

**Controlling Odor and Gaseous Emission Problems from
Industrial Swine Facilities**

Recent Laws and New Ideas

Yale Environmental Protection Clinic

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1.0 INTRODUCTION

Last May, we released a handbook entitled “Controlling Odor and Gaseous Emission Problems from Industrial Swine Facilities” (Boulind, Chapin and Moore, 1998). Because the industrial hog farming issue is coming under increased scrutiny and change, we have produced a supplement, updating some recent changes, discussing new issues and expanding on ideas for improving the hog production system. Section 2.0 elaborates on the economic consequences of large corporate farming, while Section 3.0 explores some successful alternative methods of hog production. Section 4.0 focuses on the possibility of achieving odor reduction through existing United States Environmental Protection Agency (U.S. EPA) and United States Department of Agriculture (USDA) strategies for controlling water pollution. Section 5.0 examines the potential odor-reduction impacts of Oklahoma Senate Bill 1175 and highlights some potential problems of the bill. Section 6.0 provides a brief account of how voters are responding to hog issues on the ballots. Section 7.0 discusses the groundbreaking Iowa Supreme Court case that held the Iowa right-to-farm law unconstitutional. Finally, Section 8.0 provides some conclusions and additional recommendations.

2.0 THE EMERGENCE OF UNFORESEEN ECONOMIC PROBLEMS ASSOCIATED WITH INDUSTRIAL SWINE FACILITIES

As swine facilities grow larger and more odoriferous, local economies, property values and community dynamics are often adversely affected. Residents of rural communities who live in close proximity to these growing facilities also bear the burden of additional personal economic losses. An example of this situation can be seen in Texas County (population 18,081), located in the Oklahoma panhandle.

2.1 Economic Impacts on Individuals

Swine odor has become such an enormous problem in Texas County that residents have no other choice than to seal the windows of their homes, purchase portable air cleaners, install central air cleaners, and acquire face masks to have at hand for unbearable days. In addition to these costs, residents also are inclined to invest in fly control programs since the number of flies can increase exponentially on strong odor days. A local resident reported that over a period of two hot days last summer she collected approximately a gallon of black flies in “fly-trap jars” that were placed on her front porch. Residents of Texas County also bear additional financial burdens such as increased electric bills in the summer months, when air conditioning is on at all times since windows must remain closed. Coupled with declining property values, these additional costs have cut deep into the pockets of Texas County residents.

2.2 Economic Impacts on the Community

There are other economic consequences associated with industrial swine facilities that reach far beyond the individual pocketbooks of residents who must protect themselves from the odors. For example, when Seaboard, Inc. (Seaboard) -- the eighth largest pork producer in the United States—moved to Texas County, the company assured local residents that numerous jobs would

be provided, bolstering local economies. Yet, due to the low pay and adverse working conditions, jobs such as this hog confinement position posted on the Internet (<http://www.ajb.dni.us>) were not attractive to Texas County residents:

Job Title: Hog Confinement Worker

Job Description: Paid annual salary. Paid every other week. Must be willing to perform any and all duties involved with breeding, feeding, medicating, etc., in regards to piglets and adult hogs. Will work 12 days [on] and 2 off, staying each day till work is finished.

Salary: \$17,680.00

With few Guymon residents interested in this type of work, Seaboard looked to Mexico, Guatemala and several other Central and South American countries for its labor force (Barlett and Steele, 1998), resulting in a massive influx of immigrants. Seaboard did not provide Guymon with the economic resources necessary to ready Guymon for the increased housing demand and language education needs. Once the workers arrived, a homeless shelter was opened. Oklahoma provided training curricula in over four different languages, costing taxpayers approximately \$617,000. During the 1997 - 1998 school year, approximately one-fifth of Guymon school children were not fluent in English; therefore, the school district “was compelled to add English-as-a second-language class” (Barlett and Steele, 1998). Overcrowding also resulted in extraordinarily high student/teacher ratios (Barlett and Steele, 1998).

In 1997, the Oklahoma legislature allocated hundreds of millions of taxpayer dollars to pay for state infrastructures that would support intensive hog production.

[The] legislature agreed to spend \$700 million on state roads and bridges...Guymon’s and Texas County’s share amounted to \$37.3 million...ten times what was earmarked for the rest of the state. In addition, \$47 million...of the state’s five-year capital-improvement program was set aside for Texas County for highway work (Barlett and Steele, 1998).

Although Seaboard was enjoying the benefits of taxpayer money, they were not paying taxes in full. The state tax commission “excused Seaboard from \$700,000 of [\$1,118,000 of tax bills] on the grounds that new hog farms...qualified as ‘manufacturing’” (Barlett and Steele, 1998).

The promised economic benefits of industrial swine production have yet to be realized in Texas County. Instead, the residents have had to pay out-of-pocket to control odor problems in their households; suitable jobs have not been provided; local schools have been significantly disrupted; and corporate profits have been internalized.

2.3 Economic Crisis for Producers

Despite significant tax breaks and government subsidized programs supporting the establishment and operation of industrial swine operations that have been described by some as “corporate welfare,” corporate hog producers are not enjoying a booming business. In the “Weekly Swine Economics Report,” dated November 27, 1998, Ron Plain reported that the average price for barrows (male swine castrated before sexual maturity) and gilts (young female swine) was \$14.45 per carcass weight, the lowest price in over 27 years (Plain, 1998). Compared to an average cost of \$39.61 per carcass weight to finish market pigs from 50 to 250 pounds (National Pork Producers Council [NPPC], 1998), hog producers, both large and small, are experiencing great financial difficulties. A recent article in *The New York Times* noted that “with inflation factored in, hog prices stand at their lowest level since the Depression” (Barboza, 1998).

The common explanation for the decline in market hog prices is that “the number of hogs which producers have to sell exceeds the slaughter capacity of packers” (Plain, 1998). An indicator of this situation is a notable increase in the average slaughter weight of barrows and gilts. The inadequate kill capacity of slaughterhouses and packers forces producers to hold onto their hogs for a longer period of time, within which the hogs continue to grow heavier. Currently, average slaughter weights are at a record high, indicating that the supply of hogs is exceeding slaughter capacity more than ever before.

The average weight of barrows and gilts at the 5 markets was 260.0 pounds the week ending October 31. This was 0.4 pounds heavier than the same week in 1997...The following week...barrows and gilt weights set a new 5 market record of 263.4 pounds. This record was also short-lived. Last week the 5 market average...was 270.9 pounds, 11.1 pounds heavier than the corresponding week of 1997 (Plain, 1998).

This evidence indicates that slaughterhouses and packers are overflowing with swine, and until this problem is remedied, price improvements for producers will not occur. Meanwhile, the “steep decline in [market] hog prices has not yet reached the nation’s consumers, who continue to pay \$2.90 a pound for pork, about the same as a year ago, according to the USDA,” (Barboza, 1998). Retailers are reluctant to reduce prices, in fear of future market fluctuations; therefore, the slaughterhouses, packers and retailers are “ringing up huge profits, while producers face collapse,” (Barboza, 1998). In response to this crisis, the NPPC has lobbied Congress and the USDA for financial assistance. The USDA has responded to their pleas, authorizing “up to \$50 million worth of pork purchases...for school lunch programs and 50,000 metric tons of pork for a food aid package to Russia,”(Welna, 1998).

Thus, at the present time it seems as though large-scale hog facilities that do not process the meat are not economically beneficial to corporate producers. Paradoxically, the more hogs they produce, the more money they lose, while at the same time, generating more and more environmental pollution. Perhaps looking to other methods of hog production could provide both economic and environmental sustainability.

3.0 ALTERNATIVE METHODS OF SWINE PRODUCTION

3.1 Promoting Environmental and Economic Sustainability

In light of the fact that current large-scale confinement methods of producing hogs is resulting in negative consequences for all parties involved, it is time to look to other feasible methods of swine production that have more benign economical, societal and environmental impacts. As John Crabtree of the Center for Rural Affairs noted:

If producing quality pork at a competitive price is the goal, then production systems that have demonstrated the ability to achieve that goal should not be overlooked simply because they are more apt to be utilized by smaller, independent producers (Crabtree, 1998).

In a study sponsored by the Minnesota Department of Agriculture entitled “Hogs Your Way,” a large multidisciplinary team of farmers, bankers, agricultural economists, agricultural engineers and rural sociologists developed a set of criteria to evaluate three alternative hog production systems as well as the conventional confinement system used today (Bergh et al., 1998). Criteria categories included economics, labor, productivity, environmental factors, marketability, and social and animal health. The three alternative systems evaluated in the study were the Swedish Deep Straw Farrowing System (Vastgotmodellen), Pasture Systems for farrowing and finishing, and Deep Straw Hoop Houses for farrowing and finishing.

After the multidisciplinary team developed the criteria for the study, a small evaluation team visited eight farms at least twice in both the fall of 1996 and the spring of 1997. Interviews, tours of production areas and follow-up phone conversations were the methods of data collection. Results indicated that all three alternative systems were financially competitive with the conventional confinement system for beginning, small and medium sized producers (Bergh et al., 1998). The alternative systems also alleviated many environmental problems caused by conventional confinement facilities that utilize liquid manure systems (Bergh et al., 1998).

Some might argue that since hog production in the United States has already evolved into a large-scale system, it is unlikely that producers will change their ways and down-size to accommodate alternative methods of hog production. However, the process of down-sizing has been successful in Sweden (Halverson, 1998), and there is no valid reason why it is not a feasible option for the United States.

3.2 Deep-Bedded Swine Housing: The Swedish Example

In the 1950s and 1960s, hog production in Sweden was much like the large-scale confinement facilities utilized in the United States today, in which hogs are kept in individual crate housing under factory-like conditions (Halverson, 1998). Yet, in 1973, researchers found a higher incidence of morbidity among sows housed in crates than those housed loosely in groups

(Backstrom, 1973; Ekesbo, 1995). This research did not lead to a ban on crate housing in Sweden at that time, yet it may have influenced farmers to begin the transition from confinement housing to deep-bedded loose housing. After one farmer in east central Sweden began to use the deep-bedding technique, his methods began to spread until 1985, when “deep-bedded housing systems with individual feeding stalls had become, and are today, the conventional method of dry sow housing in Sweden” (Halverson, 1998).

In this type of system, the hog housing consists of a well-insulated, naturally ventilated barn that caters to all aspects of the gestation, farrowing and nursing cycle. Eight to twelve sows are housed together, forming stable social groups as they go through the reproductive cycle (Gegner and Kuepper, 1997). Each social group lives in a gestation room deep-bedded with clean straw. The rooms have ample space for sows to move about—approximately 27 square feet per sow compared to approximately 14 square feet per sow in typical U.S. operations (Gegner and Kuepper, 1997). During the farrowing portion of the cycle, sows are generally segregated in deep-bedded farrowing pens and later moved to a common deep-bedded nursing room with their piglets. Piglets remain in the nursing room, alongside their mothers, for 11 to 12 weeks, when they reach a suitable weight to move on to a finishing facility (Gegner, and Kuepper, 1997).

In addition to the more humane nature of the deep-bedded systems, when correctly managed, the beds do not emit ammonia and hydrogen sulfide (Halverson, 1997). The deep-bedding absorbs the liquid component of hog waste, separating liquids from solids, thereby slowing the process of decomposition, which produces compounds such as ammonia and hydrogen sulfide. Thus, odor in these facilities is minimal, making them a more neighbor-friendly alternative to hog production.

Swedish farmers still cite [this system’s] efficiency, aesthetics, friendliness to neighbors and the environment, and it’s contribution to sow well-being, fitness and health. To return to the old days of individual sow housing in crates without bedding would be seen as a step backwards by the majority of Swedish swine producers (Halverson, 1998).

3.3 Deep Straw in Hoops: Another Feasible Alternative to Confinement Housing

In addition to the deep-bedded alternative system pioneered by Swedish farmers, several American farmers have experimented with alternative hog production systems, and the results are quite favorable. For example, Nancy and Mark Moulton of Rush City, Minnesota, used to produce hogs in a conventional confinement building that housed a total of 600 hogs. Yet when the Moultons started to hear complaints from neighbors about the odors emanating from their facility, they began to investigate new methods of hog production (Moulton, 1998). In the fall of 1995, they erected a 30 by 72-foot hoop house, bedded with straw, marsh grass and two 1,200-pound round bales to “see if it would reduce odor as touted” (Moulton, 1998).

With help from the Energy and Sustainable Agriculture Program of the Minnesota Department of Agriculture, the Moultons engaged in a three-year project, evaluating both the risk of nutrient leaching through the bedding and into the subsoil and the odor reduction possibilities associated

with the hoop house. Two years after the construction of the first house, the buildings had proven so successful in reducing odor and leaching that the Moultons erected four additional houses. According to the Moultons, the new houses substantially reduce the odor:

At our Sustainable Agriculture Field Day (August 1997), we had 60 - 70 people here... We had pork burgers, beans and potato salad, and we had this 10 feet away from the hoop house. Now I don't know any other system...where you could have people enjoy a meal right next to a hog barn. Plus I had 6 months worth of manure being stored in a compost pile nearby (Moulton, 1998).

Moreover, the Moultons are also saving money with their new hoop houses (see Table 1).

Table 1: Hoop Housing Compared to Conventional Confinement Housing

3 Groups per year, both systems	6 Hoop Buildings, 170/lot (3,060 pigs per year)	1,000 Head Confinement (3,000 pigs per year)
Initial Cost	\$60,000	\$180,000
Cost, Pig Space Per Year (10 year amortization)	\$58.82	\$180
Cost, Pig Space/Pig (3 groups per year)	\$19.60	\$60
Pig Cost, 40 lbs	\$40	\$40
Feed Cost, Per Pig	\$43	\$40
Utilities (Electric and Heat)	\$0	\$1,500 (\$.50/pig)
Cost Per Pig	\$102.60	\$140.50

* Source: Moulton, 1998, "Deep Straw in Hoops: Managing Manure in Concert with the Natural, Social and Economic Environments".

3.4 Summation

Although the myth that "bigger is better" has crept its way into the American agricultural system, it does not mean that we must continue to produce hogs on an industrial scale. Industrial-scale hog production is not benefiting producers, consumers or neighbors of hog facilities. Producers will eventually end up losing more money year after year if the supply of hogs continues to outpace demand, reduced market hog prices are not reaching consumers, and neighbors of facilities have a decreased quality of life. Several more environmentally and socially friendly alternatives to hog production exist today; however, downsizing must occur before these alternatives are employed. The perception that "bigger is better" must be amended, and the fact

that moderate-sized alternative hog farms can be equally profitable needs to be given more attention. The problem is nicely summed up in the following quotation from John Crabtree:

The question we face today is whether we will pass to future generations an economic system that provides economic opportunity and a decent quality of life for ordinary people. Or, will we pass to the next generation a system with declining opportunities and little respect for the stewardship of the environment... That is the choice. There is not much question that, given the opportunity, most people would choose the former (Crabtree, 1998).

A first step in creating a more stable economic and environmental system is to bring industrial swine facilities into the jurisdiction of existing regulatory schemes. The following section discusses ways in which these facilities can be incorporated into federal regulation programs.

4.0 FEDERAL STRATEGIES TO COMBAT ENVIRONMENTAL POLLUTION FROM SWINE FACILITIES

4.1 Federal Recognition of Environmental Problems

Increasingly, the USDA and the U.S. EPA are recognizing that industrial swine facilities pose a serious environmental problem. To date, the primary focus has been to address declining water quality resulting from the manure and wastewater released from these facilities. Another focus has been the reduction of methane released into the atmosphere. These efforts may assist indirectly in the remediation of other environmental impacts associated with industrial swine facilities, including odor. However, these efforts alone will not significantly alleviate the odor problem. Therefore, modifications to these efforts and the development of efforts that specifically address odor control are necessary.

4.2 Strategies Addressing Water Pollution

In 1976, the U.S. EPA issued regulations under the Clean Water Act (CWA) to address “animal feeding operations” (AFOs) (U.S. EPA, 1997a). However, within the last several years, the livestock industry has changed such that the number of large “industry consolidated” operations have increased, while smaller, family-owned operations have decreased. Enforcement of existing regulations has not adjusted to the changing industry. The number of incidents involving the release of millions of gallons of manure waste into surface water bodies has increased in the last several years. These releases have caused environmental degradation and impacted public health (i.e. fish kills, shellfish bed closures, pathogen contamination of drinking water supplies and human illness resulting from exposure to *Pfiesteria piscicida*) (U.S. EPA, 1997a; U.S. EPA, 1998a). To curb this problem, the U.S. EPA and the USDA have been formulating plans to specifically minimize the water quality and public health impacts of AFOs (USDA and U.S. EPA, 1998a) by “making implementation of the existing concentrated AFO regulations a priority” (U.S. EPA, 1997a).

4.2.1 *Compliance Assurance Implementation Plan for Concentrated Animal Feeding Operations*

In 1997, the U.S. EPA issued a *Compliance Assurance Implementation Plan for Concentrated Animal Feeding Operations*, which addressed efforts needed to enforce the compliance of point discharges for confined animal feeding operations (AFOs) under the National Pollutant Discharge Elimination System (NPDES) as dictated under the CWA. The plan called for increased coordination between state and federal agencies and stakeholders to ensure NPDES compliance by providing assistance information, proper regulatory designation of each facility and periodic facility inspections. According to the plan, the U.S. EPA is developing an “overall AFO strategy” that would include methods “to protect aquatic ecosystems, drinking water sources and air quality; minimize odors; and promote environmentally sound and beneficial uses of animal wastes.” Implementation of the strategy would involve “improving existing program implementation” and using both voluntary measures and “enhanced regulatory controls” (U.S. EPA, 1997a).

4.2.2 *Strategy for Animal Feeding Operations*

On March 4, 1998, the U.S. EPA issued a draft *Strategy for Animal Feeding Operations*, which presented short and long-term efforts that U.S. EPA would undertake to address the environmental and public health problems associated with AFOs. This strategy, which focused primarily on water pollution, outlined the following five objectives: 1) the expansion of compliance and enforcement efforts; 2) the improvement of permits issued under the CWA; 3) the identification of watersheds “that are a priority for action;” 4) the revision of existing regulations pertaining to the CWA permit program and existing effluent limitations guidelines for feedlots; 5) the increased coordination and dialogue between the U.S. EPA, the USDA, the agricultural industries, and environmental and community organizations. The strategy proposed the establishment of new national standards for allowable levels of runoff pollution from swine facilities by December 2001, and the issuance of permits to limit runoff pollution from the largest confined AFOs by 2002 and from “all other large feeding operations and priority facilities in impaired watersheds by 2005.” Also proposed was the inspection of facilities that are deemed to present the greatest threat to the environment and public health within 3 years and all large feedlot operations within 5 years. Furthermore, the regulatory scope was to be broadened to include “national efforts to manage pollution associated with the land application of manure.” In conclusion, the strategy called for the preparation of a unified national strategy “under U.S. EPA and USDA leadership to control pollution from feedlot operations by November 1998” (U.S. EPA, 1998a).

4.2.3 *Unified National Strategy for Animal Feeding Operations*

On September 11, 1998, in response to President William J. Clinton’s Clean Water Action Plan released in February 1998, the U.S. EPA and the USDA issued a draft *Unified National Strategy for Animal Feeding Operations* for public review and comment. Similar to previous strategies issued by the U.S. EPA, this strategy addresses declining water quality resulting from the release of manure and wastewater from AFOs. The strategy calls for the minimization of water quality

and public health impacts from AFOs by establishing “a national environmental performance expectation” that all AFOs develop and implement technically sound and economically feasible Comprehensive Nutrient Management Plans (USDA and U.S. EPA, 1998a). These plans are to include information pertaining to the AFO’s operation, including its mission and size and its methods pertaining to manure handling and storage, feed management, land application of manure, land management and record keeping (USDA and U.S. EPA, 1998a).

The strategy relies on the coordination of federal, state and local agencies, tribes (if applicable), community organizations, educational institutions and the livestock industry to encourage and manage the use of voluntary, regulatory and incentive-based approaches to minimize water quality and public health impacts from AFOs. These agencies and organizations are to provide technical assistance to AFOs for the development of CNMPs. According to the strategy, regulatory approaches, such as permitting and enforcement, are to be applied to “high risk operations,” which account for approximately 5 percent of all AFOs (USDA and U.S. EPA, 1998a). The remaining 95 percent of AFOs are expected to utilize voluntary programs, which promote “the ethic of land stewardship and sustainability” (USDA and U.S. EPA, 1998a). These voluntary programs, which would be an amalgamation of national and local requirements and community concerns, would provide technical assistance that would benefit both the AFO’s business operation and protect the environment and public health (USDA and U.S. EPA, 1998a). The strategy calls for partnerships with community grassroots groups to assist the U.S. EPA and the USDA to support and promote locally led conservation efforts and environmental education. Other partnerships with state and local agencies and educational institutions can provide educational and technical assistance, while various federal, state and local agencies may be able to provide owners of AFOs with financial assistance.

It is estimated that at least 300,000 AFOs will need either to develop or to revise existing CNMPs to meet the goals of the strategy. The U.S. EPA and the USDA have estimated that approximately 15,000 to 20,000 operations will be considered as CAFOs (defined as having 1,000 or more animal units) and be required to develop and implement CNMPs as part of permits issued under the CWA (USDA and U.S. EPA, 1998a). The draft strategy identifies seven strategic issues that are pivotal in successfully implementing the strategy. These issues include: building the capacity among agencies for the development and implementation of CNMPs; accelerating voluntary, incentive-based programs; implementing and improving the existing regulatory program; coordinating research, technical innovation, compliance assistance and technology transfer; encouraging industry leadership; coordinating data to assess water quality; and establishing performance measures to gauge the success of the strategy itself. The U.S. EPA and the USDA plan to address these issues by expanding existing programs, regulations and partnerships with other agencies and groups (USDA and U.S. EPA, 1998a). The U.S. EPA plans to revise regulations supporting this strategy and the national environmental guidelines to limit discharge from swine facilities by December 2001 (USDA and U.S. EPA, 1998b).

4.2.4 The Clean Water Act Compliance Audit Program for Pork Producers

On November 25, 1998, the U.S. EPA announced that the agency and the National Pork Producers Council had agreed to a voluntary compliance program designed to reduce environmental and public health threats to waterways from runoff of animal wastes from swine

facilities. The U.S. EPA developed the Clean Water Act Compliance Audit Program for Pork Producers in response to a proposal by the NPPC that called for a voluntary environmental assessment program for the pork industry. The resulting program “provides reasonable incentives for pork producers without compromising EPA’s and the State’s ability to enforce the law consistently and appropriately” (U.S. EPA, 1998b). It is estimated that this program will be utilized by swine facilities that account for 80 percent of U.S. pork production (U.S. EPA, 1998b).

The NPPC developed a “comprehensive and rigorous evaluation process for reviewing pork production facilities that is designed to assure the protection of our nation’s waterways by improving environmental protection controls at pork farms throughout the United States.” (U.S. EPA, 1998b). Under the program, the NPPC will pay for the training and certification of “independent” inspectors and the oversight of the program at no cost to producers. The U.S. EPA has provided funds to America’s Clean Water Foundation to assist with the assessments (U.S. EPA, 1998c).

To participate in the program, the producer can register with their local pork producers’ organization or the NPPC. An environmental assessment, which is to identify weaknesses in their environmental practices (U.S. EPA, 1998d), areas of improvement and violations of the CWA, is conducted and a report sent to U.S. EPA. A pork producer must identify and report all violations under the CWA within 120 days of the first day of the assessment and complete all corrective actions within specified deadlines. Corrective actions are to be approved by an auditor or a licensed engineer. The U.S. EPA will consult with the state to determine that the pork producer has fully complied with the program. States also have the right to administer and expand the Compliance Audit Program and to include laws and regulations other than the CWA. Pork producers, who have the environmental assessment performed and promptly report and correct any discovered CWA violations, will be awarded a special seal (U.S. EPA, 1998b).

According to the U.S. EPA, the penalties issued for a violation will be based on economic benefit. The penalties are to range from \$1,000 to \$10,000 per discharge (U.S. EPA, 1998b). The fine for a record-keeping or reporting violation will be \$250, and the fine for any other violation that did not result in an unauthorized discharge will be \$2,500; however, this fine can be reduced to \$250 if the violation has been corrected within a specified period of time (U.S. EPA, 1998d). A facility cannot be fined any more than \$40,000 (U.S. EPA, 1998b).

The Compliance Audit Program will not apply to prior violations or to those violations that are the subject of a citizen suit. The U.S. EPA is to retain its regulatory power in cases when “there is an imminent and substantial endangerment under section 504 of the Clean Water Act,” and the agency also retains its power “to recommend prosecution for criminal conduct.” The implementation of the Compliance Audit Program will not exempt pork producers from “all applicable environmental laws and regulations” (U.S. EPA, 1998b).

It is interesting to note that the U.S. EPA has decided to join in a partnership with the NPPC, which primarily represents the owners and operators of the huge industrial swine facilities that are the worst environmental offenders. The U.S. EPA defends the Compliance Audit Program by stating that the program will “exceed what EPA has the resources to do otherwise and will

disclose violations that EPA may not have discovered otherwise” (U.S. EPA, 1998b). However, the U.S. EPA is not the only environmental enforcement agency. Resources and the ability for violation discoveries can be greatly improved through partnerships between other federal, state and local agencies as outlined in previous U.S. EPA strategies. The U.S. EPA and the NPPC did not solicit state and local input in the development of the Clean Water Act Compliance Audit Program for Pork Producers (Gunter, 1999). Thus, by not taking advantage of partnerships between federal, state and local agencies and organizations, the program’s goal of reducing environmental and public health threats to waterways from runoff of animal wastes from swine facilities appears to be difficult to achieve.

4.3 Risk Analysis Models

To date, the U.S. EPA has integrated water and air quality issues in only one program, a pilot program that evaluates the site selection of future AFOs. Region VI of the U.S. EPA, based in Dallas, Texas, developed a screening tool, entitled the *Cumulative Risk Index Analysis*, under the National Environmental Policy Act (NEPA) “to consider the potential for significant, cumulative and environmental effects from swine confined AFOs.” The Cumulative Risk Index Analysis evaluates the potential environmental effects of a proposed AFO by a “watershed subunit [which] is created by merging watershed area data and state stream segment information” (U.S. EPA, 1997b). The *Cumulative Risk Index Analysis for Swine Concentrated Animal Feeding Operations*, the latest version of which (version 6.0) was issued on January 24, 1997, is a scoring model. The Cumulative Risk Index Analysis evaluates not only water quality criteria, but also issues that pertain to both water and air quality, such as the density of nearby AFOs, land application technology, storage capacity of liquid manure, nutrient budget for land application purposes and the proximity of the proposed AFO to development. The scoring model also evaluates the potential for odor by multiplying the number of swine proposed for the AFO by the threshold of 750 animals to obtain a score ranging from 1 to 5 (U.S. EPA, 1997b). Considering that the Cumulative Risk Index Analysis considers a total of 31 criteria, the potential for odor alone may not play a significant role in the overall Cumulative Risk Index Analysis score for the siting of a potential AFO (U.S. EPA, 1997b). However, the determination on whether a site is appropriate for a particular AFO using the Cumulative Risk Index Analysis scoring model is based on overlapping criteria (i.e. criteria that reflect a potential for both water and air pollution). Currently, the U.S. EPA uses the Cumulative Risk Index Analysis as an environmental assessment tool to assist the agency in making decisions, rather than solely relying on the scoring model to evaluate the potential effects from an AFO (U.S. EPA, 1997b).

4.4 The AgStar Program

To address the release of methane from manure at livestock facilities, the U.S. EPA has established the AgStar Program. This voluntary program was designed to assist dairy and swine producers in the management of manure such that it is profitable and environmentally protective. The AgStar Program promotes the use of a biogas system at livestock facilities to reduce methane and odor emissions and water pollution, while saving energy resources and increasing an operation’s profitability (refer to Section 3.7 of our handbook on biogas technology). The AgStar Program promotes itself by asserting that the conversion of manure into an energy source

can assist agribusinesses increase profits while meeting or exceeding environmental regulation guidelines (Alt, 1998).

In July 1997, the Atmospheric Pollution Prevention Division of the U.S. EPA, through its AgStar Program, released the AgStar Handbook, *A Manual for Developing Biogas Systems at Commercial Farms in the United States*. This handbook was designed to provide assistance to facility operators who need to assess whether installing a biogas system for their facility is economically and technically feasible. It also provides an overview of biogas technology and information on the various methods and technological options that are available. The handbook provides a preliminary screening process for operators considering biogas technology. Screening criteria include operation size, year-round manure production, manure management techniques, potential energy uses and resources available to manage a biogas facility (U.S. EPA, 1997c).

The handbook provides guidance in conducting a technical and economic feasibility assessment of biogas technology at a specific facility. The assessment highlighted by the AgStar Program is to be conducted using a computer software program called Farm Ware/Rate Vision, which assists with the determination of whether a biogas system could be integrated into an operation's manure management system and whether the system would increase an operation's profit margin (U.S. EPA, 1997c; Alt, 1998). The assessment involves a four-step process: 1) choosing a particular kind of digester for a specific facility; 2) completing given evaluation forms; 3) entering the information from these forms into the computer software program; and 4) analyzing the results of the computer analyses (U.S. EPA, 1997c). After choosing the best biogas technology for a specific facility, the handbook provides guidance on negotiating a contract to operate a small biogas-fired generator in parallel with a utility; selecting a consultant, developer or partner to construct and manage the biogas facility; and obtaining financing and permits. Appendices to the handbook include profiles of other livestock/farm facilities that have established their own biogas facilities (none of which were located in Oklahoma or Texas); detailed case studies; NRCS and the U.S. Department of Energy (U.S. DOE) regional contacts; user manuals for the computer software programs; samples of utility letters, rate schedules, riders and intertie requirements; and a list of designers, equipment suppliers and vendors (U.S. EPA, 1997c).

Other than the handbook, the AgStar Program provides technical fact sheets about different kinds of digesters and provides information on successful biogas systems (U.S. EPA, 1997d; U.S. EPA, 1997d; U.S. EPA, 1997f). The AgStar Program also offers assistance in negotiating deals between utilities and potential financiers, and in some cases, the engineering of a biogas system (Alt, 1998).

4.5 Summation

Although federal strategies that address water quality issues from industrial swine facilities may indirectly assist in the remediation of other environmental impacts such as air pollution, these efforts alone will not significantly alleviate the odor problem. These strategies could be expanded to address odor and air quality issues. Unlike water, odor cannot be adequately measured; however, air pollutants, such as methane, hydrogen sulfide and dust, which have been found to be components of odor, can be analyzed for in air samples. More than likely, those

AFOs characterized as being “high risk operations” in terms of potential water pollution, can also be characterized as such when evaluating the potential for emitting offensive odors and air pollutants. During the process of identifying AFOs as requiring regulatory oversight or being eligible for a voluntary program, the U.S. EPA and any other organization implementing the program should also consider the potential for AFOs to emit offensive odors and air pollutants. The previously discussed strategies/programs should be expanded to include these considerations. Any strategy or program should be designed with input from all of the major parties -- federal, state and local agencies, industry, environmental and community organizations, and the public.

5.0 OKLAHOMA: SENATE BILL 1175

In addition to the federal regulatory programs mentioned above, state legislation and regulations remain useful, especially with regard to odor control efforts. Oklahoma made such an effort on June 10, 1998, when Oklahoma Governor Frank Keating signed Senate Bill 1175, calling it “the strictest hog regulatory bill in the United States” (Hinton, 1998). Like most U.S. swine regulations, Senate Bill 1175 focuses mainly on water quality issues. Although water quality precautions can also have positive effects on odor reduction and air quality, Oklahoma took the additional step of specifically addressing odor control in its swine law. A number of provisions in the bill are encouraging to those desiring stricter environmental protections for Oklahoma, but there remain some potential problems with the legislation. The following is a brief discussion of the positive environmental provisions of the law, specifically those relating to odor and gaseous emissions, as well as areas of possible improvement.

5.1 Steps Forward

The most explicit provision for odor control is the bill’s requirement for an Odor Abatement Plan (OAP) (§10). To receive a license, a facility operator must submit a Pollution Prevention Plan (PPP), which in turn must include an Odor Abatement Plan. Presumably, because there are no infallible methods of measuring odor, the OAP requires preventative steps rather than setting a threshold level of odor. For example, the OAP must contain provisions for record keeping, odor abatement, and documentation of structural controls and best management practices (BMP). The OAP must also include site-specific methods for reducing odor from each of four sources: 1) animal maintenance; 2) waste storage; 3) land application; and 4) carcass disposal. None of these requirements mentions the level of odor to be produced, and realistically, preventative actions may be the best odor control until odor measurement methods advance.

The Department of Agriculture ultimately decides if the OAP is adequate for licensing. To do so, it considers facility design, proposed odor control technology, prevailing wind direction, operation size, distance to residences and all information in the application (§10(D)). These straightforward regulations must be asking more of the swine industry than it was doing before the legislation, because industry representatives are trying to get the Department of Agriculture to relax the rules, especially those rules concerning odor abatement (Hinton, 1998).

Section 9 of Senate Bill 1175 describes the use and criteria for best management practices. These regulations are to be promulgated by the State Board of Agriculture; however, citizens will have a voice in the rulemaking. The Board receives input from the Rule Advisory Committee, which includes scientists and community representatives. The BMP they adopt are to be based upon existing physical and economic conditions, opportunities and constraints. The bill does include some specific requirements for BMP regarding odor. It states that animal waste handling, treatment, management and removal shall comply with the OAP and “shall not otherwise create unnecessary and unreasonable odors. Odors are unnecessary and unreasonable if such odors may be reduced by more efficient management practices at a reasonable expense” (§9(B)(4)(d)).

The specified rules for BMP could have impacts on gaseous emissions in addition to their odor requirements. For example, Section 9(B)(4)(a) states: “Animal waste handling, treatment, management and removal shall not create an environmental or a public health hazard.” If the ongoing research on the public health impacts of gaseous emissions from swine facilities concludes that the gases negatively impact public health, this provision could require reductions in gaseous emissions to a level that is safe for human health. A provision of Section 9 relating to wildlife could also demand gaseous emissions reductions given conclusive studies on their impacts. This provision states that animal waste handling, treatment, management, and removal shall not “unreasonably result in the destruction of endangered or threatened species ... or interfere with or cause harm to migratory birds” (§9(B)(4)(e)). If acid rain linked to ammonia emissions were proven to harm habitat or migratory patterns, then facilities would be required to find ways to reduce these emissions.

Two other sources of odor, land application and carcass disposal, are addressed in the mandates for BMP. First, an operator must have an Animal Waste Management Plan requiring that land application practices be managed to reduce or minimize odor (§9(C)(4)(b)((3))). Second, Section 9 requires operators to develop a carcass disposal plan approved by the Department of Agriculture. Although the stated purpose of the plan is to control disease and protect water quality, proper management of carcasses will have positive odor reduction impacts as well.

Senate Bill 1175 includes some interesting provisions for public involvement. Applicants for a feeding operation license must notify the public and send notice specifically to affected property owners by mail. Section 7 also provides that affected property owners can request a hearing. However, those requesting a hearing should be aware that it will be held by the Department of Agriculture, which has tended to support the swine industry’s development. Section 7(C)(4)(b) does require the Department to deny a license if an interested party within 1 mile of the facility proves that granting the license will cause significant harm to his property value.

A few other provisions of the bill will have direct impacts on odor levels. For example, Section 6(H) mandates employee training in odor control, and Section 11(J) demands all new retention structures (such as lagoons) be designed for odor abatement. The bill also provides extensive guidelines for setback requirements to lessen the odor impacts on neighboring residents.

5.2 Room for Improvement

In spite of these advances in swine facility regulation, Senate Bill 1175 has some fundamental problems. The first and most obvious problem is that some of the bill's provisions apply only to new and expanding facilities. Of course, it is easier to impose regulations on entities as they are just beginning to invest time and money into development than it is to regulate existing operations. The new regulations will become a fundamental part of the decision to construct a facility. Those operations already in existence would argue that if they had been subject to these regulations, they would have decided not to develop, and therefore, they should not be regulated now. However, no business expects the regulatory field to remain constant throughout its lifetime, and swine operations should be no exception. True, not all of Senate Bill 1175 could apply to older facilities, but more of it could—and should. Preventing the damage to the environment and the lives of community members caused by older facilities should be no less important than preventing the damage caused by new ones.

A second major problem is that license application approval still rests in the hands of the Oklahoma Board of Agriculture, whose stated mission is to encourage agricultural development in Oklahoma. Horror stories abound regarding past lax approval methods used by the Department. A better solution would be to place license approval in the hands of a group similar to the Rule Advisory Committee, which helps the Board of Agriculture promulgate regulations on feeding operations. The Rule Advisory Committee consists of four animal producers (only one pork producer), a hydrogeologist, a soil scientist, a designee of the Secretary of Environment, a biological systems engineer, a water quality scientist, an ecologist and two members of the general public (§4(B)). Even though the Committee is selected by the Board, it should still provide a broader range of perspectives than only that of the Department of Agriculture.

Another noticeable conflict of interests is Senate Bill 1175's placement of enforcement responsibility once again in the hands of the Department of Agriculture rather than under the jurisdiction of the Department of Environmental Quality. Again, perhaps a group similar to the Rule Advisory Committee should be considered. It could prioritize investigations as well as provide technical expertise. In addition, it would not be burdened with the Agricultural Department's overriding goal of promoting agriculture in the state's economy.

Another note of caution should be given regarding Senate Bill 1175's reliance on best management practices. While it is good to require use of the "best" methods, does this leave any incentive to find *better* management practices? For example, a facility operator will not continue to invest in improving his operation once he has reached the "best" level and is safely within the bounds of regulation.

Finally, Senate Bill 1175 never mentions gaseous emissions. Although it would require new resources, Oklahoma should consider developing a program similar to Minnesota's Feedlot Hydrogen Sulfide Program (Minn. Stat. §116.0713 (Supp.1997)). Gases, unlike odors, can be measured accurately, and their emission rates can be used as a rough proxy for odor emissions. If the Oklahoma legislature decides to investigate the possibility of a gas-regulating program, it

should give the responsibility to the Department of Environmental Quality rather than to the Department of Agriculture.

Overall, Senate Bill 1175 is a step forward for the citizens of Oklahoma, and its problems should not detract from its promise. However, legislators should not pat themselves on the back just yet, as significant room for improvement remains.

6.0 COLORADO AND SOUTH DAKOTA: STATE ELECTIONS

Industrial hog facilities are hearing calls for tighter regulations not only from agencies and legislatures, but also through a more direct form of democracy. On Election Day, voters in two states approved measures to regulate industrial hog farming. Colorado voters were faced with two proposals regarding corporate farming. The first proposal, Amendment 13, sponsored by the swine industry, sought to make illegal any regulations singling out one livestock industry when other breeds have similar issues. The second proposal, Amendment 14, provided for stricter regulations on confined swine operations with more than 800,000 pounds of liveweight (“Public,” 1998). It also mandated a specific odor control technology—lagoon covers (Smith, 1998). Once again, hog industry representatives chose to criticize the odor control provisions, saying they were designed to drive corporate hog farms out of business (Eddy, 1998). Environmentalists and small farmers were thrilled when Amendment 14 passed, while Amendment 13 did not.

South Dakota’s ballot contained an initiative to change the state constitution. Voters in the state approved Amendment E, which severely limits corporate involvement in agriculture. The Amendment prohibits corporations from owning or controlling farmland or even engaging in agriculture. Limited liability partnerships are not allowed for farmers, and corporations can no longer pay farmers to raise crops or livestock for them (Graham, 1998). Like the voters in Colorado, South Dakotans made clear their desire not to support corporate farming in their state. More anti-corporate ballot options may appear as citizens nationwide grow impatient for stricter controls. Other citizens may take their concerns to court, as did Iowa couple Clarence and Caroline Bormann, whose victory in court is discussed below.

7.0 IOWA: RIGHT-TO-FARM IS UNCONSTITUTIONAL

A recent Iowa Supreme Court ruling may prove to be one of the most significant developments in the corporate farming news of the past six months. On September 23, 1998, the Iowa Supreme Court struck down its right-to-farm law, calling it “flagrantly unconstitutional” (*Bormann v. Board of Supervisors in and for Kossuth County*, 584 N.W.2d 309, 322 (Iowa 1998)). The suit challenged the law’s designation of “agricultural areas” that would be immune from nuisance suits, claiming they were an unconstitutional “taking” of neighboring property owners’ rights. The Court agreed, holding that the law effected a taking of property rights without just compensation, thereby violating both the federal and state constitutions. This case is unusual in that most recent claims of government takings and violated private property rights have run counter to environmental goals and policies. Here, the affirmation of private property rights enables owners to prevent swine operations from placing pollution (including odor, the classic nuisance) on another’s property, a result any environmentalist would embrace.

In September 1994, the Board of Supervisors designated 960 acres as an “agricultural area” for the construction of a hog lot (Frank, 1998). This designation protected the operations within its boundaries from nuisance suits (with some exceptions, such as operating negligently). Clarence and Caroline Bormann, retired farmers themselves, lived near this new “ag area” and were affected by the odors from the new swine facility (Frank, 1998). However, the Bormanns could not bring a nuisance suit against the facility because of the agricultural area designation. Instead, they sued the governmental entity that made the designation—the Kossuth County Board of Supervisors.

In its opinion, the Court first identified the property interest at stake—an easement over the land of the neighbors (584 N.W.2d at 315). The “bundle of rights” accompanying private property includes the right to prevent a physical invasion onto the property, such as the invasion of an odor. To commit a physical invasion on someone else’s property, a party must purchase an easement over the property from the landowner. In this case, the Court viewed the right-to-farm law as essentially creating an easement over the property of the neighbors, allowing the facility’s odors to invade the property without justly compensating the owners. By doing so, the Court said, the law “took” a property right from the Bormanns without just compensation and therefore is a constitutional violation (Id., at 321). As a remedy, the Court invalidated the right-to-farm law (Id.), thereby opening the door for the Bormanns, or others in similar situations, to bring a nuisance suit against the hog facility.

Iowa is the first state to invalidate its right-to-farm law, but because every state has a similar nuisance protection for agriculture, the consequences of *Bormann* could be far-reaching. However, as noted by Neil Hamilton, director of the Agricultural Law Center at Drake University, neighbors of hog facilities should not think the battle against right-to-farm laws is finished. Even if a state does invalidate its nuisance protection on governmental takings grounds, a neighbor still must prove that a nuisance exists and interferes with the use of her property. Hamilton warned, “Courts have a fair amount of discretion in resolving what is a nuisance” (Frank, 1998). Regardless of the steps still to come, the decision in *Bormann* is encouraging for those who desire industrial swine facilities to be held accountable for their externalities.

8.0 CONCLUSION

The problems of corporate hog farming highlighted in our previous report continue to affect rural communities across the country. In addition to the significant economic costs of odor and air pollution, the hog market has plummeted, adding a new dimension to the complex impacts of corporate swine production. These problems cannot be changed overnight, but there are a number of alternatives available to reduce their impacts. First, research has shown that alternative methods of swine production can reduce both the environmental and the economic harms of hog production. Second, existing federal programs addressing water pollution from swine facilities can be expanded to address odor and air pollution. Third, some states, such as Oklahoma, are taking the initiative to enact strict swine regulations. Citizens of other states, such as Colorado and South Dakota, have passed ballot measures restricting corporate swine facilities. Finally, impacts of the recent *Bormann* case in Iowa may remove the nuisance suit

protections that industrial swine facilities now enjoy. The past six months have given rural communities a mixed bag of results, illustrating that the issues surrounding corporate hog production are far from settled.

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