APPENDIX Q

Clean Water & Oceans: Water Pollution: In Depth: Report

America's Animal Factories

How States Fail to Prevent Pollution from Livestock Waste

Top of Report

Chapter 1

ENVIRONMENTAL AND HEALTH CONSEQUENCES OF ANIMAL FACTORIES

Factory farms, which mass-produce animals in assembly-line fashion, have harmed aquatic life, human health and ecosystems across the nation. As industrial-sized farms stagger under the vast burden of manure they are generating, environmental disasters ar inevitable. The scale of this unprecedented outpouring of animal waste is staggering: 13(times the waste generated by humans in this country each year.[1]

This section details how animal waste is poisoning our water and air. It also explains why more disasters are likely to occur unless the nation takes serious steps not only to regulate the way animal factories currently handle their waste but also to turn towards more benign methods of raising animals and managing the wastes they generate.

Water Pollution

Bursting and overflowing manure lagoons have spawned environmental disasters arounc the country, sending animal waste gushing into rivers, groundwater and coastal wetlands In 1995, an 8-acre hog waste lagoon in North Carolina burst, spilling 25 million gallons of animal waste into the New River. The spill killed as many as 10 million fish and closed 364,000 acres of coastal wetlands to shellfishing.[2] In 1998, a 100,000-gallon spill into Minnesota's Beaver Creek killed close to 700,000 fish.[3] In 1997, animal feedlots were responsible for 2,391 spills of manure in Indiana.[4] Sixty-three percent of Missouri's factory farms suffered spills between 1990 and 1994, according to Missouri's Departmen of Natural Resources.[5] In 1996, forty spills killed close to 700,000 fish in Iowa, Minnesot and Missouri.[6]

A North Carolina study of nearly 1,600 wells adjacent to hog and poultry operations showed that 10 percent of the wells tested were contaminated with nitrates above the drinking water standard, and 34 percent were contaminated with some level of nitrates.[7] Another study in that state found severe seepage losses of nitrogen from more then 50 percent of the lagoons tested by the state, posing a risk to groundwater.[8] While seepage can be reduced with the use of clay liners, even clay-lined lagoons may leak from severa hundred to several thousand gallons per acre per day.[9]

While spills capture public attention, the more common problem is over-application of

waste onto cropland, which sends polluted runoff into waterways and leaches pollutants into the groundwater.

Too Much Manure on Too Little Land

Animal manure can be a valuable fertilizer source. But the sheer quantity of manure that the byproduct of large-scale animal confinement operations makes it more difficult to apply manure at a rate at which it can be absorbed by crops.[10] The quantity of manure is magnified since feedlots are often clustered in close proximity to each other in small geographic areas in order to be close to slaughterhouses and inexpensive feed supplies.

Applying too much manure to farmland sends pollutants into rivers, streams, groundwate and air, which serves as yet another pathway to water. In a North Carolina state study, th nitrates in shallow groundwater below fields sprayed with liquid manure have been measured at rates five times the human health standard; in long-term sprayfields, the rates have been as high as thirteen times the human health standard.[11]

Pollutants of Concern

The pollution from animal waste can harm waterways, human health and aquatic life. The primary pollutants of concern are nutrients (nitrogen and phosphorus), pathogens like bacteria and viruses, and heavy metals.

Phosphorus and nitrogen from manure are major water pollutants. At high levels, phosphorus is acutely toxic to fish; at lower levels, phosphorus and nitrogen over-enrich water bodies, causing an excess of algae (a process called "eutrophication").

Oxygen in water is a basic requirement for a healthy aquatic ecosystem. Severe oxygen depletion usually results when large quantities of organic matter, such as animal manure pollute waterways. Prolonged exposure to low oxygen conditions can suffocate adult fish and their eggs or starve them by killing their prey. An example of the possible harm that may be caused by excessive nutrients is the development of a large oxygen-depleted "hypoxic" area known as the "dead zone" in the Gulf of Mexico. This dead zone, responsible for massive fish kills, now covers extensive areas of the continental shelf south of Louisiana at certain times of the year.[12] Related problems of nutrient enrichmer and eutrophication include noxious algae that have toxic effects on marine life.[13] Nutrien pollution has been linked to the growth of a type of organism known as *Pfiesteria piscicida*,[14] which has been implicated in major fish kills in coastal waters in North Carolina. In 1997, *Pfiesteria piscicida* killed more than 30,000 fish in the Chesapeake Bay,[15] whose Eastern Shore suffers from the over-application of poultry manure on farmland. *Pfiesteria* is also toxic to humans.[16]

Ammonia is a toxic form of nitrogen that causes algae blooms and fish kills in coastal waters. Open-air lagoons emit ammonia into the air. Sprayfields and barns also contribut to the problem.[17]Some of the ammonia emitted from factory farms is deposited into waterways or fields about 50 miles away through water or fog, and the rest changes into drier, airborne form that can travel hundreds of miles away.[18]In Sampson County, North Carolina, the amount of ammonia in the rain doubled between 1985 and 1996, a period c major expansion in the hog industry.[19]

Another pollution concern is the long-term contamination of soil from heavy metals adde to livestock feed. For example, zinc and copper are added to swine and poultry feed to prevent disease and improve digestion. Plants absorb a small amount of these metals, b a significant quantity builds up in the soil. When the level gets too high, it can stunt plant growth. Human waste, which is applied to land as sludge, also contains heavy metals, ar

EPA regulations impose restrictions on the permissible level of heavy metals in sludge.[20] These restrictions do not apply to the land application of animal waste, however. In 1995, 17 percent of the soil samples in North Carolina's largest poultry-producing counties and 10 percent of the soil samples in the state's largest swine-producing counties had zinc levels that exceeded by ten times the levels needed by the crops for their growth. The number of soil samples from these counties that exceeded this level had doubled since 1985. Already this level of zinc makes it hard to grow peanuts, and other crops will begin to suffer in future decades as the metals reach higher concentrations.[21] Application onto the land of lagoon sludge, the buildup left on the bottom of the cesspool, poses another environmental threat. Lagoons are abandoned after ten or twenty years and the sludge that has accumulated over the years contains high concentrations of heavy metals, such as zinc and copper, from animal feed.[22]

Human Health Concerns

Human health is also at risk from animal waste pollution. Some of the main concerns include pathogens and excess nitrogen.

Animal waste can contain pathogens (including fecal coliform and other forms of coliform bacteria) that can, for example, contaminate drinking water and cause gastrointestinal illnesses. In some groundwater surrounding factory farms bacteria are present, which demonstrates the potential for microbial contamination.[23] In 1993, *cryptosporidium*, a pathogen found in Milwaukee's drinking water, made 400,000 people sick and led to the deaths of more than 100 people. A suspected cause was dairy manure.[24]

Pathogens in hog waste are 10 to 100 times more concentrated than they would be in human sewage which is diluted with water in sewage treatment plants. Additionally, human sewage is treated to reduce the nutrients, organic matter and pathogens and is then usually disinfected. In contrast, hog waste is typically stored in anaerobic lagoons, which scarcely reduce the microbial indicators of fecal contamination.[25]

High levels of nitrogen leaching into drinking water supplies increase the risk of methemoglobinemia, or blue-baby syndrome, which can cause deaths in infants.[26] In 1996, the Centers for Disease Control linked the high nitrate levels in Indiana well water near feedlots to spontaneous abortions in humans.[27] High nitrate levels may also foster the growth of harmful organisms like *Pfiesteria*. In humans, exposure to *Pfiesteria* toxins in the air or water can cause skin irritation, short term memory loss and other cognitive impairments.[28]

Two studies have looked generally at the medical conditions of residents living near swin factory farms. One survey of residents living in the vicinity of a 2,500-sow facility found much higher reports of respiratory problems than those recorded in neighborhoods of farms where no livestock was raised. Another study from North Carolina found behaviora changes in individuals living near large-scale confinement operations.[29]

The intensive use of antimicrobials (including antibiotics) is an integral feature of industri animal agriculture. Over 40 percent of the antibiotics sold in the United States are used i agriculture, more than 80 percent by weight for growth promotion and the rest for treatment of animal disease. Scientists now believe that agricultural use of antimicrobials has major implications for human health. There is growing evidence that animal use of antimicrobials is tied to the evolution of multiple drug resistance in food-borne disease agents and the loss of efficacy of drugs important in human medicine.[30] Concern about antimicrobial resistance has led scientists and public health officials to advocate curbs or antibiotic use in animal agriculture.[31] The Centers for Disease Control and Prevention (CDC) has also concluded that animal use of antimicrobials has adverse human health consequences and is targetting animal use in its campaign to halt the spread of antibiotic resistance.[32]

Pollution Associated With Poor Siting

Around the nation, lagoons and fields fertilized with manure are sited in locations where pollution is likely to occur. Many states allow lagoons and fields spread with manure to be situated in floodplains and wetlands, and in areas that directly connect to groundwater.

For example, in North Carolina, many factory farms are sited in sandy soils in the coastal plain, in or near "prior converted wetlands" (those drained and converted to agriculture prior to 1985). Although the Clean Water Act exempts these areas from wetlands protections, they still behave like wetlands in many ways; for example, they often have high water tables that may facilitate the overflow of lagoons.

In Kentucky and several other states, factory farms are located in karst terrain -- porous, fragile limestone formations that directly connect to groundwater. A burst lagoon in karst areas can put both surface water and groundwater at risk.

Groundwater Depletion

Groundwater depletion is another concern associated with factory farms. Water is used t cool and water the animals and to flush waste from the confinement sites into the lagoon Additionally, many animals consume large amounts of water. For example, pigs consum from between five to eight gallons of water a day. In Missouri, activists estimate that a swine operation that finishes 80,000 animals per year consumes over 200,000 gallons of water per day, or 73 million gallons per year.[33]

Air Pollution

The air quality problems associated with large-scale confinement operations include emissions of hydrogen sulfide, ammonia and methane.

Methane is a potent greenhouse gas implicated in global climate change. A commonly used manure "treatment" technology is anaerobic lagoons, which reduce the nutrient content of the waste but produce methane gas as a byproduct. EPA estimates that emissions from manure management were about ten percent of total U.S. methane emissions in 1995, and about 31 percent of the agricultural sector's emissions. Of these emissions, liquid-based manure management systems such as those found in factory farms accounted for over eighty percent of the total emissions from animal wastes.[34]

Hydrogen sulfide is a toxic gas associated with the decomposition of swine manure. Emissions of this gas turned out to be the cause of dizziness, nausea, vomiting and blackouts for residents of Renville County, Minnesota, living near factory farms. Initial tests by the Minnesota Pollution Control Agency in that county found that public health standards for hydrogen sulfide were exceeded by half of the ten facilities tested, some by up to 50 times the state standard.[35]

Conclusion

Factory farms have polluted our surface waters, our groundwater and our air. Moreover, public health is being threatened. It's time to recognize the damage that animal factories

are wreaking on our environment.

Notes

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