Factory Farms and Climate Change

Climate change is the most pressing issue of our time, and we are already seeing its impacts, from shrinking glaciers to extreme weather events to reduced crop yields.[1] We need to make enormous cuts in our greenhouse gas emissions in order to avoid the most severe impacts. This includes significant changes in the way we produce food.[2] The dominant system for producing food animals in the United States — on crowded, polluting factory farms — is incompatible with these goals, relying heavily on fossil fuels and generating huge amounts of greenhouse gases.

Currently, the top 20 corporations worldwide that produce meat and dairy contribute more emissions than the entire country of Germany.[3] And global meat production and consumption continue to rise.[4] Without significant changes to the way we produce meat and dairy, we will not avoid a climate catastrophe.[5] We must transition to smaller, more sustainable livestock systems.

Animal Agriculture and Climate Change

Livestock production is responsible for 14.5% of all human sources of greenhouse gases. The greatest contribution to these emissions comes from producing and processing animal feed (45%).[6] The rapid increase in factory farms in the United States was made possible by the overproduction of corn and soybeans[7] — resulting in increased emissions from fertilizing, harvesting, transporting and processing all of these grains into feed. Yet this is highly inefficient, with North American systems producing only one calorie of animal products for every five-and-a-half calories of feed crop required.[8] This approach also consumes an enormous amount of cropland, with half of all crop calories in North America fed to livestock.[9]

Factory farms typically raise beef cattle on grain instead of pasture, and it takes significantly more crop calories to produce a calorie of beef than it does to produce chicken.[10] Additionally, cattle release

methane emissions during enteric fermentation (a digestive process in ruminants). Globally, emissions from enteric fermentation make up 39% of livestock's greenhouse gas footprint.[11]

Manure storage and processing makes up 10% of livestock's global emissions footprint.[12] Small and medium-sized farms can apply dry manure to neighboring fields as a fertilizer, using the waste as a resource and reducing their reliance on synthetic fertilizers. In pasture-based grazing systems, the animals distribute manure themselves. Factory farms, however, often produce more waste than can be absorbed by nearby fields.[13] Manure from hog and dairy factory farms is often stored on site before being sprayed on fields or transferred to a different watershed. Long-term storage of liquid manure can increase greenhouse gas emissions.[14] One estimate found that a ton of manure from large dairy farms produces over twice the greenhouse gas emissions as a ton of manure from small dairies.[15]

Poultry like chicken has lower production-related emissions than beef and can be a more nutritional source of protein.[16] However, simply switching from beef to chicken will not make factory farms climate-friendly. Broiler and layer farms still contribute to greenhouse gas emissions through fossil fuel use and manure management.[17] They also create the same problems with air and water pollution as other types of factory farms while relying on large quantities of corn and soy as feed.[18]

Alternative Systems

The climate change impacts of factory farms are well established. But what about alternative systems, such as smaller-scale, organic and grass-fed operations?

Organic livestock systems can have a slightly lower carbon footprint, due to the fact that they use feed that is grown without synthetic inputs and is less processed.[23] However, poor enforcement of organic standards enables some large organic farms to operate like factory farms, confining huge numbers of animals in crowded conditions and providing limited access to the outdoors.[24] These organic megafarms create the same issues with pollution and waste emissions as other factory farms.

Smaller operations have the potential to reduce their carbon footprints if they adopt more sustainable practices, such as better manure management and improved diets.[25] Integrated crop and livestock systems in particular hold promise for reducing emissions, as they use manageable amounts of manure as crop fertilizer (thereby reducing their reliance on synthetic inputs) while also producing their own feed.[26]

Grass-fed beef systems have the potential to reduce or even eliminate carbon emissions, although this is dependent on several factors. Sustainable grazing can help restore degraded rangeland and increase soil carbon sequestration through plant growth and

Why anaerobic digesters are not the solution

On paper, anaerobic digesters may appear to be the silver bullet for reducing dairy factory farms' greenhouse gas emissions. These systems convert the methane emitted from manure into biogas that can be used to generate electricity on-farm or be sold offsite. However, in practice they create more problems than they solve. Overall, anaerobic digesters have high rates of failure and can experience spills and even explosions that threaten nearby communities and ecosystems.[19] Additionally, they do not actually eliminate factory manure waste; they extract methane but leave the manure and its nutrients (like phosphorus and nitrogen) intact.[20] Farms with digestors use similar waste disposal methods as other factory farms, including field spreading, which can cause runoff and pollute nearby streams with excess nutrients.[21]

Anaerobic digesters are prohibitively expensive, requiring millions of dollars in installation and operating costs that are often not offset through revenue. They likely would not be possible in the United States without taxpayer subsidies.[22] This is an egregious waste for a technology that produces negligible climate benefits and instead serves to prop up the polluting factory dairy system.

improved soil health.[27] In some cases, converting crop fields to grazing pasture can transform livestock systems into carbon sinks.[28] However, other types of land conversion (such as converting forest to pasture) can have the opposite effect and instead result in an increased carbon footprint.[29] Careful management of grazing systems and attention to regional differences is key. In the end, sustainable grazing may continue to be an important source of food on land that is not suitable for crop production.[30]

Conclusion and Recommendations

We can reduce greenhouse gas emissions by converting food animal production to smaller operations that use sustainable methods. However, we will also need to reduce our consumption of meat and animal products in order to make significant cuts in greenhouse gas emissions. This means rethinking the role of meat in our diets. The U.S. population overconsumes protein; if we reduced our protein to recommended levels by reducing our intake of animal-based products, we would cut per person agricultural greenhouse gas emissions by 40 to 45 percent.[31]

Reductions in animal agriculture's climate footprint will only come about with policy changes in our federal, state and local governments that support a rapid transition away from the factory farm system. This will require:

- Additional funding and support for research on the greenhouse gas emissions generated by different agricultural systems and methods.
- A ban on new factory farms and on the expansion of existing ones.
- Federal, state and local governments enforcing environmental laws that hold factory farms accountable for their pollution.
- Technical assistance and funding from federal and state governments that promote integrated crop and animal operations and build the infrastructure to support them.

Shifting away from factory farms is necessary in our fight against climate change. Working toward a more sustainable farming system will not only benefit our planet but will revitalize rural communities, reduce animal suffering and benefit consumers.

Endnotes

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