The CAFO Hothouse: Climate Change, Industrial Agriculture and the Law

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Synopsis

The issue of climate change has at long last made its way into mainstream policy discussions. However, the focus both in the United States and internationally has been on reducing energy production and transportation emissions. This has led the media, policy makers and the public to overlook industrial agriculture, one of the principal contributors to global greenhouse emissions. Industrial agriculture – particularly industrial livestock activity – emits significant (and growing) amounts not only of carbon dioxide, but also of more pernicious greenhouse gases, including nitrous oxide (N_2O) and methane (CH_4). In fact, greenhouse gas emissions from agriculture far exceed those from transportation. Yet, for reasons both cultural and political, agriculture remains almost unregulated.

This lack of regulation stems in large part from a concerted effort by corporate growers to portray themselves as small farmers who live off the land in harmony with their surroundings. But the truth is that they are not and they do not. Unlike their smaller, family-farm predecessors, factory farm/industrial livestock operations (called concentrated animal feeding operations or CAFOs[i]) do not operate at near equilibrium with their immediate environment.[ii] Instead, environmental, social, nutritional and public health costs are externalized and livestock operations are consolidated to maximize animal protein output.[iii]

As global demand for meat rises, it spurs conversion of forests to pasture and to fields on which to grow feed crops. This in turn elevates the need for fossil fuel-based fertilizers and increases manure production. These factors combine to exacerbate carbon, methane and nitrous oxide emissions. The emissions in turn accelerate climate change, thus ensnaring CAFOs in a positive feedback loop as elevated temperatures negatively impact animal feed crops, facility climate-control costs and pesticide efficacy, thus requiring more fossil fuel-based fertilizers, more forest clearing, *ad infinitum*.[iv]

Legal responses to climate change have largely ignored CAFOs, and national regulations are few.[v] Meanwhile, scientific efforts have led to significant biological improvements in herd efficiency (but not pollution mitigation) and national economic policies favor industrial agriculture through subsidies, price controls and import levies. Ironically, this preferential regulatory treatment reflects the national attachment to and political and cultural cachet of family farms. The policies are depicted as integral to a broad-based cultural effort to protect small farms even as their ruinous impact on those same family farms continues unchecked.

Managing the different impacts presented by industrial farming will require a national (and international) commitment to sustainable farming. Returning to near equilibrium with the local environment and reducing greenhouse emissions will also have the beneficial effect of forcing livestock operations into a less exploitive relationship with farmed animals. CAFOs will

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necessarily give way to smaller, lower-impact farming operations that pay greater attention to animal welfare.

This essay explores how industrial livestock operations contribute significant amounts of greenhouse gases while receiving little criticism but extensive financial incentives. It first looks at the genesis of "agribusiness" and its displacement of traditional smaller farms. Next, it discusses the range of climate change impacts from factory-farming operations and explores their direct and indirect climate costs. It then summarizes the scientific, economic and regulatory responses to the issue. The essay concludes by offering some thoughts on solutions that link social farming paradigms, ethical imperatives, and climate change mitigation all at once.

2. How CAFOs Happened

In the early years of the last century and prior to that, farms were hotbeds of cultivated biodiversity. Farmers often raised a dozen or more species of fruits and vegetables, including corn, alfalfa and hay, all of which supported the pigs, cattle, chicken and horses who populated the farm. Less than a hundred years later, the animals are gone, as is just about everything else save one or two crops – usually corn and/or soybeans. The few remaining family farms represent a small and dwindling share of the agricultural market. As of 2003, four industrial producers controlled 82 percent of the cattle produced in the United States, 75 percent of the hogs and sheep, and 50 percent of the chickens. The metamorphosis of small, diversified farms into large, monocultural agribusinesses has many causes. However, as writer Michael Pollan and others have explained, the biggest factor behind the transformation was cheap, abundant corn made possible by the advent of nitrogen-based fertilizer and a generous (if misguided) program of agricultural subsidies.[vi]

The availability of synthetic fertilizer meant that rotating crops became unnecessary and the growing demand for corn could be met with an even larger output by the nation's farms. Under normal economic conditions, corn's superabundance would have glutted the market, causing prices to fall. However, New Deal farm programs set a target price for the corn, allowing farmers to take out loans using their surplus corn as collateral. When prices recovered, farmers sold the corn and paid back the loans or, if prices failed to recover, they kept the loan money in exchange for the government keeping the corn. For its part, the government could afford to wait until demand ticked up to put the corn on the market. In either case, the surplus stayed off the market until demand revived.

All that changed for the United States in the 1970s when Earl Butz, President Nixon's Secretary of Agriculture, introduced a new system of price supports guaranteeing farmers a set price for their corn. Butz exhorted farmers to "get big or get out" and to regard themselves as "agribusinessmen" rather than farmers.[vii] Paying a set price per bushel of corn meant that growers had no incentive to decrease production when demand slacked. Instead, they were spurred to grow as much as possible and dump it into the market, which caused prices to crater still more.

As prices fell, successive farm bills lowered the guaranteed price paid to farmers, shrinking profit margins and forcing farmers to grow yet more in order to eke out what little profit they could. Consequently, the market became perennially glutted with corn and prices sank to levels that made small yields unworkable. Only large-volume producers could grow

enough crops to make an adequate return. Small growers all but disappeared as storage facilities filled beyond capacity with surplus crops.

The overflowing storehouses and ever-growing supply of corn created an urgent need to make use of the resulting stockpiles. So growers began feeding the corn to animals, including cattle, whose digestive systems (which are designed to consume grass) could not tolerate it without vast doses of prophylactic antibiotics and other medications. The feed itself was cheap but the consequences of the cattle's ingesting that feed were not. From this tangled attempt to make efficient use of what should never have been grown, the factory farm emerged.[viii]

3. The Role of Livestock in Climate Change

3.1 GHG Emissions from Industrial Livestock Cultivation

Industrial agriculture's emphasis on volume has dramatically increased the number of animals raised for food. In the United States, 9.5 billion animals are slaughtered for food each year.[ix] The CH_4 (methane), N_2O (nitrous oxide) and CO_2 (carbon dioxide) released from livestock account for more than 7 percent of U.S. greenhouse gas emissions (hereafter, "GHGs") and more than 18 percent of GHGs worldwide.[x] Table 1 shows U.S. GHG emissions from the various stages of agriculture.[xi] Table 2 breaks that process down within the animal industrial cycle.[xii]

Table 1: US Greenhouse Gas Inventory for Agricultural Emissions (Source: EPA, 2007a)

Greenhouse Gas	Source	Thousand Tons	Thousand Tons CO_2 Equivalent
Methane (CH_4)	Total	8,459.14	17,770
	Enteric fermentation	5,886.34	12,360
	Manure management	2,167.14	4,550
	Other	406.75	860
Nitrous Oxide (N_2O)	Total	1,333.80	41,350
	Agriculture soil management	1,298.52	40,250
	Manure management	34.17	1,050
	Other	2.20	60

Table 2: Livestock life cycle stage and associated emissions

	Life cycle stage	Process creating emission	Type of emission
1	Production of animal feed; silage production; grassland maintenance	Production of nitrogenous and other fertilizers, agricultural machinery, pesticides and other inputs	N_2O emissions from grazing land, fodder crops and fertilizer production; CO_2 from fertilizer production
2	Animal housing and maintenance, associated machinery	Heating, lighting, milking etc.	CO_2
3	Digestion (ruminants)	Enteric fermentation	CH_4
4	Waste products	Manure and urine	CH_4 and N_2O
5	Slaughtering,	Machinery, cooking, cooling,	CO_2 and refrigerant

	processing, waste treatment	chilling, lighting, leather and wool production, rendering and incineration	emissions
6	Transport, storage, packaging	Transport, chilling, lighting, and MAP[118] gas production	CO_2 and refrigerant emissions
7	Domestic consumption	Refrigeration and cooking	CO_2 and refrigerant emissions
8	Waste disposal	Transport, composting, anaerobic digestion and incineration	CO_2, CH_4 and N_2O

The upshot of all this is that GHG emissions from agriculture exceed those from other areas of the economy (e.g., transportation) that receive far more attention, both domestically and internationally.

3.2. **Comparing Emissions from Industrial Agriculture to Other Sectors**

One often hears it said that a vegan driving a Hummer does more to combat climate change than an environmentalist in a Prius.[xiii] This claim may sound exaggerated but the data bear it out. It takes more energy to supply an average family with meat than it does to power the family car. And since fossil fuel expenditure translates into GHG emissions, the average family's carbon footprint would actually *decrease* – albeit not enough – if it used more fuel and ate less meat.[xiv]

A chief reason for factory farming's large carbon footprint lies in the fact that it requires a great deal of fossil fuel, including petroleum-based fertilizers (used to grow the corn and soy that feeds the animals) and other chemicals. According to the Pew Commission on Industrial Farm Animal Production Report ("Pew Commission Report"), the ratio of energy input to output for industrially produced meat can reach as high as 35:1.[xv] That means that it takes 35 units of energy to produce just one unit of energy from meat. Even within an agricultural sector badly in need of reform (overall, agriculture's energy input-to-output ratio is 3:1), these numbers stand out.[xvi]

3.3 **Expanding Demand for Meat**

On average, Americans consume 45 more pounds of meat per year than they did 50 years ago.[xvii] According to the Pew Commission Report, that increase translates into Americans eating 2.8 times more pork, 2.5 times more eggs, 2.3 times more chicken and 1.3 times more beef.[xviii] This upsurge forms part of a global trend.

Worldwide, demand for animal products is growing by 3 percent per year in developing countries. It is expected to increase an additional 35 percent by 2015 and to double by 2050.[xix] These increases will inevitably lead to increased production. Increased production will necessarily and significantly swell GHG emissions from the agricultural sector.

3.4 **CAFOs are Woefully Under-Regulated**

Five thousand pigs produce as much raw sewage as a town of 20,000 people.[xx] That statistic alone makes factory farming environmentally problematic and in need of regulatory oversight. But there's more. Pig waste is more concentrated than human waste and tends to contain both pathogens and antibiotics. Yet waste from pigs does not go to sewage treatment facilities; it

tends to go straight onto the ground, where it eventually makes its way into the groundwater and rivers and into the air, causing respiratory problems, antibiotic resistance, and more. Habitat loss and degradation, erosion, water depletion, pollution and salinization, agrochemical contamination, the above-mentioned animal waste and air pollution are also serious and growing CAFO-related problems. Still, agriculture remains virtually unregulated. Of the major federal environmental statutes, only the Clean Water Act[xxi] applies at all.[xxii]

This dearth of regulation does not result from collective inaction or failure to recognize the damage from industrial agriculture. Rather, as legal scholar J. B. Ruhl notes, "Congress has actively prevented their intersection through a nearly unbroken series of decisions to exclude farms and farming from the burdens of federal environmental law, with states mainly following suit."[xxiii] Ruhl calls this a "vast 'anti-law' of farms and the environment."[xxiv] The combination of a powerful agricultural lobby, the family farm's hold on the collective national imagination, and the short-term profits of industrial agriculture have proved too potent a mix for any would-be regulators.

4. Indirect Environmental Impacts of Industrial Agriculture

4.1 Water Depletion, Land Use Impacts and Deforestation

The already high and increasing demand for water places an ever-growing strain on dwindling fresh water reserves. Water shortages have always formed part of the geography of the American West. In recent years, however, the shortages have increased in scope and frequency. California has faced an ongoing drought for the last several years.[xxv] Elsewhere, Lake Powell, located in Glen Canyon, was once full but is now at less than two-thirds of capacity.[xxvi] Similarly, Lake Mead, formed behind the Hoover Dam, has also shrunk to 42 percent capacity[xxvii] Snowpack in the Rockies has also diminished considerably. The list goes on.

Even more remarkable is the fact that water shortages have become common in the eastern United States. Droughts, water shortages and litigation over water rights have become increasingly typical. Even Florida and Georgia, two of the wettest states in the country, face water shortages and have sued each other over rights to the Chattahoochee River.[xxviii]

With all that in mind, consider this: It takes 23 gallons of water to produce one pound of tomatoes but it takes *5,214* gallons to produce one pound of beef.[xxix] Furthermore, contaminants from agribusiness (runoff, pesticides, manure, etc.) account for more water pollution than all other industrial and municipal water sources combined.[xxx] So, industrial agriculture requires more water than anything else and it pollutes what it doesn't use.

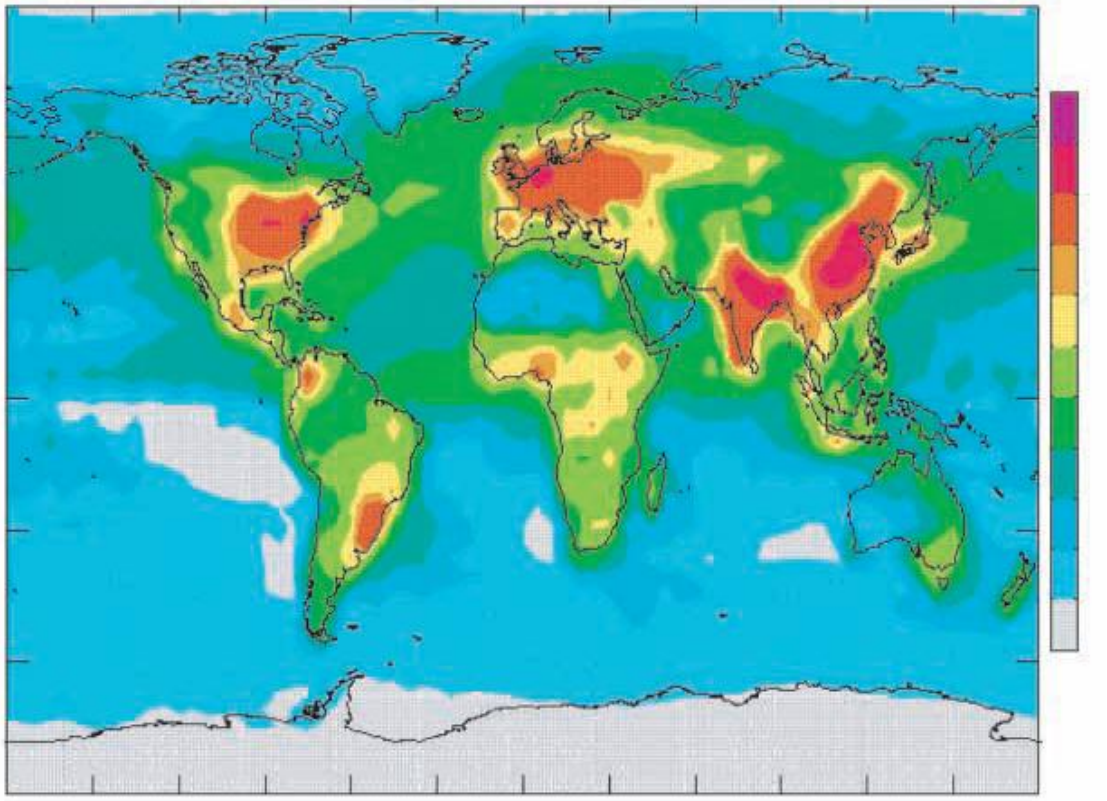
There are many other environmental impacts from factory farming as well. Worldwide, such livestock-related land use changes as deforestation and overgrazing cause desertification, ground water and soil contamination, and other environmental problems. They also lead to a release of 2.4 billion metric tons of CO_2 per year – 7 percent of global GHG emissions.[xxxi] In addition, using land for factory farms contains an embedded opportunity cost. Land used for livestock production might instead be used in ways that sequester rather than release carbon as opposed to reforestation, afforestation, and other sustainable land uses.[xxxii]

4.2 Impact on the Nitrogen Cycle and GHG Emissions

All life on earth depends on nitrogen. However, even though nitrogen makes up 78 percent of the atmosphere, very little of it is bio-available – it exists mostly as a harmless, nonreactive component of the atmosphere. Before nitrogen can be accessed by carbon-based life forms, it first must pair with a hydrogen atom – a process called "nitrogen fixing." Prior to 1909, this process could only be accomplished by certain soil bacteria that tend to live on the roots of leguminous plants, or by bolts of lightning.[xxxiii] In 1909 German chemist Fritz Haber invented a process for creating synthetic nitrogen-based fertilizer[xxxiv] (the "Haber-Bosch Process") and the world changed forever. Before Haber's invention, the human population was necessarily limited by the amount of nitrogen-fixing bacteria (and lightning) in the world. Post-Haber, petroleum-based fertilizers reign supreme and the world's population – and carbon footprint – has grown exponentially.

Today, synthetic nitrogen fertilizers provide approximately 40 percent of the nitrogen taken in by crops. Unfortunately, the efficiency rate of crop and animal use of that nitrogen is only 50 percent. The rest enters what's called the *nitrogen cascade*, working its way through the ecosystem and causing pollution, algae blooms and oceanic dead zones. It eventually winds up in the atmosphere in the form of nitrous oxide (N_2O), a potent greenhouse gas that also erodes the ozone layer.[xxxv] When one considers the potency of N_2O both as a greenhouse gas and pollutant, the lack of attention paid to agriculture as a source of emissions becomes even more perplexing. Figure 3 (below) shows the spatial pattern of inorganic nitrogen deposition in the early 1990s.[xxxvi] It is easy to see that the nitrogen hotspots also tend to be agricultural centers.

Figure 3[xxxvii]



4.3 **CAFOs & Climate Change – A Positive Feedback Loop**

Even as factory farming bears significant responsibility for planetary warming, it also numbers among the industries that will feel the impact of climate change most keenly. A full discussion of the worldwide impact of climate change on agriculture exceeds the scope of this essay. Even restricting the discussion to the United States presents an enormous task. Nevertheless, even a brief overview of the potential effects of a global temperature rise in the United States would include increased cycles of drought and dwindling snowpack.

This means that rivers will flow less full, reservoirs will dwindle and water available for irrigation will necessarily diminish. Runoff patterns will shift and soil moisture storage will decrease. Declining nutrient availability in feed crops, diminished pollinator efficacy and ozone damage will result.[xxxviii] Agricultural pests and crop diseases will also increase, causing heightened pesticide use and decreased efficacy.[xxxix] These combined impacts will likely lead to smaller harvests, increased corn and grain prices and, consequently, higher costs for animal fodder.

In sum, the already significant environmental damage wrought by industrial agriculture will worsen as demand for animal products increases. As climate change takes firmer hold and its impact becomes more pronounced, agriculture will grow more expensive and less profitable. As a result, industrial agriculture will likely fall victim to its own carbon profligacy. Unfortunately, so too will the rest of the planet. Consequently, simply letting factory farms stage a circular firing squad does not resolve the problem. The next section looks at some potential measures to bring our agricultural carbon emissions under control.

5. Mitigating a Systemic Environmental Problem

The mathematics of the predicament are easy: animal agriculture puts a lot of carbon in the atmosphere, with estimates ranging from 18 percent of global carbon emissions[xl] to as high as 51 percent.[xli] People are consuming more animal products and the human population continues to grow. This leads to more animal agriculture and therefore more carbon in the atmosphere. The result: climate change.

The mathematics of the solution are equally simple. Decreasing animal agriculture will lead to lower carbon emissions. Lower emissions will lessen global warming. Sadly, implementing the solution is less straightforward.

5.1 Mitigating through Science

A number of common-sense measures to reduce carbon output apply to all agriculture, including the industrial kind. Those include improving feed crop efficiency through better management of irrigation, fertilizer and soil acidity; integrated pest management; and conservation tillage. In addition, the amount of methane that ruminants (cows, sheep and other animals with multiple stomachs) emit varies depending on their diet. For example, feeding cattle alfalfa and flax rather than corn significantly lowers their methane output.[xlii]

Better manure management also could yield beneficial results. U.S. livestock produce 1 million pounds of manure every four seconds. That translates to 2 billion tons per year.[xliii] Any comprehensive approach to reducing carbon emissions from agriculture must include mitigating the methane produced by the decomposition of that waste.

High-temperature composting offers one waste management approach, as does anaerobic digestion (bacterial fermentation of waste in closed vessels). The latter method also produces biogas that can be used for heating and light. Some forecasts estimate that biogas production could result in a 50-percent reduction in emissions from manure in cooler climates and as much as 75 percent in warmer climates.[xliv] Decreasing the cull rate of livestock also lowers demand for land, fuel and feed, thus reducing GHG output.

One provocative study done on California and Wisconsin dairy farming methods found that increasing milk productivity per cow, either through administering bovine growth hormone (bST) or using genetic selection, resulted in an overall decrease of GHG of 5-6 percent per unit of milk. That number factors in a countervailing rise in emissions due to heightened need for grain and protein feed.[xlv] However, it does not address the increase in emissions stemming from heightened demand and accompanying growth in herd size or the concomitant ethical issues arising from such actions.

5.2 Economic Approaches

All the methods listed above would yield some carbon reduction, but none would yield enough. Even implementing all of them would fail to lower net agricultural emissions sufficiently. More drastic change is required.

Ironically, the best thing that can be done for agriculture would be to stop subsidizing it. This holds true for lessening its carbon footprint as well from the perspective of overall sustainability and environmental ethics. Subsidies, designed during the New Deal to protect

farmers from market fluctuations and prevent overproduction, now have precisely the opposite effect.

Over the last 50 years, New Deal price supports have been refashioned into direct payments to farmers. Today, farmers are guaranteed a set price for their corn and grain, no matter the state of the market. That means they have no incentive to lower production when demand slackens. As a result, the market stays perpetually glutted and prices plunge. Eventually, the government lowers the price it pays for the crops, which leads farmers to produce more in order to cover their costs. This gluts the market further, lowering prices and leading to increased consumption of animal products. This cycle repeats in perpetuity.

Where profit margins are miniscule, only large entities that do high-volume business can survive. This is the "Wal-Mart Effect" transposed onto agriculture.[xlvi] In this environment, family farms get squeezed out of existence and factory farms' chokehold on the market gets further strengthened. Thus, farm subsidies – which most Americans see as helping preserve family farms and rural American traditions – actually do no such thing.

Experts agree that subsidies entrench CAFOs, drive down prices, disguise the externalities that wreak environmental havoc, and undermine the competitive abilities of small farms.[xlvii] For example, under the current system, industrial producers receive subsidies that average $24 per hog.[xlviii] Family farms cannot hope to compete under these conditions. When combined with a regulatory environment that favors large-scale agriculture and undermines small operations, the playing field becomes impossibly skewed in favor of agribusiness.

5.3 Rethinking the Regulatory Vacuum

1. Federal Laws Are Inadequate

As noted earlier, the only federal anti-pollution law that regulates CAFOs with any rigor at all is the Clean Water Act (CWA), which prohibits the discharge of "any pollutant by any person"[xlix] into waters of the United States unless the discharging entity possesses a permit. The definition of "pollutant" includes "agricultural waste."[l] However, many industrial agricultural facilities avoid the reach of the CWA by storing animal waste in large sewage "lagoons" that do not discharge into "waters of the United States."[li] ("Waters of the United States" is a legal term of art that excludes groundwater and has been understood to include only navigable waterways.[lii]) In addition, although CAFOs themselves are subject to the CWA permitting process known as the National Pollutant Discharge Elimination System (NPDES),[liii] runoff from the huge corn and grain growers that supply the CAFOs is explicitly exempted, even when that runoff reaches navigable waterways.[liv]

The CWA also has a cooperative component under which permitting and enforcement obligations fall to the states. Unfortunately, resources at the state level for administering CWA permitting programs are inadequate. Even states with large numbers of CAFOs have few resources with which to oversee them (this is likely no coincidence). For example, as of 2004, the Iowa Department of Natural Resources had only 27 full-time staff to inspect, permit and oversee 3,500 CAFOs, and all the legal enforcement work fell to just one attorney.[lv]

The limited reach of the CWA highlights the fact that no federal laws adequately address soil, groundwater or air pollution from CAFOs. The Clean Air Act,[lvi] which regulates stationary and mobile sources of air pollution, has regulations that limit its reach to "major sources" of air pollution, a threshold that most agricultural facilities arguably do not reach.[lvii] Similarly, the

Federal Insecticide, Fungicide, and Rodenticide Act[lviii] (FIFRA) is primarily a product-licensing statute. It does little to regulate pesticide application and does not address fertilizer use at all.[lix]

In the realm of animal welfare, federal law becomes even sparser and less effective. The Animal Welfare Act,[lx] the chief federal animal protection statute, specifically exempts farm animals from its purview.[lxi] Another law, known as the 28-Hour Law, limits to 28 hours the amount of time that animals can spend consecutively in transport without rest intervals. Aside from the fact that this law is nearly unenforceable and imposes very small penalties on violators, its title testifies to its narrowness of purpose. First, the law does nothing to regulate the care and treatment of animals when not in transport. Second, limiting consecutive hours spent in transport to 28 speaks less of a concern for animals (for whom that period of time is long and brutal) than to a desire to keep losses during transport to an acceptable minimum.[lxii]

Another federal animal welfare law, the Humane Methods of Slaughter Act,[lxiii] supposedly requires that animals be killed in a humane manner. But like the 28-Hour Law, this statute has a very narrow focus. It has nothing to do with the care and treatment of animals prior to slaughter. The USDA has also determined that the Act's coverage excludes poultry. This means that 98 percent of the animals slaughtered in the United States are unprotected by the Humane Methods of Slaughter Act.[lxiv]

2. State Laws Are Equally Ineffective

Given this dearth of federal law, one might think that states would step in to fill the void. Alas, they have not. Strong agricultural lobbies and a willingness on the part of state lawmakers to cede responsibility to the federal government has meant that the regulatory vacuum under which industrial agriculture operates spans both the federal and state levels.[lxv] Indeed, as Ruhl noted, there is not just a lack of regulation – the legal framework actively supports industrial agriculture. For example, all 50 states have "Right to Farm" laws of varying scope that protect agricultural enterprises from nuisance lawsuits stemming from the smells and noises that are the result of any agricultural operation.[lxvi] Those laws were enacted to protect farmers in the days before CAFOs. Now they protect CAFOs instead.

State animal welfare laws are equally supportive of factory farming. Twenty-eight states have anti-cruelty statutes that specifically exempt farming practices that are generally accepted in the industry.[lxvii] Standard industry practices are typically those that best serve the industry. Removing those practices from legal scrutiny enables regulated entities to tailor their techniques to their maximum gain, regardless of the impact on the environment or the affected animals.

State criminal laws provide little help. Successfully prosecuting an animal cruelty case requires the state to prove that the defendant *intended* to harm the animals in his or her care.[lxviii] With hundreds of thousands of animals in their custody, producers can easily claim that they were unaware of the condition of any given animal. Thus, indifference to the animals' well-being actually becomes a defense to prosecution.[lxix]

Furthermore, criminal statutes do not have accompanying regulations or administrative agencies tasked with their oversight. Consequently, no regular inspections take place and local law enforcement officials, absent a search warrant, cannot enter private property to ensure compliance.[lxx] Even if local police could effectively enforce the statutes, they would have little incentive to do so; penalties for violations are generally quite low.[lxxi]

In addition to the ethical dimension of animal welfare laws (or lack thereof), such laws pertain to climate change as well. The scarcity of animal welfare regulations means that factory farms effectively have no check on their operations. They can confine billions of animals with few requirements as to how those animals get housed or their waste treated. As noted above, that

housing and treatment, as well as the enormous volume of animals such methods permit, results in large and increasing carbon emissions. Without substantive and enforceable animal welfare laws, industrial agricultural operations have little incentive to improve the treatment of their animals. That lack of humane treatment translates directly to a larger carbon footprint.

5.4 A Political Problem

In sum, factory farming has supplanted traditional farming throughout the country (and increasingly throughout the world) but continues to reap the benefits of the nation's ongoing romance with farmers and farming. Even as industrial agriculture has become more vertically integrated and less beneficial to rural economies, it continues to enjoy hefty governmental subsidies and political protection. This disconnect between the nostalgic image of the farmer and the reality of agribusiness remains firmly ensconced. To protect the illusion, producers tend to locate CAFOs and animal processing facilities in remote locations far from prying eyes.

The result, as described above, is an environmentally deleterious industry that brutalizes billions of animals each year while sporting a hefty and growing carbon footprint. Even the cheap meat and dairy products that industrial agriculture supposedly produce are an illusion created by the exclusion of externalities from the purchase price of animal products. When one factors in the environmental and social costs of factory farming (which consumers pay in the form of taxes, subsidies, clean-up costs and more), the price of those products increases dramatically.[lxxii] Nevertheless, agribusiness has made full use of its advantageous political and legal position. Few traditional farms remain; factory farms have married themselves fully into the nation's infrastructure even as the realities of climate change make that relationship unsustainable and potentially catastrophic.

6. Some Social and Ethical Suggestions

Though its manifestations are environmental, industrial agriculture is a social ill, born of a national need to overproduce and over-consume combined with a collective unwillingness to address the ethical and environmental problems that such behavior creates. Any solution to this dilemma must likewise be social as well as environmental. Simply adding a few regulations at the fringes of agribusiness will do nothing to resolve the crisis of climate change, nor will it address the myriad other wrongs born of industrial farming. Rather, a wholesale reevaluation of national consumption patterns and the agribusiness model is required.

6.1 Produce Less, Consume Less

The correlation is simple, direct, and irrefutable: fewer animals raised for food means lower carbon emissions. Currently, industrial agriculture in the United States survives on subsidies and wholesale mistreatment of billions of animals. It indentures enormous amounts of land (to grow the grain and corn to feed the animals) while causing widespread environmental degradation and disease. To make matters worse, the industrial model has spread throughout the world.[lxxiii]

Agribusinesses "scour the world looking for countries with cheap labor and large expanses of land available to cultivate feed for food animals."[lxxiv] Such countries often have

weak infrastructures and little environmental regulation. This means that the cycle of brutalization, degradation and global warming is proliferating all over the globe.

Reversing this trend, both domestically and internationally, will require recalibrating our relationships with food, animals and the environment. Shifting to organic farming methods, implementing carbon sequestration methods, using anaerobic digestors, lowering fertilizer use, increasing biodiversity and tightening pollution controls are all important steps. But they form only a part of the overall solution, which the Pew Commission describes as a shift from "an energy *input* system to an energy *exchange* system."[lxxv] This means trending away from energy intensive inputs (like synthetic fertilizers, CAFOs and monoculture) toward agriculture based on biodiversity and an emphasis on organisms exchanging energy with other organisms, thus creating a self-sufficient and synergistic web. This shift will inevitably require consuming less animal protein and turning instead to a more plant-based and local diet.

Retooling agriculture will also require refashioning our relationship with farmed animals. The well-being and ethical treatment of farmed animals is inexorably linked with a sustainable agricultural model. Confining billions of animals under horrific conditions, feeding them an unnatural, energy-intensive diet that requires massive doses of subtherapeutic antibiotics to maintain, and slaughtering these billions each year despite the enormous energy and environmental demands such treatment requires defies both logic and decency.

In his 1789 *Introduction to Morals and Legislation*, Jeremy Bentham asked, "[T]he question is not, Can they reason? nor, Can they talk? but, Can they suffer? Why should the law refuse its protection to any sensitive being?"[lxxvi] Over a century later, Aldo Leopold observed that "A thing *is right when* it tends to preserve the integrity, stability and beauty of the biotic community." It is wrong when it tends otherwise."[lxxvii] CAFOs cause horrific suffering. They also cause widespread environmental degradation, and global warming. They do *not* tend to preserve the integrity, stability and beauty of the biotic community. Ethics – both societal and land – demand a change. So too does the planet.

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[i] CAFOs are a type of AFO (Animal Feeding Operation). According to the EPA, an AFO is a lot or facility where:

1. animals have been, are or will be stabled or confined for a total of 45 days or more in a 12 month period; and
2. crops, vegetation, forage growth, or postharvest residues are not sustained in the normal growing season over any portion of the lot or facility.

CAFOs are larger version of AFOs, containing 1000 or more animals. *See* Concentrated Animal Feeding Operations, 40 C.F.R. § 122.23 (2008).

For purposes of reducing the number of acronyms, I use the term CAFO in this essay generically to refer to all industrial livestock operations.

[ii] This is not to suggest that traditional farming methods are without ecological and social problems. I merely suggest that when compared to industrial agriculture, the ecological impact (and the number of animals involved) is considerably less.

[iii] *See, e.g.* DOUG GURIAN-SHERMAN, CAFOS UNCOVERED: THE UNTOLD COSTS OF CONFINED ANIMAL FEEDING OPERATIONS (Union of Concerned Scientists 2008), *available at* http://www.ucsusa.org/assets/documents/food_and_agriculture/cafos-uncovered-executive-summary.pdf.

[iv] *See* M.J, OTTE & P. CHILONDA, ANIMAL HEALTH ECONOMICS: AN INTRODUCTION (Food and Agricultural Organization of the United Nations 2002), *available at* ftp://ftp.fao.org/docrep/fao/010/ag275e/ag275e.pdf.

[v] As of this writing, the proposed Waxman-Markey legislation (titled the American Clean Energy and Security Act of 2009 (HR 2454)) is designed to reduce national greenhouse gas emissions specifically exempts agriculture from any emission reduction obligations. *See* OpenCongress: For the 111th United States Congress, http://www.opencongress.org/bill/111-h2454/text (last visited Nov. 29, 2009).

[vi] MICHAEL POLLAN, THE OMNIVORE'S DILEMMA: A NATURAL HISTORY OF FOUR MEALS 54-64 (The Penguin Press 2006).

[vii] *Id.*at 52.
[viii] *Id.* at 48.
[ix] *See* THE HUMANE SOCIETY OF UNITED STATES, THE WELFARE OF ANIMALS IN THE MEAT, EGG, AND DAIRY INDUSTRIES (2006), *available at* http://www.hsus.org/web-files/PDF/farm/welfare_overview.pdf.
[x]HENNING STEINFELD ET AL., LIVESTOCK'S LONG SHADOW: ENVIRONMENTAL ISSUES AND OPTIONS, at xxi (Food and Agriculture Organization of the United Nations 2006) In the time since this article was written the number of land animals slaughtered annually for human consumption has grown from 56 billion to 65 billion. *See also* Gowri Koneswaran & Danielle Nierenberg, *Global Farm Animal Production and Global Warming: Impacting and Mitigating Climate Change*, 116 ENVIRONMENTAL HEALTH PERSPECTIVES 578, 578 (2008).
[xi] PEW COMM'N ON INDUS. FARM ANIMAL PROD., PUTTING MEAT ON THE TABLE: INDUSTRIAL FARM ANIMAL PRODUCTION IN AMERICA 27 (Jeffrey Olson ed., 2008).
[xii] *See* Tara Garnett, *Meat and Dairy Production & Consumption: Exploring the Livestock Sector's Contribution to the UK's Greenhouse Gas Emissions and Assessing What Less Greenhouse Gas Intensive Systems of Production and Consumption Might Look Like* 46 fig. 2(working paper, on file with the Food Climate Research Network).
[xiii] *See* Gidon Eshel & Pamela A. Martin, *Diet, Energy and Global Warming*, EARTH INTERACTIONS, April, 2006 at 1.
[xiv] Of course, any realistic approach to combating climate change must include both reducing meat consumption *and* driving less.
[xv] PEW COMM'N ON INDUS. FARM ANIMAL PROD., *supra* note 11, at 29.
[xvi] *Id.*
[xvii] Note, *Challenging Concentration of Control in the American Meat Industry*, 117 HARV. L. REV. 2643, 2643 (2004).
[xviii] PEW COMM'N ON INDUS. FARM ANIMAL PROD., *supra* note 11, at 18.
[xix] *Id.* at 6; *see also* Koneswaran et al., *supra* note 10, at 581.
[xx] PEW COMM'N ON INDUS. FARM ANIMAL PROD., *supra* note 11, at 29.
[xxi] Clean Water Act, 33 U.S.C. § 1251 et seq. (2008).
[xxii]J.B. Ruhl, *Farms, Their Environmental Harms, and Environmental Law*, 27 ECOLOGY L.Q. 263 (2000). Ruhl points out that the Endangered Species Act is a federal environmental law that does apply to farms, but only in a general way. The Act does not specifically regulate farms or their emissions. *Id.* at 322. There is currently some question as to whether and how the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. § 9601 et seq. (1980), and the Emergency Planning & Community Right to Know Act of 1986 (EPCRA), 42 U.S.C. § 11011 et seq. (1986), might apply to CAFOs, but even if they do, their reach will be limited. *See* http://law.lexisnexis.com/practiceareas/Environment-Climate/Pork-Producers-and-environmental-groups-sue-EPA-to-stop-EPA-regulation-exempting-non-CAFO-farms-from-CERCLA-and-EPCRA-reporting-requirements-re-animal-waste-emissions.
[xxiii] *Id.* at 267.
[xxiv] *Id.*
[xxv] *See* Department of Water Resources, http://cdec.water.ca.gov/cgi-progs/reports/EXECSUM (last visited Nov. 29, 2009).
[xxvi] *See* Flesh & Stone, http://www.fleshandstone.net/healthandsciencenews/1569.html (last visited Nov. 29, 2009).
[xxvii] *See* United States Department of the Interior, http://www.usbr.gov/lc/region/g4000/hourly/rivops.html, http://www.usbr.gov/lc/region/g4000/hourly/rivops.html. There is also a report that suggests that Lake Mead could be completely dry by 2021; *see* Scripps News, http://scrippsnews.ucsd.edu/Releases/?releaseID=876 (last visited Nov. 29, 2009)..
[xxviii] *In re* Tri-State Water Rights Litigation, 481 F.Supp.2d 1351 (2007).
[xxix] Holly Cheever, *Concentrated Animal Feeding Operations: The Bigger Picture*, 5-FALL ALB. L. ENVTL. OUTLOOK 43, 44 (2000).
[xxx] *Id*. at 44.
[xxxi] Koneswaran et al., *supra* note 10, at 579; *see also* Garnett, *supra* note 12, at 47.
[xxxii] Garnett, *supra* note 12, at 47.
[xxxiii] POLLAN, *supra* note 6, at 42; *see also* STEINFELD ET AL., *supra* note 10, at 42-43.
[xxxiv] Haber also invented some of the most virulent poison gases used in World War I as well as Zyklon B, the gas used to exterminate prisoners in Nazi concentration camps. These dubious accomplishments could account for why he does not enjoy the same status as the other legendary scientists of that era. *See* POLLAN, *supra* note 10, at 43.

[xxxv] STEINFELD ET AL., *supra* note 10, at 103. Animal and animal crop production make up 65% of global N2O emissions. *See* Koneswaran et al., *supra* note 10, at 580.
[xxxvi] STEINFELD ET AL., *supra* note 10, at 115.
[xxxvii] *Id.*
[xxxviii] Rachel Warren, ET AL., *Understanding the Regional Impacts of Climate Change*, 50 (Tyndall Ctr. for Climate Change Research, Working Paper No. 90, 2006).
[xxxix] *See* Bhakta R. Palikhe, *Relationship Between Pesticide Use and Climate Change for Crops*, 8 J. AGRIC. & ENV'T 83 (2007); S. Chakraborty et al., *Climate Change: Potential Impact on Plant Disease*, 108 ENVTL. POLLUTION 317 (2008).
[xl] THE HUMANE SOCIETY OF THE UNITED STATES, THE IMPACT OF ANIMAL AGRICULTURE ON GLOBAL WARMING AND CLIMATE CHANGE 2 (2008), *available at* http://www.hsus.org/web-files/PDF/farm/hsus-the-impact-of-animal-agriculture-on-global-warming-and-climate-change.pdf.
[xli] *See* http://www.worldwatch.org/files/pdf/Livestock%20and%20Climate%20Change.pdf
[xlii] Leslie Kaufman, *Greening the Herds: A New Diet to Cap Gas*, N.Y. TIMES, June 4, 2009, at A12, *available at* http://www.nytimes.com/2009/06/05/us/05cows.html?_r=1&hpw.
[xliii] Allison N. Hatchett, *Bovines and Global Warming: How the Cows Are Heating Things Up and What Can Be Done To Cool Them Down*, 29 WM. & MARY ENVTL. L. & POL'Y REV. 767, 784 (2005).
[xliv] STEINFELD ET AL., *supra* note 10, at 121; *See also* Koneswaran et al., *supra* note 10, at 580; Nicholas M. White, *Industry-Based Solutions to Industry-Specific Pollution: Finding Sustainable Solutions to Pollution from Livestock Waste*, 15 COLO. J. INT'L ENVTL. L. & POL'Y 153, 156 (2004); G.J. McCrabb et al., *Managing Greenhouse Emissions From Livestock Systems* (2003).
[xlv]D.E. Johnson et al., *Selected Variations in Management of U.S. Dairy Production Systems: Implications for Whole Farm Greenhouse Gas Emissions and Economic Returns* 3 (2003).
[xlvi] *See*, CHARLES FISHMAN, THE WAL-MART EFFECT: HOW THE WORLD'S MOST POWERFUL COMPANY REALLY WORKS – AND HOW IT'STRANSFORMING AMERICA'S ECONOMY (Penguin Books, 2006).
[xlvii] *See e.g.* Colin Kreuziger, *Dismembering the Meat Industry Piece by Piece: The Value of Federalism to Farm Animals*, 23 L I. 363;Gurian-Sherman *supra* note 3; PEW COMM'N ON INDUS. FARM ANIMAL PROD., *supra* note 11; Hatchett *supra* note 43; ALAN B. DURNING & HOLLY B. BROUGH, TAKING STOCK: ANIMAL FARMING AND THE ENVIRONMENT 32 (Worldwatch Institute 1991).
[xlviii] PEW COMM'N ON INDUS. FARM ANIMAL PROD., *supra* note 11, at 6.
[xlix] 33 U.S.C. § 1311(a) (1977). Recently, the EPA relaxed the notice requirements under CERCLA for hazardous substances released into the air from animal waste at CAFOs. However, there are remaining emergency notification requirements that continue to exist under EPCRA for certain types of CAFOs. *See* 40 C.F.R. §302.6(e)(3) (2009), 40 C.F.R. § 355.31(g) (2009).

[l] *Id.* at § 1362(6).
[li] Hatchett, *supra* note 43, at 791.
[lii] *Id. See also* Solid Waste Agency v. United States Army Corps of Engineers, 531 U.S. 159 (2001); Rapanos v. United States, 547 U.S. 715 (2006); Waterkeeper Alliance, Inc. v. United States EPA, 2005 U.S. App. LEXIS 6533 (2d Cir. 2005).
[liii] 40 C.F.R. §§ 9, 123, 412 (2004). In addition, in the revised regulations issued by the EPA in 2008 following the Waterkeeper decision (*see* previous note), 25% fewer CAFOs would be regulated under the 2008 rule than under the 2003 rule. *See* United State Environmental Protection Agency, Concentrated Animal Feeding Operations – Final Rule, http://cfpub.epa.gov/npdes/afo/cafofinalrule.cfm (last visited Nov. 29, 2009).
[liv] Ruhl, *supra* note 22, at 293.
[lv] Michele M. Merkel, EPA and State Failures to Regulate CAFO's Under Federal Environmental Laws, Outline of Remarks Prepared for the National Commission on National Animal Production Meeting 7 (September 11, 2006) *available at* http://www.environmentalintegrity.org/pubs/EPA%20and%20State%20Failures%20to%20Regulate%20CAFO%27s%20Under%20Federal%20Environmental%20Laws.pdf.
[lvi] 42 U.S.C. § 7401 et seq. (2009).
[lvii] Ruhl, *supra* note 22, at 305-306. As Ruhl points out, other sectors of the agricultural economy (e.g. pesticide and fertilizer manufacturers) do not enjoy similar regulatory exemptions. *Id.* at n. 237.
[lviii] 7 U.S.C. §§ 136-136y (2004).
[lix] Ruhl, *supra* note 22, at 309.

[lx] 7 U.S.C. §§ 2131-2159.
[lxi] *See id.* § 2132(g): In defining "animal", the statute excludes "farm animals, such as, but not limited to livestock or poultry, used or intended for use as food or fiber, or livestock or poultry used or intended for use for improving animal nutrition, breeding, management, or production efficiency, or for improving the quality of food or fiber."
[lxii] PEW COMM'N ON INDUS. FARM ANIMAL PROD., *supra* note 11, at 38.
[lxiii] 7 U.S.C. §§ 1901-1907.
[lxiv] PEW COMM'N ON INDUS. FARM ANIMAL PROD., *supra* note 11, at 38.
[lxv] There is one notable exception: North Carolina – the nation's epicenter for hog production – enacted a moratorium on the construction of new hog waste lagoons and spray fields in 2007. The law also enacts strict requirements for waste management systems. However, the law does not require existing lagoons and waste management systems to be retrofitted. It rather provides assistance for operators to voluntarily convert and upgrade their facilities. PEW COMM'N ON INDUS. FARM ANIMAL PROD., *supra* note 11, at 25; *See also* Swine Farm Environmental Performance Standards Act of 2007, Session Law 2007-523 (2007). It also bears noting that some states, including Arizona, California, Florida, Maine and Michigan, have recently changed their laws (through ballot initiatives or the state legislature) to afford some minimal protections to animals on the farm. These new laws address such issues as cage sizes for battery cages, gestation crates, veal crates and so forth. See: http://www.humanesociety.org/news/press_releases/2009/10/mich_gov_granholm_signs.html

[lxvi] *See* State Environmental Resource Center Home Page, http://www.serconline.org/cafoZoning.html (last visited Nov. 29, 2009).
[lxvii] Other states, including Maine, North Carolina Ohio, Vermont, and Wisconsin, exempt specific industry practices from regulatory scrutiny. Still others, including Louisiana and South Carolina, exempt specific animals (in this case, birds) from state protection. *See* David J. Wolfson, *Beyond the Law*, 2 ANIMAL L 123, 137 (2006).
[lxviii] *See* David J. Wolfson & Mariann Sullivan, *Foxes in the Hen House, in* ANIMAL RIGHTS: CURRENT DEBATES AND NEW DIRECTIONS 209 (Cass R. Sunstein ed., 2004); *see also* Paula J. Frosso, *The Massachusetts Anti-Cruelty Statute: A Real Dog-A Proposal for a Redraft of the Current Law*, 35 NEW ENG. L. REV. 1003 (2001).
[lxix] *See, e.g.*, State of New Jersey v. ISE Farms, Inc. (Sup. Ct. Warren Co., March 8 2001) (unreported decision on the record) (vacating conviction for animal cruelty because the hundreds of thousands of chickens owned by defendant and the few people actually responsible for them meant that the two sick but still-living chickens found in a garbage bin full of dead chickens might not have been "knowingly" discarded); *see also* Wolfson & Sullivan, supra note 68, at 209 (citing same).
[lxx] *See id.* at 209-210.
[lxxi] *Id.* at 212
[lxxii] *See, e.g.*, http://www.ucsusa.org/assets/documents/food_and_agriculture/cafos-uncovered.pdf (discussing the unaccounted external costs; http://www.telegraph.co.uk/earth/agriculture/farming/5225298/Taxpayers-forking-out-700-million-for-factory-farming-in-England.htm (discussing same issue from European perspective).
[lxxiii] According to the U.N. FAO, industrial systems account for an estimated 67% of poultry meat production, 50% of egg production, and 42% of pork production around the world. FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, COMM'N ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE (2007).
[lxxiv] PEW COMM'N ON INDUS. FARM ANIMAL PROD., *supra* note 11, at 9.
[lxxv] *Id.* at 53 (emphasis in original).
[lxxvi] *See* JEREMY BENTHAM, AN INTRODUCTION TO THE PRINCIPLES OF MORALS AND LEGISLATION 310 (Oxford, Clarendon Press 1823) (1780) *available at* http://www.ivu.org/history/renaissance/Bentham_Introduction_to_Morals.pdf
[lxxvii] ALDO LEOPOLD, A SAND COUNTY ALMANAC 262 (Oxford University Press 1949).