MESSAGE FROM THE CHAIR
Todd Janzen

Agricultural Management Committee members and vice chairs have been hard at work putting together this special “animal agriculture” newsletter. In this issue, Linda Wendling first offers a review of regulatory food safety issues in the United States relating to animal agriculture. Next, Bruce Myers provides the current view from those who believe that animal agriculture’s “carbon footprint” has grown too large, and better regulations are needed to reduce greenhouse gas (GHG) emissions in this sector. Vice chair Tom Redick explains some of the scientific limitations in the current studies and explains the current sustainability initiatives that come at livestock’s environmental impact from a different direction. Finally, vice chair Shawna Bligh provides an in-depth analysis of the shortcomings of the “life cycle assessment” underlying many GHG studies of the livestock industry. One thing is certain—the current debate of livestock’s contribution to GHG emissions is not going away any time soon. As chair and a livestock lawyer, I am delighted to host this discussion in the forum of our Ag Management newsletter.

The Section had a successful 44th Spring Conference: The ABA Super Conference on Environmental Law in San Francisco last month. This meeting was a super conference held jointly with other ABA Sections and environmental committees from across the ABA.

Our committee newsletter editors are always ready to entertain article ideas. If you want to get more involved in any of our committee’s activities, including any topics that you would like to write about in a future newsletter, please let us know (Agricultural Management—Tom Redick at thomasredick@netscape.net and Megan Galey at Megan.Galey@huschblackwell.com). We appreciate periodic guest editors who help to get out the news. Additional contact information for our committee is available on the committee website.

If you would like to involved in committee activities, just let me know.

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Visit the committee webpage
www.ambar.org/EnvironCommittees
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FOOD SAFETY MODERNIZATION ACT—
REGULATORY UPDATE
Linda Wendling

During this holiday season, we are all talking about food, what we are making, baking, eating, and forgetting on our endless trips to the grocery store. This past year, farmers, producers, and foodie-watchers have been talking about something else too—the Food Safety Modernization Act (21 U.S.C. § 2201 et seq.) (FSMA). Calling the recent and seemingly endless reforms to the regulations concerning food safety under FSMA “the most sweeping” may perhaps be the understatement of the past 70 years. (The last set of vast food-related reforms under the Federal Food, Drug & Cosmetic Act occurred in 1938.) There do not appear to be any components of food production, storage, processing, packaging, transportation, and/or record keeping that the reforms do not address. Although, do note that FSMA does not overlap the jurisdiction of meat/poultry packaging and inspection and egg production and related processes covered under the U.S. Department of Agriculture. The two key components of the act that will be addressed in this article are the Tester-Hagan Amendment and the Preventative Controls/ HARPC Rule and how they apply in particular to animal feed.

As in any regulatory scheme there appear to be very different perspectives regarding the impact of their eventual implementation. The very last extension for public comments on the FSMA regulations closed on December 15, 2014. Farmers, already susceptible to unpredictable climate changes, are now potentially subject to these rules and controls, both of which will generate high-cost-of-compliance issues with potentially low rate of demonstrable return in prevention of foodborne illness associated with the consumption of contaminated produce. The farmers affected generally frame the problem as one of shifting this heavy burden of responsibility onto producers through expensive compliance measure and testing procedures—one which simply cannot economically be borne by them.

In an attempt to shield smaller, direct-market producers from the substantial costs associated with compliance in the original draft of the FSMA, the Tester-Hagan Amendment proposed to exempt certain classes / sizes of business. The Tester-Hagan exemption applies to businesses that have gross sales less than $500,000 over a three year period and sell more than half their products directly to individual consumers or local restaurants/ retailers. However, in practice under the regulations it appears to be relatively eviscerated. Due to these primary two weaknesses contained in the Amendment, it is hotly contested for two reasons. First, there are many farmers who have gross sales of more than the $500,000 over a period of three years, but who are still not large enough to absorb the costs associated with full compliance with the FSMA regulations. This problem is compounded by the way that the gross earnings get calculated. All food sold, including that sold as animal feed or other products, even those not regulated under FSMA, counts toward this total, effectively discouraging diversification or effective use of surplus product or land. Second, very often this excluded farmer does not sell his products to individual consumers, retailers, or restaurants within the same state or within 275 miles of the producer because he, the excluded farmer, does not have access to that kind of market. It is not a matter of lack of will, it is the lack of opportunity that keeps this farmer from qualifying for the Tester-Hagan exception.

As if the Tester-Hagan Amendment were not strained enough, the Food and Drug Administration (FDA) has the power to revoke the exemption for an individual farm or processor if an inspector determines that that site is connected to a foodborne illness or outbreak even if that site is not ultimately responsible for the contamination. The farm or processor has only ten days after the decision to respond to the FDA actions; if the revocation of the exemption is upheld, the farm or processor has only 60 days from the date of the original letter to come into full compliance with the regulations. (The proposed rule posits an extension to 120 days.) This brings us back to the issues surrounding costs associated with these regulations and the very reasoning behind the Tester-Hagan exception for these small farmers/producers—they simply will be unable to bear the burden of compliance. This is an administrative mechanism for shutting down businesses because even if they...
take an appeal, it is unlikely that a farmer/producer can sustain the compliance until resolution.

FDA is concerned about our four-footed domestic consumers as well. The Food Safety Rule/Good Manufacturing Practices applies to animal feed and as it was originally written has some farmers concerned that they no longer have an outlet for their produce waste that was perfectly acceptable for animal consumption. Imposing additional human controls and safety requirements for these by-products such as spent grains from brewers, fruit peels, or whey from milk processing appeared too costly where the product was undergoing no other process other than containment and transport. This regulation was recently (September 2014) modified as to farmers and producers who were already bound by human regulations for their original processing to permit this traditional practice and the comment period for all such types of preventative controls for food for animal closed on December 15, 2014. That proposed rule document alone was almost 100 pages; indeed the regulations for FSMA have been abundant.

Within that proposed rule, FDA also discussed feed mills and whether contract farming operations fall under the Preventative Controls Rule for Animal Food and, as is typical in any area of the law, the answer was, it depends. As it stands currently, in contract farms that own the feed mill and the animals but not do raise them, the mill is not a part of the farm and therefore would have to register as a facility under the rule. In a fully vertically integrated farm, the mill is a part of the farm raising the animals, and therefore is not separate and would not have to register as a facility under the rule. Cooperative arrangements, from mills to farmers, would have to examine their structure to determine which model they most resembled to determine whether they are required to register as a separate animal food facility. This is something that must be monitored as FDA sorts through the comments in the upcoming year.

And with feeding animals comes some “collateral” effect; yes, FDA is even regulating manure. FDA, FSMA Proposed Rule for Produce Safety Standards for the Growing, Harvesting, Packing, and Holding of Produce for Human Consumption (manure strategy to be further studied) (2014), available at http://www.fda.gov/Food/GuidanceRegulation/FSMA/ucm334114.htm (last visited Dec. 13, 2014). FDA had originally set a nine-month minimum time interval between initial storage and land application of “untreated biological soil amendments of animal origin.” The proposed rule will determine whether to follow organic standards of 120 days for foods in contact with the soil and 90 days for crops not in contact with the soil. This impacts farms that have both crops and livestock because there will be additional burdens to reasonably secure animals, which may be free-range, from accessing even a currently fallow field; to say nothing of the controls over working animals. The rule also leaves unaddressed the issue of wildlife and the potential necessity to destroy habitats near crop-growing areas to eliminate the potential for their incursions into fields. The challenges here lie in the lack of science behind the risk assessment in the use of manure and the time limitations imposed.

In conclusion, are these thousands and thousands of pages of regulations really necessary to ensure food safety for animals and humans? Can we really ever eradicate the source of naturally occurring contaminants? (The foreign-substance and product-testing elements are not at issue.) Does the proposed rule actually address where the foodborne illnesses actually come from? Or do we have to admit that food is a natural product that comes from an environment that we simply cannot regulate at 100 percent efficacy? In this case, it appears that only time will tell. There are still years to come before the regulations are fully implemented and years before we can assess whether they have prevented any foodborne illnesses as they were designed to do. In the meantime, we can eat, drink, and be merry and support our local farmers and producers!

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[Ed. Note: Comments to FDA on the FSMA rule closed on Monday, December 15, 2014 without a new extension].
In September, the World Meteorological Organization reported that atmospheric concentrations of the greenhouse gases (GHGs) carbon dioxide, methane, and nitrous oxide reached record levels in 2013. The concentration of carbon dioxide is now flirting with 400 parts per million—the level long viewed by many scientists as a climate tipping point. The window of opportunity for avoiding irreversible climate harms is closing.

In the United States, we are finally seeing a concerted legal and policy response to the unfolding climate crisis. Last year, the Obama administration rolled out its Climate Action Plan, which relies on a combination of regulations and incentives to reduce carbon pollution from power plants, accelerate the shift to clean energy, reduce emissions from transportation, and improve energy efficiency in industry, businesses, and homes. The centerpiece of this plan, the Environmental Protection Agency’s (EPA) proposed regulations to reduce carbon emissions from new and existing power plants, has been a lightning rod for controversy. Some states, too, have stepped up: California’s climate regime under AB 32, the California Global Warming Solutions Act, as well as the Northeast’s Regional Greenhouse Gas Initiative (RGGI) are examples of signature, state-led efforts to combat climate change. And in less than a year, parties to the United Nations Framework Convention on Climate Change (UNFCCC) will come together in Paris to seek an international deal on climate.

And yet, how to tackle the climate impact of agriculture, especially the emissions attributable to the production of meat and dairy, has been largely absent from this dialogue. According to the UN Food and Agriculture Organization (FAO), 14.5 percent of all heat-trapping GHGs emitted worldwide into the atmosphere as a result of human activity are attributable, directly or indirectly, to the livestock sector. Some estimates run far higher—see, e.g., Robert Goodland and Jeff Anhang, Livestock and Climate Change, Worldwatch Institute (2009) http://www.worldwatch.org/node/6294 suggesting that GHG emissions from livestock are around 51 percent of all global GHG emissions. And in the United States, the percentage is likely lower than FAO’s global figure, though apples-to-apples comparisons are difficult given different methodological approaches. EPA’s latest GHG inventory takes a narrower approach to categories of livestock-attributable GHGs than FAO. EPA estimates that all of agriculture contributes 8.1 percent of total U.S. GHG emissions, with livestock emissions representing roughly 40 percent of that figure.

Nor are worldwide meat and dairy emissions likely to decrease absent intervention. On the contrary, global meat production is projected to double by 2050 due to increasing population and growing per capita demand. According to research published in the Proceedings of the National Academy of Sciences in 2010, GHG emissions from the livestock sector alone could, by 2050, account for over two thirds of what the authors characterize as humanity’s “suggested safe operating space” for anthropogenic GHGs. We are poised to spend far too much of our limited carbon budget here.

How is it that animal-based food production can have such a weighty climate footprint?

Livestock Production as a Source of GHG Emissions

Intensive farm animal production in the United States generates GHG emissions in multiple ways. The major GHGs emitted are carbon dioxide ($CO_2$), methane ($CH_4$), and nitrous oxide ($N_2O$). $CO_2$ emissions result principally from transportation and energy usage. Sources of these emissions range from the manufacture of chemical inputs for feed production (such as pesticides and fertilizer), to the operation of farm machinery and equipment, to the processing and transporting of final products.
The production of animal feed, in particular, is a significant but often overlooked source of GHG emissions. The fertilizers, pesticides, and herbicides used to produce feed are energy-intensive inputs that must be manufactured and transported.

Agricultural soil management and the manufacture of chemical fertilizer are major sources of N₂O emissions. N₂O’s heat-trapping capacity (or global warming potential, GWP) is about 300 times that of CO₂ on a 100-year time horizon.

Livestock rearing and waste disposal are also key sources of emissions. Methane is the major culprit. In the United States and worldwide, agricultural activities are the primary source of anthropogenic methane emissions, with livestock as the primary contributor. In fact, in the United States, livestock production outpaces natural gas and petroleum production as a source of methane. Cows and other ruminants expel methane as a byproduct of their digestive process, called “enteric fermentation.” Ruminants are overwhelmingly responsible for livestock methane emissions. Storing and processing vast quantities of manure from any livestock also generates methane, as well as N₂O.

Despite methane’s much shorter atmospheric lifespan compared with CO₂ (12 years versus 50–200 years), methane paints a troubling climate picture. First, its potency as a heat-trapping gas has likely been underestimated until recently. According to the Intergovernmental Panel on Climate Change (IPCC), methane’s GWP is 34 times that of CO₂. Second, there is probably more methane in the atmosphere than previously thought. A 2013 Harvard study on methane published in the Proceedings of the National Academy of Sciences found that U.S. emissions of the gas due to ruminants and manure are actually up to twice the magnitude shown in existing GHG inventories (and methane attributable to fossil fuel extraction and processing could be multiples of existing estimates).

The GHG emissions attributable to livestock production are significant. How can we reduce them?

**Rolling Back GHG Emissions from Animal Agriculture . . . Where to Begin?**

Conceptually, the GHG emissions associated with meat and dairy production can be reduced either by making these products in ways that generate less climate pollution, or by reducing production of meat and dairy, or both.

**Technical mitigation.** As a starting point, livestock operations can pursue technical options to lower their GHG emissions. Manure management, animal husbandry, feeding practices, and grazing land management all offer opportunities for GHG mitigation. In fact, FAO asserts that technical mitigation options are available across all climates, regions, and livestock production systems. FAO also estimates that as much as a 30 percent reduction in sectoral GHG emissions is possible globally through the adoption of practices that are already in use.

Despite the availability and promise of technical mitigation options, a lingering concern is who foots the bill for them. Producers are unlikely to pursue climate-friendly practices voluntarily if it hurts their bottom line. Take the example of anaerobic digesters, the equipment and processes used to convert organic material in manure into methane, which can then be used to generate electricity. The U.S. Department of Agriculture’s Economic Research Service has determined that even though digesters can provide environmental benefits, agricultural operators may not find it profitable to adopt them absent taxpayer assistance. And indeed, despite being touted as a climate solution, digesters have not been widely adopted in the United States.

Digesters also illustrate the conflicting policy preferences that come into play in climate mitigation. These systems provide a climate benefit by eliminating methane. However, they are economically viable only at large industrial livestock facilities, and environmental and animal welfare advocates have sharply criticized the wisdom of promoting GHG reductions through a
taxpayer subsidy that has the effect of supporting the prevailing model of intensive animal production.

**Mitigation through reduced consumption.** The demand side of meat and dairy production also offers possibilities for decreasing GHG emissions. If reduced consumption patterns lead to reduced production, it follows that GHG emissions would drop. In a study published several years ago in the journal *Global Environmental Change*, the authors modeled various scenarios of future adoption of mitigation options and changes in meat consumption and found that the best reduction potentials for non-CO₂ agricultural GHGs resulted from a combination of technical mitigation and changes in consumption. A 2014 study in the *Journal of Industrial Ecology* reaches a similar conclusion: technological improvements in agriculture will not be enough; behavioral shifts, especially in developed countries, are needed. Yet another 2014 study, this one in *Climatic Change*, opines that deep cuts in GHG emissions from agriculture are implausible without large changes in consumption.

More widespread adoption of vegetarian or vegan diets can reduce demand for meat and dairy products at the individual and institutional levels. But more realistically, people can also lower demand by simply cutting back on their consumption of meat and dairy (by embracing “Meatless Mondays,” for example); choosing the most sustainably produced products; following a diet that minimizes the consumption of ruminant meat relative to other sources of protein; eliminating animal-based food product waste (a staggering one-third of all food produced for human consumption is lost or wasted); or a combination of these.

Encouraging behavioral changes, especially on as personal and visceral a matter as one’s diet, poses significant challenges. A growing body of social science literature is examining how best to accomplish such changes in the climate context and otherwise. Notably, socially beneficial shifts in other personal behaviors have occurred over the last several decades (e.g., recycling is commonplace, seatbelt use is standard, and smoking is down). Behavioral shifts are also possible in the area of meat and dairy consumption.

**The Role of Law and Policy**

What role should the law play in incentivizing or, better yet, compelling cuts in GHG emissions resulting from livestock production? Should the problem be addressed through the Clean Air Act, or through state and regional mechanisms, along the lines of California’s Global Warming Solutions Act or the Northeast’s RGGI (neither of which currently curbs livestock-related GHG emissions)? What role is appropriate for international processes like the UNFCCC, which faces outsized expectations leading up to the 2015 Conference of the Parties in Paris? Do we need an entirely new mechanism—e.g., a carbon tax that includes agricultural emissions, or a cap-and-trade mechanism that brings these emissions under the cap?

Currently, no EPA regulations are in the works to tackle livestock-related GHGs. A federal interagency methane strategy seeks to address agricultural methane emissions “exclusively” through voluntary, and not regulatory, actions—principally by targeting the increased adoption of biogas systems/methane digesters. EPA does have legal authority under several Clean Air Act mechanisms to regulate GHG emissions from concentrated animal feeding operations (CAFOs). But EPA has raised the emissions thresholds for GHGs under the title V operating permits program such that only the largest emitters are required to have permits, and few livestock producers would qualify. In addition, Congress has prohibited EPA from using its funds to issue or implement any rule that would require livestock producers to secure a title V permit for GHG emissions, sometimes referred to as a “cow tax.” EPA does require mandatory GHG reporting, and its rules cover manure management at certain kinds of large-emitting facilities. But again, Congress has, through the appropriations process, barred EPA from spending funds for implementation.
Ultimately, whatever legal tools are used to incentivize or mandate the rollback of GHG emissions from meat and dairy production, CAFOs look like the place to start. They dominate the U.S. livestock production landscape, they contain (by definition) large numbers of animals, they rely on fossil fuel inputs more than other animal production systems, and the regulation of industrialized livestock facilities is already a familiar concept (e.g., under the Clean Water Act)—albeit one that to date has met with limited success.

**Responding to the Arguments Against Regulation**

Any serious attempt—and certainly any regulatory attempt—to curb GHG emissions from meat and dairy production in the United States will be met with resistance. Following are several possible objections, together with responses.

*American farmers are already bogged down by environmental regulation, and regulating GHG emissions is a bridge too far.* The premise that U.S. agriculture is overregulated for its environmental impacts lacks support. Federal environmental laws expressly exempt many agricultural activities. Even where the federal government has statutory authority, EPA has encountered industry resistance and suffered legal defeats in the face of attempts to regulate. The clearest example is EPA’s long-running effort to arrive at a legally defensible CAFO permitting regime under the Clean Water Act. And many state legislatures protect agricultural operations from lawsuits (e.g., through right-to-farm laws), and in some instances insulate them from whistleblowers and public scrutiny (e.g., through so-called ag gag laws that restrict and in some instances criminalize the recording of activities at agricultural facilities without an owner’s permission). By contrast, environmental regulation of livestock-related GHGs would be novel.

*With the Earth’s population at over 7 billion, and racing toward 9 to 10 billion by 2050, we need* to produce meat and other animal products as efficiently and inexpensively as technology will allow. *This means generating GHGs.* The “feed the world” argument misses the fact that, all things being equal, meat and other animal products are an ecologically inefficient way for people to obtain protein, fiber, and calories, compared to a plant-based diet. Plants convert energy from sunlight, a fraction of which is available to the livestock that consume the plant matter, and a further fraction of which is obtained by people that consume animal products. Energy is lost at each step of the food chain. To be sure, producing and transporting any food, including grains and vegetables, or any of the meat substitutes now hitting the shelves, imposes a climate cost. But on average, the carbon cost of eating meat, particularly ruminant meat, is far higher than that of eating plants.

Also, meat production competes for land with plant-based foods grown for people. Obviously, there are communities and places where a vegetable-centric diet is impractical or even impossible (e.g., Inuit populations in the far North), or inconsistent with tradition. And not all pasture land or other land used to grow feed crops is suitable for producing human food; but much of it is. With over 800 million people around the world undernourished, we dedicate to livestock production an estimated 30 percent of the planet’s land surface and nearly three-quarters of all agricultural land.

*Emissions from agriculture are a developing-world problem—and one largely attributable to land clearing for feed and pasture. U.S. agriculture, by contrast, is a model of efficiency.* Livestock-related emissions in developing nations are indeed a serious problem. Land clearing for agriculture is more commonplace in some developing countries, and it is true that U.S. agriculture is comparatively efficient. But similar points could be made about electricity generation and transportation, as well, when one compares the United States to many developing nations—yet this does not relieve us of the burden of addressing those major categories of emissions.
And regardless of production efficiencies, Americans are among the top per capita consumers of meat on the planet. We eat it at roughly three times the global average. Residents of developed nations eat vastly more meat per capita than people in developing countries, even though they tend to have far more dietary options. And industrialized nations are exporting their eating habits: a 2013 report issued by the UN Environment Program noted that citizens of the developed world are “setting a standard for food consumption patterns, especially of meat and dairy products, that is far from being sustainable, while at the same time leading to significant additional health risks through over consumption.” Add to this that the United States is the second-largest global emitter of GHGs (China holds the top spot), and the argument for inaction becomes even less tenable.

**Conclusion**

Politically and legally, shrinking livestock’s carbon hoofprint will be an enormous challenge. The Waxman-Markey cap-and-trade climate legislation that passed the House but failed in the U.S. Senate in 2010 not only exempted agriculture from emissions reductions, but also provided for agricultural offsets. Still, the American Farm Bureau and many other agricultural interests opposed the bill. Further complicating the policy response to livestock-related GHG emissions is the fact that the climate dimension of meat and dairy production in the United States is but one facet of the environmental impact of how we produce our food. The prevailing U.S. food system is the subject of mounting scrutiny—and criticism—on issues ranging from water and air pollution, to antibiotic resistance due to the non-therapeutic use of antibiotics, to animal welfare concerns, to human health impacts from obesity and diabetes. The question remains whether this food system, as currently constituted, can account for so many externalities of production and still be viable. Regardless, climate change will not wait on broad-based reform. We have already reduced transportation-related emissions by improving fuel efficiency and increasingly favoring electric vehicles, and power plants will soon have to reduce their emissions. But agricultural emissions continue to stand mostly outside of the climate policy debate. Achieving a sustainable solution on climate change demands otherwise.

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VOLUNTARY STANDARDS MOVE FORWARD TO IMPROVE LIVESTOCK GHG MANAGEMENT
Thomas P. Redick

This article will profile the current state of GHG emissions in livestock around the world, comparing the ratio of GHGs to output in developing nations and the “industrial” model prevailing in the developed world, including the United States, Brazil, China and other major livestock-producing nations. I will also discuss the relative benefits of “free-range” and “agroecological” movement in livestock production (“green” livestock for the purposes of this article) as compared to the concentrated animal feeding operation (CAFO) side of livestock production. The issue of sustainability in meat production raises the question, mainly from producers, of “who cares?” about sustainability. The answer may not lie in the estimated the top 15 percent or so of consumers who pursue “lifestyles of health and sustainability” (LOHAS) but in broader drivers toward production efficiency such as shareholder pressures and the sense of needing a “social license” to continue operation as a large company. McDonald’s has its reasons for seeking sustainable beef, for example, but few of its consumers are part of the 15 percent LOHAS folks who are boycotting it or demanding sustainability information. Sustainability standards can help companies like McDonalds reduce their environmental footprint, including GHG emissions. As a result of these pressures, the concentrated, higher efficiency form of livestock production will come under increasing pressure to reduce its environmental footprint, particularly in terms of carbon emissions.

Setting the Science on Emissions Straight

When the dietary guidelines issued by the U.S. Department of Agriculture are opened up to discussion of environmental impact issues, it is clear that an industry needs to take action to answer questions about its environmental footprint. See, Dan Charles, Congress to Nutritionists:


While the regulatory bodies of the world may be taking their time in addressing the climate impact of livestock operations, sustainability standards and industry life cycle analysis are moving ahead at a fast pace to address these emissions.

First, what is the scientific status of establishing livestock’s fair share of global emissions? In an erroneous report published in 2006 entitled “Livestock’s Long Shadow”—the UN Food and Agriculture Organization (FAO) stated an inflated number of over 18 percent of total GHGs. In response, U.S. scientists used a comprehensive life cycle analysis (LCA) for livestock while FAO used direct emissions for transportation to erroneously elevate livestock’s relative contribution to climate. Pitesky et al. found the UN report off by over 15 percent; the actual emissions from livestock were 2.8 percent, citing EPA’s LCA and GHG inventory for agriculture in 2010. Maurice E. Pitesky et al., Clearing the Air: Livestock’s Contribution to Climate Change, 103 ADVANCES IN AGRONOMY 1–40 (D. Sparks ed., 2009), http://animalscience.ucdavis.edu/faculty/mitloehner/publications/2009%20pitesky%20Clearing%20the%20Air.pdf. While UN’s 18 percent number is simply wrong, it keeps being cited by critics of livestock agriculture as if it applied to U.S. agricultural livestock emissions. The variation in emissions from the United States to worldwide emissions could be due to increasing efficiency of U.S meat. production, which has much better genetics and contains its footprint better than developing nations.

British livestock GHG emissions were similarly low, around 3 percent. M. Gill et al., Mitigating Climate Change: The Role of Domestic Livestock, 4 ANIMAL 173 (2010).

FAO GHG estimations from livestock are based on livestock-related land use changes (i.e., deforestation creating new pasture lands) as a huge
contributor (34 percent) toward their livestock-related emissions of GHGs. H. Steinfeld et al., Livestock’s Long Shadow. Food and Agriculture Organization of the United Nations (FAO) (2006), ftp://ftp.fao.org/docrep/fao/010/a0701e/a0701e.pdf. There is also less “contained” operations and more “free-range” livestock around the world. While ostensibly better for animal welfare to some folks, this may not prove to be the most eco-efficient manner of producing meat. Since land use change to supply new pasturelands rarely occurs in the United States, EPA counts the actual relative emissions.

FAO revisited this issue (as Mr. Myers notes) to claim 14.5 percent of all heat-trapping GHGs emitted into the atmosphere as a result of human activity are attributable, directly or indirectly, to the livestock sector. The same defect in analysis, in terms of applying this to the United States, would apply—FAO assumes deforestation caused by livestock and relies on free ranging animals.

One thing these disparate numbers point toward is the higher efficiency of U.S. meat production, in terms of resources used. With much better efficiency of meat and dairy production in the United States and other developed nations with good genetics, feed and medicine compared to the developing world, the relative emissions of GHG measured in pounds of meat produced make the U.S. numbers for GHGs even lower.

Developing countries path to reducing emissions may need to follow the Chinese model—it is moving animals indoors and concentrating them to enable higher efficiency in meat production. This is not an accepted path to controlling livestock’s footprint worldwide, however. Indeed, there is a romantic notion of “natural” and “free-range” that would call archaic, land-intensive production practices more “sustainable” without regard for the vastly larger acreage of land that has to be set aside to support this romantic notion. For example, one article claims, “The small farm continues to be a perfect ecosystem, with cow manure used to fertilize crops and vegetables grown on the farm. By contrast, cow manure and chemicals from factory farms contaminate streams and destroy the environment.” See, e.g., Michelle Goldstein, Why Grass-Fed Meat Is Better for Your Health and the Environment, Natural News (Sept. 6, 2014), available at http://www.naturalnews.com/046753_grass-fed_meat_environment_food_production.html (last visited Dec. 12, 2014).

If a concentrated animal feeding operation (CAFO) captures its waste and creates energy to heat its barns, however, it could lower its carbon footprint drastically and could leave free-range agriculture far behind in terms of environmental management of carbon emissions.

While the “green” livestock movement likes to throw stones at the CAFO side of livestock production, there is a potential “glass house” that the “green” livestock may be housed in, from which rocks should not be thrown. The use of grasslands and distribution of manure across the landscape may be a more significant environmental impact than a well-controlled, energy-producing CAFO that puts all its manure to use as compost and soil amendments.

As a result, it appears clear that global livestock emissions will need to be significant transfer of technology to the developing world and higher efficiency in meat production to avoid fulfilling the prediction recently made that emissions from the livestock sector alone could, by 2050, account for over two-thirds of the worlds “suggested safe operating space” for man-made GHGs in the Proceedings of the National Academy of Sciences in 2010.

The Council for Agricultural Science & Technology has published several reports relating to environmental impacts of livestock. In Air Issues Associated with Animal Agriculture: A North American Perspective, the authors review various LCAs conducted in the livestock industry and profile industry stewardship to address air contamination, including GHGs. Their summary is worth including here:
Regulation of air emissions from animal production at the federal, state, and even local level has been steadily increasing during the past 20 years, creating uncertainty for producers and the industries. Compliance to existing and new regulations is being met through a combination of new mitigation technologies and management practices depending on the animal species, location of the production operations, and economics of the industry. Many of these mitigation technologies are site and specie specific, but several, such as diet manipulation, are common to all animal species. The goal is to use science-based information to help all stakeholders involved in animal production to protect the environment and public health in a proactive manner and avoid costly litigation to solve nuisance suits or enforce regulations. Larry Jacobson et al., *Air Issues Associated with Animal Agriculture: A North American Perspective*, CAST Issue Paper No. 47 (May 2011).

In terms of health of animals and food safety, there are also competing concerns on either side of the production model (green vs. CAFO), since freely ranging livestock can more readily pick up diseases and infections, some of which raise food safety risks (see, Scott Hurd et al., *The Direct Relationship Between Animal Health and Food Safety Outcomes*, CAST Commentaries (May 2012)).

**Sustainability Standards in Livestock Production**

As president of CAST, I attended the inaugural meeting of the Global Roundtable for Sustainable Beef (GRSB) in 2010. In 2014, GRSB announced the rollout of its “principles and criteria” that the World Wildlife Fund (WWF) and other proponents hope will drive sustainable beef standards around the world. GRSB Principles & Criteria document address five areas: (1) Natural Resources; (2) People and the Community; (3) Animal Health and Welfare; (4) Food; and (5) Efficiency and Innovation, including GHG. Under each is a series of broad criteria and indicators and metrics drill down further. Each country or region has been given the latitude to develop regionally suited standards and practices to produce “sustainable beef” within the broader rubric.

The GRSB currently has 55 members in over 18 livestock-producing countries—this includes cattle ranchers, feedlot operators, packers, wholesalers, restaurants, and retailers. These industry interests worked closely with academics, activists, and others to create rules to reduce the environmental and social impacts of bringing beef to market, including GHG emissions. Ruaraidh Petre, *Without Profitable Producers, There Is No Beef Industry*, BEEFCENTRAL, Apr. 15, 2014, http://www.beefcentral.com/news/opinion-without-profitable-producers-there-is-no-beef-industry/.

The GRSB Principles & Criteria document created a common platform for countries and regions to set their own standards and certification systems in the coming years. One of the world’s largest buyers of beef, McDonald’s, plans to make “sustainable beef” part of its operations in 2016. It hopes to sell only sustainably sourced beef worldwide someday soon. It will launch its first verified sustainable beef using Canadian beef. This GBSP standard and verification scheme will enable the Canadian beef industry to meet McDonald’s demand for data by 2016. See Joel Makower, *Principles in Place, McDonald’s Looks to Canada for Sustainable Beef*, GREENBiz, Nov. 3, 2014, http://www.greenbiz.com/article/principles-place-mcdonalds-looks-source-sustainable-beef-canada.

While the World Wildlife Fund and other major environmental groups support GRSB, there are others that consider it just another corporate “greenwashing” initiative. There will always be competing visions of sustainability in livestock production.

**The Path Forward May Be Driven by Liability Prevention Metrics**

For a company involved in livestock production, there is a looming specter of litigation and liability risk involved with air and water emissions. This
has typically involved common law nuisance claims, and the occasional citizen suit under the Clean Water Act or Clean Air Act. In the future, nuisance case law may evolve toward holding companies liable for the economic impacts of global warming. While the U.S. Supreme Court preempted federal common law nuisance for climate emissions in *American Electric Power (AEP) v. Connecticut*, 131 S. Ct. 2527, 41 ELR 20210 (2011), it left open state common law public nuisance. While the latter is a long-range risk that may never materialize, there are recognized risks in private nuisance for air and water emissions.

Taking all of these risks into account, however, a sound financial plan—to ensure economic as well as ecological sustainability—would incorporate the financial benefits of avoiding litigation and liability, and add that benefit to the calculus of whether to incur capital costs to upgrade a livestock facility, particularly for the costly step of containing livestock manure to fuel energy production, via a “digester,” or converting feed rations to more costly methane-reducing feeds. Each of these approaches is subject to intense scientific research to increase the efficacy of these control methods.

Over time, considerations of long-range business planning may dictate the transformation of CAFOs to a more energy-producing model. The insurance industry may need to get more involved in offering discounts on comprehensive general liability coverage, to recognize the reduction in liability risks that such steps toward sustainability deliver.

**The Path Forward Need Not Rely on Regulation**

There is a trend in environmental law toward voluntary stewardship and “sustainability” that go well beyond regulation, and link up such initiatives to consumer or shareholder demand. With the fast food giant McDonald’s making its move toward sustainable beef, there can be no question that sustainability in meat production is reaching beyond the top 15 percent or so of consumers who pursue the “LOHAS” path to personal sustainability. An international standard on sustainability can go beyond regulatory minimums around the world, achieving higher levels of environmental self-regulation than regulators could hope to achieve.

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This article will address both the article in this issue by Bruce Myers as well as a more detailed policy brief published in February 2014 entitled “Livestock’s Hoof Print: The Challenge of Regulating Global Warming Emissions.” See http://www.eli.org/sites/default/files/docs/policy_brief_8.pdf. Mr. Myers contends that livestock agriculture is an overlooked and critical contribution to global warming. Specifically, Mr. Myers argues that the “national climate change dialogue” fails to address the impacts of livestock agriculture or “production of meat and other animal products” on global warming. Mr. Myers identifies methane and nitrous oxide as the primary emissions associated with livestock agriculture, which are contributing to global warming. Mr. Myers’ contention primarily relies upon 2010 research published in the Proceedings of the National Academy of Sciences (NAS), as well as findings of the United Nations Food and Agriculture Organization (FAO). Myers, citing the 2010 research in the Proceedings of the National Academy of Sciences alleges, “The livestock sector alone could, by 2050, account for 70 percent of what the authors characterize as humanity’s ‘suggested safe operating space’ for anthropogenic GHGs.”

However, it is important to note that both the findings stated in the Proceedings of the National Academy of Sciences in 2010 and the United Nations FAO are premised upon a methodology referred to as “life cycle assessment” (LCA). As this article will discuss in greater detail, use of LCA methodology brings to question both the findings of the NAS and FAO. LCA, while a predominant methodology in use, has also come under attack with respect to its ultimate value. As such, because the underlying premise advanced by Mr. Myers relies upon findings based upon the use of LCA to advance his contention, the contention itself becomes questionable. In this article, the question is raised of whether there is sufficient depth of analysis to characterize livestock emissions as a predominant source of greenhouse gas emissions or a significant factor with respect to the national debate on climate change? This article does not answer the question of whether or not livestock agriculture should or should not be a significant factor of consideration in the national debate on climate change, but rather questions whether we yet have enough information to call livestock agriculture, in total, a predominant source of greenhouse gas emissions.

**LCA Methodology**

LCAs have significant limitations based upon how certain criteria are defined, analyzed, allocated, and interpreted. For instance, in a phase of LCA referred to as “goal and scope,” limitations on the ultimate utility of the methodology of LCA arise due to how certain functional units are defined, namely, how inputs and outputs are defined in the assessment. See J. Reap et al., *A Survey of Unresolved Problems in Life Cycle Assessment*, 13 Int’l J. Life Cycle Assess. 290 (2008). Preliminary decisions about how inputs and outputs will be defined can render LCA of lesser value and even drive the assessment to a predetermined outcome. The best analogy to describe this problem is through the analogy of “garbage in; garbage out.”

The Proceedings of the National Academy of Sciences in 2010, for example, defined inputs as feed, water, energy, and fertilizer. The authors defined outputs as including greenhouse and other emissions, manure, and runoff. This critical phase in the LCA omitted from consideration other factors relevant to a full analysis of the cumulative impacts of livestock agriculture on global warming or climate change. For instance, the 2010 research failed to consider the carbon sequestration associated with tall grasses used to feed livestock. The study also failed to consider how advances in livestock management achieve a reduction in greenhouse gas emissions (recall that the time frame evaluated with respect to the Proceedings was 2000–2010). The authors also failed to
contemplate advancements in livestock feed, which may reduce enteric fermentation-related livestock emissions. Another factor the authors failed to address in their LCA is improvements in pasture management.

Another problematic phase or aspect of LCA is allocation or weighting of the various inputs and outputs. For instance, while the Proceedings of the National Academy of Sciences in 2010 considered manure management, it is unclear how they allocated or weighted this output. All manure management systems are not equal. It is unknown if the authors considered changes or advances in manure management that may impact the true significance of this output. Manure management strategies such as aeration, compaction, composting, manure removal frequency, optimizing bedding materials for dry manure management, the shift from liquid to solid systems, or the use of digesters for methane capture can result in substantial reductions in livestock emissions. Similarly, while the Proceedings of the National Academy of Sciences in 2010 defined as an output greenhouse gases, including methane, it is unclear that due to methane’s global warming potential, even small reductions in methane emissions have significant effects on overall livestock agriculture emissions. Information on how these relevant factors or variables were allocated across the LCA or weighted in the LCA is absent in the Proceedings of the National Academy of Sciences in 2010.

Finally, data availability and the overall quality of data utilized in life cycle assessment will impact key findings. In the Proceedings of the National Academy of Sciences in 2010, the authors conceded that certain data were not available to them. For instance, they state, “Our analysis is based on the best data currently available, but follow-up studies are necessary to improve parameter estimates and fill remaining knowledge gaps.” The authors also acknowledge that the LCA requires “expansion, updating, and further analysis to enhance statistical robustness.” These obvious definitional omissions and data limitations bring to question the true value of the LCAs underlying the basis of the data relied upon by Mr. Myers. More significantly, it calls to question the central premise of Mr. Myers’ policy brief, namely, the role that livestock agriculture does or should play within the national climate change debate. Rather, it seems that a more thorough evaluation of the cumulative impact of livestock agriculture on climate change is needed in order to determine whether its role or impact on climate change or global warming is, in fact, truly significant.

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