corn and soy [would] translate[] to an 11 percent increase in the 14 million acres of [agricultural land dedicated to the production of] fruits and vegetables."[157]

Shifting production away from feed crops and toward a more diverse array of fruits, vegetables, and grains intended for human consumption would also help make our food production system more efficient at making more calories and protein available to a wider mass of people. "[F]eed crop cultivation produces more calories per acre than human crop foods, with the result that [livestock] eat [nearly] two-thirds of [all] calories derived from crops grown in the United States."[158] "However, only a fraction of those crop calories are delivered to humans because, for example, the production of one pound of beef from feedlot cattle requires 15-20 pounds of grain."[159] Put another way,

> More than one-half of all plant protein in the United States is used to feed animals. Only 14% of U.S.-produced protein is used as human food; 80% is used as animal feed. If U.S. consumption of grain-fed animal products were cut by 50%, calorie availability would increase by enough to feed an additional 2 billion people.[160]

156. *Agriculture and Health Policies in Conflict: How Food Subsidies Tax Our Health*, PHYSICIANS COMM. FOR RESPONSIBLE MED., http://www.pcrm.org/health/reports/agriculture-and-health-policies-unhealthful-foods (last visited Sep. 15, 2018) (citing Press Release, Am. Farmland Tr., The United States Needs 13 Million More Acres of Fruits and Vegetables to Meet the RDA (July 7, 2010), http://www.farmland.org/news/pressreleases/13-Million-More-Acres.asp).

157. Haspel, *supra* note 108 ("Whether that would translate to increased consumption is, of course, another question.").

158. Lehner & Rosenberg, *supra* note 30, at 10847.

159. *Id.*

160. Donahue, *supra* note 9, at 11116 (internal citations omitted).

One way to promote the production of a diversity of fruits, vegetables, and grains in this country would be for the federal government to provide crop insurance subsidies to specialty crop growers the way it does for commodity crop producers.[161] The federal crop insurance program applies to over 100 crops.[162] Although "[t]his marks a huge expansion from 1980 when only twenty-six crops were eligible,"[163] economists argue that the insurance program is still woefully inadequate to catalyze a marked shift toward specialty crop production.[164] According to Vincent Smith, professor of economics at Montana State University and a former visiting scholar at AEI, weather events pose the greatest risk to specialty crop growers.[165] While many private weather insurance plans currently available do cover a wide variety of crops, many farmers do not buy these insurance packages because they are not subsidized.[166] Albeit cautiously optimistic, Smith predicts if the federal crop insurance program were expanded to include subsidies for specialty crops, "there would be some price effect"—but how much would be "[a]nybody's guess."[167]

Perhaps unexpectedly, mushrooms appear to be one specialty crop that shows promise for helping to reduce the greenhouse gas emissions associated with meat production and could also potentially benefit from an expanded crop insurance subsidy program. Fast food chains are experimenting with adding mushrooms to their hamburger to boost flavor and reduce the amount of meat in each patty. Recently, Sonic Drive-In, a fast food chain that has not been widely associated with eco-conscious food products, announced that it was adding blended beef-mushroom burgers to its menu.[168] The company

161. See *supra* Part II.d.1 for an overview of the crop insurance program.

162. *See* RISK MGMT. AGENCY, 2015 COUNTY CROP PROGRAMS, U.S. DEP'T OF AGRIC., https://www.rma.usda.gov/data/cropprograms/2015cropprograms.html (last visited Apr. 8, 2018) (most recent listing of the various crops eligible for insurance). Although it is called "crop" insurance, the program also covers other aspects of agriculture unrelated to growing plants, such as livestock, apiculture (beekeeping), and clams. *Id*.

163. Jaworski, *supra* note 109, at 1690–91.

164. *See* Haspel, *supra* note 108.

165. *Id.*

166. *Id.*

167. *Id.*

168. *See* Dan Charles, *Here's Why Environmentalists are Cheering the Latest Burger at Sonic Drive-In*, NAT'L. PUB. RADIO (Mar. 2, 2018),

downplays any potential positive environmental impact, emphasizing instead the added flavor and juiciness mushrooms provide.[169] Even so, "[a]ccording to the World Resources Institute, if 30 percent of the beef in every burger in America were replaced by mushrooms, it would reduce greenhouse emissions by the same amount as taking 2.3 million vehicles off of our roads."[170]

If Sonic's beef-mushroom burger sales are strong—because of their taste, their eco-friendly appeal, or both—other fast food chains will likely start to produce similar products. In that case, mushrooms will be in higher demand. Specialty farmers would then be incentivized to start producing more mushrooms so long as they can adequately minimize their risk—crop insurance programs are one of the most effective ways to do that. As described *supra* in Part II.d.1, "there are two primary categories of crop insurance: yield protection and revenue protection." In both programs, the federal government pays a significant portion of the insurance premiums to farmers who produce certain crops. Yield protection is designed to protect farmers during low-yield years due to weather events like flooding or drought,[171] and revenue protection ensures farmers are compensated if crop prices drop below a predetermined threshold.[172]

Because mushrooms are cultivated indoors in controlled settings,[173] mushroom farmers do not necessarily face the same concerns about weather events that other specialty crop

https://www.npr.org/sections/thesalt/2018/03/02/590253046/heres-why-environmentalists-are-cheering-the-latest-burger-at-sonic-drive-in [https://perma.cc/6RAA-9YCU] (last visited Mar. 13, 2018).

169. *See id*.

170. *Id*.

171. *See* ECON. RES. SERV., CROP INSURANCE PROGRAM PROVISIONS–TITLE XI, U.S. DEP'T OF AGRIC., https://www.ers.usda.gov/topics/farm-economy/farm-commodity-policy/crop-insurance-program-provisions-title-xi/ [https://perma.cc/JN9X-68HK] (last visited Mar. 12, 2019).

172. Jaworski, *supra* note 109, at 1691–92.

173. *See* Roger Morris, *The One Tiny Region That Produces Nearly Half of U.S. Mushrooms*, MODERN FARMER (May 16, 2014), https://modernfarmer.com/2014/05/welcome-mushroom-country-population-nearly-half-u-s-mushrooms/ [https://perma.cc/43B6-M5EM] (last visited Mar. 12, 2019) (noting that in the U.S. mushrooms are grown primarily in single-level cinderblock buildings—variously called mushroom "barns," "houses" and "doubles").

farmers might. Therefore, they likely would not benefit from being included in the yield protection program. However, mushroom farmers could potentially benefit greatly if they were able to receive subsidies to cover the premium costs for revenue protection insurance. The federal government already spends billions of dollars every year subsidizing premiums for revenue insurance programs.[174] In fact, the vast majority of federal spending on crop insurance premium subsidies—$5.5 billion of the total $6.7 billion in 2012—subsidizes revenue protection plans.[175] The problem is that none of this money goes to support specialty crops. Indeed, only ten commodity crops are eligible for revenue protection premium subsidies, with corn and soybeans predictably gobbling up nearly two-thirds of the federal funding.[176]

Mushrooms already have a well-established market in the United States. In 2017, the domestic mushroom crop capped out at $1.22 billion, up 3% from the previous season.[177] Between 2014 and 2017, the average price of mushrooms nationwide remained relatively stable at around $1.30 per pound.[178] But in some parts of the country, the prices fell as much $0.18 per pound in a single year, which translated to total lost revenue of $35 million in those areas.[179] This price flux, while seemingly modest, might be alarming enough to many mushroom farmers to discourage them from expanding their production capacities without revenue protection insurance because of the inherent financial risk involved.

Consider the following hypothetical: If Sonic's new blended

174. *See* Jarworski, *supra* note 109, at 1692.

175. *Id.*

176. U.S. GOV'T ACCOUNTABILITY OFF., CROP INSURANCE: CONSIDERATIONS IN REDUCING FEDERAL PREMIUM SUBSIDIES 14 (Aug. 2014), https://www.gao.gov/assets/670/665267.pdf [https://perma.cc/QNL5-WR9W]. The ten covered crops, in descending order of total revenue premium subsidies provided, are: corn, soybeans, wheat, cotton, grain sorghum, sunflowers, canola, rice, barley, and popcorn.

177. NAT'L AGRIC. STAT. SERV., AGRIC. STAT. BD. & U.S. DEP'T OF AGRIC., MUSHROOMS 1 (Aug. 21, 2017), https://downloads.usda.library.cornell.edu/usda-esmis/files/r781wg03d/1r66j3656/wm117r667/Mush-08-21-2017.pdf [https://perma.cc/WB3M-4J2Y].

178. *Id.*

179. *See id.* at 4 (showing that the price per pound of mushrooms in "other states" dropped from $1.65 to $1.47 between the 2014–2015 and 2015–2016 seasons).

mushroom-beef burgers is any indication of rising demand, should production rates remain static, it would drive up the cost of mushrooms because demand would outpace current supply. In turn, fast food chains—and consumers generally—may not be as inclined to incorporate mushrooms as meat substitutes, thereby negating their potential to help mitigate U.S. livestock-related greenhouse gas emissions. Therefore, if the federal government extended revenue protection premium subsidies to include mushrooms, farmers would be incentivized to expand production, which could, in turn, help kick start a national trend toward reduced meat consumption.

V. CONCLUSION

Ultimately, if the United States is going to contribute to the collective international effort to tackle climate change, the federal government must develop a comprehensive strategy that prioritizes mitigating the impacts of the nation's industrial animal agriculture sector. An effective emissions-reduction strategy must be multi-faceted and address not just livestock-related emissions themselves, but also the underlying drivers of factory farming. This necessarily includes significantly revising our federal crop subsidies, which are providing livestock producers with a seemingly endless supply of cheap feed grains and enabling them to produce meat and dairy products well below their true cost of production. Overhauling the agricultural subsidies programs could level the playing field between commodity crop and specialty crop production and, in turn, potentially catalyze a much-needed shift in consumer choices away from meat and toward more plant-based alternatives.