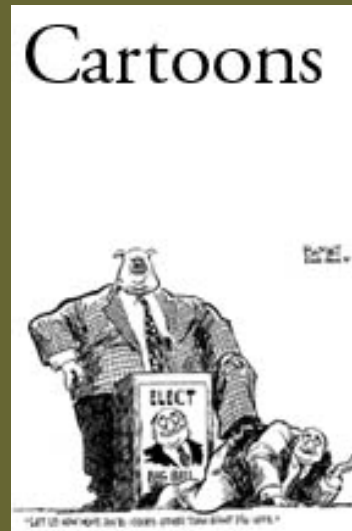


THE PRICE WE PAY FOR CORPORATE HOGS



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The Price We Pay for Corporate Hogs

By Marlene Halverson

July 2000

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Confined Animal Feeding Operations.

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Dedicated to the memory of Ruth Harrison

Author of *Animal
Machines: The New
Factory Farming
Industry* (1964).
June 1920-June 2000



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Written by Marlene K. Halverson

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Marlene Halverson was raised on a southern Minnesota dairy and crop farm. She is a Ph.D. candidate in agricultural economics at the University of Minnesota. In 1992, she was a guest researcher at the Department of Animal Health and Environment, Swedish University of Agricultural Sciences, where she studied the economic effects of animal protection legislation on Swedish hog farmers. She has visited farms and pig research institutes in several European countries. From 1995 to 1997, while employed by Iowa State University, she assisted Iowa and Minnesota farmers adopting a humane, sustainable Swedish hog production system. She has served on the University of Minnesota Institutional Animal Care Committee's subcommittee on agricultural animals used in research and teaching. She participated in the "Hogs Your Way" project of the Minnesota Department of Agriculture Energy and Sustainable Agriculture program and is a member of the Minnesota Institute for Sustainable Agriculture Alternative Swine Systems Task Force. Halverson has written for popular magazines, citizen group publications, and farm and scientific journals on the subject of humane, sustainable pig production.

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We acknowledge the growing number of independent family hog farmers who are striving every day to farm more humanely and more sustainably. May this report highlight their cause.

2nd Printing

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i. Executive Summary

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Executive Summary and Overview

The Price We Pay for Corporate Hogs

The industrialization of U.S. animal agriculture has pressed on, unabated, for half a century, gradually changing the faces of American farming and rural communities. The changes wrought by industrialization are occurring in all of animal agriculture. This report focuses on the impacts of hog factories.

The industrialization of hog farming has been attributed in great part to inexorable advances in science and technology and the freedom afforded economic development by an unfettered marketplace. Indeed, some experts see current industry structure as simply "what has evolved out of the marketplace,"¹ the inevitable result of impersonal, irresistible economic forces triggering a kind of "natural selection" process over which we are powerless to do anything but go with the flow.

Writing about mega-hog factory Seaboard Corporation's move to Guymon, Oklahoma, however, authors from the North Central Regional Center for Rural Development note that the move was hardly due to market forces at work. Describing the over \$60 million in publicly supported incentives that drew Seaboard to Guymon and helped it build its facilities and train its workers, they note:²

Guymon is a case of state-directed, rather than market-driven introduction of new economic activity.

The chink in the armor of the natural selection theory is that the industrialization process is not impersonal or natural or necessary. It, too, has been engineered. Says rural sociologist Doug Constance:³

It is very important that we do not accept the industrialization process, the industrialization of agriculture, as something natural, as something inevitable, as something determined. It is no such thing. It is a plan. It is a plan for certain people to benefit and others to pay.

The industrialization of hog farming has taken place in a political-economic environment or context in which the quality of natural resources, the quality of human and animal life, the safety and quality of our food, and the quality of life for future generations are valued lower than short-term economic gain.

The choice as to whether or not to change the political-economic context in which American agriculture operates that is, the set of laws, regulations, penalties, incentives, and community expectations influencing agricultural development is a political choice. We can change the political-economic context, within which structural change in agriculture occurs, and thereby change its direction. For the good of the planet, our response to the changes the industrialization process in agriculture is invoking must not be hands-off.

The Need for An Historical Perspective

What people tend to think of as modern problems associated with a modern industry have been in the making for decades, as long as the industrialization of agriculture has been taking place. Consider the problem of antibiotic resistance, which medical scientists contend stems in significant part from the use of antibiotics at subtherapeutic levels in animal feeds to control disease and make animals grow faster. Thirty-six years ago, in Great Britain, Ruth Harrison wrote a book entitled *Animal Machines: The New Factory Farming Industry* in which she described the cruelty of animal factories. The story she told could have been written today:⁴

[F]eeding firms are entitled to incorporate up to 100 grammes of antibiotic in each ton of animal feeding stuffs as a regular supplement for intensively kept animals, and the farmer may buy and incorporate antibiotics at any level he thinks fit. This, when the merest trace can mean the difference between life and death to a consumer.

Since 1964, Great Britain and other parts of Europe have taken effective steps to reduce at least some antibiotic use in agriculture. In the United States, to date we have not. For the past 40 years, the profits of a few have repeatedly trumped the benefits to the many who depend on the continued effectiveness of precious antibiotics.

It is important to know that the question of antibiotic use in animal feeds has been debated for four decades and that the evidence for agricultural origins of antibiotic resistance has been building for many years. We need this awareness to resist agribusiness' and the animal health industry's continued calls for more study, more time, more proof before acting to restrict the use of how antibiotics are used in agriculture. We need it to know for certain that it is time to stop listening to agribusiness and take action.

Hence, this paper places some animal factory issues in a historical context,

in consideration of George Santayana's observation that "those who cannot remember the past are condemned to repeat it." It also describes, in more detail than is usually seen, the experiences of people who have tried to channel industry change in more socially beneficial directions, because we can learn from each other's experiences.

The report is organized in seven parts. Each provides a detailed description of its issue and closes with a list of strategies and action alternatives for constructive reform. This Executive Summary and Overview closes with a list of ways foundations can help empower citizens and their organizations in their efforts to preserve family farms and protect the public, farm animals, wildlife, and the environment from the ravages of animal factories.

Summary of Parts 1 through 7

[I. Are Independent Farmers an Endangered Species?](#)

Part One of this report asks "are independent farmers an endangered species?" The statistics indicate that is the case. Between 1950 and 1999, the number of U.S. farms selling hogs declined from 2.1 million to 98,460. In 1950, average sales per farm were around 31 hogs. By 1999, average sales had grown to around 1,100 market hogs per farm. One hundred five farms having over 50,000 pigs each accounted for 40% of the U.S. hog inventory. The largest four operations Smithfield Foods, Inc., ContiGroup (Continental Grain and Premium Standard Farms), Seaboard Corporation, and Prestage Farms accounted for nearly 20% of production, and economists estimate 50% of hogs slaughtered in 1999 were produced or sold under some form of contract.

Using several examples, Part One explores the reasons behind the drive toward the industrialization of animal agriculture and the impending demise of the independent family farm. It concludes with reasons for preserving independent family farms and a warning from the U.S. Department of Agriculture's National Commission on Small Farms: "If we do not act now, we will no longer have a choice about the kind of agriculture we desire as a Nation."⁵

[II. Putting Lives in Peril](#)

Part Two: Putting Lives in Peril, describes two major health hazards associated with factory farming: workplace dangers and antibiotic resistance.

Workplace dangers: Manure from animal factories is liquefied when

massive quantities of groundwater are used to flush the buildings where the animals are housed. The resulting "slurry" may be stored temporarily in cement pits under the slatted floors of the barns or in outdoor structures, and emptied once or twice a year by being spread or sprayed onto land. The problems result from the anaerobic (absence of free oxygen) nature of manure that has been liquefied by the addition of water. Decomposition of liquid manure by anaerobic bacteria during storage and treatment produces and emits nearly 400 volatile organic compounds. Gaseous emissions from the anaerobic decomposition of liquefied manure have led to human and animal fatalities. Dusts inside intensive confinement facilities have led to respiratory illnesses among farmers and farmworkers. These problems, too, have been known at least since 1964. Yet, waste handling technologies remain essentially the same and still no Occupational Safety and Health Administration (OSHA) standard exists for work in intensive confinement buildings or around manure pits. Instead, the industry and land grant university focus has been on ways to control liquid manure odors. Little research or technology development effort has focused on the readily available alternative forms of animal waste management that do not produce deadly manure gasses in the first place, such as raising hogs and cattle on pasture or using solid floors and ample bedding in indoor environments.

Antibiotic resistance: The continuous stress of intensive confinement lowers farm animals' immunity to diseases. Alleviating the stress of intensive confinement would raise animal factories' costs of production. To avoid these costs, animal factories rely on continuous, subtherapeutic administration of antibiotics in the feed or drinking water to promote growth and control bacterial illnesses.

The subtherapeutic use of antibiotics creates selective pressure on bacteria that favors resistance, placing in jeopardy the effectiveness of precious antibiotics for treating animal and human bacterial diseases. Stressed animals excrete more pathogens in their feces than do unstressed animals. When antibiotics are used subtherapeutically in the feed of farm animals, the pathogens that survive the gut and are excreted are the resistant ones. Yet, the industry resists controls.

According to the National Academy of Sciences/National Research Council (NAS/NRC), if the use of antibiotic feed additives were to be curtailed in the United States, it "is questionable whether production in confinement swine operations could be maintained at an intensive level" and "a reversion to extensive or pasture production could take place[that] would be disruptive for today's packing industry."⁶

From the experiences of farmers in Sweden, however, who have produced pigs without subtherapeutic antibiotic feed additives since 1986, we know

it is still possible to raise healthy pigs year round, efficiently, and without disrupting supplies, if the environments in which the animals are raised are hygienic, spacious, enriched with clean bedding, and comfortable from the animals' point of view.

Food Irradiation: The Wrong Answer for Food Safety

Though most Cold War-era nuclear technologies such as the atomic coffeepot and plutonium-heated long-johns have fallen into the dustbin of history,¹⁶⁵ food irradiation has not only survived into the 21st century, it is on the verge of becoming the food industry's no. 1 weapon in the war against food-borne illnesses. No one is against creating a safer food supply. But there are plenty of reasons to be against food irradiation.

Irradiation is murder on family farmers and marketplace diversity, because it uses huge, centralized facilities and is intended to correct quality-control problems endemic to today's factory-style food processing plants.¹⁶⁶ Simply put, irradiation and consolidation go hand-in-hand. IBP and Tyson Foods, whose pending merger would spawn the country's largest poultry and red meat conglomerate, are among the many corporate giants that are on the verge of selling irradiated food in mass quantities.

[III. Building Sewerless Cities](#)

Part Three: Building Sewerless Cities describes the impacts on water quality resulting from the separation of animals from the land. At one time, crop and livestock production were complementary enterprises on farms. Most of the nutrients originating from the soils of a given area were returned to that same area. Animals' living quarters were bedded with hay or straw and, when soiled, the bedding was removed to a manure heap where it composted, killing most of the pathogens that may have been present in the manure. Under such conditions, environmental problems arising from animal production activities, when they sometimes occurred, were minimal and relatively easily solved by improving management or taking other, relatively low-cost, remedial measures.

Environmental problems were exacerbated when specialization separated livestock production from the land and the availability of cheap, mineral fertilizers made it possible to produce crops without manure nutrients. Today, most farm animals are concentrated in large holdings on small acreages and are raised under intensive conditions resembling manufacturing processes. Animal feeds generally come from areas far away from the industrialized livestock farm. Manures from these "animal factories" may be handled as wastes or surpluses to be disposed of, rather than as valuable soil amendments, and may be applied to the land in

quantities far exceeding the nutrient needs of crops. Quantities of liquid waste can be enormous. At a single site in Missouri, one hog factory produces fecal waste equivalent to that of a city of 360,000 people.

Earthen manure storage basins have leaked manure onto cropland and into streams, killing the life in them. Some leaks were found to be deliberate; others were unintentional – minor accidents or widespread catastrophes. Either way, it seems clear that the liquid manure storage technology is fundamentally unsafe.

Besides the plant nutrients nitrogen, phosphorus, and potassium, liquid manure also contains bacterial and viral pathogens, parasites, weed seeds, heavy metals, and even antibiotics, disinfectants, and insecticides, when these are present on the farm. In 1988, an expert panel convened by the World Health Organization identified liquid manure spreading as a critical pathway by which salmonellae and other pathogens are transferred to the natural environment.

Part Three concludes by noting that options exist for safer, more environmentally-friendly hog production using pastures (outdoor production) and deep-bedding (indoor production) that are within the financial range of independent family farmers. Being more management-intensive than capital-intensive, these other options, if mandated, could also allow independent family farmers to compete with larger operations on a playing field that favors hands on husbandry and management over capital.

[IV. Part of the Pig Really Does Fly](#)

Part Four: Part of the Pig Really Does Fly describes the air quality impacts of animal factories and recommends solutions. Neighbors of hog factories report not being able to go outdoors or let their children play outdoors due to odors from nearby hog factories. Some report lining their windows and fireplaces with plastic to keep the stench from coming into their homes. Animal factories need not be large to create a problem. Increasingly, to save on labor and because the technology is almost exclusively recommended by the industry and land grant universities, smaller farmers have adopted liquid manure handling systems and create the same detrimental effects, albeit on a smaller scale. Recent studies have shown that dusts and gases responsible for hog factory odors are having serious respiratory impacts on nearby residents.

As much as 70 to 80 percent of the nitrogen in a liquid manure storage facility changes from liquid to ammonia gas and escapes into the atmosphere. The gaseous ammonia returns to earth, precipitated from the atmosphere by rain. Nitrogen-enriched rainfall contributes to excessive

algae growth and can damage or alter natural habitats, for instance, causing nitrogen-loving plants to replace the existing flora in a given area. Methane is a significant greenhouse gas that is emitted by liquid manure storage.

The most significant contribution to the reduction in greenhouse gases that farms can make is to change manure management. The change can go in two directions: away from liquid manure and open lagoon storage toward more costly and complex management systems, such as electricity generation from methane, or toward ecologically sound and less complex management systems, such as manure handling incorporating straw or other natural bedding and composting. The latter direction is least costly for small livestock farms and not only reduces greenhouse gases, but replenishes the soil carbon.

V. Hog Factory in the Back Yard

Part Five: Hog factories have divided communities, neighborhoods, and families. In most cases the people who feel the strongest impacts from hog factories are people who have lived in their rural homes for most, if not all, of their lives, many of whom farm or have farmed, with livestock, as well.

Part Five describes the ways in which corporate hog factory owners have used the public's sympathy for family farmers to obtain exemptions for their activities from local zoning laws and from county and state regulations. For example, thirty states have enacted laws exempting farm animals from protection under their anti-cruelty statutes. "Strategic lawsuits against public participation," or SLAPP suits, can be brought against citizens who protest siting of animal factories in their communities. In at least 13 states, agricultural disparagement laws, popularly known as "veggie libel laws," protect food products and production processes from "disparagement." The very laws enacted to protect small farmers from frivolous complaints serve to protect corporate hog factories from well-grounded complaints over their much larger impacts on the environment and on public health and welfare. Such laws erode democratic processes.

Public policies supporting hog factories and excusing them from bad behavior also help create an illusion that hog farming is industrializing because technological advances have increased the efficiency (that is, have reduced per-unit costs of production) of larger, more concentrated operations. How many of these efficiencies are based on the ease with which public policies allow hog factory operators to pass off unwanted costs of doing business onto neighbors and society (i.e., make others pay) have not been quantified. It is becoming clear, however, that by helping

hog factories avoid the expenses associated with socially responsible practices, such protections give hog factories leeway to grow and squeeze independent family hog farmers out of the market.

VI. Pigs in the Poky

Part Six: Pigs in the Poky describes the impacts of factory farming on farm animals and their implications for human welfare.

Farmers who treat their animals with respect for their natures are internalizing the costs of providing a decent life and humane environment for them. Animal factories externalize those costs by evading that responsibility. The first to bear these externalized costs are the animals but the costs of the failure to farm in ways that respect the welfare of farm animals extend beyond the boundary of the farm. Everyone ultimately bears the costs of the reduced effectiveness of antibiotics. Taxpayers and natural resource users bear the costs of soil and water pollution by liquid manure spills. Future generations will bear the costs of global warming and depleted resources. Until production systems meet the species-specific needs of farm animals, we are farming beyond their ability to adapt. Ultimately, ignoring the welfare of production animals makes animal agriculture unsustainable.

Industrial rearing of farm animals has resulted in loss of individual animals' fitness and in loss of genetic diversity. It has increased the incidence of environmentally-induced animal illnesses, diseases, and injuries as well as the frequency of abnormal behaviors indicative of severe mental distress. Factory farming is pushing animals beyond their ability to adapt. Consequently, many die prematurely from the stress. For example, Time Magazine reported in November 1998 that the 1997 hog death toll at Seaboard Farms in Oklahoma was 48 hog deaths an hour, or 420,000 for the year. Industry spokespeople estimate that as many as 20% of breeding sows die prematurely from exhaustion and stress due to impacts of restrictive confinement and accelerated breeding schedules.

Industrial hog rearing methods are especially hard on pigs in the breeding herd who are confined to crates so narrow and short that they cannot walk or turn around. The inactivity leads to muscle atrophy and osteoporosis. Sows, adult females, may collapse and not be able to stand up again when they are made to walk. They may be beaten and dragged before they are killed and placed on the "dead pile" to be picked up by rendering trucks.

The mass production of farm animals in industrial systems has resulted in a changed "disease panorama" across animal agriculture. New animal diseases have emerged and they are harder and harder to treat. Animal diseases also have consequences for the safety of food consumed by

people. When pathogens in fecal matter contaminate the carcass at the slaughterplant, some can remain on the meat that reaches the grocers' counter.

An estimated 76-80 million cases of foodborne disease occur annually in the United States. An estimated five thousand twenty deaths from foodborne disease occur each year. Research completed by the U.S. Department of Agriculture's Economic Research Service (ERS) indicates that meat and poultry sources account for an estimated \$4.5 to \$7.5 billion in costs stemming from foodborne illnesses in the United States each year.

Opinion polls conducted in the United States indicate that the public cares about the welfare of farm animals. A growing number of farmers are finding special niches in the market where consumers will pay more for pork certified as having been raised according to strict protocols drafted by established animal welfare organizations. Animal welfare is an issue around which both farmers and consumers can come together to oppose hog factories and those who profit from them.

Many of the problems we now associate with industrialized animal production have their roots in the mistaken paradigm that forces animals to fit into production systems designed with human convenience and extractive profits in mind. Many of the solutions to those problems will be found again by adopting technologies and production systems that work with the natural, biological, and behavioral characteristics of farm animals rather than against them.

[VII. Stop the Madness!](#)

Part Seven: Stop the Madness! describes effective strategies that national public interest organizations and local citizens groups are following to protect family farms, environmental quality, public health, animal welfare, community well-being, and social justice.

Part Seven also describes the activities of organizations that are actively developing and promoting alternatives to factory hog farming. An effort to develop humane, sustainable, alternative forms of animal farming must go hand in hand with efforts to end animal production that is exploitive of people, animals, and future generations and wasteful with respect to care and use of natural resources. Without viable and preferable alternatives, an old paradigm will not be displaced.

There is today an urgent choice before the American public and its institutions. We can ignore the massive and destructive structural changes occurring in U.S. agriculture, and thus simply hope for the best.

Alternatively, we can try to correct the problems that have occurred and search for less destructive and more ecologically, socially, and ethically desirable methods of production. We can take forceful steps to see that technological change in agriculture is channeled for the betterment of human life and society.

Foundations can:

1. Help make it easier for activist groups to collaborate on important national, state, and local actions.
2. Support litigation against polluters.
3. Enhance activists' scientific understanding of the issues surrounding factory farms.
4. Ensure that state and federal regulatory agencies and Congress are well-informed about policies that would reduce the adverse impacts of factory farms.
5. Help activist groups call for stronger laws and regulations at the local, state, and national level.
6. Support media work to educate the public about factory farming and its implications for the quality of life that could be experienced by current and future generations.
7. Publicize and ensure adoption of sustainable alternatives to systems that pollute and are inhumane.
8. Investigate legal authorities for reducing pollution.
9. Build a campaign to mobilize activists around the issues.
10. Encourage colleagues in the funders' community to become informed on animal factory issues and support reform efforts.

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I. Are Independent Farmers an Endangered Species?

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Are Independent Farmers an Endangered Species?

In 1950, 2.1 million U.S. farmers sold hogs.¹ Average sales were 31 hogs per farm. However, by 1950, radical structural changes had already begun to occur in the hog industry, similar to the concentration and specialization that had already taken place in the broiler industry. By the close of 1999, only 98,460 U.S. farms sold hogs.² Average sales were around 1,100 market hogs per farm, but 105 farms having over 50,000 pigs each accounted for 40% of the U.S. hog inventory. The largest four operations Smithfield Foods, Inc., ContiGroup (Continental Grain and Premium Standard Farms), Seaboard Corporation, and Prestage Farms sold 11.6 million, 2.9 million, 2.5 million, and 2.2 million market hogs, respectively, accounting for nearly 20% of total U.S. hog production.³

The Irrationalization of U.S. Hog Farming, 1950 to 2000

Prior to 1950, most U.S. hog farms operated seasonally. Hogs were "mortgage lifters," adding value to crops grown on the farm and adding significantly to the farm's cash flow.⁴ Most farms were independently owned and managed by families whose members also provided the major part of the farm's labor. Hogs were raised outdoors with access to bedded shelters or indoors in pens bedded with straw or hay. Sows, adult females, gave birth, or farrowed, once or twice a year. Half a year later the grown market hogs were sold. Sales took place primarily on competitive, open markets with a large number of buyers bidding for hogs. Farms were characterized by low capital costs and a diverse enterprise structure, combining crops, forage, and one or more species of livestock. These features of independent farms made it relatively easy for the industry to contract or expand supply, as farmers went into and out of the hog business in response to changes in the market price.

With the discovery of vitamins A and D in the early 20th century, it had become possible to confine farm animals indoors without sunlight and produce year round.⁵ But indoor confinement had contributed to disease and death losses. The discovery in the late 1940s that low-level antibiotic feeding helped suppress disease outbreaks made it possible to crowd more animals into a single building, contributing to the trend toward intensive confinement.⁶

Higher capital costs of confinement led to the development of specialized technologies to save on space and increase output per unit of investment. Individual crates, roughly the size of a standing sow, allowed twice the



number of sows to be kept in a single building compared to unrestricted housing in pens or rooms. It became possible to warehouse tens of thousands of breeding sows and their progeny on just a few acres. Specialized equipment also reduced the amount of labor needed to care for so many animals. Slotted floors permitted passive manure collection in which manure from hogs was trodden (by the animals) and flushed by groundwater several times a day into storage pits beneath the barns or into channels that flowed to outdoor storage pits.⁷

However, the new intensive confinement technologies were not scale neutral with respect to the substitution of capital for labor. They could be adopted to a greater advantage by larger farms than by smaller ones.⁸ Fewer, less skilled personnel could work with more pigs. Independent farmers who adopted the new methods soon found that they had to get bigger or get out. These farmers also became more dependent than ever before on technology and other input suppliers for the materials to operate their businesses: genetics firms, animal breeders, equipment manufacturers, feed companies, drug suppliers, and others. Farming became "technology driven" and capital-intensive.

The process of technology change and adoption that enabled the production of greater and greater amounts of output per number of skilled workers was called "rationalization." Capital-intensive technologies did increase output per number of skilled workers. But they did it so a great extent by substituting machines, drugs, and unskilled labor for farmers and workers skilled in the husbandry of animals; i.e., by simply doing away with the role traditionally played by the skilled stock person or farmer.

The "rationalization" process in livestock farming was characterized by a switch from the traditional animal agriculture's reliance on animal biology and behavior and skilled husbandry to the new animal agriculture's reliance on mechanized techniques of restricting and controlling animals' behavior and biological processes.⁹ Embracing the philosophy of "rationalization," agricultural scientists focused on refining the mechanical techniques that could substitute for labor, reducing the number of workers (and farmers) needed for animal production. Herd sizes were increased to spread fixed costs over a higher volume of output. Between 1950 and 1980, the number of U.S. hog farms declined by nearly 80% while average hogs produced per farm increased six-fold.¹⁰

The path to industrialization and the restructuring of U.S. hog farming had been laid out. Industrialization commenced with the transformation of animal agriculture from a primarily biological to a primarily technical process.

During some of the most critical years of this transformation, U.S. farm

programs were put in place that promoted the industrialization of animal agriculture.^{11,12} These included: investment tax credits for confinement building technology; rapid depreciation on confinement facilities; write-offs of capital investments as cash expenses; inclusion of closely held corporations in the definition of family farms eligible to use cash accounting; capital gains exemptions on sales of breeding stock; price support programs that made land more profitable for growing crops than for raising animals and reinforced the move to intensive confinement; and crop deficiency payments that served as "de facto" subsidies from taxpayers to livestock farmers by keeping grain (feed) prices low, further encouraging expansion.

Perhaps as important, there seemed to be a philosophical premise underlying farm programs which has persisted to the present: that aid to farmers, in the name of preserving family farms, should be awarded on the basis of production volume rather than income, stewardship of natural resources, or some other, desirable social goal. This philosophy had the effect of channeling aid into the hands of the highest volume farmers.¹³ During the years 1975 to 1980, in particular, major expansion occurred in the hog industry.¹⁴ Two-thirds of the total building capacity was in capital intensive structures specialized to hog production. Specialization permitted greater separation of ownership, management, and labor. Government policies and the new mass production technologies were attracting new investors to hog farming. More than half of U.S. farms selling 5,000 or more hogs in 1978 had not been in hog production in 1975; some had not been in the business of farming at all in 1975.¹⁵ While hog farms were becoming fewer in number and more specialized, hog output increased by 40% between 1975 and 1980.

The years between 1980 and 1988 saw further declines in farm numbers. By 1988, only 326,000 U.S. farms had hogs. While hog farm numbers were declining, the total number of hogs produced was increasing due to larger sow herds, more litters born per sow in a year, and more pigs produced per litter on larger farms. Since 1992, hog farm numbers have increased only in the size category of 2,000 hogs or more.¹⁶ By 1999, there were 98,460 U.S. farm selling hogs.

Figures 1 and 2 show changes in the annual U.S. pig crop and in the number of U.S. farms with hogs between 1983 and 1999.

Figure 1. U.S. Annual Pig Crop 1983-1999. (Source: U.S. Department of Agriculture, National Agricultural Statistics Service (NASS)).

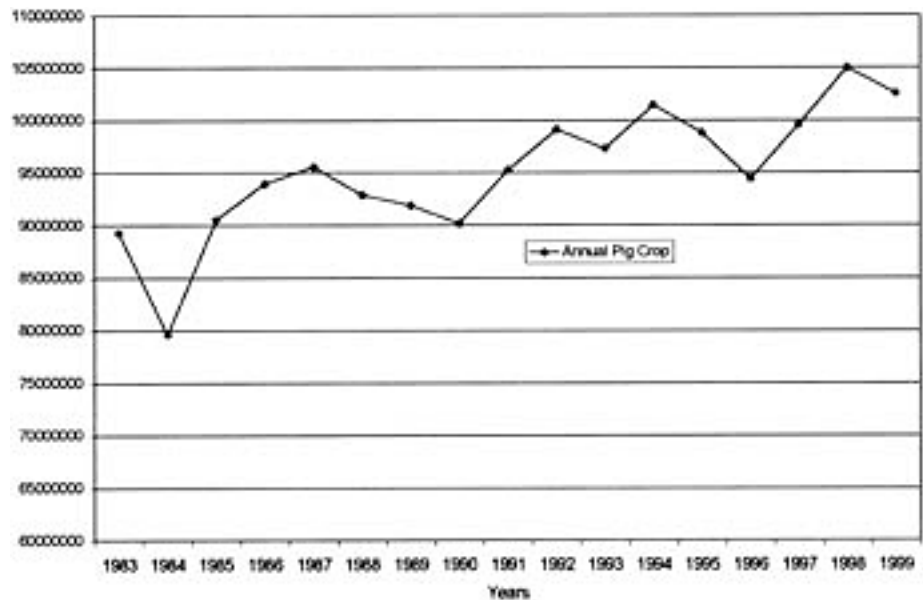
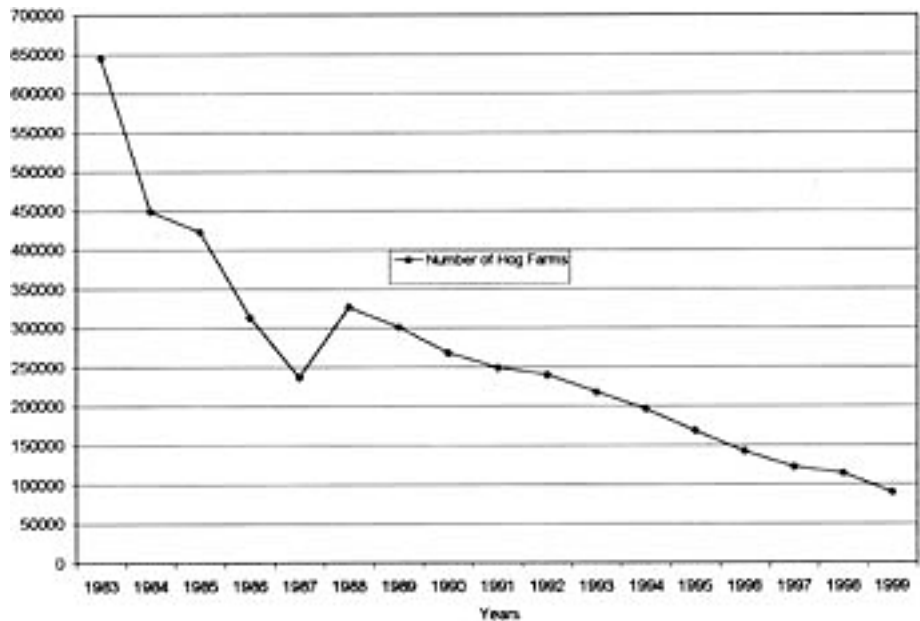


Figure 2. Number of U.S. Farms With Hogs 1983-1999. (Source: U.S. Department of Agriculture, National Agricultural Statistics Service (NASS)).



The Price Crisis and Its Economic Impacts

The demand for farm products that faces farmers at the farm gate is not direct consumer demand but processor demand. As such, it is highly influenced by conditions in the processing industries.¹⁷ In the case of pork, consumer demand is derived through the packing industry's demand for hogs. In 1996, there was excess capacity in the slaughter-processing, or packing, industry. Packers were bidding against each other for hogs and prices to farmers were high. Packers closed buying stations and, in some cases, bought rival plants and then closed them, reducing excess capacity

and consolidating their own control over the markets, but limiting and, in some cases, eliminating marketing options for farmers who depended on those plants to buy their hogs.¹⁸

Despite the dramatic reduction in number of hog farms between 1988 and 1998, the 1998 annual pig crop was 105,004,000, a record high.¹⁹ Beginning in late summer 1998, prices paid to farmers started to fall. By the end of the year, farmers were in crisis.²⁰ Packers, whose excess capacity just two years before had resulted in plant closures, now could not handle the record supply of hogs. At the same time, other countries were producing surpluses of their own. The dollar was strong, limiting other countries' interest in purchasing U.S. pork. Supplies were not easily adjustable downward. Imported live hogs from Canada were competing with U.S. hogs at the packing facilities and the anticipated Asian export markets that had helped fuel the expansion did not materialize. Nevertheless, pork exports were up 18% from 1997. There were just too many hogs being produced. Meanwhile, domestic demand for pork, which had been relatively stable with consumption ranging between 48 and 53 pounds retail weight per capita since 1982, did not appreciably increase.²¹

As a few firms become large enough, they account for substantially more of the market and it took fewer large producers expanding supply to reduce prices.²² The typically inelastic consumer demand for pork means there are only three ways to increase sales of pork: population growth, government purchases, and export. Without these options, increased supplies lower price and cause some farms to fail.

Increased specialization of production decreases elasticity of supply over time.^{23,24} Specialization and capitalization tend to decrease firms' flexibility of entry and exit. The result has been fewer firms reducing production when prices fall, keeping supplies high.

The record high hog supplies of 1998 had hit a wall. Retailers did not lower prices to consumers; meatpackers and processors reduced their prices to farmers; specialized and highly capitalized hog factories could not easily reduce supply.²⁵ The results were high marketing margins and record profits for the packing industry. While independent farmers were receiving the lowest prices since the Great Depression, Smithfield Foods, IBP, and Hormel Foods (first, second, and fifth largest hog packers, respectively) announced record profits.^{26,27,28}

In the general commodity market, there is little opportunity for individual farmers to add value to their products and get a higher price for doing so. The price that farmers receive for their hogs is the base, minimum price that can be received for a raw product. Although credits may be given for

carcass size, leanness, and number of hogs delivered, no "extra credit" is given for the way in which hogs are produced (for example, whether the farmer is a good steward of the land or maintains his animals in a high state of welfare). The buyer (packer) decides how much the hog is worth. The packer, processor, further processors, and retailers or exporters reap the benefits of adding value to the farmers' raw product. Effectively selling their outputs wholesale while paying the retail cost of inputs caught between increasingly oligopsonistic buyers and increasingly oligopolistic sellers independent farmers continue to be squeezed in the middle.

By December 1998, hog prices had dropped to record lows.²⁹ For farmers selling independently, on open (cash or spot) markets, prices dipped as low as eight to 10 cents per pound, 20 to 30 cents below costs of production. Adjusted for inflation, these prices were lower than hog prices during the Great Depression. Some farmers gave their hogs away.

Analysts predicted that as many as one-fifth of the nation's remaining hog farmers would leave the business by mid-year 1999.³⁰ Farmers most likely to leave the business voluntarily were the small to mid-size independent farmers for whom hog production was not the sole enterprise. These farms may survive without hog production and may be able to get back in the hog market at some future time, especially if they can serve a special niche.

Of great concern are the independent farmers who bought into the factory technologies but did not produce on a sufficient scale to cover costs of production. A *Wall Street Journal* reporter interviewed an Iowa farmer who spent his life savings to erect four "state-of-the-art" buildings.³¹ In 1998, his partnership lost half a million dollars. He closed down, laid off his seven employees, and sold his breeding herd. But he still did not have the money to pay construction loans totaling hundreds of thousands of dollars.

The *Journal* reported on another Iowa farmer selling 40 hogs to a meatpacker that day. He expected to lose \$44 per hog.³² He had to shoot a sow because he could not afford to pay for a routine veterinary procedure.

Related to the price crisis is the difficulty small and mid-sized independent farmers have in obtaining credit to begin and renovate hog operations.³³ The emphasis on the factory mode of production that prevails in the industry and within land grant universities lends greater apparent legitimacy to factory methods than to more traditional methods of raising hogs. Creditors can be reluctant to lend to independent farmers who propose production plans that do not meet the corporate mold or who are not contracting with a larger, corporate entity, even if the plans are within the farmers' financial and managerial capabilities.³⁴ One farmer reported:
³⁵

Farm Credit [Service] is pushing loans to large livestock operations. [It] lines up the credit for producers who put up finishing barns for one of the mega-producers in our area which is in the ranking of the top 50 producers in the United States.

Technologies designed to substitute capital for labor benefit independent farmers only to a degree. They benefit owners and investors in hog factories more by effectively eliminating barriers to growth. Independent farmers and industrial producers are on different playing fields.

Of all the independent hog farmers operating during the crisis, perhaps the only ones who were making a profit were the few who were fortunate enough to be selling to niche markets on the basis of product quality or process of production, or those who were selling direct to neighbors or other consumers. These independent hog farmers stayed afloat during the price crisis while others went out of business. A Minnesota farmer called the Niman Ranch program "a godsend." This program pays independent farmers premium prices for antibiotic-free pork from hogs raised humanely according to a protocol developed by the Animal Welfare Institute.³⁶

Vertical and Horizontal Integration and Vertical Coordination

Vertical integration refers to arrangements where two or more stages of production are under the same ownership. Vertical coordination is a broader term. It refers not only to integration, but also to contract arrangements between feed companies or packers and farmers to produce hogs.

Contracts

As a percentage of total inventory, hogs produced by farmers under contract increased from 21% to 30% between 1996 and 1998.³⁷ In 1998, 30% of farms having 5,000 or more hogs were produced under contract. University of Missouri economists estimated that more than 50% of all hogs were being produced under some form of marketing contract in 1999. Sixty-four percent of hogs slaughtered in January 1999 were sold under some type of prearranged marketing agreement.³⁸

According to the Land Stewardship Project, feed companies and other supply co-ops as well as veterinarian networks whose businesses depend on farmers, pressure independent farmers to enter into contracts and help finance large-scale facilities.³⁹

Farmers contracting with feed companies or packers to grow hogs may receive higher short-run prices than those trading on the cash market, but in some cases these arrangements are a double-edged sword. Of particular concern to family farm organizations are ledger contracts. With one form of ledger contract, offered by a large meatpacking company, when the market price dips below the contract price, the contractor calls this amount a negative balance. When the market price goes above the contract price, this is called a positive balance.

The positive balance is split between the contractor and the farmer contractee. Contract terms, however, call for the farmer to pay back to the contractor the whole of the negative balance accumulated over the life of the contract at the end of the contract term. If the farmer is unable to pay it, the contract is extended. Contracts of this type, signed by desperate farmers, offer short run relief. However, they have left farmers tens, maybe hundreds, of thousands of dollars in debt due to 1998's extended period of low prices. Potentially, ledger contracts can wipe out a farmer's entire net worth.

Farmers who contract with companies to produce hogs for them also must adopt their preferred production protocol which, most often, means building expensive, industrial style hog facilities at their own expense.⁴⁰ If the company terminates the contract, the farmer is left with empty buildings, hundreds of thousands of dollars of debt, no market, and no livelihood.

Vertical and Horizontal Integration

Vertical integration is attractive to packers because it allows them to slaughter their own hogs, produced according to their standard, and at the slaughter rate they need. Horizontal integration by packers into other industries, such as feed and pharmaceuticals, gives them stability and a way to cover losses in one division with profits in another.

Virginia-based Smithfield Foods, Inc. is the largest U.S. hog producer. In a May 1999 press release, Smithfield attributed its record 1998-99 profits to its integrated structure:⁴¹

[This] gives us a more stable earnings base and eliminates the extreme cyclicalities that characterizes the results of many companies in our industry. While we sustained large losses in hog production during fiscal 1999, we achieved record results in our processing operations.

Smithfield described fiscal 1999 as its "third consecutive year of record

results despite a \$58.6 million pretax loss," incurred by its Hog Production Group due to record low prices for hogs and a \$12.6 million fine levied against its Virginia operation for polluting.⁴²

In January 2000, Smithfield purchased Murphy Family Farms for 11.1 million shares of Smithfield Foods, Inc. common stock, and the assumption of approximately \$203 million in debt and other liabilities.⁴³ Together with Smithfield's other "domestic hog production subsidiaries," Brown's of Carolina, Inc. and Carroll's Foods, Inc., Smithfield's operations were expected to involve control of some 700,000 sows.⁴⁴ Over 60 percent of the hogs slaughtered by Smithfield every year would be owned by Smithfield from birth to slaughter, continuing the erosion of competition in hog markets and closing the door to the market for many independent, family hog producers in regions where Smithfield companies raise and process their own hogs.⁴⁵

Regarding Smithfield's Murphy purchase, Missouri hog farmer Steve Madewell commented that the merger was another nail in the coffin of independent operators. "They are going to put us out of business. How they are going to do it is to take our markets from us."⁴⁶ Wayne Prewitt, farm management specialist with the University of Missouri Extension Office in Vernon County, Missouri, and a contract grower for Murphy commented:⁴⁷

It's sad; in all honesty, it brings tears to my eyes. Smithfield will be controlling a significant amount of the market. As an ag economist, I understand it well, but our communities are going to lose a lot when they lose their farmers.

Smithfield has also acquired interests in other countries, including 51% of the voting control of Animex, Poland's largest meat and poultry processing company.⁴⁸ Smithfield is meeting staunch opposition from Poland's family farmers and food workers.⁴⁹

Smithfield's domestic acquisition plans have drawn strong criticism from farm organizations and calls for the Justice Department to investigate their anti-trust implications.⁵⁰ Iowa Senator Tom Harkin asked the Justice Department to force Smithfield to divest selected assets to prevent market concentration in certain regions. Senator Tim Johnson of South Dakota announced that he is drafting a bill to ban meatpackers from owning livestock for slaughter. He noted:⁵¹

Current antitrust law fails to address the concerns of livestock producers in the marketplace, and instead creates an imbalance in bargaining power between huge meatpackers and independent livestock sellers.

In January 2000, Smithfield was forced to divest all Missouri property within ten days of acquiring Murphy Family Farms (which qualified as a family farm under Missouri law).⁵² Smithfield, a publicly traded corporation, does not qualify as a family farm.

Iowa Attorney General Tom Miller filed suit to block Smithfield's acquisition of Murphy because Iowa law prohibits packers from owning, controlling, or operating a feedlot in Iowa. Around 300 Iowa farmers have contracts to raise Murphy's hogs.⁵³ In response, Murphy sold its Iowa assets to a former employee. Attorney General Miller then filed a fresh lawsuit contending the sale was a sham to create the appearance of compliance by Smithfield. He asked the court to prohibit Smithfield Foods, Inc. from directly or indirectly participating in any manner with the operation or control of Iowa feedlots.⁵⁴ In March 2000, a special investigator was appointed to handle the case. As of mid-April, 2000 the case was unsettled.

Continuing integration negatively influences the prices independent farmers receive for their hogs. A University of Nebraska study indicated that at the 10% level of integration, the price received by independent farmers declines by six percent and at 50% integration, the price declines by about 26%.⁵⁵

Manipulation of Markets

The concentration ratio for the top four packers rose to almost 60% in 1998.⁵⁶ The seven largest packers represented 75% of total daily slaughter capacity.⁵⁷ Smithfield's daily hog capacity is "over 80,000 hogs, just under a quarter of the total daily U.S. hog slaughter."⁵⁸ Fewer buyers result in less competition for hogs. The independent farmer takes the price the packer sets. The farmer often is prevented from shopping among packers because he or she must use the packer with the closest buying station. Increasingly, packers are no longer taking hogs from independent farmers because packers fill their slots with contract hogs or else slaughter hogs they own directly.⁵⁹ Independent farmers end up providing packers with "residual supplies."⁶⁰

In April 2000, Smithfield's wholly-owned unit John Morrell and Company announced its intent to purchase the slaughterplant owned by Farmland Industries, Inc. in Dubuque, Iowa. According to plans, Smithfield would close down hog slaughter at the plant and convert it from a fresh pork facility to a producer of processed meat.⁶¹ The Dubuque plant slaughtered 8,000 hogs per day, and its closing will eliminate another market for independent hog farmers, further reducing market competition.

Independent farmers still may take their hogs to the nearest terminal and

sell on the spot or cash market, but even here the farmer is a price taker. Fewer bidders for his or her hogs means reduced competition and therefore a reduced price.⁶²

Supplies of hogs that packers own, or that they contract with farmers to produce for them, are known as "captive supplies." According to a recent study by the Land Stewardship Project, the concentration in the packing industry and the level of captive supplies on the market are high enough to have some control over price.⁶³

Other Concerns

Independent hog farmers find themselves "powerless to address their problems in the closed concentrated systems with which they must deal."⁶⁴

Giant, farmer-owned processing and supplier cooperatives such as Land O' Lakes and Farmland Industries, have used members' equity, withholding or reducing dividends, to invest in contract hog production and compete in the market with their members who produce hogs independently.⁶⁵ In 1999, Farmland Industries, for example, was the ninth largest producer of hogs in the United States, with 67,000 sows.⁶⁶

An anti-corporate farming law prohibits Land O' Lakes from owning hogs in Minnesota where its headquarters are located, so it went outside the state to build. In 1999, Land O' Lakes had production operations in Oklahoma, Illinois, North Carolina, Iowa, Indiana, and northern Missouri, and was the twelfth largest hog producer in the United States with 63,738 sows.⁶⁷ It marketed seven million hogs through contracts. Its swine division lost \$25.8 million in 1999 and \$51.8 million during the past two years.⁶⁸

It is the opinion of a growing number of independent family farmers that they have been ill-served by organizations purporting to represent their interests. In December 1999, membership of the Mississippi Farm Bureau Federation unanimously adopted a resolution strongly condemning and calling "a gross breach of faith" the American Farm Bureau Federation's (AFBF) lobbying efforts against U.S. Senator Paul Wellstone's bill. This bill would have placed an 18-month moratorium on agribusiness mergers until their impacts on independent family farmers could be determined.⁶⁹ As of April 1, 2000, over 175 organizations and 600 individuals have signed a petition initiated by GrassRoots Environmental Effectiveness Network calling for a federal

investigation of AFBF, which was the subject of an April 9, 2000, CBS 60 Minutes report.⁷⁰

In April, 2000, Defenders of Wildlife published a 100-page examination of the AFBF and its role in furthering the concentration of the agricultural industry and the demise of the nation's small farmers.⁷¹

In May 1999, the Campaign for Family Farms presented the U.S. Department of Agriculture (U.S.D.A.) with 19,000 signatures on a petition calling for a referendum of U.S. hog producers on whether or not to continue the mandatory pork checkoff program. Twice the NPPC attempted to force U.S.D.A to release the signatures on the petitions and twice it was rebuffed in the courts. In February 2000, U.S. Secretary of Agriculture Dan Glickman, agreeing with the Campaign's assertion that U.S.D.A. had bungled the signature verification process, directed the U.S.D.A. to fund and conduct the referendum.⁷² The NPPC claimed that, through the referendum petition process, "apparent political interests, who in many cases aren't even pork producers[were] punishing bonafide pork producers."⁷³

The "pork checkoff" is one of several federally-mandated checkoff programs that taxes farmers on each unit of commodity sold. Civil penalties can be assessed against farmers who do not "contribute." The revenues from these checkoff programs are used to fund national boards such as the National Pork, Beef, Sheep, and Dairy Boards that are supposed to work in farmers' interests by funding research, technology development, and promotion efforts. The National Pork Producers Council (NPPC) and state Pork Producer Associations are primary beneficiaries of the pork checkoff funds, and they in turn select and fund the research and development projects. Independent farmers have argued that the research funded with checkoff dollars, including their own contributions, contributes to industrialization of the livestock industry by advancing the interests of primarily large-scale, factory hog farms.

One of the last straws for many small hog farmers was the NPPC's hiring of Washington, DC, firm Mongoven Biscoe & Duchin, Inc., to investigate the activities and leadership of "activist" farm groups, such as Missouri Rural Crisis Center, Land Stewardship Project, and Iowa Citizens for Community Improvement, alleging they had been infiltrated by animal rights groups. Even the 300,000-member National Farmers Union was investigated.

Why Should We Care About Independent Hog Farmers?

The reasons for caring about independent family farmers and for preserving the family farm structure of agriculture are expounded in the following chapters. In general, however, there are high private and social

costs to ignoring the factory farm problem. From the experience of thousands of rural residents and communities across the nation, the investors in hog factories have little loyalty or regard for their neighbors or for the welfare of the communities in which they have settled.

The waste handling technologies used by hog factories are generally the cheapest possible and most hazardous to the environment, animals, and people. The reliance of hog factories on subtherapeutic use of antibiotics to promote growth and prevent disease outbreaks is endangering the effectiveness of precious pharmaceuticals and the health of people and animals that depend on them.

Food is cheaper in the United States than in countries where agricultural practices are more strictly regulated, but it is becoming more hazardous to consumers.⁷⁴ Animal factories abuse animals and threaten genetic diversity, a common property resource of great public value. The issues surrounding what kind of agriculture we will have are fundamental to human life and to the quality of life of every creature on the planet. Twenty-five years ago the Center for Rural Affairs noted:⁷⁵

In a concentrated industry, where a few firms control the supply of a product, the product is available only on their terms – which means at their price. [T]here is more at stake than the independence of hundreds of thousands of pork producers. At stake is the availability of and control over a substantial portion of the daily menu of American families.

There are benefits to retaining the independent family farm structure of agriculture, including hog production. A number of researchers have determined that independent family livestock farmers are important to the infrastructure of rural communities ^{76,77,78,79,80} and that smaller farms are at least as efficient as larger ones.⁸¹

In general, these studies found that hog factories displace three times as many jobs as they create. In contrast, these studies showed that smaller farms generate a higher number of permanent jobs and account for a greater increase in local sales and per capita income, and a greater reduction in unemployment rate than hog factories. While integrated hog factory systems create jobs within the company, these tend to be low-wage, low-skill jobs. In 1996, hired farm workers overall earned only 58% of the median weekly earnings of all U.S. wage and salary workers.⁸² Independent family farming systems create jobs within the community.

Critiquing an Iowa State University study in which researchers determined

that it would take nine 300-sow hog farms to generate the equivalent local tax benefits of one large 3,400-sow operation, Thompson and Haskins point out that the flip side of this claim, regarding the apparent efficiency of factory hog farms, is that nine smaller farms could generate the same tax benefits with fewer (2,700) sows than the larger operation.⁸³

Concentration in animal agriculture is continuing, nearly unabated, and often aided by the very institutions that are supposed to protect the public against corporate power and abuses. The continuing loss of independent family farmers has far-reaching impacts on us all. We have yet to comprehend what the ongoing concentration of ownership of the basic factors of production, in the hands of fewer and more powerful corporate entities, will mean for the future of democracy and personal liberty.

In January 1998, the report of the U.S. Department of Agriculture National Commission on Small Farms expressed urgency about the choice before us:⁸⁴

The dominant trend is a few, large, vertically integrated firms controlling the majority of food and fiber products in an increasingly global processing and distribution system. If we do not act now, we will no longer have a choice about the kind of agriculture we desire as a Nation.

Some Strategies and Action Alternatives Supportive of Independent Family Farmers

1. Support research and development of production systems and technologies that are appropriate for the size and scale of independent family farmers and consistent with their values.

Rationale: The technologies being developed today are not size neutral with respect to substitution of capital for labor, with the result that independent farmers can get in over their heads and carry huge debt loads if they adopt them. The only factor of production for which the independent farmer can set the price is his or her own time or labor. Technologies that improve production by stressing management and skilled labor over capital investments are potentially empowering to independent farmers. In some cases, these production systems will help qualify the farmer to take advantage of special marketing opportunities, such as organic or antibiotic-free or with endorsements by bonafide animal welfare groups, where prices above market price are offered.

2. Support the promotion of alternative markets and independent, quality-oriented, farmer-owned packinghouses.

Rationale: Independent hog farmers are being squeezed out of the conventional pork market and increasingly end up providing packers "residual supplies." According to the Land Stewardship Project, [85](#) conventional processing plants owned by groups of farmers are not generally successful, but profitable niches exist for small farmer-owned plants that offer specialty products, such as pork from particular breeds (e.g. Berkshires) or raised in conditions supportive of their natural behaviors or without antibiotics. Such opportunities allow farmers to add value to their own hogs, potentially commanding a higher price than packers would pay or that spot or cash markets would afford.

3. Support legislation that strengthens the definition of family farmer and prevents large, corporate "family farm" entities, such as Murphy Family Farms and Continental Grain, from operating in states with strong anti-corporate farming laws and benefiting from government programs and legislation geared toward helping farm families.

Rationale: Family farms traditionally have been defined as farms under the ownership or control of the operator, with management and most of the daily labor input being provided by the operator and his or her family members. Government programs and policies designed to benefit family farmers are predicated on this description of family farms. Legal loopholes, however, allow corporate entities such as Murphy Family Farms, at one time the nation's largest hog producer, to qualify as family farms and operate in states where other corporations cannot, and to take advantage of benefits originally designed to assist farm families living off the land.

4. Support small farmers efforts to regain control of their dollars that now go to mandatory "producer checkoff" programs.

Rationale: Small farmers feel disadvantaged by the checkoff programs because the Boards they support channel checkoff dollars to research and promotion activities that primarily try to solve the problems associated with industrialized farming, which contributes to the growth of animal factories. Farmers should at least have the opportunity to vote on whether these checkoff programs should continue to exist. Not having to pay into existing mandatory checkoff programs also frees independent farmers' dollars to support programs that are more in their interest.

5. Support legislation to strengthen current antitrust law and prevent anti-competitive practices in the livestock industry. Call for stronger enforcement of existing antitrust laws.

Rationale: "The Packers and Stockyards Act and other antitrust laws provide a sound legal framework for the free market system of trade in the livestock industries."⁸⁶ Ongoing concentration and integration is eliminating farmers' access to markets and concentrating power over the food supply in ever fewer hands.

6. Rein in producer cooperatives that use members' equity to leverage capital and build hog, dairy, and other animal factories that directly compete with members engaged in livestock farming.
7. Enact legislation that revises federal price support programs to reward farmers for adopting humane, sustainable animal management practices; for providing and protecting other desirable public amenities such as open space, a clean and pleasant countryside and landscape, prairie establishment or maintenance, and watershed enhancements; and for taking specific measures to protect public health, such as going organic or discontinuing subtherapeutic use of antibiotics in animal feeds or agreeing not to use recombinant bovine somatotrophin or other production and growth promoters. Rewards should be reserved for undertakings that are more fundamental than simply building a better lagoon and should not be used for animal factory expansions.

Rationale: For decades, farm programs have funneled taxpayer support to the highest volume farms. Smaller farmers, the environment, and farm animals have suffered under this arrangement. Freedom to Farm legislation phased out agricultural price supports over a period of six years. Yet, the farm economy indicates that a safety net is needed to protect farmers when market prices fall below unit costs of production. This may be an opportune time for recoupling price supports to farmer-initiated investments designed to help farmers better provide desirable public goods rather than farm bigger.

8. Support strong national organic standards.

Rationale: Strict U.S. organic standards regarding animal production are necessary to conform to longstanding international organic standards for agricultural practices that are based on sound biological principles and respect for the dignity and interdependence of all life. Food and agribusiness industry interests lobbied successfully for weakened organic standards in the first draft of U.S. Department of Agriculture's proposed national organic standards. Public outcry resulted in a new drafting effort by the Department. The new draft proposal answered most concerns of organic supporters but some things need to be specified more completely, such as conditions for confinement of

animals and definition of pastures that might become loopholes allowing animal factories to claim that they produce organically. Secretary Glickman spoke favorably of the potential for organic production to help smaller farmers stay in the business of farming. Maintaining the integrity of U.S. organic standards is a critical factor in helping independent farmers farm according to their values, maintain an environmentally beneficial farming system, and add value to their own products.

9. Create or enhance legislation to require collective bargaining between farmer-sellers selling in conventional markets and meatpacker-buyers so that farmers can secure prices for their hogs that are based on costs of production, including returns to the farm operator and farm family. Enable bonafide organizations supporting independent farmers to bargain collectively on behalf of their members for prices that meet full costs of production.

Rationale: Independent farmers are "competitive" producers operating in a marketplace that has "oligopsonistic" meatpacker-buyers and "oligopolistic" feed and other input suppliers. Increasingly, meatpackers are taking over the role of adding value to the raw commodities produced by farmers. Farmers are left to provide generic, raw commodities, produced to the packer's specifications, which often conflict with what consumers' desire, for whatever price meatpackers will pay. Farmers cannot continue producing below their costs of production simply because they are producing raw commodities to which others ultimately "add value".

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II. Putting Lives in Peril

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Putting Lives in Peril

Overview

The nature of the technology used, rather than size alone, distinguishes industrial from non-industrial animal farming methods. Whether practiced by many small farmers or by a few large operations, industrialized animal farming techniques can be harmful to life in ways that more natural and less intensive farming techniques are not.

Dusts inside intensive confinement facilities and gaseous emissions from liquid manure pits and lagoons have led to worker illnesses and injuries as well as human and animal fatalities.

The continuous stress of intensive confinement lowers farm animals' immunity to disease. But, reducing the intensity of confinement to alleviate stress would raise animal factories' costs of production. To avoid these costs, animal factories rely on continuous, subtherapeutic administration of antibiotics in the feed or drinking water to help promote growth and control bacterial illnesses.

The subtherapeutic use of antibiotics creates selective pressure on bacteria that favors resistance, placing in jeopardy the effectiveness of precious antibiotics for treating animal and human bacterial diseases.

The Threat to Farmer and Farm Worker Health and Safety

Anaerobic decomposition of liquefied hog manure in under-barn storage pits or open, outdoor "lagoons" produces nearly 400 volatile organic compounds.¹ The four most abundant of these are methane, hydrogen sulfide, ammonia, and carbon dioxide.² These compounds may or may not be odorous. One of the mercaptans, for example, which smells like rotten eggs, is added to normally odorless natural gas to call attention to gas leaks. Methane is both colorless and odorless, but is potentially deadly. It is a potent greenhouse gas, can be explosive at certain concentrations in the air, and can displace oxygen in confined spaces, resulting in asphyxiation. The potentially deadly hydrogen sulfide is detectable at low levels as a "sour gas" or rotten egg odor. As concentrations increase and become more dangerous, hydrogen sulfide paralyzes the olfactory senses and becomes undetectable. Scientists now believe that, even at low levels of exposure, hydrogen sulfide can have lasting effects on human health.

In 1982, more than 85,000 people in Iowa and 500,000 in the United States worked in livestock confinement systems that used liquid

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manure.^{3,4} According to one expert, due to the size of the industry and the growth in the number of farms using liquid manure handling methods, it is no longer possible to determine how many people are exposed to liquid manure each year in the United States.⁵ Yet every year incidents are reported in which someone becomes ill or dies from exposure to deadly gasses emanating from liquid manure storage structures.⁶

Safety Hazards of Industrialized, Intensive Livestock Confinement

On July 26, 1989, five farm workers in one family died after consecutively entering a 10-foot deep liquid manure pit on their Michigan farm.^{7,8} A shear pin had broken on the mechanism used to agitate the manure before pumping it into the tank that would carry it to the fields. The farm owner's 28-year-old son descended into the pit on a ladder and made the repair. While climbing out, he was overcome by fumes and fell back into the pit. Subsequently, the owners' 15-year-old grandson, his 63-year-old cousin, his 37-year-old son, and the 65-year-old farm owner himself entered the pit and collapsed, each one having intended to rescue the others. The medical examiner cited methane asphyxiation as the cause of death.

On June 26, 1989, a 31-year-old Ohio dairy farmer and his 33-year-old brother died when the farmer entered a liquid manure pit to unclog a pump intake pipe.^{9,10} The brother died in an attempted rescue. The coroner's ruling was drowning secondary to loss of consciousness from methane asphyxia.

Methane is explosive at concentrations of 55,000 parts per million (ppm) or five percent to 15% by volume.¹¹ Usually it escapes, but it can collect below the slotted floors of confinement buildings. Farmers and farm workers are cautioned, when using machinery around manure pits, not to ignite fire or create sparks. To avoid asphyxiation by methane, farmers and farm workers are advised to don a self-contained air supply, such as those worn by fire fighters, before entering liquid manure pits.

On August 8, 1992, a 27-year-old employee of a Minnesota hog farm and his 46-year-old uncle, who co-owned the farm, died after entering an outdoor manure pit.¹² The employee entered the pit to repair a pump and was overcome by fumes. The uncle died when he attempted to rescue his nephew. They were pronounced dead from hydrogen sulfide poisoning.

Hydrogen sulfide is highly toxic.¹³ Because it is heavier than air, it concentrates just above manure level in the storage pit. Hydrogen sulfide is also explosive over a wide range of concentrations from 4.3% to 46%

by volume in air.¹⁴ Five parts per million of hydrogen sulfide is the recommended maximum exposure level for human health.¹⁵ At 20 ppm in the atmosphere, hydrogen sulfide causes irritation to eyes, nose, and throat. At 50 to 100 ppm, it causes vomiting, nausea, and diarrhea. At 200 ppm, it causes dizziness, nervous system depression, and increased susceptibility to pneumonia. With prolonged exposure at 200 ppm, fluid accumulates in the lungs. At 500 ppm for 30 minutes, hydrogen sulfide causes nausea, excitement, and unconsciousness. At 600 ppm and above, death occurs.

Hydrogen sulfide gas is most hazardous when the manure pits are beneath the production buildings. However, gas from outside pits back-flowing into a building, or any confined space where this gas can be trapped, can produce an acutely toxic environment. Cases have occurred in which all the hogs in a building have been asphyxiated when ventilation systems have failed. Hydrogen sulfide gas poses a potentially lethal hazard when liquid manure is agitated, which operators commonly do to suspend the solids before pumping out the pits. During agitation, hydrogen sulfide gas can be released rapidly, increasing from less than five parts per million (ppm) to over 500 ppm within seconds. Farmers are advised to remove animals and people before agitating manure.

On August 11, 1992, a 43-year-old Minnesota dairy farm owner was overcome when he entered a manure pit to clear an obstruction that prevented the emptying of the pit.¹⁶ His 23-year-old son tried to rescue him and was also overcome. They were pronounced dead from asphyxiation due to lack of oxygen.

All manure gasses can displace oxygen in manure pits.¹⁷ At 21% oxygen in the atmosphere, there are no asphyxiation effects. At 16% oxygen in the atmosphere, people experience impaired judgment and breathing. At 14%, they experience faulty judgment and rapid breathing. At six percent, people have difficulty breathing and can die within minutes.

The National Institute of Occupational Safety and Health (NIOSH) catalogued 22 deaths from manure pits in the United States between 1980 and 1989.¹⁸ The deaths involved both individual and multiple fatalities. In Minnesota, 12 human fatalities in liquid manure waste storage structures occurred between the years 1989-1998.¹⁹

Moreover, gas concentrations indoors increase in winter when facilities are tightly closed and ventilation rates are reduced to conserve heat. Should a ventilation system fail for several hours, gases can rise to deadly levels. Carbon monoxide has caused sows to have stillbirths and abortions in poorly ventilated buildings when unvented heaters lacked sufficient

oxygen for complete fuel combustion.^{20,21}

Acute and Chronic Health Hazards, Intensive Livestock Confinement

Both hog and poultry workers report similar, adverse respiratory health impacts from the air inside intensive confinement facilities, although it is thought the problems are more extreme in hog production.²² Hog factory workers also report more respiratory problems than workers rearing other livestock or raising crops.²³ Hog factory workers may spend eight or more hours a day, five to seven days per week, inside the facilities.²⁴

Besides gasses, the internal environments of intensive closed-confinement hog buildings contain dust composed of dander, dried fecal matter, and feeds.²⁵ Also present are broken hairs, inflammatory substances from bacteria known as bacterial endotoxins, pollen grains, insect parts, fungal spores, and fine airborne dusts called bioaerosols that contain bacteria, ammonia, and other toxic or irritating gasses. Breathing this air has led to losses in workers' lung capacities, occupational asthma, chronic bronchitis, airway obstruction, and organic toxic dust syndrome.²⁶

It has been known from experience in Eastern and Western Europe, where animal production was industrialized over 40 years ago, that the air quality in intensive confinement buildings is detrimental to the animals and the health, lives, and working capacity of the employees and farmers working in them.^{27,28} In the intervening years, many of these countries have found healthier forms of production.

Yet, in the United States, after decades of research on the serious deficiencies of liquid manure handling, the technology remains essentially the same. The industry's focus, as well as most land grant universities' research, has been on ways to control odors from liquid manure not on critical public health issues or on alternative forms of production. For the most part, perhaps due to its cheapness for mass livestock production, the industry and its university partners have clung for dear life to the liquid manure model. Little institutional effort or money has been put into investigation and promotion of waste management methods that do not produce deadly manure gasses in the first place, such as raising hogs and cattle on pasture or using solid floors and ample bedding in indoor environments. Millions of dollars have been spent on research to make liquid manure socially acceptable in a superficial sense. Yet, it is well known that controlling odor is not the same as safeguarding human and animal health.

No Occupational Safety and Health Administration (OSHA) standard

exists for work in intensive confinement buildings or around manure pits, although officials have known of the dangers for years.²⁹ There is a confined space procedure that could be used for manure pits, but even this standard is not enforceable on farms employing fewer than 10 people. In response to a 1990 NIOSH-Centers for Disease Control request for assistance to prevent loss of life in manure pits, extension services in several states published fact sheets on manure pit safety.³⁰ Complying with the recommendations, though, is voluntary.³¹

Liquid manure handling originally was introduced to reduce the labor costs associated with cleaning out hog buildings and, it was thought, for simple and safe storage. This promise has been fulfilled at the expense of individual farmers and workers who have become ill or died and their families who have watched loved ones suffer. As will be seen in later chapters, it also has been fulfilled at the expense of the environment, farm animals, and neighbors.

The Threat of Antibiotic Resistance

Domestic food-producing animals outnumber humans in the United States by more than five to one.³² The majority of these animals are routinely given subtherapeutic doses of antibiotics to make them grow faster and convert feed to flesh more efficiently. Low-level antibiotic feed additives are also used to control disease in animals that are raised under less than optimal environmental and management conditions.

Medical scientists have estimated that about 40% to 45% of antibiotics produced in the United States is used in animals.³³ Eighty percent of this is used subtherapeutically in feed or water of farm animals to make them grow faster and control disease. Only 20% of antibiotic feed additives is used to treat actual illnesses.

What Is Subtherapeutic Use?

According to the National Academy of Sciences, National Research Council (NAS/NRC):³⁴

Subtherapeutic use [is] defined in the United States as the use of an antibiotic as a feed additive at less than 200 grams per ton of feed [that] delivers antibiotics that have therapeutic effects but at dosages below those required to treat established infections (emphasis added).

For nearly 50 years, medical scientists have expressed concern that this subtherapeutic usage of antibiotics in farm animals, at levels too low to

cure bacterial diseases but high enough to control them, is creating a selective pressure on bacteria, causing them to develop resistance to the antibiotics. When these resistant bacteria infect animals or people, treatment with the same antibiotics (or close relatives of those antibiotics) to which they have become resistant cannot kill them, imperiling the lives of human and animal patients. According to NAS/NRC, up to 50 grams of an antibiotic or antibiotics are added to a ton of animal feed to promote growth in the animals eating it.³⁵ These are low levels, but they are sufficient to allow resistance to develop.³⁶

Although subtherapeutic levels of antibiotics do not prevent bacterial pathogens from infecting animals, they can prevent subclinically present diseases from becoming clinical.³⁷ According to the National Research Council:³⁸

The [disease control or prophylactic] effect is less pronounced in clean, healthful, and stress-free environments [while] beneficial effects of subtherapeutic antibiotic feed additives are greatest in poor sanitary conditions.

The disease controlling and growth-promoting effects of subtherapeutic levels of antibiotics are strongest in herds on farms with low hygienic standards and crowded, stressful conditions that put animals at a high risk of infectious diseases.³⁹

Stress lowers animals' immunity levels. Antibiotics are perceived as especially beneficial when animals are stressed either by intensive husbandry or by shipment.⁴⁰

In the United States, nearly 30 antibiotics and chemotherapeutics are approved for use in farm animals as subtherapeutic feed additives to promote growth and increase the efficiency with which animals convert feed to flesh.^{41,42} Many of these same antimicrobials are also used therapeutically to treat human and animal diseases. Eleven of them (for example, penicillin and the tetracyclines) are identical to those used in treatment of human disease. Feed additives also include the so-called antibiotics of last resort for treatment of human diseases, such as vancomycin.

Recently, the U.S. Animal Health Institute, a trade association representing companies that develop and manufacture pharmaceuticals and other animal health products, reported that 83% of feed additive antibiotics are used for prevention and treatment of disease while only 6.1% are used for growth promotion.⁴³ On the face of it, these figures

appear to contradict the figures of medical scientists noted above,⁴⁴ but the claim may be misleading. It is difficult to distinguish between the growth promoting and disease controlling effects of subtherapeutic antibiotic use. This is because prophylaxis itself promotes growth⁴⁵ for the following reason:⁴⁶

When antibiotics stabilize animal health, food animals can reduce the portion of nutrient requirements associated with the immune response to fight infection and [instead] use those nutrients for growth and reproductive purposes.

Growth of Resistance and the Social Impact

Repeated subtherapeutic doses of antibiotics disrupt animals' normal bacterial flora and promote the growth of antibiotic-resistant bacteria. Antibiotic-resistant bacteria selected in animals can reach humans and pass their resistance to bacteria pathogenic to humans or, if pathogenic themselves, can cause disease that is not easily treatable, prolonging patients' recovery time.⁴⁷ Antibiotics provided in feed or water remain active and are widely dispersed, contributing to resistance in bacteria they meet.⁴⁸

Stressed animals shed more pathogens in their feces than unstressed animals.⁴⁹ The pathogenic bacteria that survive the gut and are excreted in the feces are the antibiotic-resistant ones.⁵⁰ These bacteria end up in airborne dust, on the floors, and in the liquid manure storage where they are preserved until they are spread, along with the manure, on the fields where they can be detected both in soil and water.^{51,52,53,54} Once on the fields, antibiotic-resistant bacterial pathogens, as well as parasites in the feces, can persist and infect wildlife and livestock that ingest them.^{55,56} These resistant pathogens may pass through several "vectors" before multiplying to an infectious dose for the next host.⁵⁷

Antibiotic-resistant infections show up regularly in hospitals, a circumstance that has led to restrictive antibiotic policies in hospitals.⁵⁸ Medical practitioners are being urged to limit their prescriptions of antibiotics. Nevertheless, in the United States, antibiotics continue to be used as animal growth promoters. And it is possible for farmers, or anyone else without professional medical or veterinary training, to walk into a farm supply store and purchase penicillin and other antibiotics, in quantity, without prescription, and use them without veterinary supervision or any other restrictions.

There are several possible routes antibiotic-resistant bacteria can take to

reach humans, including:⁵⁹ direct transmission via contaminated meat, transmission of the gene mediating resistance to other bacterial strains capable of infecting humans, and indirect transmission of resistant strains via the accumulation of such strains in the environment. Fecal matter having resistant bacteria in it can contaminate carcasses at the slaughterhouse and remain on meat cuts that eventually reach the consumer. Slaughterhouse workers and even farmers can harbor antibiotic resistant bacteria and transmit them to their families.

When pathogens are resistant to antibiotics the delay caused during repeated efforts to find an antibiotic effective against the given pathogens can be fatal (especially for the elderly, young children, and immune-compromised individuals). Since some bacteria are resistant to more than one antibiotic, it may take even longer for medical professionals to find an antibiotic that is effective against them than if the bacteria were resistant to only one antibiotic. An untreated or poorly-treated infection increases the risk that the patient will die. Longer periods of infectiousness increase the pool of infected people that are moving in the community and that expose the general population to the risk of infection with resistant strains of bacteria.⁶⁰

Antibiotic resistance increases costs of treatment in other ways. Older antibiotics can be sold in generic forms that cost consumers less than private-label drugs. However, as older antibiotics become ineffective due to resistance, newly patented and more costly private-label antibiotics must be used.⁶¹

New or alternative drugs may be more toxic (that is, have stronger side effects) or be less effective than those that would be used if the infecting organisms had not become resistant.⁶² Even alternative new drugs may be compromised, especially if they are related to drugs originally thought to have little potential for human use that were approved for use as growth promoters in animals.⁶³ Such is the case with the newly approved antibiotic Synercid, used for treating human disease, and also with vancomycin, an antibiotic of last resort for certain human diseases.⁶⁴ Use of virginia-mycin selected for enterococci with resistance to it and to Synercid. Use of avoparcin, a growth promoter in poultry, selected for vancomycin resistant enterococci among animals; the same vancomycin-resistant clone of enterococci has been found in animals and people.⁶⁵

The market for antibiotics is influenced by the levels of resistance that exist in the microbial population.⁶⁶ Because it costs a great deal to bring a new antibiotic on the market, drug companies have a strong incentive to sell as much of it as possible, thus contributing to the resistance problem that eventually necessitates new efforts be undertaken to develop a substitute. Shareholders and investors in pharmaceutical companies

demand high returns on their shares, putting additional pressure on sales.⁶⁷

Pfizer, Inc. is one of the pharmaceutical companies most heavily vested in animal health. When the European Union banned the use of virginiamycin as an antibiotic feed additive, Pfizer, as the sole maker of virginiamycin, recorded "asset impairment charges" of \$103 million. Still, Pfizer reported that its revenues grew by 284% during the 1990s. The company's growth outpaced the industry every year for the past decade and was more than double the average in 1999.⁶⁸ (On October 2, 2000, an industry news source reported that Pfizer, Inc., one of the companies most heavily vested in animal health, has agreed to sell the feed additive products of its Animal Health Group to Phibro Animal Health. (For complete story, see Feedstuffs magazine, October 9, 2000.))-

Intensive Confinement and Antibiotic Use

The introduction and use of feed-additive antibiotics "has been concurrent with change in production technology in the swine industry."⁶⁹ Furthermore, it "is likely that the use of anti-microbial agents has facilitated the development of the concentrated operations."⁷⁰

Intensive confinement and industrial rearing methods require high capital investments. Herd sizes must be large enough to generate the output volume to pay for the investments. With higher herd sizes it is more difficult to treat the individual animal. It becomes necessary to treat the herd en masse when diseases do break out and to control disease by feeding animals subtherapeutic levels of antibiotics in the feed or water continuously.

Before the advent of animal factories, farmers weaned pigs at eight to ten weeks of age and the sows were not rebred until their farrowing date could fit into the schedule of other farm activities (such as harvesting) or expected mild weather. With specialization and capitalization, it became necessary to increase the number of litters a sow could farrow in a year and spread a larger number of produced pigs over a fixed investment.⁷¹ The industry began to wean small pigs earlier, at three to four weeks of age. Today it is common for pigs to be weaned at between five and 15 days of age and transported offsite to "nurseries" under strict "biosecurity" arrangements. This process is called segregated early weaning (SEW).

The practice of early weaning has implications for pig welfare, and hence, for antibiotic use. Pigs are born without protective immunity. Maternal antibodies are transferred to small pigs through colostrum in the milk during approximately the first two weeks of life.⁷² There follows a period of about one week during which the pig is "unprotected" from

microorganisms in the environment. At the end of this third week, the small pig's immune system begins to develop antibodies in response to exposure to microorganisms in the environment, but this process is gradual. If weaned before the immune system begins to develop, the pig is devoid of these natural antibodies to disease.

Weaning is stressful for these early weaned pigs. The first stress relates to unexpected loss of the mother. Stress slows the natural contracting movements of the stomach and a complete cessation of stomach movement may occur.⁷³ Blood flow to the gut increases with stress, leading to congestion of the blood vessels supplying it; the gut lining may get small hemorrhages and ulcerations. A second stress results from the abrupt dietary change in diet from milk to solid feed, which compounds the problems of the early-weaned pig by leading to digestive upsets or "malabsorption syndrome."⁷⁴ Weaning diarrhea, known as "scours," damages the gut lining, interfering with the production of a substance that normally protects the gut lining, IgA (immune globulin A).

In the case of scours, *E. coli* pathogens take advantage of the lowered gut immunity and multiply rapidly.^{75,76} The addition of antibiotic feed additives to the water suppresses scours and other enteric illnesses in early weaned pigs, permitting hog factories to intensify production schedules by weaning early.⁷⁷ When early weaned pigs are moved out of the protective environment of the nurseries to the finishing barns, they continue to depend on subtherapeutic antibiotic feed additives to control disease.

Nearly 93% of pigs in the United States receive antibiotics in the diet at some time during the grow/finish period.⁷⁸ Use of antibiotics in the diets of breeding females (sows) to prevent disease outbreaks occurred in 45.5% of operations in 1995, having increased from 39.1% in 1990.⁷⁹ These figures for breeding males (boars) increased from 10.9% in 1990 to 38.4% of operations in 1995. Subtherapeutic antibiotic use in the breeding herd helps hog factories increase sow conception rates, pigs born per litter, and piglet birth weights, and reduces the incidence of mastitis in sows.⁸⁰

A Long, Contested History

Concerns about antibiotic resistance and the controversy about subtherapeutic antibiotic use in agriculture are long standing.

The trend toward industrialized animal production began with broilers, in the years before World War II.⁸¹ Farmers living near large cities began to specialize in year-round production of chickens to meet demand for eggs and chicken meat. Discovery of Vitamins A and D enabled farmers to raise large flocks indoors because using these vitamins made exposure to

sun and exercise unnecessary for proper growth and bone development.

Farmers built large buildings and increased flock sizes.⁸² But the birds had trouble using their natural coping abilities to adjust to the unnatural conditions of life in these buildings: poor ventilation, crowding, and lack of fresh air and sunlight. The density of the bird populations inside buildings permitted infectious diseases to spread throughout the flock. Diseases soon spread to other poultry farms. Financial and bird losses multiplied throughout the industry and many intensive poultry farmers went bankrupt. But demand for cheap meat remained high, especially during the war years when troops ate chicken meat. Pharmaceutical, feed, and other technical companies put experts to work on the problems plaguing industrial broiler production.⁸³

In the 1940s, antibiotics were introduced into veterinary use. Interest arose concerning "unknown growth factors" that caused more rapid growth and better feed utilization in pigs and poultry. The interest was especially keen in the United States.⁸⁴

By 1950, it had been discovered that small amounts of antibiotics added to the feed of pigs and poultry increased their growth rates and the efficiency with which they converted feed into meat.⁸⁵ Improvements appeared to be greatest on farms that lacked good hygiene in the barns or good health management.⁸⁶

The United States began to use specific antibiotics to promote growth and control disease in farm animals in 1949, Great Britain in 1953.⁸⁷

Almost as soon as the first antibiotics were introduced, concerns were raised that with their increased use, some bacteria were becoming resistant. With their adoption as growth promoters and prophylactics in agriculture, as described by Ruth Harrison,⁸⁸ public debate ensued between "medical authorities that were urging that antibiotics be used only with great discrimination on the grounds of dangerous resistance building up and the agricultural authorities encouraging ever wider use."

In the United Kingdom in 1960, the Netherthorpe Committee was formed to investigate the effects of penicillin, chlortetracycline, and oxytetracycline feed additives on bacteria and human health.⁸⁹ Subtherapeutic use of antibiotic feed additives appeared to increase the number of resistant bacteria isolated from the feces of treated animals. However, dependence on them was built into the new, industrialized, factory farming system. In 1962, the Netherthorpe Committee reported that it recognized both the economic gain of the livestock industry from subtherapeutic antibiotic use and the emergence of resistant strains of

bacteria, but it saw no reason to curtail the industry's use of antibiotics.⁹⁰

It was soon discovered that a bacterium that was resistant to one or more antibiotics could transmit its resistance to other bacteria even though they had not been exposed to the antibiotic(s) themselves, and even though the bacteria were not related. Bacteria were also developing patterns of multiple resistance to several antibiotics.

In the United Kingdom, another scientific committee, the Swann Committee, was formed to look into the new discovery.⁹¹ In its November 1969 report, the committee recommended, among other things, that permission to use and supply drugs without prescription in animal feed should be restricted to antibiotics that are of economic value to the industry and of little or no therapeutic benefit to humans.⁹²

In 1971, the United Kingdom restricted to veterinary prescription the use of penicillin, tetracyclines, and other antibiotics used to treat disease in humans and animals.⁹³

In June 1977, the U.S. General Accounting Office (GAO) called on the U. S. Food and Drug Administration (FDA) to regulate the subtherapeutic use of antibiotics in animal feeds.⁹⁴

In late 1977, FDA proposed regulations on the distribution of penicillin and tetracyclines in animal feeds, noting the increasing resistance of bacterial pathogens to drugs used in human and animal therapy.⁹⁵ Pressured by the industry, Congress intervened and ordered more studies to see if the regulations were necessary. The National Academy of Sciences, National Research Council (NAS/NRC) conducted the study.

In 1980, a scientific committee of the NAS/NRC released its report. The report acknowledged that subtherapeutic feeding of antimicrobials to animals increases the prevalence of antibiotic resistance among *E. coli* and *Salmonella* in those animals.⁹⁶ However, the committee stated it could not find direct evidence linking resistant human illnesses with that use.⁹⁷ The committee stated that the lack of direct evidence should not be equated with proof that the proposed hazards do not exist because the research that could establish and measure such a risk had not been conducted.⁹⁸ In view of the indirect evidence available, the committee recommended specific research.

In 1981, Congress again appropriated money to FDA for a definitive epidemiological study of the antibiotics in animal feeds issue, ordering that any impending rules not go into effect until completion of the study and a reevaluation of FDA concerns.⁹⁹

In 1984, scientists at the Centers for Disease Control and Prevention (CDC) published a report of an investigation in which they had been able to trace a number of drug-resistant *Salmonella newport* infections to hamburger originating from South Dakota beef cattle fed chlortetracycline as a growth promotant.¹⁰⁰ This was the first time scientists had been able to use new DNA fingerprinting techniques to trace antibiotic resistant human infections to a specific source of infectivity where the same resistance patterns existed. The fingerprinting technique is capable of providing incontrovertible evidence of epidemiological connections between antibiotic-resistant strains of bacteria.¹⁰¹ This appeared to be the confirmation scientists were looking for that subtherapeutic antibiotic use in animal feeds presented an imminent hazard to human health.

Following publication of the CDC study, the Natural Resources Defense Council (NRDC) petitioned then Secretary Margaret Heckler of the Department of Health and Human Services (HHS) to suspend approval of the subtherapeutic use of penicillin and tetracyclines in animal feeds on the grounds that such use constituted an "imminent health hazard."¹⁰²

Among those opposed to the petition, American Cyanamid, National Pork Producers Council, American Feed Manufacturers Association, Pfizer, Inc., American Farm Bureau Federation, and the National Cattlemen's Association figured prominently in defending low-level agricultural use of antibiotics.¹⁰³ In support of the petition were NRDC, Dr. Scott Holmberg, a coauthor of the 1984 CDC study, the United Steelworkers of America, Farm Animal Reform Movement, Animal Legal Defense Fund, Animal Protection Institute, Public Citizen Congress Watch, and James Mason, a coauthor with Peter Singer of the book, *Animal Factories*.¹⁰⁴ Dr. Richard Novick, a microbiologist and public health official, explained how resistance occurs and how modern farming practices contribute to it. The animal protection groups stressed the need for less intensive and more extensive animal farming practices to eliminate the need for subtherapeutic antibiotic use.¹⁰⁵ The NRDC and the others stressed human health impacts and the groundbreaking nature of the CDC study.

On November 13, 1985, noting the benefits of subtherapeutic antibiotic use to the livestock industry and an alleged lack of direct evidence of animal to human transmission of drug-resistant diseases, HHS Secretary Heckler ruled that the use of antibiotic feed additives did not present an imminent hazard to human health.

In 1987, the Food and Drug Administration (FDA) asked the National Academy of Sciences Institute of Medicine (IOM) to conduct an independent review of the human health consequences associated with the

use of penicillin and tetracycline as subtherapeutic animal feed additives.[106](#)

In 1988, the IOM committee issued its report.[107](#) Citing one controlled study, it noted that fecal coliform from a herd of pigs fed and treated with antibiotics continuously for 13 years exhibited a 90% resistance level to tetracycline. The herd was then kept antibiotic free and closely monitored. It took an additional 13 years for resistance levels to drop to 30%.

The IOM committee noted studies showing compelling evidence of a human health hazard arising from antibiotic-resistant *Salmonella* originating in animals fed subtherapeutic levels of antibiotics. However, it also noted a lack of sufficient direct evidence to quantify the human health hazard from antibiotic-resistant pathogenic bacteria created by the use of subtherapeutic penicillin or tetracycline additives in animal feed. Nevertheless, the committee concluded that, on the basis of the available indirect evidence, "these antibiotics in subtherapeutic concentrations do present a hazard to human health and may contribute to a percentage of deaths annually in the United States from salmonellosis."[108](#)

In 1995, FDA approved subtherapeutic use of one of the fluoroquinolone antibiotics in poultry drinking water to control illnesses caused by *E. coli* bacteria.[109](#) The fluoroquinolones are used to treat *Campylobacter* and other bacterial infections in humans. *Campylobacter*, a bacterium that is also present in chickens, is not killed by the low levels of fluoroquinolone added to poultry drinking water to control *E. coli*. Instead, as had happened in Europe earlier when fluoroquinolone feed additives were approved, *Campylobacter* developed resistance to fluoroquinolones.[110](#) However, trends are not direct evidence of linkage or causation.

In May 1999, The New England Journal of Medicine published a Minnesota study that went further in establishing such a direct link.[111](#) The Minnesota study documented that DNA fingerprints in quinolone-resistant *Campylobacter jejuni* from domestically produced poultry were identical to those in the resistant *C. jejuni* from domestically-acquired infections in humans.[112](#) Yet, following the study's release, the animal health industry contended "no significant risk to humans [stemming from antibiotic feed additives for animals] has been documented," and warned farmers and veterinarians to "remain informed about potential political threats to drug availability, threats based on fear and speculation rather than science and data."[113](#)

On January 26, 1999, the FDA released for comments a report entitled, "A Proposed Framework for Evaluating and Assuring the Human Safety of the Microbial Effects of Antimicrobial New Animal Drugs Intended for

Use in Food Producing Animals."¹¹⁴In it, the FDA noted that the weight of the evidence, particularly in the past decade, indicates there is a relationship between use of antibiotic feed additives as growth promoters and resistance buildup in bacteria previously susceptible to the antibiotics, and that this evidence is sufficient to take the measures it proposed. The agribusiness and animal health industry interpreted the published framework as an overreaction by the FDA and called for more research.¹¹⁵

In its proposal, the FDA noted European studies published since 1993, which showed that comparisons of vancomycin resistance in organically reared poultry, and in conventionally reared poultry fed avoparcin as a growth promoter, found no vancomycin-resistant enterococci in organically reared birds organic standards forbid feeding antibiotics but detected vancomycin-resistant *Enterococci* in the majority of conventionally reared birds.¹¹⁶ The investigators also compared conventional swine and poultry flocks that did and did not use avoparcin and found a strong, statistically significant association between the presence of vancomycin-resistant *Enterococci* in the animals and use of avoparcin as a growth promoter.¹¹⁷

In March 1999, fifty scientists and forty-one public interest groups called on the FDA to ban the use of certain antibiotics as growth promoters.¹¹⁸ On November 9, 1999, Representative Sherrod Brown of Ohio, along with Representatives Henry Waxman and Louise Slaughter, introduced H.R. 3266, "to direct that essential antibiotic drugs not be used in livestock unless there is a reasonable certainty of no harm to human health."¹¹⁹

Progress in Europe

Between 1985 and 1999, the most progressive developments in preserving the efficacy of antibiotics for human and animal health occurred in Europe.

In 1986, Sweden enacted a total ban on the use of antibiotics as subtherapeutic feed additives for disease prevention and growth promotion.¹²⁰ Although they had requested the ban, Swedish farmers had not anticipated the health and economic impacts that were to follow.

On many piglet-producing farms, withdrawal of antibiotics from feeds unmasked disease pressures that low-level antibiotic use had kept "hidden." Small pigs became sick and died from weaning diarrhea, or "scours." It would have been possible simply to substitute another kind of additive (such as zinc) for the missing antibiotics, and some farmers did this. But these substitutions have the potential to create pollution problems. Meanwhile, it was noted that some farms, having a high level of hygiene and using straw in the pens, escaped the adverse impacts and had

few problems adjusting.

Making use of this observation Swedish farmers, who were having problems and wanted to cope with the ban in more natural ways, changed facilities and management to provide a higher level of welfare to the animals than before.¹²¹ Changes included increasing the space allotted to each individual animal and providing straw, a natural source of warmth, dietary fiber, and occupation for the animals. Fresh straw, continually added to the beds, keeps animals separated from their waste. Also, farmers went back to their practice of weaning pigs at five to six weeks of age. This length of time allowed small pigs to build their own antibodies and accustom their guts to solid feed before weaning.

These improvements helped keep the pigs' natural immunity high by reducing the stress of confinement and increasing the hygiene level in the barns. Farmers incorporated deep-straw farrowing and nursing systems, changed feed contents and rations, and adopted "all in-all out" production schedules where pigs are reared in stable groups and rooms are cleaned after every group is moved.¹²²

Today, total antibiotic use for food animals in Sweden is 55% lower than before the ban, the incidence of antibiotic resistant bacteria has been reduced, animal health is very high, and production levels are close to pre-ban levels.¹²³

Upon entering the European Union (EU) in 1994, Sweden was permitted to retain its total ban until December 31, 1998, at which time it was either to present scientific evidence to support retention of the ban or adopt EU policies. Sweden's 1997 submission in support of its ban is comprehensive.¹²⁴

In 1997, the World Health Organization recommended that the use of any antimicrobial agent for growth promotion in farm animals should be terminated if it is used in human therapeutics or known to select for cross-resistance to antimicrobials used in human medicine.^{125,126}

In January 1998, Denmark, exercising the "precautionary principle," banned the use of virginiamycin as an animal growth promoter. The European Union (EU) followed suit, citing scientific evidence presented by Sweden, Finland, and Denmark. It banned four antibiotic feed additives (virginiamycin, spiramycin, tylosin phosphate, and bacitracin-zinc) and granted exceptions to the ban for antibiotics not used in human or animal therapy.¹²⁷

The makers of virginiamycin and bacitracin-zinc, Pfizer, Inc. and

Alpharma respectively, sued Denmark and the EU, seeking a reversal of the decision and asking for an immediate suspension of the regulation's "operation."¹²⁸ On June 30, 1999, the President of the European Court of First Instance found against the companies' request for immediate suspension, because the companies had not shown that the ban on sales in the European Union would cause them serious and irreparable damage, and because "public health must take precedence over economic considerations."¹²⁹ The question of the decision itself is pending.

Assessing the Impacts of a Ban on Subtherapeutic Antibiotic Use

To ease the transition to antibiotic restrictions, scientists have recommended adoption of "better feeding practices and production systems that promote animal health and welfare."¹³⁰ In Sweden, it was the farmers, through their national organization, Lantbrukarnas Riksförbund (LRF), who urged the government to ban the subtherapeutic use of antibiotics in animal feeds. Then took action to maintain the confidence of Swedish consumers in the safety of Swedish-produced meat, dairy, and poultry products in response to the debate that was occurring in the 1980s regarding antibiotic resistance. But, the immediate result was that many piglet farmers incurred economic losses due to an increase of diarrhea in weaned piglets. Because there was a law, however, they had to go forward. In a 1992 interview, LRF economic policy advisor Gunnela Ståhle stated:¹³¹

Antibiotics are only allowed after prescription for treatment of illness. And that is the first step toward better animal welfare. If you are not allowed to use antibiotics as preventive measures, you must correct your environment ... better housing, better environment, better management in order to prevent disease.... When you don't consider animal welfare you have to use antibiotics to cover the problems.

In a 1992 interview, then Minister of Agriculture Karl-Erik Olsson described the rationale behind the Swedish antibiotic law:¹³²

The idea is that we shall not use antibiotics in the feed to prevent diseases or grow the animals faster. If there is something wrong we can use it for the single animal. But if you have the possibility to use antibiotics in the feed, you can keep the animals in a worse situation, and this use of antibiotics will hide the real problems. So when we cannot use them, we will create a situation for the animal that is natural and good.

The Swedish thus regard improved animal welfare, particularly five to six week weaning and the addition of straw to small pigs' environments, as central to Swedish pig farmers' successful adjustment to antibiotic restrictions.¹³³ No housing and management adjustments were necessary for keeping sows and boars without antibiotic feed additives. The majority of Swedish farmers have, since the mid-1980s, kept their sows loose-housed in groups on deep straw, maintaining a low stress, more natural environment, conducive to good health and fitness.

Discussing ways to minimize antibiotic resistance, the 1998 NAS/NRC study acknowledged that "researchers in some European countries would suggest that a shift to less intensive rearing and increased attention to hygiene can resolve many of the situations where the disease and stress load on animals might warrant the use of antibiotics and augment the risk to human health."¹³⁴

The NAS/NRC study cited two sources:

1. Witte¹³⁵ called for the gradual phasing out of antibiotics as animal growth promoters, stating "[s]imilar benefits can be generated by improving other aspects of animal care, such as hygiene."
2. The World Health Organization¹³⁶ recommended improving production environments by raising the level of hygiene and switching to more extensive and enriched housing systems that could reduce stress by means of better animal welfare.

However, the NAS/NRC group, noting the difference in magnitude and scale of animal agriculture in the United States compared to Europe, as well as the economic importance of subtherapeutic antibiotic use to current industry practices, went on to state:¹³⁷

a goal of producing food animals in the United States devoid of antibiotic use would require a total change in the philosophy and economics of how animals are raised... and a major overhaul of the interactions and interdependencies inherent between the animal producers and crop producers.

What these "interdependencies" might be or why an overhaul might be needed is not explained, nor is it self-evident. What might the outcome be if, in the United States, "antibiotics were eliminated as feed additives"? According to the 1998 NAS/NRC report:¹³⁸

[I]t is questionable whether production in confinement

swine operations could be maintained at an intensive level. It is likely that weaning age would be increased. Inventory would be reduced, more labor and time would be required to thoroughly clean and disinfect between groups of pigs, and the breeding herd efficiency would be reduced to conform to calendarized farrowings. In the long run, because of the increased cost of operating confinement units, a reversion to extensive or pasture production could take place. The seasonal nature of extensive production would mean large month to month variability in marketings reminiscent of historical patterns and would be disruptive for today's packing industry.

The NAS/NRC panel advised against banning the prophylactic and growth-promoting use of antibiotics in animal feeds. The NAS/NRC group concluded that the costs of removing antibiotics from animal feeds would exceed the benefits.^{[139](#)}

In a U.S. study, bacteria from participating hog farms where antibiotic use was limited had significantly lower incidence of resistance than bacteria from control farms where antibiotics were routinely used at subtherapeutic levels in the feed.^{[140](#)} Another U.S. study, by Wade and Barkley,^{[141](#)} concluded that both consumers and hog producers would receive slight, overall net benefits from a ban on feed-grade antibiotics due to an increase in pork demand, which would result from consumer perceptions of safer meat offsetting increased production costs.

In Sweden, post-ban production costs have been only slightly higher than pre-ban costs, due in part to improved animal health and Swedish farmers' innovative approaches.^{[142](#)}

Consumers in Sweden have been willing to pay the slightly higher price needed for Swedish farmers to produce meat and poultry products without growth promoting and prophylactic antibiotic use.^{[143](#)}

A 1999 Iowa State University (ISU) study estimated the economic impact of a ban on the use of over-the-counter antibiotics in the United States.^{[144](#)} The authors estimated outcomes from three different scenarios over a ten-year period from 2000 to 2010. Under all three scenarios, costs to both hog producers and pork consumers increased. Under the most likely scenario, the authors estimated that such a ban would add 5.2 cents to the retail price of a pound of pork and would cost the farmer an additional \$6.05 per market hog to produce in the first year of the ban and \$5.24 per hog by the end of the projected ten-year period. The authors projected a \$1.039 billion decline in present value of the industry over the 10-year period. This was the sum of "foregone" profits over 10 years on hogs

marketed, discounted to the present at a seven percent rate.

Although the study falls short on a number of counts that are beyond the scope of this report, the authors do estimate a cost figure for the industry (\$1.039 billion decline over 10 years). Their estimate can be compared to another: the cost of infections caused by drug-resistant organisms, at least some of which originate in agriculture, that has been estimated to be \$4 billion, annually.¹⁴⁵

The fight to preserve the therapeutic effectiveness of precious antimicrobials by eliminating non-therapeutic uses in animal agriculture has been a long one. In much of the world, including the United States, it still is taking place.

An overwhelming body of indirect evidence exists regarding the livestock industry's contribution to antibiotic resistance. Since it makes industrial livestock production methods possible, it seems clear that the use of subtherapeutic antibiotics in animal feeds benefits the animal health industry and the owners of animal factories far more than it does farm animals, family farmers, and consumers. Governments that have acted to restrict antibiotics in agriculture have chosen to base their decisions on the substantial, available indirect evidence and on the principle that the role of government is to protect people, not industries.

Swedish farmers were able to overcome temporary negative impacts on productivity that resulted from the ban on using antibiotics as growth promoters and prophylactics by improving their practices. Family farmers in the U.S. should also be able to overcome potential negative impacts of a ban on subtherapeutic use of antibiotics and, indeed, some family farmers are already operating successfully without such use. An antibiotic feed additive ban applied across the board would also reduce costs to farmers who make the effort to not use antibiotic feed additives but who now must pay more to "special order" feed that is not routinely dosed with antibiotic additives.

It would appear that for over forty years, the power and profits of a few have repeatedly trumped the benefits to the many who depend on antibiotics' continued effectiveness. If changing how animals are raised is required to help reverse the massive and growing resistance problems, is it not worth it to individuals and society?

Potential Solutions

It is possible to require hog factories to furnish more than one respirator per barn. It is possible to require extra ventilation to reduce the risk of

asphyxiation or poisoning by manure pit gasses. And it is possible simply to limit the subtherapeutic use of antibiotics to those not used in human therapy. However, these steps are band-aids. A different, more sustainable approach to animal production, consistent with high animal welfare standards and a deep concern for human safety and the natural environment, is needed. In the United States, the NAS/NRC noted, taking a more sustainable approach to animal production would require "a total change in the philosophy and economics of how animals are raised."[146](#)

From the experience of farmers in Sweden who produce pigs without subtherapeutic antibiotic feed additives, it is clearly possible to raise healthy pigs year round without disrupting supplies if the environments they are raised in are hygienic, spacious, enriched with clean bedding, and comfortable from the animals' point of view and if the entire industry makes the commitment to do so. Less intensive, more natural farming practices provide a foundation for beneficial farm-level solutions.[147-164](#)

Food Irradiation: The Wrong Answer for Food Safety

Though most Cold War-era nuclear technologies such as the atomic coffeepot and plutonium-heated long-johns have fallen into the dustbin of history,[165](#) food irradiation has not only survived into the 21st century, it is on the verge of becoming the food industry's no. 1 weapon in the war against food-borne illnesses. No one is against creating a safer food supply. But there are plenty of reasons to be against food irradiation.

Irradiation is murder on family farmers and marketplace diversity, because it uses huge, centralized facilities and is intended to correct quality-control problems endemic to today's factory-style food processing plants.[166](#) Simply put, irradiation and consolidation go hand-in-hand. IBP and Tyson Foods, whose pending merger would spawn the country's largest poultry and red meat conglomerate, are among the many corporate giants that are on the verge of selling irradiated food in mass quantities. The Titan Corporation, a defense contractor that irradiates food with a scaled-down linear accelerator originally designed for the "Star Wars" program, claims to have contracts with companies that control 75 percent of the U.S. meat market. Major food industry trade groups such as the National Food Processors Association and Food Marketing Institute are furiously trying to sell irradiation to consumers and government decision-makers. Moreover, the ongoing privatization of the federal meat-inspection system makes irradiation even more attractive, as fewer inspectors equals dirtier meat.

Because it uses extraordinarily high doses of ionizing radiation 3/4 the equivalent of up to 1 billion chest x-rays 3/4 food irradiation is also murder on food. Vitamins, essential fatty acids and other nutrients are

destroyed, leaving behind "empty calorie" food.¹⁶⁷ And, because ionizing radiation dislodges electrons from molecules, irradiation leads to the formation of bizarre new chemicals in food called "unique radiolytic products," which the U.S. Food and Drug Administration has never studied for potential toxicity.¹⁶⁸ The FDA has also failed to determine a level of radiation to which food can be exposed and still be safe for human consumption, which federal law requires.¹⁶⁹ And, the FDA has ignored research dating to the 1950s revealing a wide range of problems in animals that ate irradiated food, including premature death, a rare form of cancer, reproductive dysfunction, chromosomal abnormalities, liver damage, low weight gain and vitamin deficiencies.¹⁷⁰

All told, irradiation promises to do more harm than good. The food industry needs to clean up its operations with thoughtful solutions that will preserve the integrity not only of the food production system, but of our food supply itself.

Some Strategies and Alternatives for Improving the Safety and Quality of Animal Production

Occupational Safety and Health

1. Get strict occupational safety and health standards and enforcement applied to confinement livestock operations.

Rationale: The burden of safety must rest with employers who choose to use and who profit by using cheap liquid manure handling and intensive confinement.

2. Ban handling of manure as a liquid.

Rationale: Handling manure as a solid will reduce the hazards associated with storage and disposal of animal feces and urine to workers, farm animals, and the environment and will eliminate fatalities associated with manure pits.

3. Require reduction in the stocking density in livestock confinement buildings to reduce the percentage of airborne dust, animal dander, and feed particles in confinement building air, thus lessening exposure.
4. Continue to support research to quantify airborne contaminants in confinement buildings, determine their impacts on human and animal health, and reduce their numbers. Support research comparing respiratory health impacts of alternative methods of production.

5. Support the right of hog factory workers to form union to protect their welfare.

Antibiotic Use

1. Inform farmers about the scientific reasoning underlying current calls for reform of policies regarding antibiotic use in agriculture. Overcome the misinformation of agribusiness and pharmaceutical interests, which imply that concerns about antibiotic resistance from subtherapeutic antibiotic uses in animal agriculture are based on "junk science." Many farmers believe this because only the agribusiness point of view is presented in magazines and journals serving farmers. These magazines are usually free or low-cost to farmers because advertising revenues from chemical companies, and other input industries to agriculture, support them.
2. Implement natural solutions for such animal problems as environment-induced production diseases and aberrant behaviors.

Rationale: Animal performance will again be dependent upon nutrition, husbandry, and naturally supported health and well-being, rather than on antibiotics and other growth promoting feed additives.

3. Demonstrate models of livestock rearing based on sound ethological and ecological principles. Provide farmers the science-based know-how to operate humane, sustainable farming systems in which antibiotic feed additives are not needed.

Rationale: Only if they have workable alternatives can family farmers reject the prevailing industrial model of animal production.

4. Inform consumers of the importance of their choices in influencing animal agriculture to become more humane and sustainable.

Rationale: Safe, environmentally sound, and humane livestock production practices cannot be sustained if they are not supported by consumer demand and willingness to pay in the marketplace.

5. Ban growth promoting, non-therapeutic uses of antibiotics in agricultural production.
6. Work toward national legislation requiring that use of antibiotics in agriculture be under veterinary prescription.
7. Ban the industrialized, intensive confinement production methods

and practices that make animal production stressful to the animals and make industrialization of animal agriculture possible and feed-additive antibiotic use necessary. Such practices and methods include gestation crates and tie stalls for sows and boars, slotted floors, small space allowances, tail docking of pigs and dairy cows, battery cages for laying hens and beak trimming of laying hens and broiler chickens, and liquid manure handling.

8. Identify and tap markets for meat, dairy, and poultry products that were produced without antibiotic feed additives and other growth promoters. Link humane, sustainable farmers to these markets.
9. Help fund the transition for independent farmers who are seeking to make the switch from conventional to organic meat production.

Rationale: Considerable trial and error may be required for individual farmers, depending on their current production practices, to make the transition to raising animals according to organic standards. Not every farmer can afford to absorb costs associated with the learning curve. Technical assistance and some financial support will make their transition easier, while promoting environmentally and socially desirable practices.

10. Support formation of coalitions among the various citizen organizations representing interested constituencies – environmental, public interest science, food safety, animal welfare, family farmer, and public health groups – to accomplish the above objectives.

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III. Building Sewerless Cities

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Building Sewerless Cities

Hog Factory Impacts on Surface and Groundwater

At one time, crop and livestock production were complementary enterprises on farms. The number of animals on any one farm was proportional to the number of acres that grew crops for the animals' food. The soil, in turn, benefited from the crop nutrients and organic matter contained in their manure. The number of animals was also consistent with the availability of farm labor. As a consequence, "most of the nutrients originating from the soils of a given area were returned to that same area."¹

Animals' living quarters were bedded with hay or straw and, when soiled, the bedding was removed to a manure heap where it composted, killing most of the pathogens that may have been present in the manure. Under such conditions, environmental problems arising from animal production activities, while they sometimes occurred, were minimal and relatively easily solved by improving management or taking other, low-cost, remedial measures.²

Environmental problems were exacerbated when specialization separated livestock production from the land and the availability of cheap mineral fertilizers made it possible to produce crops without manure nutrients.³ Today, most farm animals are concentrated in large holdings on small acreages and are raised under intensive conditions resembling manufacturing processes. Animal feeds generally come from areas far away from the industrialized livestock farm. Manures from these "animal factories" often are handled as wastes or surpluses to be disposed of rather than as valuable soil amendments. Viewed in this way, they are often applied to the land in quantities far exceeding the nutrient needs of crops.

Manure from animal factories contains little or no bedding material. It is liquefied when massive quantities of water are used to flush the buildings where the animals are housed. The use of unpriced, ground or surface water to flush the barns saves on the number of employees (and, hence, labor costs) that otherwise would be required for handling manure. The resulting "slurry" may be stored temporarily in cement pits under the slatted floors of the barns, or in outdoor structures, and emptied once or twice a year by being spread or sprayed onto land.

Handling manure as a liquid or slurry, storing it untreated in open, earthen or clay-lined basins or lagoons, and spraying it onto the land are the cheapest methods of manure handling and disposal. Consequently, they are the methods preferred by the vast majority of animal factory operators.

Receiving minimal day-to-day employee attention and requiring minimal capital structure, open-air, earthen storage basins or lagoons and aerial spraying onto nearby crop or pastureland add significantly to the economy of industrialized farming. In hot, dry climates, lagoons may be allowed to fill with animal waste indefinitely under the theory that the liquids and solids will separate and the liquid, rising to the top, will evaporate. Eventually, however, the sludge that accumulates at the bottom rich with phosphorus and containing heavy metals must be disposed of in some way.

What's Wrong With Liquefied Manure?

The intentional mixing of water and animal wastes is proving to be one of the great mistakes of modern technology. The practice facilitates the housing of thousands of large animals on very little land. The accumulated sewage creates health concerns, as does sewage from human cities, but unlike human sewage, treatment of animal waste is not required by law.

The liquefied hog manure from animal factories contains the nutrients nitrogen, phosphorus, potassium, calcium, and magnesium (common to all manures) along with heavy metals such as cadmium, zinc, and copper (copper sulfate is added to the diets of hogs to promote growth).⁴ In amounts that are easily taken up by crops, nitrogen, phosphorus, and potassium are important soil nutrients that contribute to the healthy growth of crops. In excess, they create pollution and health problems.⁵

Nitrates are formed from the organic nitrogen contained in manure. These dissolve in water and can move through the soil into groundwater.⁶ A high nitrate content in drinking water may cause methemoglobinaemia, or blue-baby disease, where the blood's oxygen-carrying capabilities are drastically reduced in infants that drink nitrate contaminated drinking water, leading to developmental deficiencies and, in severe cases, death.⁷

In many parts of the nation, the soil is receiving too much phosphorus. Growing corn requires a ratio of about six parts nitrogen to one part phosphorus, while there is only about 1.5 parts nitrogen for one part phosphorus in liquid hog waste.⁸ Applying liquid manure in excess of a crop's phosphorus requirements results in a buildup of soil phosphorus. Phosphorus is transported to surface water by eroding soil particles and runoff. In surface waters phosphorus contributes to algae proliferation⁹ and surface water degradation.

Heavy metals can damage the fertility of soil and may poison grazing animals. Metal pollution is virtually irreversible and has a greater toxic potential on grassland than on crops.¹⁰ Grazing animals tend to ingest soil from the surface, which is how they can absorb metals.

Liquid manure also contains bacterial and viral pathogens, parasites, weed seeds, and even antibiotics, disinfectants, and insecticides, when these are present on the farm.¹¹ The spread of many classic human diseases, such as cholera, typhoid fever, or dysentery, has been controlled by improvements in personal hygiene and the use of sewage and water treatment processes that separate humans from their waste.¹² In areas of the world where these improvements have not been made, or where treatment systems are inefficient, these diseases are endemic. Several hundred diseases are transmitted from animal to animal, and more than 150 of them can be passed from animals to human beings.¹³ The pathogens and parasites causing most of these diseases are excreted by the affected animals.¹⁴

Animals on factory farms are highly stressed by their surroundings. Stressed animals excrete more pathogens in their feces than animals that are not under stress.¹⁵ Pathogens such as *salmonellae* can even be present in the feces of animals that appear to be clinically healthy. Antibiotics used routinely at subtherapeutic levels in the diet of hogs suppress outbreaks of some bacterial diseases but do not kill all the pathogens that may be present. The pathogens that survive and are excreted are those that become resistant to the antibiotics during their stay in the gut.¹⁶ Unlike the composting or heating that takes place naturally in stored manure from animal housing when ample straw bedding is used, manure stored anaerobically in liquid form never reaches the temperatures necessary to kill pathogens, parasites, and weed seeds.

When liquid hog manure is spread or sprayed onto pastureland, cattle, other livestock, and wildlife grazing there can accidentally ingest pathogens and parasite eggs from the manure, endangering their health.¹⁷ Yet, a number of large hog factories spray or irrigate cattle grazing areas with liquid manure effluent. Although pathogens may die of attrition during liquid manure storage if the storage is kept undisturbed for a month or more, it requires the farm to have a second storage basin or facility to accept fresh manure a fresh source of pathogens daily while the first is standing still. Few, if any, factory farms have a second manure storage facility for this purpose.

Although it is very hazardous,^{18,19,20} on some factory farms, human wastes may be channeled to the storage lagoons.²¹ Residents living near hog factories have witnessed dead hogs floating in open-air lagoons.²²

In 1988, an expert panel convened by the World Health Organization identified liquid manure spreading as a critical pathway by which *salmonellae* and other pathogens are spread to the natural environment.²³

Hog Factory Impacts on Groundwater

Groundwater Pollution

When earthen manure basins or lagoons are constructed, they are thickly lined with clay, which, theoretically, provides a protective liner against manure leaching from the lagoon into the soil or groundwater. In this case, theory does not conform to reality. Groundwater pollution can occur when manure leaks into the soils beneath and surrounding manure lagoons.^{24,25,26} Cracks in lagoon sidewalls develop when the lagoon has been emptied for spreading.²⁷ The sidewalls are exposed to air and dry out, forming cracks in the clay lining. As the lagoon fills, manure fills the cracks and leaks into the surrounding medium before the manure seals them. Pollutants travel through the soil to shallow groundwater tables.²⁸ Both soil and groundwater can be contaminated in this way. Repeated emptying and refilling of the lagoon degrades the sidewalls over time so that eventually the clay liners are no longer effective at preventing seepage.

In many cases, storage pits are constructed under barns and made of concrete. Pits of concrete construction do not offer greater groundwater protection automatically.²⁹ Joints leak and concrete cracks. If concrete is laid in sand or gravel, leaking manure can migrate to water tables. Particular specifications related to suitability of the soils and structural reinforcement must be followed to prevent cracks in the concrete and leakage. However, there are no rules requiring that these specifications be used.

Overapplication of waste occurs because handling and transportation costs are less when liquid wastes are applied near the waste source rather than where nutrients are needed. Factory farms may have little or no associated cropland, but must rely on neighboring farmers to apply the manure onto their land.

Groundwater pollution can also occur when manure is spread or sprayed onto land, particularly around abandoned, uncapped wells, or if heavily incorporated into shallow or well-drained soils.³⁰ In karst areas, there is not only danger of seepage, but there is danger that sinkholes will form and swallow lagoons. (Karst refers to land that is underlain by limestone or dolomite bedrock, where erosion has resulted in fissures, cracks, sinkholes, caverns, and underground streams.) Areas with karst or faults are extremely vulnerable to lagoon leaks because sinkholes and cracks are preferential pathways through the soil to groundwater.³¹

Scientists are learning that even seemingly invulnerable areas can be vulnerable to groundwater pollution, however. In the Oklahoma

Panhandle, where there is little rainfall and the water table is often more than 200 feet below land surface, sheltered by layers of naturally cemented sand and gravel, it has long been thought that it took hundreds or thousands of years for water and waterborne contaminants to seep down to the area's High Plains aquifer.³² In 1999, it was learned that nitrates and tritium have contaminated the Ogallala aquifer, the sole source of drinking water in the Oklahoma Panhandle, and a resource that is already being depleted by irrigation. The presence of tritium indicates that seepage is from rainfall that fell since 1953, when atmospheric testing of hydrogen bombs began.

In a study commissioned by the Iowa State Legislature in 1997, investigators found that 72% of the roughly 40 earthen manure lagoons they studied throughout Iowa are leaking faster than Iowa standards allow and that pollution of the groundwater is "unavoidable."³³ The median excavation depth of the lagoons was 15 feet. Thirty percent were dug more than 20 feet into the ground. At those depths, the report stated, excavations will intersect a continuous water-table surface, and groundwater quality will be affected. Sixty-five percent of the site areas contained soils with seasonally high water tables less than five feet below the ground surface.

Studies also are being and have been conducted to determine the extent of environmental pollution by pharmaceuticals used in both animal factories and aquaculture facilities. About half of the fifty million pounds of antibiotics produced in the United States is for agriculture. Around eighty percent are given for growth-promoting and prophylactic purposes as opposed to treatment of individual animals for specific diseases. Residues of these antibiotics may be excreted by the animals as active metabolites or "parent substances" or else may be metabolized and excreted as inactive components.^{34,35,36} There is concern that this widespread use of antibiotics may lead to contamination of ground and surface waters and increase the potential for development of antibiotic-resistant bacteria that could pose a risk to human health.³⁷ Scientists with the U.S. Geological Survey and the U.S. EPA detected antibiotics in liquid waste from eight hog lagoons and in well samples and surface water samples near the lagoons.³⁸

In late 1998, scientists for the federal Centers for Disease Control and Prevention studied nine Iowa hog factory sites, each with 1,000 or more hogs.^{39,40} The investigators found pathogens, including antibiotic-resistant bacterial pathogens, metals, antibiotics commonly fed to hogs, nitrates, and parasites (including cryptosporidium) in the manure lagoons and surrounding wells, drainage ditches, and underground water. The contaminants were also found in agricultural drainage wells that empty into underground aquifers.

In 1998, the U.S. Geological Survey (USGS), in cooperation with the Minnesota Pollution Control Agency (MPCA), studied the quantity and quality of seepage from two Southern Minnesota liquid manure basins/lagoons during their first year of operation.⁴¹ One basin belonged to a small dairy farm and another held liquid manure from the pregnant sow barn belonging to a large hog facility. Seepage from both exceeded the MPCA recommended maximum design rate. Seepage was greatest through the lagoon sidewalls at both sites, except for the first three months at the hog operation. Nitrate concentrations in seepage from the hog lagoon exceeded the U.S. Environmental Protection Agency (EPA) drinking water standard in 17 of 22 samples.

In August 1999, the Oklahoma State Agriculture Department reported on tests of soils next to a Hanor Farms 43,000-hog site named Roberts Ranch.⁴² Compared to 10 units of coliform bacteria per 25 grams of soil nearby, scientists found 3,000 to 5,100 units of coliform bacteria per 25 grams of soil next to the manure lagoon. High levels of fecal matter were found four feet under the soil. Salt levels ranging from 4,594 parts per million to 10,930 parts per million were found in the ground next to the lagoon, while a control sample showed a maximum of 299 parts per million. High levels of ammonium nitrate were also found.

In LaGrange County, Indiana, a cluster of miscarriages among residents was investigated by the national Centers for Disease Control and Prevention (CDC).⁴³ Sampling by the state health department found one conclusive pollutant, nitrate. In three of the cases, the suspected cause was a hog confinement facility whose well had previously been documented as contaminated.

The facility was located within a mile of three of the affected women's homes.

Groundwater Depletion

Hog factories use millions of gallons of fresh groundwater daily to serve the animals and save labor costs by using the water to clean and flush the barns. On some large factory farms, a steady, but shallow, stream of water runs continuously over floors to keep accumulating feces moist enough to be flushed. The potential for recycling flush water to clean barns is limited due to concerns of reintroducing disease microorganisms.

Groundwater is a precious, but unpriced, common property natural resource. Using this resource for flushing manure from hog factories is a major economizing factor of industrialized farming methods and, hence, for factory farm owners and investors. But it is an extractive rather than a sustainable use, and it is potentially costly to society, future generations,

and people already living in and dependent on the water in areas where hog factories settle.

One of the most severely affected aquifers in the nation is the Ogallala, which has been estimated to have possibly 50 years of water left at the current rates of irrigation.⁴⁴ It has been estimated that Texas County, in the Oklahoma Panhandle, uses around 58,653,180,000 gallons a year from the High Plains (Ogallala) aquifer to grow 90,000 acres of irrigated corn for livestock feed. This use accounts for 92% of water withdrawal in Texas County. The growth of intensive hog operations accounted for a 66% increase in livestock water use between 1990 and 1995. Between 1990 and 1998, the number of pigs in Oklahoma jumped from 230,000 to 1.98 million, with Seaboard Corporation accounting for 80% of the increase.⁴⁵

Extractive groundwater pumping can also lead to pollution by saltwater intrusion.^{46,47} A proper balance must be kept between groundwater recharge and pumping. When massive quantities of freshwater are pumped from underground aquifers faster than they can be recharged, it is possible for the saline water to intrude into the freshwater aquifer to replace the freshwater extracted. This pollutes the fresh groundwater source. Although saltwater intrusion is a particularly important concern along coastal areas, many fresh water aquifers in the Midwest also are underlain by saltwater aquifers and susceptible to saltwater intrusion.⁴⁸ Hog factories take massive quantities of water from the ground. Yet few, if any, large-scale, hog farm permitting processes require that hog factory owners consider and follow proper procedures to ensure that groundwater is recharged.

Hog Factory Impacts on Surface Water

Manure can pollute surface water by runoff from fields, by accidental or intentional spills from pipes and hoses or lagoons, by deposition of airborne ammonia, or by single catastrophic events such as when the berm around an earthen lagoon bursts.⁴⁹

In June 1995, 25 million gallons of liquid manure broke through the berm surrounding a hog lagoon in Onslow County, North Carolina. The manure flowed over a neighbor's cropland and into the New River, creating the biggest lagoon spill on record and eventually killing 10,000,000 fish. The spill caused the closing of 364,000 acres of coastal wetlands to shell fishing.⁵⁰ The day before, a million-gallon hog lagoon spill had occurred in Sampson County. Later that same year, four more spills occurred in North Carolina, including 8.6 million gallons of liquid manure that spilled from a poultry farm.⁵¹ The North Carolina legislature responded by passing a law requiring operators to take classes on manure waste disposal

and creating setback distances from homes, churches, schools, and hospitals.

Many hog factories and lagoon disposal systems were constructed in flood plains in North Carolina. In July 1996, flood water from Hurricane Bertha led to a 1.8 million gallon spill from a hog waste lagoon in Craven County, North Carolina.⁵² In September 1996, Hurricane Fran caused the Cape Fear River to rise, flooding sewage treatment plants and manure lagoons and resulting in \$6 billion in damages \$872 million of which were in farm losses.⁵³ However, the worst was still to come.⁵⁴ In September 1999, Hurricane Dennis hit North Carolina with eight inches of pounding rains, raising the levels of wastewater in hog lagoons. A week later, early on the morning of September 16, Hurricane Floyd brought 22 inches of rain. Floyd caused widespread flooding; drowned hogs, chickens, and turkeys; covered hog manure lagoons throughout Eastern North Carolina; and spread hog waste, rotting animal carcasses, and pathogens in the floodwaters.^{55,56}

As the Neuse River Foundation's riverkeeper, Rick Dove is a full-time public advocate for the Neuse. Dove described the sight as he flew over the nearly 2 million year-old river the day after Floyd hit:⁵⁷

We saw animal operations whose barns were almost completely covered with floodwater – a tragedy for the animals, operators, and our environment. There were numerous large hog operations where flooding of barns and lagoons released visible plumes of waste into the surrounding waters. As we continued to fly upstream, the number of farms with flooded barns and lagoons continued to rise. Many farms would have one or more lagoons compromised, and other lagoons with as little as a foot to go before the waters reached them as well. In the Neuse watershed alone, we counted around 25 lagoons that had been flooded, and double that number was within feet of being compromised. Today reports estimate that the number of lagoons compromised could reach as high as one hundred. As far as the concern over animal deaths, today the estimates of dead hogs range from the industries' 15,000 to the media's 500,000. Poultry casualties are estimated in the millions.

Dove continued by quoting the *Winston-Salem Journal*:⁵⁸

For more than a decade, while North Carolina's swine population passed 9 million, state leaders knew they were

gambling with environmental disaster. As the waters from Floyd recede, it is now clear that North Carolina just lost that bet. When legislators return to Raleigh next May, they should set a short-term deadline for the closing of all hog lagoons. This technology is not safe

Even in the absence of such catastrophic events as hurricanes, spills too numerous to mention are reported every year from industrialized hog, dairy, and poultry farms in states where liquid manure handling and storage in earthen basins are permitted. These have been documented in the Natural Resources Defense Council/Clean Water Network's 1998 report, *America's Animal Factories*,⁵⁹ and updated for 1999 by the Network and the Izaak Walton League in a report entitled *Spilling Swill*.⁶⁰ Part Five of this report recounts the experiences of residents in Missouri, Oklahoma, and other states with factory farm pollution.

The industry is often quick to deny responsibility for accidents. In April 1999, an accident at a Murphy Family Farms site in North Carolina spilled up to 2 million gallons of manure into a Duplin County creek and wetlands.⁶¹ In a May 17 letter to the North Carolina Division of Water Quality, a Murphy spokesperson opined that the spill was caused by vandals.⁶² Following an investigation, however, the state found that the spill occurred when a subcontractor left the site while pumping waste from one lagoon to an emergency backup lagoon. Murphy Farms was fined \$40,650.⁶³

The Iowa legislative report on lagoon leakage indicated that major spills had occurred from nine percent of the lagoons examined.⁶⁴ Poor management and maintenance activities were observed at 76% of the facilities. Many of the lagoons were located less than 500 feet from a stream; at one site, the operator had actually constructed the lagoon by impounding the valley of a small stream. The lagoons examined were built in accordance with state standards.

In 1997, significant outbreaks of *Pfiesteria piscicida* occurred in several rivers on Maryland's Eastern Shore, killing thousands of fish and making people sick.⁶⁵ Some of the waterways were closed to recreational and commercial uses for several weeks due to *Pfiesteria* activity. Laboratory and field data show that the growth of *Pfiesteria* is stimulated by the presence of nutrients, especially phosphorus and nitrogen. Seventy-five percent of the major fish kills due to *Pfiesteria* in North Carolina have been in waters with excessive nitrogen and phosphorus content, and evidence suggests that nutrients also played a role in the other 25%.⁶⁶ In North Carolina, pollution due to excessive nutrient loadings were blamed primarily on the hog industry. *Pfiesteria* and *Pfiesteria*-like organisms have been identified in several rivers in the Chesapeake Bay. The majority

of nutrients in the Bay come from man-made sources such as factory-scale chicken and hog farms, other intensive agricultural practices, sewage treatment plants, automobiles, runoff from roadways, and grass fertilizers from lawns and golf courses.⁶⁷

Effluent from manure storage, runoff from outside lots or cropland, and milking center wastewater are strong pollutants that, by themselves, are harmful to fish and other aquatic life.^{68,69} When the organic matter in the manure decomposes (or is oxidized) by microorganisms in a stream or lake, the oxygen level decreases and fish suffocate. The pollution strength of manure runoff from outside lots and drainage from manure storage structures is from two and a half to forty times greater than raw municipal sewage, depending on the amount of water that has been added to the manure. ^{70,71}

Problems With Abandoned Lagoons

There is always the danger that a hog factory will pull up stakes and move to another location, possibly where the political or economic climate is more favorable, abandoning the building site and lagoons.

Over 700 abandoned hog manure lagoons exist in North Carolina, like "festering sores on North Carolina's landscape."⁷² Even abandoned, they pose threats to ground and surface water and emit obnoxious odors. Both small farms and large animal factories have abandoned lagoons, and in other states, the situation may be similar. In North Carolina, the state has been unable to force factory owners to clean up the lagoons unless they violate a current regulation. Livestock growers who went out of business emptied barns of animals, but the waste was left behind in the lagoons, without a financial incentive for "ex-farmers" to keep the lagoons from polluting.⁷³ A North Carolina law passed in 1999 required the administration of Governor Hunt to assess the risk posed by each of the "inactive" lagoons by March 1, 2000. It is part of a plan to phase out waste lagoons entirely over the next 10 years.

The choice to use the "cheapest cost" manure disposal technology was made by the individual firms and defended, against all reason, by a highly defensive livestock industry and its supporters in academia and government. But this cheapest cost does not include the cost of responsible handling and cleanup for which the industry now insists the public must help pay. The industry forgets or does not care that the public has already been paying for the industry's technology choices by absorbing the impacts of polluted water, polluted air, contaminated food, abused workers and animals, impeded effectiveness of antibiotic therapy, surplus product,

and millions of dollars of publicly supported research directly benefiting agribusiness and hog factories. A technology that is too costly for a proprietor to clean up should be recognized as a technology that is too costly for the proprietor to adopt.

An abandoned lagoon at a chicken farm north of Raleigh has been visited by state inspectors frequently since 1995.⁷⁴ Seven times between 1995 and 1998, inspectors found the lagoon overflowing into a stream and wastes washing out of a saturated field. In 1997, a state-ordered study found groundwater beneath the lagoon contaminated with nitrates and coliform bacteria. After Hurricane Floyd, an inspector found wastewater washing over the top of the lagoon. Despite more than \$20,000 in fines, the farm has continued to pollute. The retired egg farmer who owns the farm said he was unable to spend the tens of thousands of dollars necessary to get rid of an estimated five million gallons of wastewater.

Two abandoned hog waste lagoons were filled so high by waters from Hurricane Floyd that they ruptured, spilling two million gallons into a nearby creek.⁷⁵ One of the lagoons continued to leak for six weeks after a state inspector ordered the owner to fix it.

For a retired North Carolina farmer who voluntarily closed his lagoon, the cost was \$24,000, \$15,000 of which was paid by the State's cost-share program.⁷⁶ The cost may have been so low because he was permitted to spray the lagoon contents onto nearby land rather than pumping it into tankers for transport to a safer disposal area.

In Jackson County, Michigan, ten "state-of-the-art" hog confinement systems were built at a single site by Jackson County Hog Production (JCHP).⁷⁷ This site had three open-air anaerobic manure lagoons. The stench caused nearby residents nausea, headaches, respiratory ailments, and sleep disturbances. It burned their eyes, noses, and throats. Litigation brought by the community against the company to force it to deal with the stench cost the community members \$100,000. In 1992, the company declared bankruptcy, leaving 30 steel buildings and three lagoons on denuded areas surrounded by a chain link fence. After years of polarization, suffering under the health and psychological impacts of the pollution created, and failed economic promises and benefits, the community was left with the cost of cleaning up the waste. The hog factory owners went on to build facilities in other states to the West.⁷⁸

Abandoned liquid manure lagoons and storage pits are the legacy of failed policy processes, greed, and flawed technology. Hog factories, sewerless cities whose hapless residents excrete as much as three to four times the waste of humans, are being built all across the United States. Given the overproduction taking place in the industry and the evidence noted above

that lagoons begin to leak even in the first year of operation, it is at least short-sighted of permitting authorities to continue to permit new lagoon construction. Almost certainly more of them will be abandoned when the farms and factories can no longer survive economically. Unless the laws are changed to force animal factories to clean up their waste or to ban the construction of any lagoons or in-ground storage pits for liquid manure, taxpayers will pick up the tab.

Some Choices We Face

The treatment of animal excrement using methods that are prevalent in the purification of municipal sewage is generally considered too expensive and not suitable for farm-animal manure.⁷⁹ As environmental needs grow and as local and state governments demand more accountability from polluters, this expense is a reason for small operators not to choose this technology in the first place. However, as consolidation continues in the hog industry and hog production is concentrated into the hands of a few large corporations operating ever-larger entities, such sewage treatment systems may become necessary to deal with all the wastes concentrated in small areas. Should the public help pay for the industry's technology choices?

In the past few years, companies have emerged as purveyors of patented technologies for waste purification and odor control to large-scale hog farms. Bion Environmental Technologies, for example, designs and operates systems that control odor and "bioconvert" animal waste into a fertilizer material called BionSoil, to which the company retains the rights.⁸⁰ As of August 1999, Bion operated 16 animal waste systems in six states with additional systems in the stages of design, permitting, or construction. Bion's clients include Murphy Farms, Continental Grain, and Smithfield Foods.

Environmental Products & Technologies Corporation has developed a "closed-loop waste management system" that separates animal wastes into solids and liquid.⁸¹ These are then processed into a nutrient-rich soil amendment, agricultural water, and electrical energy generated from methane. EPCT hopes to make money by solving the waste management problems of large livestock operations and helping them optimize their productivity.

At the University of Illinois, a researcher has processed hog waste into a diesel-like product that eventually might be used for heating oil.⁸² An investment of \$250,000 would yield 5,000 barrels of crude from 10,000 hogs raised annually. Reportedly, Premium Standard Farms of Missouri is investigating an "oil-from-dung" program and has tanked slurry to

Pennsylvania where it is being tested by a firm knowledgeable about the conversion process.

A Southern Illinois University researcher has potentially developed a way to reduce ammonia odors from hog waste and produce fertilizer and hot water heat that could be used to heat animal nurseries and containment buildings.⁸³ Other technical solutions include genetically engineering pigs that produce manure 20 to 50% lower in phosphorus than the manure of normal pigs.⁸⁴ However, so far the track record of technical solutions is to create more problems requiring more technical solutions. It remains to be seen whether these solutions deal with more than only one of the many hazardous aspects of liquid animal waste – more than one hazardous gas, more than one nutrient – or whether they present truly holistic approaches in harmony with the environment and public expectations. Plants using anaerobic digestion of slurry to produce biogas generally operate at temperatures too low to destroy pathogens in slurry, for example.^{85,86}

As important as it is to curtail pollution from the nation's animal factories, it is also important to keep in mind that industrialized animal farming is a multi-faceted problem. The industrialization of animal agriculture not only has environmental dimensions, but social, economic, ethical, and human ones as well. The costs associated with "purifying" liquid animal manures are prohibitive enough that liquid manure handling is not a scale neutral technology, once all users are forced to internalize the costs of operating so as to prevent polluting the environment. Capital-intensive technologies to convert liquid manure into safer products can be adopted at greater economy by the largest factory farms, for which animal manure often is an unwanted waste product, than by diversified family farms that look upon animal manures as a fertilizer resource contributing to their sustainability.

The challenge arises, then, to develop an ecological and balanced approach, because we may have passed the point where piecemeal solutions will continue to provide the short-term fixes without jeopardizing the future of the planet, its fauna, and its flora. With each new technical solution to the problems caused by the previous solution, the path of industrialization becomes more irreversible, more fixed. The time is running out for the radical change that is needed to bring agriculture back into harmony with natural processes. Soon it may be too late.

On traditional farms, animals were bedded indoors in pens with fresh straw or in huts on pastures. The straw-manure mixtures, otherwise known as "farmyard manure," built tilth and soil organic matter.^{87,88} The organic matter content of a soil serves as its energy reserve.⁸⁹ About half of the organic matter in farmyard manure added to soil is incorporated into the

native organic matter pool of soils, while slurry (liquid manure) provides only a small fraction of that.⁹⁰

When the carbon to nitrogen ratio in farmyard manure is 20 to one, the soil microflora use all the available ammonium and nitrate present to metabolize the carbon into biomass, preventing the buildup of nitrates in the soil and reducing the chance of nitrate leaching.⁹¹ Bedding is a byproduct of small grain production, a valuable component of a healthy crop rotation. The grain can be sold and/or fed to animals on the farm. On traditional farms, manure management was not merely waste disposal but was an integral aspect of the nutrient cycle and contributed to the overall economy of the farming operation. On sustainable farms of the present, this integral role for manure and manure management continues, aided by the blending of animal and crop enterprises on the farm.

Increasingly sophisticated and costly techniques to "purify" liquid manure, capture gasses and emissions, develop new uses for liquid manure and new methods of stabilizing and disposing of it properly are therefore a double-edged sword: they may help prevent some of the most catastrophic problems caused by industrial hog farming, but they also will lead animal agriculture farther down the path of industrialization.

The more capital intensive the waste management technology, the more out of financial reach it is for independent family farmers, and the more incentive there is for corporate hog factories to look to the public for financing their adoption of it. Pasturing, rotational grazing, and deep-bedded barns with solid manure handling particularly when coupled with management and husbandry that are compatible with animals' natural behaviors are alternatives to factory hog production that are economical for independent family farmers and communities. In the long run, they are also more sustainable.

Some Strategies and Action Alternatives for Alleviating the Water Quality Impacts of Animal Production

1. Educate the public with regard to the environmental dangers posed by large-scale animal factories and citizens' rights and opportunities for self-protection.
2. Impose a moratorium on new large animal factories until the massive pollution from current factory farm facilities is eliminated.
3. Phase out open-air lagoons and require the adoption of ecologically and socially responsible manure management practices.

4. Mandate opportunities for public participation in the decision to grant a permit for a new animal factory or expansion of an existing one.
5. Require frequent inspection of animal factories and require factories to conduct regular air and water quality monitoring programs near manure storage facilities.
6. Mobilize public support at the local, state, and federal level to get strong factory farm regulations enacted that are protective of the environment and public health, and involve citizens in monitoring the regulatory activities of state agencies to hold them responsible for enforcing these regulations.
7. Educate consumers to avoid factory-produced meat and instead choose meat produced by diversified, family farmers using animal rearing and manure disposal methods that are harmonious with animal needs, the natural environment, and consumers' expectations.
8. Mobilize public support for legislation that would force polluters to pay the total costs of their technology choices by making them reimburse the public for environmental and health damages caused by their operations, and by preventing them from being able to transfer unwanted costs of their technology choices, such as environmental cleanup and technology retrofits, onto taxpayers and consumers.
9. Help citizens mobilize to oppose state and federal legislation giving animal factories and their owners and investors limited liability status that relieves them of responsibility for monetary and environmental damages.
10. Mobilize public support to hold land grant universities accountable for the time and public money they spend helping animal factories compete against independent family farms when they research, develop, and provide direct assistance with technologies that promote the interests of large-scale animal factory owners and investors to the exclusion of smaller scale independent family farmers.
11. Mobilize public support to put pressure on land grant universities to research, develop, and provide technical assistance for production technologies that are sustainable and appropriate for the size and scale of independent family livestock farms.
12. Prevent legislatures from taking control over zoning away from counties and townships.

Help preserve local control over whether or not animal factories will be permitted in counties and townships.

13. Tie public support of animal agriculture to desirable social aims, such as clean water and air, by rewarding environmentally sound management rather than production volume.

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IV. Part of the Pig Really Does Fly

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Part of the Pig Really Does Fly

Gasses emitted from liquid manure (slurry) lagoons and intensive livestock confinement buildings are having detrimental effects, not only on neighbors' quality of life, but also on their physical and mental health. Ammonia released from the surface of liquid manure storage structures also contributes to ammonia deposition in rainfall that can cause excessive growth of algae in surface waters and the loss of aquatic life due to oxygen depletion. Methane, carbon dioxide, and nitrous oxide are known to contribute to global warming.

The problem results from the anaerobic (absence of free oxygen) nature of manure that has been liquefied by the addition of water.¹ The decomposition of liquid manure by anaerobic bacteria during storage and treatment produces and emits nearly 400 volatile organic compounds.²

Animal factories need not be large to create a problem. Prior to the mid-1980s, most small, independent farmers raised their animals in bedded shelters or barns with access to pastures and handled manure as a solid. This practice caused few neighbor complaints and few environmental problems. Increasingly, to save on labor and because it is the technology recommended by the industry and agricultural advisors at land grant universities, smaller farmers have adopted liquid manure handling systems. These farmers also can create detrimental effects, albeit on a more localized scale.

Odorous and Toxic Emissions

Compounds identified in liquid manure emissions include sulfides, disulfides, organic acids, alcohols, aldehydes, amines, fixed gasses, nitrogen heterocycles, mercaptans, carbonyls, and esters.³ Also identified are carcinogens such as benzene⁴ and the mutagen phosphane.⁵ These compounds also may be found in emissions from cattle and hog slurry biogas processing plants. In addition to gasses, disease molecules can be carried on the wind for miles, potentially affecting the health of animals on other farms.⁶

When manure is not liquefied and bedding is used, the soiled bedding is stored in a solid form. Sufficient bedding creates a porous mixture wherein free air space provides conditions suitable for aerobic microbes to flourish.⁷ Decomposition of solid manure by aerobic bacteria begins a heating process called composting.⁸ This decomposition process produces heat, water vapor, carbon dioxide, and ammonia. Only ammonia is

odorous and its emissions are low or negligible if farmers use enough carbon-rich bedding to keep wet spots in the beds covered and maintain a high carbon/nitrogen (C/N) ratio in the manure-bedding mixture. Carbon/nitrogen ratios of 36 to one or greater permit carbon in the bedding to bind ammonia nitrogen and prevent it from volatilizing.⁹ Generally, maintaining the top of the bedding pack in such a way as to provide a dry and comfortable environment for the animals will be sufficient to maintain a high C/N ratio and keep ammonia emissions negligible.

Odors associated with intensive hog production come from a mixture of urine, fresh and decomposing feces, spilled feed,¹⁰ and putrefying carcasses. They are in the air ventilated from buildings where the animals are intensively confined as well as in the air coming off liquid manure storage structures and fields where liquid manure has been spread. This air is distributed in the form of a plume that changes direction with the wind. Endotoxins produced by bacteria found in the air inside the buildings also may be present in the plume.¹¹

Most research on manure odors by land grant university agricultural scientists has been directed toward developing and testing odor control technologies for liquid manure handling systems. However, both scientific evidence and human experience reveal that efforts to control odors are not synonymous with addressing liquid manure's potential to create serious public health problems.

Hydrogen sulfide is the most odorous of the manure gasses at low levels in the atmosphere. At higher levels, hydrogen sulfide paralyzes the olfactory senses but is still toxic. Manure gas accidents have demonstrated hydrogen sulfide's ability to kill [see Part 2. Putting Lives in Peril, above].

Past thinking has been that if an exposure to hydrogen sulfide has not been fatal, no bad effects linger.¹² Scientists now believe that even at low, chronic concentrations, hydrogen sulfide is a potent neurotoxin and poses a serious, irreversible threat to human health. According to one scientist, "hydrogen sulfide poisons the brain and the poisoning is irreversible."¹³

Hydrogen sulfide interferes with an enzyme necessary for cells to make use of oxygen.¹⁴ Neurological tests of residents living close to oil refineries, another industry whose operations emit hydrogen sulfide, have shown pronounced deficits in balance and reaction time, attention deficits, and inability to process information quickly, "analogous to an outdated computer program. It runs, but it is maddeningly slow and inefficient."¹⁵ Dizziness, insomnia, and overpowering fatigue were reported by residents.

The dangers of hydrogen sulfide have been known for nearly three

centuries. In 1713, an Italian physician published a discussion of "Diseases of Cleaners of Privies and Cesspits," in which he discusses painful and sometimes blinding eye inflammations. In the late 18th century, a scientific commission was appointed to investigate the illnesses and deaths of workers in the Paris sewers.¹⁶ The cause now appears to have been hydrogen sulfide.

Few states have hydrogen sulfide standards. Minnesota is an exception. However, agribusiness interests succeeded in weakening the law to lift the standard at peak manure spreading times. More recently, the Minnesota legislature has changed the definition of animal units, on which regulations for farms of different sizes are based, in such a way that hog farms having over 1,000 animal units of finishing hogs under the current definition would now be considered under 1,000 animal units and hence eligible for fewer environmental restrictions.

The U.S. Environmental Protection Agency (EPA) does not currently regulate hydrogen sulfide emissions for any industry. The compound was removed from the federal Hazardous Air Pollutant List following pressure from the oil and gas industries. Subsequent pressure by the chemical and paper industries has kept it off the list despite petitions to reinstate it.¹⁷ Currently, a new petition to reinstate hydrogen sulfide, signed by scientists, environmental and other citizen groups, is before the Agency.¹⁸

Air Pollution Impacts on Neighbors

Health impacts of air pollution from intensive livestock farming on neighbors are both psychological and physiological.¹⁹ Odors greatly influence quality of life and enjoyment of property.

Neighbors to industrialized hog farms report not being able to go outdoors or let their children play outdoors. Some report lining their windows and fireplaces with plastic to keep outside air from coming into the house.^{20,21} Neighbors of Seaboard Farms, in Guymon, Oklahoma, told the Dallas Morning News: "We're farmers and ranchers who have roots in the land. Our private property rights have been taken away from us by pig producers."²² Another area resident told the News that she and her late father would sometimes stay a month at a time in an Elkhart, Kansas motel to get away from the odor. In November 1998, Time Magazine reported that neighbors of Seaboard Farms wore gas masks frequently to avoid breathing the odors from rotting hog carcasses, manure lagoons, and air vented from the barns.²³ In Missouri, farmer Rolf Christen told Audubon Magazine, "On hot summer nights we have to shut the windows. We lie in bed at 2:00 a.m. sweating, and I get so mad. How does anybody have the right to stink up my place? You feel like a prisoner."²⁴

Hog farm odors and the volatile organic compounds given off from manure lagoons appear to be especially hard for asthmatics to tolerate.²⁵

In August 1999, a study led by epidemiologist Steven Wing of the University of North Carolina found that residents living near a 6,000-hog factory farm reported a higher occurrence of headaches, runny noses, sore throats, excessive coughing, diarrhea, and burning eyes than residents of a community where no liquid manure facilities were nearby.²⁶ Quality of life, as indicated by the number of times residents could not open windows or go outside even in nice weather, was greatly reduced among residents living near the hog factory. North Carolina Pork Producers' director, Walter Cherry, asked for Wing's data, indicating that the Pork Council was considering whether the researchers had defamed the pork industry.²⁷ Final results were released in February and confirmed the earlier results, but Cherry called it "junk science."²⁸

A 1997 University of Iowa study compared responses of residents living near a 4,000-sow hog factory with a control group of residents living near minimal livestock production.²⁹ Compared to individuals in the control group, residents living near the operation reported a higher incidence of toxic or inflammatory effects on the respiratory tract, similar to those experienced by hog confinement workers.

On February 15, 2000, the Minnesota Department of Health (MDH) released its review of data from Minnesota Pollution Control Agency (MPCA) hydrogen sulfide monitoring at the ValAdCo hog finishing site in Renville County.³⁰ Stressing that its estimates were conservative due to limitations in data collection (monitors were unable to detect emissions above 90 parts per billion (ppb), for example), MDH stated that ValAdCo emissions violated the State standard 53 times in 1998 and 106 times in 1999. On 100 occasions over those two years the hydrogen sulfide emissions levels were at least 90 parts per billion.³¹ The number of violations occurring in 1999, after ValAdCo had started using a floating, permeable lagoon cover and straw cover, were double those of the previous year when there was no cover.³² In September 1999, over six hours in one day had levels greater than or equal to 90 ppb. The MDH concluded that the monitored concentrations are high enough to cause nausea and headaches and interfere with the quality of life of nearby residents. ValAdCo operators consistently maintained that their site posed no health hazards to neighbors, and despite the recent findings, continue to do so.³³

Dr. Susan Schiffman, a psychologist at Duke University School of Medicine, studied 44 subjects living near North Carolina hog operations

and 44 control participants not living near hog operations.³⁴ Neighbors to the operations experienced odors both outdoors and inside their homes via open windows and air conditioning systems. The smell permeated clothing, curtains, and building materials, which released the odor over time. Persons living close to swine operations and subjected to liquid manure odors were significantly more angry, depressed, tense, fatigued, confused, and lethargic, and experienced more total mood disturbances than the controls. On days when subjects experienced odors, they almost never recorded a positive feeling. On the day following strong odors, moods were still depressed. Schiffman found that specific molecules in the odorous plumes from hog factories cause nasal and respiratory irritation.³⁵ Nasal irritation can elevate adrenaline, which can contribute to anger and tension. The volatile organic compounds responsible for odors can be inhaled and transferred into blood and body fat. These compounds may be released over time, so that the exposed person continues to smell the odor after the plume carrying it has changed direction.

Pollutants in Rain Deposition

As much as 70 to 80% of the nitrogen in a lagoon changes from liquid to gas, which escapes into the atmosphere in a process called ammonia volatilization.³⁶ In contrast (depending largely on the amount of carbon-rich bedding used, the more carbon, the lower the ammonia emissions), dry, pasture or solid manure handling systems lose only 15 to 40% of their nitrogen to the atmosphere.³⁷

The gaseous ammonia returns to earth, precipitated from the atmosphere by rain or trapped by trees, grass, or water bodies, in a process called atmospheric deposition.³⁸ In the Netherlands, where pigs outnumber people, atmospheric deposition of nitrogen is ten times greater than natural levels and the greatest deposition (50 to 60 kilograms per hectare per year) occurs in the southeastern portion of the country where the livestock industry is the most intensive.³⁹ Nitrogen-enriched rainfall has damaged natural habitats in the Netherlands and changed the ecology of natural areas, causing some species of flora to disappear and other, high nitrogen-consuming species to take their place.⁴⁰

The North Carolina Division of Air Quality estimates that collectively North Carolina's 2,400 large hog factories discharge at least 186 tons of ammonia into the air every day.⁴¹ As Environmental Defense scientist Joe Rudek pointed out, factory hog farms in North Carolina operate under non-discharge permits that prohibit them from dumping waste into streams and groundwater, yet they discharge ammonia to the environment continuously via emissions from their liquid manure lagoons.⁴² The permits also allow them to discharge to rivers during major storm events.⁴³

For the past 20 years, researchers at the Department of Marine, Earth and Atmospheric Sciences at North Carolina State University have examined rainfall data collected in Sampson County, in the heart of North Carolina's "hog belt."⁴⁴ Beginning in 1985, ammonia in Sampson County's rain began to rise. By 1995, ammonia in the rain had doubled, while ammonia levels outside the hog belt had not changed significantly. The timing of the increase coincided with the rapid proliferation of industrial hog farms in North Carolina. For researchers, there is no other possible source. Said Viney Aneja, the North Carolina State University Professor who led the state-funded study, "There is an overenrichment of our ecosystems. We now know the source is the hog industry."⁴⁵

A typical five-acre hog waste lagoon, during an average North Carolina summer, releases 15 to 30 tons of ammonia into the air.⁴⁶ About half the ammonia rises as a gas and generally falls to forests, fields, or open water within 50 miles, either in rain or fog. The rest is transformed into dry particles, which travel up to 250 miles. Ammonia is the most potent form of nitrogen that triggers algae blooms and causes fish kills in coastal waters.⁴⁷ The North Carolina Division of Water Quality estimates that hog factories constitute the largest source of airborne ammonia in North Carolina more than cattle, chickens, and turkeys combined.⁴⁸ In 1995, University of North Carolina marine ecologist, Hans Paerl, reported that airborne ammonia had risen 25% each year since 1991 in Morehead City, 90 miles downwind of the hog belt.⁴⁹ Paerl also reported traces of pure urine in rain.

Greenhouse Gasses Produced

The "greenhouse effect" is a natural and beneficial process by which the gasses in the earth's atmosphere trap solar energy to warm the planet.⁵⁰ However, human activity has increased the amount of greenhouse gasses. Carbon dioxide, methane, and nitrous oxide are the most common agricultural gasses contributing to the greenhouse effect. Water vapor also contributes.

Carbon dioxide

Carbon dioxide is the most voluminous of the greenhouse gasses, but it has less than two percent of the warming effect of methane and less than 0.5 percent of the warming effect of nitrous oxide. It is also being constantly absorbed from the atmosphere by oceans, soils, and plants.

Once emitted to the atmosphere, carbon dioxide is the easiest of the greenhouse gasses to remove.⁵¹ Animals breathe in oxygen and breathe

out carbon dioxide. Plants take in carbon dioxide, photosynthesize the carbon into plant tissue, and release oxygen. Some carbon is released when plants die or it can be stored in live plants and trees or in soil.

Research by the Center for Rural Affairs finds that agriculture can reduce its carbon dioxide emissions and manage productive land in a way that removes carbon from the atmosphere and stores it in the soil and living plants.⁵² Farmers can (1) plant trees as windbreaks, (2) plant grass on previously cultivated land, (3) reduce soil erosion to levels that are offset by natural soil formation, (4) reduce fossil fuel use, and (5) rebuild organic matter (carbon) in cultivated soils.

Organic matter can be rebuilt in cultivated soils by returning crop residues to the soil, reducing tillage intensity, minimizing fallowing, and rotating row crops with grasses and deep-rooted legumes. Returning manure to the land is most beneficial if the carbon and nitrogen nutrients in the manure have been stabilized by composting.⁵³

Methane

Methane is a highly potent greenhouse gas. Nearly half of all methane emissions are from agriculture.⁵⁴ Other sources include lakes, wetlands, oceans, and tropical forests. Bacteria produce methane in the absence of oxygen (anaerobically). Hence, anaerobic digestion of liquid manure is a major source of agriculturally produced methane into the atmosphere. The other major agricultural source is fermentation of food organic matter during ruminant digestion. It is estimated that nearly 63 million tons per year, of the 88 million tons produced by digestion in all animals, is produced by cattle.⁵⁵

The waste characteristics of the animal species and the animals' diets affect how much methane is emitted by manure. But the key factor is the way in which the manure is handled once it has been excreted.⁵⁶

Nearly half the manure methane emissions from cattle and hogs in the United States before 1992 came from anaerobic lagoon waste management systems.⁵⁷ Since then, the number of factory farms using anaerobic lagoon systems has increased as hog and dairy cattle factories have proliferated across the United States. The number of smaller farms operating anaerobic lagoon systems has increased dramatically as well. Hence, manure methane emissions from anaerobic lagoon systems account for a much greater proportion of the total livestock emissions today.

Unstable organic matter in liquified manure also can have negative effects on the physical properties of the soil, filling cavities between soil particles,

excluding air from between solid particles and creating anaerobic conditions that lead to production of gasses such as methane and ethylene.⁵⁸

Nitrous oxide

Nitrous oxide is released from natural processes in the soil, from nitrogen fertilizer, fossil fuel combustion, animal and human wastes, water bodies, and biomass burning and land clearing. Nitrous oxide is the least prevalent of these three gasses, but it is one of the most potent greenhouse gasses.⁵⁹ Nitrous oxide has over 200 times the warming effect of carbon dioxide and lasts 150 years in the atmosphere. However, because it is not prevalent, it has contributed to only about three percent of the global warming. Hence, in livestock production, methane and carbon dioxide are the relevant greenhouse gasses.⁶⁰

Potential Solutions

Emission processes suggest that the most significant contribution to reducing in greenhouse gasses that farmers can make is to change manure management.⁶¹ This change can be toward more complex and capital-intensive liquid manure management systems, such as sophisticated methods of methane collection, solids separation, and biogas production, or toward more natural management systems such as pasture or solid manure. Which direction we choose will have implications both on how well other social goals are met and for the structure of animal agriculture. The two main gasses emitted in solid manure handling and storage, carbon dioxide and ammonia, are easily taken up, carbon dioxide by plants and ammonia by the bedding materials. Solid manure using straw or other grain-based bedding also replenishes the soil carbon. Solid manure handling with composting is more labor and management intensive and, hence, the less costly choice for independent farmers, while the more capital-intensive systems may be the only option for the largest animal factories.

At animal factory sites where large amounts of waste are generated, composting can also produce odorous volatile compounds that create air pollution and "should be carried out in closed reactors with sufficient treatment of exhaust air."⁶² Bion Environmental Technologies (Part 3. Building Sewerless Cities) designs, sets up, and operates systems at animal factory sites that "bioconvert" liquid animal waste into a fertilizer material called BionSoil.⁶³ BionSoil is then certified as an organic product to which Bion Environmental Technologies retains the rights. As of August 1999, it operates 16 animal waste systems in six states with

additional systems in the stages of design, permitting, or construction. Bion's clients include Murphy Farms, Continental Grain, and Smithfield Foods.

The BionSoil conversion process is also touted as being able to control odors. However, in December 1999, the Illinois Attorney General filed a lawsuit against The Highlands, LLC, a 3,650-sow, farrow-to-wean hog factory in Illinois, for alleged odor violations that occurred since the Highlands opened in 1997.^{64,65} Over 230 complaints of offensive odor from the facility had been lodged. Co-defendants in the suit are Murphy Family Farms, which owns the hogs and shares in the operation of the factory, and Bion Technologies, Inc., which designed and shares in the operation of the Highlands' waste handling system. The Attorney General asked for an injunction to stop further violations of the law, for civil fines of up to \$50,000 for each violation and an additional fine of \$10,000 for each day the violations continued.

Some Strategies and Action Alternatives for Clean Air from Animal Production

1. Call for and support the reclassification of animal factories as manufacturing entities rather than as agricultural.
Rationale: Animal factories more nearly resemble manufacturing than farming. A farming classification exempts animal factories from some federal and state environmental regulations and monitoring, to which they rightfully ought to be subject by virtue of the toxic and environmentally damaging emissions created in the normal course of their operations. The classification of hog factories as farms rather than industrial facilities prevents meaningful regulation. For example, the Illinois Supreme Court ruled that all hog farms, regardless of size, are agricultural in nature and may not be regulated by counties.
2. Call for a nationwide ban on liquefying animal manure as a way of dealing with waste from animals raised for food. Ban all new construction of liquefied manure storage systems and require existing operations to phase in solid manure handling over the next 10 years.

Rationale: Leakage from liquid manure storages can be gradual and, if failures occur, the discharges can be catastrophic. Waste discharges from the largest hog factories (and other confined animal feeding operations (CAFOs)) are currently permitted under the National Pollution Discharge Elimination System (NPDES) program by the U.S. Environmental Protection Agency. Because of loopholes in the regulations, inadequate permit conditions, and

inadequate enforcement of the Clean Water Act, facilities are still polluting the water. Moreover, animal factories also leak pollutants to the air. Over 400 volatile organic compounds have been found in emissions from anaerobic hog lagoons. In North Carolina alone, 186 tons of ammonia a day are discharged from liquid animal waste storages. Compared to the life-threatening and polluting leakages from liquid manure storage and handling, the problems with solid manure systems that use abundant grained-based bedding are more manageable; the benefits to the environment are unequivocal. The Environmental Protection Agency will be addressing whether lagoons can continue to be used as it revises the effluent guidelines for feedlots in the next two years.

3. Require manufactured covers on all existing liquid manure storage structures and "scrubbers" over vents leaving hog buildings to help control air pollution.

Rationale: Chopped straw covers and other ad hoc methods cannot adequately control emissions of potentially dangerous volatile organic compounds created in the anaerobic digestion of liquid manure.

4. Support public education, empowerment, and the ability of counties and township governments to exert local control over the siting and behavior of hog factories.

Rationale: Across the nation, groups of citizens are organizing to make hog factory owners liable for the damage they do to rural quality of life and the environment. They need reliable information concerning the hazards of hog factories and effective remedies. They need legal assistance to help prevent the erosion of their rights to health, enjoyment of property, and quality of life. They also need financial support.

5. Call for and support policies that would provide financial assistance to independent hog farmers switching from liquid manure handling to solid manure handling using composting as a treatment process.

Rationale: According to the Center for Rural Affairs, the single most significant contribution to reduction in greenhouse gasses that farms can make is to change manure management.

Compared to liquid manure, the number of gasses emitted by solid manure handling systems is very few. Plants and trees easily take up carbon dioxide. A high carbon/nitrogen ratio will prevent ammonia volatilization. In the long run, adoption of solid manure handling practices is the least costly and most effective odor- and

pollution-reducing option for small farmers. Buildings can be designed with minimal equipment and large doors for efficient cleanout by tractor.

6. Ban spray irrigation as a manure disposal method in existing liquid-based manure systems. Require that manure be "knifed" into the soil while being spread or that it be tilled into the soil within 24 hours of spreading.

Rationale: Spray irrigating manure provides opportunity for dispersal of parasites and pathogens into the natural environment, potentially infecting wildlife and grazing farm animals. Ammonia is released into the air during spray irrigation. Odors from spray irrigation of liquid manure make life miserable for neighbors to animal factories and there is the potential for uneven application as sprayers stand in one place for long periods of time.

7. Scientifically determine how manure gasses are affecting the ecology of given geographic areas.

Rationale: The scientific basis is being established that links ammonia volatilization from liquid manure lagoons in North Carolina to the algae pollution of estuaries and other surface waters on the Eastern seaboard. This scientific information is being used to inform regulation of the Carolina hog industry. However, little is known about how ammonia volatilization and deposition affect prairies or desert areas where many hog factories are now locating. A better understanding of the impacts of manure gas pollutants on the ecology of given geographic areas will make it easier to demand appropriate regulation and enforcement in those areas.

8. Conduct a legal investigation of the Clean Air Act's potential for regulating emissions from animal factories and campaign to ensure implementation of the Act.

Rationale: Animal factories are industrial sites whose waste handling procedures emit large quantities of hazardous compounds into the air. They should be regulated along with other industries that are subject to emissions control under the Clean Air Act.

9. Support the recent petition to add hydrogen sulfide to the EPA's of Hazardous Air Pollutant List.

Rationale: This is the first step in getting this toxic pollutant regulated under the Clean Air Act.

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V. Hog Factory in the Back Yard

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Hog Factory in the Back Yard

The public typically has exhibited sympathy and respect for independent family farmers. To protect them from frivolous complaints by neighbors and others bothered by normal farm odors and activities, states, counties, and localities have enacted nuisance suit, or "right-to-farm" protections. Yet, the very laws enacted to protect small farmers from frivolous complaints protect corporate hog factories from well-grounded complaints over their much larger impacts on the environment and public health and welfare. Small farmers may benefit from some of these protections, but corporate hog factories benefit more. By helping hog factories avoid the expenses associated with socially responsible practices, such protections give hog factories leeway to grow and squeeze independent family hog farmers out of the market.

Thirty states have enacted laws exempting farm animals from protection under their anti-cruelty statutes.¹ "Strategic lawsuits against public participation," or SLAPP suits, can be brought against citizens who protest siting of animal factories in their communities. Minnesota law protects its citizens from SLAPP suits, but such protections are rare among the states. In at least 13 states, agricultural disparagement laws, popularly known as "veggie libel laws," protect food products and production processes from "disparagement."^{2,3}

Public policies supporting hog factories and excusing them from bad behavior help create an illusion that hog farming is industrializing because technological advances have increased the efficiency (i.e., have reduced per-unit costs of production) of larger, more concentrated operations. (See, for example, U.S. General Accounting Office, December 1999.)⁴ How many of these efficiencies are based on the ease with which public policies and "technological advances" allow hog factory operators to pass off unwanted costs of doing business onto neighbors and society has not been quantified.

Corporate hog factory owners may seek out needy communities willing to provide tax abatements, development funds, and other incentives in return for promises of jobs and economic development. Many communities with hog factories in the back yard have found that hog factories cost them far more than any benefits they might bring in. Hog factories have divided communities, neighborhoods, and families. Even in the areas most in need of jobs and economic development, hog factories rapidly diminish or deplete what Iowa State University rural sociologist Dr. Cornelia Butler Flora has called the four kinds of capital⁵ on which successful communities are based. These are a community's financial capital, its natural capital, its human capital, and its social capital. Social capital is

made up of the trust and reciprocity among community members that often takes generations to build.

Contrary to the claims of corporate hog factory owners and their supporters, in most cases it is not city dwellers moving to the country and imposing their unreasonable demands on ordinary farmers that are the problem. In most cases the people who feel the strongest impacts from hog factories are people who have lived in their rural homes for most, if not all, of their lives, many of whom farm or have farmed with livestock, as well. It is the hog factories that have moved in and made their lives miserable. When ravaged communities attempt to institute safeguards, the factories may fight them or they may move on to areas with fewer regulations, in a pattern some have called "pollution shopping."

Across the country, rural citizens have coped with regulatory inertia by becoming overnight experts on water pollution, air pollution, environmental law, other states' animal factory problems, animal welfare, food safety, zoning, world trade, legislative action, and other issues relevant to their fight. They have traveled hundreds of miles in a month to attend meetings, hearings, rallies, and conferences. Phone bills have soared as they reached out to find support from others with similar experiences, mobilized their neighbors, contacted their legislators, and looked for studies and public documents relevant to their situation. They have become public speakers, lobbyists, researchers, and consultants. But they have done so at heavy personal costs and have often realized that a successful outcome is not always guaranteed.

Members of one small, neighborhood group in a southern Minnesota county spent over \$100,000 in cash outlays over several years and countless hours in personal time in an unsuccessful fight to get the Minnesota Pollution Control Agency (MPCA) to bring a turkey manure composting site into compliance with state anti-pollution laws.⁶ The site was allowed to operate for years without a permit. Although now permitted by MPCA, the owner continues to violate state laws and best management practices. The site has polluted neighbors' wells and created an on-going odor and air pollution problem. After a dozen years fighting to protect their health and quality of life, the citizens' resources are depleted. Calls to the MPCA about odor and poor management at the site go unanswered. The composting site is classified as a feedlot by the MPCA, even though no animals live there, rather than as an industrial site which it more closely resembles. If it were classified an industrial site, stricter environmental standards would apply.

After five years of struggle with the MPCA, Julie Jansen of Olivia, Minnesota, and her neighbors were vindicated by a Minnesota Department of Health (MDH) investigation of data that the MPCA collected during

hydrogen sulfide monitoring at the ValAdCo hog finishing facility near her home. To convince MPCA to monitor the site, Jansen and her neighbors had purchased a "Jerome" meter to monitor hydrogen sulfide levels at the site, the results of which they planned to disseminate widely. The outcome of the MDH study showed that the facility violated state hydrogen sulfide standards on over 150 separate instances in 1998 and 1999. The MDH called on the MPCA to take action "without delay" to bring hydrogen sulfide emissions back into compliance with Minnesota Rules "for the protection and safety of human health."⁷

Despite the MDH findings, however, the Minnesota legislature, led by agribusiness interests, increased the number of days hog farms would be able to exceed state hydrogen sulfide standards when spreading manure and increased the number of hogs and poultry in an animal unit, a measurement based on the manure output of a species. This allowed more state hog and poultry factories to be included in the size category "fewer than 1,000 animal units." One thousand animal units is a threshold at which stronger regulations apply. Under the previous rules, a farming operation having 2,500 finishing hogs would have been considered a 1,000-animal unit operation. Under the new rules, the same operation could expand to 3,333 hogs without exceeding the 1,000 animal unit threshold. Minnesota's governor is also considering transferring environmental jurisdiction over dairy farms from MPCA to the State Department of Agriculture, a move that some animal factory opponents see as opening the way for large dairies to move into Minnesota.

Property Rights and Right to Farm Laws

Preliminary results from a state-by-state survey indicate that laws or right-to-farm acts that protect farms from nuisance suits over their operations exist in 43 states.⁸ Twelve states have specific laws protecting farmers from "takings" by government or neighbors.

Iowa

Iowa's Code illustrates typical right-to-farm language:

A farm or farm operation located in an agricultural area shall not be found to be a nuisance regardless of the established date of operation or expansion of the agricultural activities of the farm or farm operation.

In September 1998, the Iowa Supreme Court upheld the rights of landowners to bring a nuisance challenge against local factory farm owners.⁹ The factory farm owners had sought to gain an "agricultural area

designation" for their property that would protect them from nuisance suits by neighbors affected by their operations.

The Iowa Supreme Court ruled that nuisance suit protection for designated agricultural areas in Iowa was "flagrantly unconstitutional" because neighbors' property rights were being taken away without just compensation as required by the State and U.S. Constitution. When the factory farm owners attempted to take the case to the U.S. Supreme Court, the Court declined to hear it.

Right-to-farm acts directly prohibit local jurisdictions from regulating a "nuisance" on agricultural land. These laws also prevent local communities from regulating factory farm facilities, which many argue should not rightfully be called "agricultural."

North Dakota

EnviroPork is owned by North Dakota Pigs Cooperative, a group made up of 27 Minnesota farmers and feed dealers.¹⁰ EnviroPork has 5,000 sows that produce over 100,000 piglets annually. Neighboring landowners brought suits against EnviroPork for violating state odor rules an alleged 70 times and against the North Dakota Health Department for failing to enforce state rules.¹¹

On September 28, 1998, North Dakota District Judge Bruce E. Bohlman found that the classification of EnviroPork as a "farming operation" by the North Dakota Department of Health was "erroneous."¹² Relying on an earlier district court ruling that classified a feedlot as a beef factory,¹³ Judge Bohlman ruled:¹⁴

EnviroPork is not a 'farming operation' but a pig factory. There is no family farm here, no cultivation of the land, nor any other indicia of a farm. It is an industrial enterprise. It produces waste of a magnitude that clearly requires regulation. There is a clear difference between EnviroPork and a farmer wishing to spread manure from his cattle raised on the farm as fertilizer on his fields.

In fall 1999, Sarah Vogel, attorney for the plaintiffs, settled the lawsuit against the Health Department for \$15,000 and a promise that the Department would enforce the state odor rules.¹⁵ However, in December 1999, the Health Department announced that it reached a settlement with EnviroPork. This forestalled the enforcement action against the cooperative.

In the settlement, EnviroPork agreed to pay \$25,000 over three years to the University of North Dakota Energy and Environmental Resources Center for research into new ways to reduce odor levels below legal limits.¹⁶ The head of EnviroPork claimed victory, expressing satisfaction with the settlement.

Vogel asserted that the Health Department led a fight in the legislature to weaken state odor laws to accommodate EnviroPork.¹⁷ She commented further:¹⁸

The message the Health Department is sending is that people can violate the law until you get caught and then any fine will be suspended and all you have to do is what you should have been doing in the first place. You win a case and then they change the law. It's not a fair fight. It's citizens against big corporations.

Exemptions from Local Zoning

In eight states, animal factories and/or land applications of manure are exempted from local zoning authority.¹⁹ In ten states, local authority to regulate animal factories is restricted or preempted. Some state laws also contain loopholes that allow certain large corporate farms to qualify as family farms, which may be immune to nuisance suits or certain regulations. In Kansas, counties are allowed to exclude corporate animal factories from operating within their borders. Hodgeman County, Kansas, voted in a public referendum to ban corporate hog farms.²⁰ Shortly after the referendum, Murphy Family Farms announced it would construct an 11,000-sow operation there and the Kansas governor issued a permit for the operation. Murphy contended that it was not subject to the exclusion because it was a family farm. Families Against Corporate Takeovers (FACT) tried to prevent Murphy Family Farms from entering the county. Following the low prices of 1998, however, Murphy postponed plans for construction. Later, Murphy Family Farms was purchased by Smithfield Foods, which does not meet the definition of a family farm.

County and town or township governments in 21 and eight states, respectively, are involved in administration and enforcement of laws.²¹ Twenty-two states require local agency approval. Local jurisdictions in 16 states passed new ordinances or have policies regarding animal factories.

Concerning local control, rural sociologist Doug Constance has said: "Of course, firms don't want it. Firms want the widest geographical area with the same regulations so they can plan systematically their expansion."²²

Pollution Shopping by Corporate Interests

Animal factories engage in a form of "pollution shopping" by locating in communities or other geographical areas where few regulations exist that could impede their growth or where few people live who could mount strong opposition.

Corporate hog factory owners often target communities where a high percentage of residents are impoverished, disenfranchised, unorganized, and underemployed or unemployed, ensuring little or ineffective opposition.

When people of color populate these communities, this form of pollution shopping has been termed "environmental racism" and is a matter of great concern to environmental justice organizations.²³

According to activist Gary Grant of Halifax Environmental Loss Prevention, Halifax County, North Carolina, there are 100 counties in North Carolina, of which fifteen are the top hog-producing counties.²⁴ Fourteen out of the fifteen rank in the bottom 50% of North Carolina's state family income ranking. Thirteen out of the 15 have a 25% or higher African-American poverty rate. In Grant's words, "the corporate hog industry is not an example of economic development but rather another example of under development, just like the other unskilled, low-wage hazardous industries such as sewing factories, textile mills, and poultry processing plants."²⁵

It is commonly heard that if hog factories are not allowed to operate without restrictions in the United States, the hog industry will move to other countries. Hog factory supporters have used this claim to gain the public's support for their opposition to regulations on hog factory location and practices. Speaking of the expansion of Virginia-based Smithfield Foods outside U.S. borders, their chairman and CEO Joe Luter claimed, "the current hostility from interest groups in this country has made other parts of the world look good to us."²⁶

However, corporate hog factories are moving to other countries even though areas remain in the United States that are favorable to their expansion here. Carroll's Foods, Inc., was the first corporate hog producer to operate factory hog operations outside the United States with two operations in Brazil.²⁷ Carroll's also has a 1,300-sow hog factory outside the village of Perote near Mexico's Gulf Coast, about 150 miles east of Mexico City. Smithfield Foods, Inc., owns Carroll's.

Smithfield Foods, Inc., has a 50% ownership interest in a Mexican meat

processing and hog production company, Agroindustrial Del Noroeste (ADN).²⁸ Smithfield also acquired meatpacking companies in Canada, France, and Poland, where it is attempting to construct hog production facilities that would be among the largest in the world. Polish farmers who survived collectivism and competition from government-owned hog factories, with 80% of farmland still in private hands, now fear that they may not survive capitalism.²⁹ Smithfield Foods is encountering staunch opposition from family farmers in Poland, who have been joined by workers and other constituencies.^{30,31,32,33}

Moreover, animal factory investors from other countries are settling in the United States to get away from stricter regulations in their own countries. For example, hog factories owned by Japanese investors now operate in the United States in Texas and Wyoming. Dutch farmers are escaping a crackdown on pollution in the Netherlands by setting up large dairies in Indiana.³⁴

The expansion of U.S.-based corporate hog factories into other, often less developed or economically struggling countries, either through exports of U.S.-produced meat or through acquisition of local businesses, has the potential to harm emerging independent agricultural sectors in those countries.

In 1994, the North American Free Trade Agreement opened the borders for U.S. pork exports to Mexico but allowed the U.S. to bar Mexican pork imports ostensibly due to disease concerns.³⁵ Then, when pork prices worldwide plunged in 1997 and 1998, sales of U.S. pork to Mexico again surged, forcing many Mexican hog farmers out of business. Many of them went to towns or came to the United States to find jobs.

Led by integrated packer-producers, the U.S. hog industry is claiming a global market. Increasingly, independent family hog farmers in the United States may find they have more interests in common with independent family hog farmers in countries such as Poland, Brazil, and Mexico, where hog factory investors are making inroads, than they do with the owners of the hog factory down the road. The world is the new back yard.

However, as the following stories illustrate, hog factory owners do not have to go overseas or across the border to find vulnerable populations in need of economic development.

South Dakota

Bell Farms, LLP, is a North Dakota limited liability partnership that owns hog factories in Colorado. As Colorado was strengthening its

environmental laws, and as they had been rejected by the Winnebago Tribe of Nebraska,^{36, 37} Bell Farms approached the Rosebud Sioux Tribe (RST) of South Dakota in the spring of 1998 with a proposal to erect a \$105 million hog factory on tribal lands.³⁸

Rosebud Reservation has an 85% unemployment rate and is located in one of the poorest counties in the nation.³⁹ The need for the project was described as "poverty and lack of economic opportunity among reservations of South Dakota," while the proposed action was to "provide opportunity for economic prosperity to the area and tribal members."⁴⁰ South Dakota enacted an anti-corporate farming law in 1988 in response to an effort by National Farms to establish a hog factory there. In fall 1998, South Dakota's Constitutional Amendment E was passed, strengthening the State's position against corporate farming. However, because Indian lands are not subject to state laws, in September 1998, Bell Farms, Sun Prairie, a Nebraska partnership, and the Rosebud Sioux Tribal (RST) Council entered into a business relationship that would bring hog factories to the people of Rosebud Reservation.⁴¹ Bell Farms, LLP, signed an agreement with Sun Prairie to manage the Rosebud Pork Production Facility. Sun Prairie (the owner) signed a lease agreement with the RST Council in which Sun Prairie would finance facility construction and operation while the RST would put up the land, water, and human resources for sites and operations, along with various infrastructure improvements such as roads and an electric substation.

Upon completion of both phases of construction, 859,000 hogs per year were to be marketed under contract to Hormel Foods, Inc., of Austin, Minnesota. Under terms of the lease agreement between the Tribe and Sun Prairie, the facilities also would not be subject to governmental fees, sales or use taxes, real estate taxes, or similar assessments.

In addition to 150 estimated jobs during the construction phase, the completed project was to bring 220 permanent jobs for tribal members, with wages ranging from \$16,000 to \$50,000 per year.⁴² Profits from the completed venture were projected to be \$1,168,320 per year. This amount was to be split 25-50-25 to Rosebud Sioux Tribe, Sun Prairie, and Bell Farms, respectively, during a 15-year amortization period. At the end of this period, the lease stipulated that the Rosebud Sioux Tribe could buy out the facility at 50% of its original cost, or an estimated \$50 million. There is no indication that project proposers ever explained to the RST Council that the life expectancy of modern hog confinement buildings is only about 10 to 15 years.

The project was planned in two phases: Phase I, three hog finishing (wean to market) sites and Phase II, five sow production sites and five additional

finishing sites.⁴³ Altogether there would be 13 sites. A typical 120-acre, 24-building, 48,000-hog finishing site would have a five-acre anaerobic digester pond 32 feet deep and a 50-acre evaporation pond (lagoon) nine feet deep.⁴⁴ Each 35-acre, 5,000-sow production site would have an approximately 2.3-acre anaerobic digester pond 32 feet deep and a 20-acre evaporation pond nine feet deep.

Every two hours, hog and human wastes would be "flushed" from the buildings to the digester ponds.⁴⁵ Manure solids would be allowed to accumulate at the bottoms of the digester ponds while the separated liquids would be allowed to evaporate.

At the end of around 25 years of operation, it was expected that the manure solids or sludge rich with accumulated nutrients, as well as heavy metals would need to be removed from the ponds.

Because tribal lands are held in trust for the tribes by the U.S. government, the Bureau of Indian Affairs (BIA) must approve the lease and, in so doing, must comply with relevant federal laws, including the National Environmental Policy Act (NEPA).

A preliminary environmental assessment (EA) was prepared for the Tribe and the Bureau of Indian Affairs by RESPEC, a South Dakota engineering consulting firm.⁴⁶ During a public comment period, numerous tribal members and area residents, the South Dakota Department of Environment and Natural Resources, the Mellette County Board of Commissioners, and citizen groups pointed out inaccuracies and deficiencies in the EA and requested that an Environmental Impact Study be conducted.⁴⁷ Among the many concerns expressed was where manure would be spread if plans for evaporation failed.

Also left unspecified in the EA were the issues of how the sludge would be disposed of—landfill or spreading and where. Mellette and surrounding counties are made up largely of prairie and rangeland. Since Sun Prairie and Bell presumably would be out of the picture before 25 years had passed, this problem would be left for the RST to deal with.

Commenters also noted endangered species in the area; cultural sites important to the Sioux people; the conflict between hog factory methods and Native values regarding respect for animals and nature; water use; and serious unanswered questions and vaguely worded statements from RESPEC about animal waste management. They noted that the project would produce, in liquefied feces, waste equivalent to that of a city of around 3,000,000 people and urged careful consideration of the impacts of so much fecal waste on the area. RESPEC also had failed to evaluate

alternatives to the proposed project as required, other than a "non-action" alternative.

Nevertheless, on August 14, 1998, the local (Aberdeen) office of BIA issued a Finding of No Significant Impact (FONSI) and notified the public that the BIA would be approving the lease arrangement.

In the EA, RESPEC estimated that water use at the facilities would be 1.686 million gallons per day. The Tribe would supply approximately 400 gallons per minute from existing wells installed into the Ogallala Aquifer. This Ogallala water would be pumped north to the hog sites via distribution pipes constructed for the Mni Wiconi pipeline, a public works project that will supply Missouri River water to the Lower Brule, Pine Ridge, and Rosebud Reservations and nine counties in Southwestern South Dakota when it is completed.⁴⁸ The Mni Wiconi project was authorized by Congress in 1988 at \$87.5 million and expanded in 1994 to include the Lower Brule and Rosebud Reservations, raising the cost to \$251 million.⁴⁹ Water supplied by the project was allocated among these areas based on a needs assessment. An estimated 10 million gallons per day can be handled by the Mni Wiconi intake at Pierre, South Dakota.

RESPEC noted that the Tribe's allotment from the Mni Wiconi Rural Water System, which was intended to supply drinking water for the Tribe as well as water for some economic development purposes, would be completed by 2003 and could be used to "supply adequate water for the project."⁵⁰ However, this claim has been questioned by some who suggest that the amount of Mni Wiconi water allotted for all of the RST's economic purposes by the needs assessment could supply water to only one to two of the planned hog sites.⁵¹

In a letter of September 22, 1998, the Environmental Protection Agency (EPA), which found both the environmental assessment and the BIA's FONSI to be "significantly flawed," disputed the 1.686 million gallon per day water use estimate for the project.⁵² The EPA also disputed that the waste handling system would operate as described in the EA and that it would be a "no discharge" facility. (Waste discharges from large confined animal feeding operations must be permitted under the National Pollution Discharge Elimination System (NPDES) program by the U.S. Environmental Protection Agency. However, if it is expected that the facilities will not discharge (as in the case of the evaporation systems of the Rosebud Pork Production Facility), these are called "no discharge facilities" and do not need to be permitted under the NPDES program.)

The proposed venture divided the community.^{53,54} While most tribal members were unaware of the plans, a few tribal members and the

majority of the Tribal Council supported the project in anticipation of the jobs it would bring. Other tribal members, along with white ranchers who leased land from the tribe, opposed the project. They feared that the long-term cost of the facility would outweigh the benefits, that the project would conflict with Native values regarding treatment of animals and Mother Earth, and that the project would harm sacred sites, wildlife, and the environment, and affect the quality and availability of groundwater.⁵⁵

The Tribal Council rejected one Council member's request to hold a referendum to determine the desires of the Tribe as a whole. Said member Calvin Kelly Jones, Sr., "the (Tribal Trust) land belongs to everybody (tribal members). It's the tribal members, not the Tribal Council, who have the right to decide whether they want a major corporate hog facility."⁵⁶

The 16 Council members who voted for the development stressed the Tribe's serious need for jobs.⁵⁷ In September 1998, Neola Spotted Tail, acknowledged Elder of the Spotted Tail Clan, asked the South Dakota Peace and Justice Center, a 20-year old interfaith grassroots organization, for help in fighting the hog facility. Spotted Tail had asked the Tribal Council to rethink their support of the hog project. She said, "Yes, the people need jobs. But what kind of job is that for Lakota men? How long will they last? They won't be able to stand the smell and they won't treat the animals that way."⁵⁸

Over the next few months, students and concerned tribal members went from district to district and arranged public forums to inform tribal members of what was going on and how they could be affected by the project.⁵⁹ It took a long time for the community to be informed. Not every tribal member has a telephone and very few none in the outlying districts had fax machines or access to computers for e-mail. Some concerned tribal members did not have cars and had to "hitch" rides to reach other tribal members living in remote areas of the Reservation. Individual tribal members spent many hours in this effort to inform the rest of the Tribe of the project and their concerns about its implications for the welfare of the Tribe.

Student leaders at Sinte Gleska University researched hog factories and presented an analysis at a Tribal Council meeting. They concluded that the hog factory development "would be the worst business venture the Tribe has ever passed without public consensus," and that the only people who would benefit in the long run were with the contracting companies, not the Tribe or its members.⁶⁰

Leo Campbell voiced the students' concern over the lack of control the Tribe would have over the project:⁶¹

Corporate farm operations seek limited liability contracts with vulnerable communities. People often use a corporate form of doing business in this industry to avoid the consequences of environmental and economic damages. With a 'limited liability partnership,' the short-term and long-term environmental damages will revert to the Tribe. The next generations of tribal members will end up paying.

In fall 1998, tribal members and white Mellette County ranchers formed Concerned Rosebud Area Citizens (CRAC). South Dakota Peace and Justice Center sought help from the Indigenous Environmental Network (IEN), an "alliance" of Native American community-based groups, tribal communities, tribal environmental staff, and others. The IEN assisted CRAC members to travel to a Baton Rouge, LA, meeting of the EPA National Environmental Justice Advisory Council (NEJAC), where they obtained NEJAC support of the Rosebud tribal hog farm issue as an "environmental justice issue."[62](#)

In fall 1998, the President's Council on Environmental Quality (CEQ), which oversees NEPA, became involved and started to express concerns regarding the project's compliance with NEPA. In November 1998, CEQ convened meetings with staff from the BIA, EPA, and Department of Justice regarding the Bell Farms issue.[63](#) In an internal memorandum obtained through the Freedom of Information Act by Nancy Hilding, President of the Prairie Hills Audubon Society, a CEQ staff member analyzed aspects of RESPEC's Environmental Assessment and concluded that the FONSI "appears to violate the letter and purpose of NEPA."[64](#)

On November 23, 1998, CRAC, the Prairie Hills Audubon Society, South Dakota Peace and Justice Center, and the Humane Farming Association the litigants brought suit in Federal District Court in Washington, DC, against the U.S. Bureau of Indian Affairs. At issue was BIA's approval of the land use by the project despite what the groups identified as violations of the National Environmental Policy Act (NEPA) during the environmental assessment process.[65](#)

On December 11, 1998, Alan Bakeberg, Natural Resources Engineer with the South Dakota Department of Environment and Natural Resources, wrote a scathing ten-page criticism of the hog factory plans and the proposed environmental mitigation measures, disputing whether the waste management system would work as described by Bell Farms, BIA, and the RST.[66](#) Bakeberg also noted that both the EA and the BIA's FONSI had stated that the State of South Dakota standards would be used as design guidelines and that the State would be allowed to review and comment on the design prior to construction. However, despite the fact that Bell Farms

had started construction in October 1998 and the first site was nearly complete at the time of Bakeberg's letter, Bakeberg further noted that:⁶⁷

complete plans and specifications for this "proposed" project have not yet been submitted by the Tribe to the department for review and comment and we have had to obtain much of the information from EPA to complete our review.

[C]onstruction of this facility prior to submitting complete plans to the department for review and comment is not in compliance with the Mitigation Measures listed in the EA report and the BIA FONSI for this project. Construction of the facility prior to allowing DENR reasonable time to fully review and comment on the design indicate that the sponsors do not intend to consider the department's comments on the design, construction, or operation of this facility. Furthermore, if construction of this facility prior to DENR's review and comment is acceptable to the Tribe and BIA under the conditions set in the Mitigation Measures and FONSI, we seriously question whether any of the other mitigation measures listed will be followed by the sponsors or enforced by the Tribe or BIA.

Bakeberg called the company's anaerobic digesters and evaporation ponds "lagoons" and "flush pits" because the technical specifications followed in the construction were not adequate to achieve the breakdown of volatile solids that is supposed to occur in a digester. He also disputed that the evaporation ponds were large enough to work properly. Bakeberg concluded that the waste management system as constructed would not have been adequate to meet South Dakota's qualifications for a General Permit.⁶⁸

Subsequently, representatives of the local BIA, the RTC, and Bell Farms met at EPA's Denver offices in January 1999 and delivered to EPA staff revised technical design specifications from Bell Farms. Based on these revised designs, EPA now contended that there should be no significant impact from the facility and that the waste management system should operate as designed,⁶⁹

assuming [the facility] is constructed and managed as described in the technical design specifications[and] with the understanding that the proposed anaerobic lagoon digester process employs a new, promising technology which should largely mitigate odor problems. (emphasis added)

The EPA further concluded that:⁷⁰

*there is a reasonable likelihood that the facility will not have a wastewater discharge within the next 25 years if constructed, operated and monitored as designed.
(emphasis added)*

Finally, the EPA "strongly recommended" that:⁷¹

before operations begin, the BIA and the Tribe, with EPA assistance if you wish, work to ensure a sufficient resource base for the Tribe to regulate the facility and perform its monitoring and enforcement responsibilities.

Meanwhile, in the course of the CRAC, et al. litigation, Justice Department lawyers, on behalf of BIA, filed a pro forma "denial of legal liability," claiming that the "environmental assessment was in compliance with federal environmental and historic preservation laws."^{72,73} One day after the Justice Department filing, however, Kevin Gover, Assistant Interior Secretary for Indian Affairs in Washington, DC, voided the lease between Sun Prairie and RST, as he concluded that the environmental assessment had been inadequate and felt it was important to establish the environmental impact of the project.⁷⁴ The litigants' then settled the case.

At this development, attorneys representing Bell Farms and the Tribal Council brought suit against the BIA in Federal District Court in South Dakota aiming to overthrow BIA's decision to void the lease. The litigants Concerned Rosebud Area Citizens, Humane Farming Association, Prairie Hills Audubon Society, and South Dakota Peace and Justice Center then intervened on the side of the BIA to affirm its decision to void the lease.

Federal District Court Judge Charles Kornmann at Pierre, South Dakota, heard the case. Judge Kornmann accused Gover of abusing his discretionary powers and acting in an "arbitrary and capricious" manner when he ordered work stopped on environmental grounds.⁷⁵ In February 1999, Judge Kornmann issued a preliminary injunction enjoining the BIA and the interveners from taking any action that might interfere with the construction and operation of the first phase of the project while he studied the issues. He promised he would render a swift decision.⁷⁶ The intervening groups appealed Judge Kornmann's preliminary injunction arguing they ought not to have been included in the injunction. The BIA also appealed the injunction.

Meanwhile construction went ahead. The first of the project's thirteen sites

a 24-building, 48,000-hog finishing installation was completed and began operating in March 1999.

Even though the purpose of the project was to bring much needed jobs to the Rosebud tribal people, fewer than one-third of the workers employed at the facility are enrolled tribal members.⁷⁷ As of March, 2000, there reportedly were still only five tribal members employed at the facility.⁷⁸ During the construction phase of the project, in which 150 jobs had been promised to tribal members, the out-of-state builder brought in most of its own workers. Three graduates of the Reservation's Sinte Gleska University were given managerial positions on the hog farm and sent to Colorado for training, but they were not tribal members.⁷⁹ Tribal members received more menial jobs, even though Sinte Gleska University graduates qualified tribal members every year.

Nearby residents complain of terrible odors emanating from the site, despite the EPA's presumption, based on claims by Bell Farms, that the "proposed anaerobic lagoon digester process employs a new, promising technology which should largely mitigate odor problems."

By the time of the August 1999 primary election for Tribal Council, enough tribal members had become fully informed that most now opposed the Rosebud Pork Production Facility project, even though a handful of tribal members had been given jobs at the facility.⁸⁰

In the October 1999 tribal election, the Tribal Council chairperson and Tribal Council members who brought in the hog facility were voted out and new Council members were elected.

The first act of the new Tribal Council in 2000 was to pass a resolution concerning the Bell Farms-Sun Prairie-Tribal partnership.⁸¹ The resolution called for:

- an examination of the legality of the contracts and leases entered into with Bell Farms,
- a full Environmental Impact Study on the entire facility to be conducted by the Bureau of Indian Affairs,
- no further expansion of the facility until the results of the first two investigations are known,
- a report on the costs to the Tribe of withdrawing from the agreements the previous Tribal Council entered into with Bell Farms,

- an investigation of the ramifications and consequences of withdrawing from the pending litigation brought by the previous Tribal Council and Sun Prairie against the BIA,
- an exploration of the Tribe's options for withdrawing from the litigation, and
- a non-binding referendum of the people regarding acceptance of the pork production plant.

Meanwhile, nearly a year had gone by without the speedy decision Judge Kornmann had promised the interveners and BIA back in February 1999 when he handed down the preliminary injunction prohibiting them from taking further actions to prevent the hog facility from being built.⁸² In January 2000, a date for oral argument on the interveners' appeal finally was set for February 17, 2000. On February 3, 2000, only two weeks before the oral argument was scheduled and almost a year after he issued the preliminary injunction, Judge Kornmann made the February 1999 preliminary injunction final. His act rendered the groups' appeal moot and permanently barred both the groups and the BIA from interfering with either phase of construction and operation of the hog factory project.

In a Rosebud Sioux Tribal (RST) Council session of February 9, 2000, the following motion was made and carried:⁸³

that the Chairman and the RST Council request to meet with the interveners and Washington officials, in order to make [an] intelligent decision; and that the Council's concerns are now consistent with the intervener's concerns.

In May, a non-binding referendum of the people was held and the hog factory development was rejected by the voting tribal members. The situation for Rosebud citizens is complicated because, in order to show Bell, Sun Prairie, and Hormel that the Tribe would be a responsible business partner, the previous Tribal Council gave up the Tribe's sovereign immunity from legal liability.⁸⁴ This allows the other partners to sue the Tribe in State or Federal Court if they have a complaint over how the Tribe is conducting its part of the agreement.

The Tribe is deeply concerned that withdrawing from the project now could result in a lawsuit by Bell Farms and Sun Prairie that could require the Tribe to pay Bell Farms and Sun Prairie a sizeable settlement to close down the operation.⁸⁵ At the same time, the new Council chairperson has voiced concern that the "costs could be higher for cleaning the site up after Bell Farms is finished."⁸⁶

The previous Tribal Council cannot be blamed for its efforts to alleviate Rosebud's unemployment and poverty. Tribal Councils are between a rock and a hard place and, as will be seen below, they are not the only ones to be persuaded by corporate hog factories' promises of economic development and prosperity and assurances of environmental care.

A few menial jobs for tribal members have resulted from the hog factory development so far. At what cost were these jobs obtained? Is there a more wealth-creating, self-reliant, culturally-compatible source of economic development for the Tribe? Ideas that have surfaced at Tribal meetings include wind power that could take advantage of the strong prairie winds and a credit card service agency.⁸⁷ There also may be economic potential for the Tribe in reestablishing bison culture.

A pernicious aspect of animal factory development by outside investors in depressed communities, particularly when it requires a substantial public outlay of financial and other resources, is that very often the animal factory's presence (and even its departure), as well as the money vacuum created by the community resources its owners have consumed, effectively precludes other kinds of major investment by that community. Further economic development at Rosebud, for example, likely will be limited to enterprises that will not further stress the Tribe's water allotment from the Mni Wiconi project.

In the case of the Rosebud Farms Pork Production Facility, conditions of the Tribe's lease with Sun Prairie, LLP, include that no livestock operation competitive with the project be operated on the Tribe's tribal, trust, or reservation lands or on any other lands owned or controlled by the Tribe; that livestock operations already existing within five miles of the project's 13 sites not expand beyond their current capacity; and that no new livestock operations shall be built or operated by the Tribe or allowed to operate by the Tribe on its tribal, trust or reservation land, or on any other lands owned or controlled by the Tribe within a five-mile radius of the Project.⁸⁸ Hence, even sustainable alternatives to the hog factory are not allowed under the lease.

In early winter, Bell delivered the first quarterly profit sharing check to the Tribe. It was for \$5,000. The Tribe turned it down.⁸⁹

Judge Kornmann's February 3, 2000, judgment overturned the decision by the U.S. BIA headquarters to void a lease agreement improperly approved by a local BIA office. The BIA's grounds for overturning the decision were that the permitting and approval process violated the National Environmental Policy Act (NEPA) and an environmental impact statement was needed before deciding whether or not to go ahead with the project. According to Jim Dougherty, attorney for the four citizen groups, the

decision by Judge Kornmann to tie the hands of the U.S. BIA and the litigators/interveners is already having repercussions in environmental disputes in the western United States, because the decision implies that regional agency personnel have the final say over issues falling under the purview of NEPA and that when the National office orders an Environmental Impact Statement, the order can be safely ignored. It is important that the interveners and the U.S. BIA prevail upon appeal.

Corporate welfare

Pollution shopping by corporate hog factories can be accompanied by a different kind of shopping, when animal factory investors seek out communities that are willing to offer financial incentives to firms to locate in their areas. Hog factory proponents dangle the hope of much-needed jobs and local business renewal to leverage permit approvals, tax reductions, revenue sharing, and other perks from the community and/or state targeted for development.

Ten states report having special tax incentives for expansion of animal factories.^{[90](#)}

In a recent report entitled "Corporate Hogs at the Public Trough," the Sierra Club details the payment of millions of taxpayers' dollars to ten, wealthy, corporate hog factories "from Utah's red-rock country to Maryland's Chesapeake Bay."^{[91](#)} One of these states is Oklahoma.

Oklahoma

In 1979, Oklahoma had 10,000 hog farmers raising more than 300,000 hogs. By 1998, it had 3,100 producers raising 1.77 million hogs.^{[92](#)} The fastest growth in hog numbers is in the Oklahoma Panhandle where Seaboard Corporation carries out much of the increased production on factory hog farms.^{[93](#)}

The story of Seaboard Corporation's journey from Albert Lea, Minnesota, to the Oklahoma Panhandle and the town of Guymon, capturing lucrative financial concessions in return for economic development and leaving behind economic misery instead, is told in Time magazine's series on corporate welfare.^{[94](#)}

In 1996, Carla Smalts, a Safe Oklahoma Resources Development (SORD) founder and Guymon rancher, described the personal and social toll Seaboard's arrival in the Panhandle has taken on Oklahoma residents:^{[95](#)}

Seaboard Farms left Albert Lea, Minnesota to come to Guymon and began buying land and building a packing plant. They bought land at inflated prices sometimes double what it was going for. They were given tax abatements, zero percent loans, and recently were given a \$10 million tax revenue sharing bond.

Is this economic development? Our tax dollars are going to pay for a new jail, a new hospital, a new school, more patrolmen, and new judges because the social services have definitely increased along with crime and especially domestic violence. Land prices have escalated to the point where it is impossible for young farmers to get started and others to expand. Our ad valorem taxes are increasing but property values next to a hog site are lowered.

Smalts described a situation that citizens of other states know all too well:[96](#)

Up until 1991 we had an anti-corporate farming law that was changed in the twinkling of an eye. Our regulatory agencies changed rules and regulations without people even being aware of what was happening to the point where we have no county regulations, no local government control.

Carla Smalts passed away in 1998, but her words still speak for many communities reeling from the impact of corporate hog factories.

In 1999, the North Central Regional Center for Rural Development (NCRCD) at Iowa State University published a report for the Kerr Center for Sustainable Agriculture on the economic and social impacts of the "industrial recruitment strategy" for rural development. The NCRCD used Seaboard Corporation's move to Guymon, Texas County, Oklahoma as a case study.[97](#)

The federal, state, and local public sectors have a direct investment of over \$60 million in the Seaboard Corporation operations in Texas County, provided through publicly repaid bonds, taxes foregone, interest subsidies, and grants.[98](#)

The state also provided employee training in breeding, farrowing, nursery, growing and finishing for Seaboard's pork production facilities as well as company orientation, safety, management training, quality assurance, maintenance, butchering, boning, equipment and tools handling, Spanish,

and other training for its slaughter-processing plant.⁹⁹

Seaboard also benefited from a lack of clarity in state government definitions. It was viewed as a regular Oklahoma corporation as well as an agricultural enterprise. This allowed Seaboard:

*both manufacturing and agricultural exemptions, financing of the hog lagoons by Industrial Revenue Bonds as manufacturing facilities, as well as an agricultural exemption from sales tax as a farming facility [M]any of these sources of support are not available to non-corporate hog producers.*¹⁰⁰

The NCRCD researchers conclude that the true "cost" of a job in the hog industry in Texas County and Guymon, its county seat, is over 50% higher than the average wages paid to the employees.¹⁰¹ This true cost is comprised of tax incentives, tax rebates, and permissive land lease agreements; human costs including education and security issues; and environmental costs including air pollution, water and soil degradation, and odor.

Frequently, hog factory proponents claim that the rise of corporate hog factories and other concentrated animal feeding operations is an inevitable outcome of market forces at work. The NCRCD researchers point out that the industrial recruitment strategy that brought Seaboard Corporation to Texas County and Guymon is a case of "state-directed, rather than market driven, in-troduction of new economic activity."¹⁰²

The NCRCD researchers concluded that the main beneficiaries of the arrangement between Texas County, Oklahoma, and Seaboard Corporation are the stockholders of Seaboard.¹⁰³ Seventy-five percent of shares in Seaboard are owned by a single Boston family that runs the corporation.¹⁰⁴ The NCRCD report concludes about the impacts on employment and community well-being: ¹⁰⁵

What was needed was not new jobs but a chance to lessen the gap among locals by creating wealth from within the region rather than from outside. The emphasis on economic development favors job creation, without recognizing the types of jobs that are being created or whether the community was as socially and culturally prepared as a community development approach would encourage.

Missouri

Prior to 1993, the State of Missouri banned corporate farming. In 1993, an amendment riding on an economic development bill changed that, allowing corporate farming in three northern tier counties, Mercer, Putnam, and Sullivan.¹⁰⁶ Shortly afterwards, Premium Standard Farms (PSF) targeted these three counties for development of a vertically-integrated hog production and meatpacking operation.

Missouri's Department of Economic Development provided \$1.34 million in Community Block Grants for infrastructure development.¹⁰⁷ The grant was made to encourage PSF to locate in the area. This was followed by a \$200,000 offer of job training assistance.

The Sullivan County Enterprise Zone offered PSF's Milan slaughterhouse a 100% tax abatement on real property for 18 years.¹⁰⁸ The electric company offered abnormally lower discount rates of two to three cents to PSF, compared to other farmers who pay six to ten cents.

In January 1994, residents of Lincoln Township, Putnam County, learned that PSF was interested in purchasing land in their township to build a confinement feeding facility for 105,984 hogs.¹⁰⁹ On February 25, Lincoln Township officials placed the question of enacting township planning and zoning laws on the June 7 ballot. By early April, PSF purchased 3,000 acres in the township.

On June 7, Lincoln Township residents voted 2-1 to enact planning and zoning laws, and an ordinance was adopted June 29. The zoning ordinance was designed to protect property values, secure the most economical use of land, and facilitate the adequate provision of public improvements by regulating a wide variety of land uses. Despite the ordinance, PSF constructed nine lagoons and 72 hog confinement structures in Lincoln Township without seeking a permit or attempting to design the project so as to comply with the ordinance.

After being contacted by the code enforcement officer about the need to comply with the township ordinance, PSF filed a lawsuit seeking \$7.9 million in damages from the township. Officials for PSF did not disclose the actual cost of compliance with the ordinance. The PSF lawsuit against Lincoln Township is an example of a "SLAPP" suit strategic lawsuits against public participation. SLAPP suits are designed to intimidate citizens and local governments, to stifle opposition, and prevent them from regulating the activities of those initiating the SLAPP suit.

In October 1994 Lincoln Township filed a counter-suit, seeking enforcement of the zoning ordinance and abatement of the facility on the

grounds that it was a public nuisance.

The David against Goliath image of tiny Lincoln Township, with fewer than 250 residents, being sued by a multimillion-dollar corporate hog factory, with the clout of Morgan Stanley and Chemical Bank to back it, brought sympathy from many quarters. In March 1995, the newly-formed national Campaign for Family Farms and the Environment worked with Township residents to organize an April 1st rally in Lincoln Township that would show support for the residents and opposition to factory hog farms. In a remarkable one-day event, three thousand people from Minnesota, North Carolina, Oklahoma, Iowa, Missouri, and other states, drove by car and came by buses to the little green in back of the Lincoln Township town hall to show their support.

Musician and FarmAid co-founder Willie Nelson drove from Texas to welcome and thank the crowd for their support of the small farmers and other residents of Lincoln Township, and to entertain them with music. Thirty-five speakers represented environmental protection, animal welfare, and family farm groups, along with representatives from the United Auto Workers, Southern Christian Leadership Conference, United Rubber Workers, and the Federation of Southern Cooperatives/Land Assistance Fund.¹¹⁰

In March 1995, PSF dropped the monetary part of its lawsuit against Lincoln Township but refused to abide by the ordinance. Subsequently, the court ruled the Lincoln Township ordinance void.

Premium Standard Farms was touted widely by the industry as a model of the efficiency that could be achieved by a fully integrated pork production firm. In 1996, Premium Standard Farms filed bankruptcy, ridding itself of around \$450,000,000 in unsecured debt, and then reorganized, largely debt-free, and continued to operate.

In 1997, Citizens Legal Environmental Action Network (CLEAN), a group of Lincoln Township citizens, sued PSF for violation of the Federal Clean Water and Clean Air Acts.

In 1998, Continental Grain purchased 51% of PSF.

On January 13, 1999, the Ozark Chapter of Sierra Club sent out a press release describing the results of an on-site inspection of PSF that was court-sanctioned as part of the discovery process in the CLEAN suit.¹¹¹A CLEAN spokesman said "[m]any lagoons were dangerously overfull and evidence of what appeared to be leaks were noticed below the cess pits. Trash and veterinary wastes were floating in the pits, and pig bones and

drifts of maggot cases were washed up at the edge."¹¹²

Premium Standard Farm's monitoring data, reviewed by Missouri officials, according to the Sierra Club press release, "document severe bacteriological pollution of PSF's network of twenty-four fresh water lakes, totaling 825 surface acres. PSF is currently abandoning this network of lakes and hooking its production facilities into rural water lines, apparently due to this coliform bacteria contamination."¹¹³

Following the press release, PSF accused the Sierra Club and CLEAN of libel, demanding retractions and corrections to an e-mail alert the groups had sent to farmers, environmental groups and volunteers. Ken Midkiff, spokesman for the Ozark Sierra Club, said that neither the farm families in CLEAN nor the Sierra Club will be "bullied into silence."¹¹⁴

On January 19, 1999, Missouri Attorney General Jay Nixon filed a lawsuit against Premium Standard Farms, alleging PSF to be in violation of state environmental laws at its facilities in northern Missouri.¹¹⁵ Nixon asked the Jackson County Circuit Court to order PSF to cease breeding operations until the company implemented a court-approved waste management plan. The lawsuit also asked the court to order appropriate penalties for past violations. He stated, in part, that:¹¹⁶

PSF has failed in its obligations to obey the law, to not despoil the environment, and to be a good neighbor to those Missourians whose families have been farming this land for generations. The violations have been numerous, they have been ongoing and, in some cases, they have been unreported. PSF has stymied our efforts to reach a resolution without filing suit. We are now asking the courts to stop those violations and assess penalties.

Nixon said ongoing negotiations had broken down in December 1998 between his office and PSF after the state learned that the company had been over-applying hog waste on agricultural land at several locations. Specific violations cited in the lawsuit included:¹¹⁷

- *Spills of hog waste that caused fish kills in 1997 in Spring Creek. One was not reported to the 24-hour hotline of the Department of Natural Resources until more than 16 hours after it occurred;*

- *At least 11 spills in 1996 and 1997 that went unreported to the DNR until December 1998;*

- *Deficient construction of the piping systems;*

· Operating a facility holding substantially more nursery pigs than DNR authorized the facility to hold.

Nixon also stated in his lawsuit that PSF has operated its facilities in such a manner as to constitute a public nuisance, emitting offensive odors at "frequencies, intensities and for durations that are unreasonable:"[118](#)

For the families that live in any kind of close proximity to a PSF hog operation, there has been a profound negative impact on the quality of their lives because of the uncontrolled stench that comes from tens of thousands of pigs whose manure and urine are unreasonably handled.

Nixon was in the process of negotiating a settlement with PSF when, on July 23, 1999, the U.S. Department of Justice, on behalf of the U.S. Environmental Protection Agency, filed legal motions in federal court to intervene in CLEAN's lawsuit.[119](#) The EPA's new investigation, begun at CLEAN's request, "revealed significant violations of the Clean Water Act." The Justice Department seeks fines of \$25,000 per day for each violation before January 31, 1997, and \$27,500 per day for each violation after that.

On July 30, Attorney General Nixon filed a consent decree with the courts. The consent decree was hailed by PSF as eminently fair.[120](#) It would fine the company \$1,000,000, with \$650,000 paid up front by PSF and Continental Grain. The companies would not be required to pay the remaining \$350,000 if they spent \$25,000,000 (or less, if a team of experts agreed it could be done for that) to clean up the PSF operations in Northern Missouri within the next five years. CLEAN members feared that the consent decree could amount to a \$650,000 fine and continuation of the status quo. Meanwhile, more pollution incidents occurred.[121](#)

Premium Standard and Continental Grain filed a motion for summary judgment on the CLEAN suit. However, on February 23, 2000, Judge Sachs denied the majority of their motion. CLEAN lost violations that had been part of the Attorney General's consent decree, but "the vast universe of past and continuing violations against both companies is intact and headed to trial."[122](#)

The Ozark Sierra Club acknowledges that PSF created jobs, but asks "at what cost?"[123](#)

Putnam County's average unemployment rate for 1998 was 4.8%, up from 1992's rate of 3.5%.[124](#) Between 1990 and 1996, Putnam County had the

slowest growth in personal income of any county in Missouri, 17.9% over six years. Missouri's average was 36.1%. Domestic violence has increased each year since reporting began in 1992. Since 1993, Missouri has lost over 60% of its family farmers. And, two recent University of Missouri studies indicate that large-scale swine and poultry operations may be depressing rural property values.^{[125](#),[126](#)}

The effects of the conflict in Lincoln Township, as in all communities where hog factories settle, are lasting. In the words of Scott Dye, whose family owns a century farm in Lincoln Township:^{[127](#)}

[W]hat is truly worst, is that PSF has forever shredded the social fabric of our once tightly knit community, pitting neighbor against neighbor, factionalizing, bullying and intimidating local residents and farmers.

Utah and Idaho

Circle 4 farms came to Beaver County, Utah, after two local businessmen approached Virginia-based Smithfield Foods, Inc. about locating there. Circle 4 was a conglomerate made up of Smithfield, Murphy Family Farms, Prestage, and Carroll's Foods. As an article in the Salt Lake Tribune of November 10, 1997, noted, "conflicts of interest abound."^{[128](#)}

In 1994, the Utah legislature passed a bill aimed at reducing agribusiness's exposure to nuisance lawsuits. Circle 4's attorney drafted the Agriculture Protection Act of 1994 based on conversations with Smithfield Foods.^{[129](#)}

The governor of Utah appointed a Circle 4 development director to the state Water Quality Board.^{[130](#)} "There's more than one thing that stinks out here" was the comment of a Milford, Utah farmer, referring to the conflicts of interest and the control Circle 4 has come to have over the community.^{[131](#)} Smithfield Foods, Inc. is now the sole owner of Circle 4 Farms and intends to expand the operation. Currently the operation has 44,000 sows and is applying for permits for another 33,000 sows.^{[132](#)} Nearly a hundred lagoons pock the countryside around Milford.

As in other states, the arrival of Circle 4 and its continued presence have divided the community. As in other states, Circle 4 owners benefited immensely from taxpayer dollars. In January 1997, a bill was passed by the legislature that put up \$1 million in state money to help the company build an access road to its feed mill, part of \$3 million from the Utah legislature spread over three years.^{[133](#)} One and one half million dollars in state funds have been spent to pave a 25-mile access road to the facility and install turn lanes and a railroad crossing. The town of Milford donated

portions of an industrial park, already served with water, sewer, and electric lines, for the slaughterplant. A landfill located along the Beaver River allowed Circle 4 to dump dead hogs at reduced prices.

Circle 4 has spilled 80,000 gallons of liquefied manure into an aquifer used for drinking water. Between April and July 1998, workers were hospitalized after exposure to high levels of hydrogen sulfide, methane and ammonia.¹³⁴ In 1998, one worker was electrocuted by a high pressure water sprayer used to wash down crates and pens after pigs leave. Researchers are studying why respiratory illness rates (per 10,000) were four times higher in Milford residents than in Utah as a whole and double those for two similarly sized towns.¹³⁵ Between 1995 and 1998, when Circle 4 was operating, respiratory illness rates in Milford doubled. Diarrheal illness rates in Milford averaged eight times more in Milford than for the state as a whole and spiked in 1997-1998.¹³⁶ Researchers have not pinpointed the cause but hope to use DNA fingerprinting techniques to trace the movement of pathogens and identify sources. However, the illnesses are typical of illnesses experienced by neighbors of other large hog facilities using liquid manure disposal methods.

Idaho is home to Sawtooth Farms, a newly-formed partnership of Bell Farms and the Anderson Group in cooperation with a Twin Falls, Idaho packer. Sawtooth plans a 250,000-sow operation filling a 15,000-head-a-day packing plant.¹³⁷

Neither Utah nor Idaho has prohibitions against corporate livestock farming, packers owning or contracting livestock supplies, or packers providing price premiums or long-term minimum-price contracts for large suppliers of livestock. Neither has laws that limit marketing alliances, networking, or closed cooperatives for confined livestock operations.¹³⁸

Both states provide nuisance suit protection to hog factories, including right-to-farm legislation.¹³⁹ Idaho has one of the strongest laws specifically exempting farm animals and farming practices from protection under state anticruelty statutes.¹⁴⁰ It should be obvious why hog factories push for legislation to weaken state anticruelty statutes, making practices that would be subject to prosecution if performed on companion animals legal for farm animals. If the same laws applied to both, hog factories in most states would not be allowed to reduce the per-sow cost of capital investment in facilities by housing sows in crates that prohibit them from walking or turning around, warehousing them by the thousands at a single site. Without this major economizing factor, it is doubtful whether hog factories could grow so large and still survive economically.

A Pattern Emerges

In nearly every case, as if there were a blueprint, the pattern of corporate invaders is similar. Dr. Laura DeLind describes this pattern succinctly in her summary of the grassroots protest by Farm Environment Defense Foundation (FEDH) against Jackson County Hog Producers (JCHP), a ten-site, 480 sow-per-site operation in Jackson County, Michigan.¹⁴¹

Although the FEDH won its battle, the victory was bittersweet. As the JCHP had presented itself as simply another beleaguered farming operation, the battle became "reinterpreted by agribusiness as an assault on the 'right to farm' of all farmers regardless of scale and organizational management."¹⁴² This reinterpretation led to development of state right-to-farm guidelines that disadvantaged rural residents and smaller farmers. Further, the right-to-farm argument:¹⁴³

recast a complex agro-environmental issue into an issue of individual entitlement. Within this context, it mystified the social and political dimensions of the original issue by reducing them to a set of technical problems (i.e., odor, surface water contamination) amenable to individually managed solutions. It likewise concealed the class divisions that were developing between corporate farmers and family farmers (and in this case rural residents generally) by polarizing producers and nonproducers, agriculturalists and environmentalists.

Buried in the technical arguments that put the debates into the hands of "experts" far removed from the consequences are the critical issues of the loss of state and local democracy and the capitulation of public institutions to corporate interests.

The mixed outcome of the struggle in Jackson County, Michigan serves as a warning against allowing agribusiness to reduce the original issue to a set of technical problems, each of which can be solved individually.¹⁴⁴ As this report shows, the factory farm problem has many dimensions. It cannot be solved by the resolution of one or more individual technical problems.

Some Strategies and Action Alternatives for Improving the Social Accountability of Animal Production

1. Fight the activities of agribusiness and animal factory supporters that influence legislators to weaken state anticruelty statutes to allow practices, which would be considered cruel if applied to dogs or other pets, to be used with farm animals. Proactively, hold referenda or ballot initiatives to ban certain cruel

practices that favor the profitability of animal factories over independent family farms.

Rationale: Equipment to restrain sows and prevent them from walking or turning around for their entire adult lives would be illegal if applied to dogs; yet pigs have learning abilities similar to dogs and rank behind humans and dolphins in intelligence. Weakening animal cruelty statutes to exclude "normal" agricultural practices benefits animal factories more than independent family farmers because, without intensive confinement practices, animal factories would not be able to achieve the economies of scale that allow them to grow, almost without limit, and squeeze smaller competitors out of the market. Fighting this issue is cost-effective because it will not only make farm animals' lives better but will eliminate a significant "economy of scale" contributing to proliferation of animal factories.

2. Repeal "food disparagement" laws.
3. Enact laws that protect citizens from being sued under state laws intended to stifle dissent, such as strategic laws against public participation (SLAPP).
4. Support citizen efforts at the state and local levels to maintain local county, township, and municipality control over zoning and siting of large-scale animal factories.
5. Help citizens mobilize, develop, and collect written and video materials, and hold community assemblies, to educate community members about the economic, environmental, public health, and ethical issues surrounding the siting and operation of animal factories.
6. Help citizens collect and disseminate information developed by other citizen organizations to make anti-factory farming activities at the state, township, county, and municipal levels more effective.
7. Help citizens collect and disseminate information to community members promoting more sustainable agricultural development alternatives in their communities.
8. Support state and regional level citizen action organizations, with funds to hire staff devoted specifically to fighting the proliferation of animal factories and making existing animal factories accountable to the public.
9. Help fund development and dissemination/broadcast of public service announcements and other public education efforts by citizen groups.

10. Support groups assisting the Rosebud Sioux Tribe in its efforts to extricate itself from the lease agreement that commits them to providing infrastructure, resources, and labor for a major hog factory development there; particularly the appeal effort of groups that were permanently enjoined from taking actions that might impair the construction and operation of the hog factory development by South Dakota District Court Judge Charles Kornmann

Rationale: (1) The people of Rosebud are saddled with a hog factory development that most do not want, that they feel is not delivering on its original promises, and that will have potentially devastating economic, environmental, and cultural effects on their community now and in the future. At the same time, extricating themselves from the lease arrangement and from the legal pairing with Sun Prairie and Bell Farms could be costly. What is the Tribe's legal liability? From the standpoint of economic and environmental justice, it is important that the appeal be won.

(2) Judge Kornmann's judgment overturned the decision by the U. S. BIA headquarters to void a lease agreement approved by a local BIA office. U.S. BIA's grounds for overturning the decision were that the permitting and approval process violated the National Environmental Policy Act (NEPA) and an environmental impact study was needed before deciding whether or not to go ahead with the project. It is important to get Judge Kornmann's judgment overturned on appeal. As it stands, according to the attorney for the litigators, the judgment is already affecting environmental decisions in other parts of the country where local agency personnel cave in to pressures by hog factory interests.

11. Help support communications among groups and especially among group members who belong to disenfranchised or impoverished communities that often are the target of corporate hog factory investors.

Rationale: Individuals in these communities have few resources to expend on things other than daily necessities. Most do not have access to internet or computers or fax machines or office supplies. Some may not have telephones or personal transportation. They need funds for basic equipment to do their work.

12. Help local groups fund individual group members who end up spending the bulk of their time in organizing and advocacy, but who cannot afford to do so without compensation.
13. Help citizens investigate animal factories. Require owners and

investors in animal factories to be identified in the public record during the permitting process and require owners and investors in existing animal factories to be publicly disclosed.

Rationale: Clean Water Action, Minnesota, notes that for most businesses, it is relatively easy to learn who are the owners and investors in those businesses. This is not the situation for animal factories. Without knowing who owns animal factories, it is impossible to enforce state corporate farm laws. Full public disclosure of those with financial interests in animal factories will help communities affected by pollution know whom to hold liable for environmental cleanup or pollution problems. Farmers who sign up to become part of business partnerships may learn that they have no decisionmaking authority regarding the facility their neighbors think they own. Non-farmer owners and investors in animal factories may hide behind the farmer-partners, claiming to be a cooperative made up of small farmers when the small farmer-partners actually make few of the decisions that affect the business, have little security in the arrangement, and make only a small share of the profits.

14. Help citizens oppose limited liability status for corporate animal factories that would allow investors in livestock operations to limit their liability for poor financial or environmental management of the operations, encourage more off-site ownership, and increase potential for poor community and environmental stewardship.

Rationale: Animal factory supporters are pushing for legislation that would change corporate farm laws to allow animal factory owners and investors to set up limited liability corporations. Citizens need the resources to oppose these efforts of agribusiness to pass liability for problems they cause onto local communities and taxpayers.

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VI. Pigs in the Poky

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Pigs in the Poky

Animal factories generate many externalities that fall on people, communities, and the natural environment. But externalities of animal production fall first and most heavily on the animals themselves.

There are reasons consistent with human self-interest to farm with animals in ways that are compatible with their welfare and that are respectful of their natures. Preserving the occupation of diversified farming as a safe, dignified, and prosperous way of life for independent farm families; conserving the potency of precious antibiotics; controlling the emergence of foodborne pathogens; promoting safe and environmentally healthy manure management; showing consideration for the quality of life of neighbors; and creating wealth-sustaining economic development for communities are goals that can be achieved by creating more natural environments for farm animals and using animals in less aggressive ways. These are arguments for stewardship of resources vital to human interests as well as for the welfare of the animals themselves.

Many of the problems we now associate with industrialized animal production have their roots in the mistaken paradigm that forced animals to fit into production systems designed with human convenience and extractive profits in mind. Many of the solutions to those problems will be found by adopting technologies and production systems that work with the natural, biological, and behavioral characteristics of farm animals rather than against them systems that are in harmony with both the animal and the natural environment.

What is Meant by Animal Welfare?

Welfare has been defined as "the state of an individual as regards its attempts to cope with its environment."¹ Welfare is a state of the individual animal and is not the same as care, which is something humans do to or for the animal.² An ideal state of welfare is one in which the animal is in "complete mental and physical harmony with its environment."³ Animal welfare encompasses both the basic physiological health, hygiene, and comfort, as well as the mental or psychological health of the animal.⁴ Together, these components define the "quality of life" or level of welfare the animal experiences.

Welfare is not a broad ecological concept such as species preservation; it does not refer to populations but to individuals. It also is not an environmental concept. Humans and animals stand in the same relation to their shared environment.

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An illustration of the distinction between individual welfare and broader ecological concepts is given by the case of the musk deer of Asia.⁵ In some areas of Asia, this small deer is hunted for its musk. Trade in musk is so lucrative that the deer is in danger of extinction. In other areas, hunting is not allowed. Instead, the wild deer is farmed. It is kept in captivity and periodically its musk is extracted. From an ecological viewpoint, if musk is to be harvested, farming a few of the animals and preserving the species is preferable. However, from the welfare perspective, hunting may well be preferable to the techniques used in farming this wild deer. If, in hunting the animal is shot cleanly and death comes instantly so that it does not experience fear or pain, its welfare is not in question. If the animal dies a long and painful death, then its welfare is affected negatively.⁶ On musk farms, male deer often are kept in wooden boxes that are only slightly larger than they are and sometimes too low for them to stand, through which no light enters, and are fed and watered only enough to keep them alive. Periodically, they are dragged from the boxes so the musk can be extracted. Following its extraction, the deer are returned to their boxes. There is little profit incentive to provide for the animals' broader welfare. The musk deer's physiology is such that it produces musk whatever the conditions in which it is housed.

Like animals kept as pets, farm animals are individuals. They can experience pain, fear, agony, distress, physiological deterioration, aversion, learned helplessness, and other effects of mental and physical abuse or neglect. They can suffer. But farm animals also can experience curiosity, satisfaction, confidence, pleasure, comfort, and affiliativeness toward others. They can exhibit intelligence and resourcefulness with respect to their environments. They can engage in life and experience well-being.

Defenders of animal factories assert that the fact that farm animals are productive proves their welfare is good. However, animals are genetically programmed to grow and produce. They cannot help but do so, except under the severest deprivation. Animals also have the ability to adapt to a significant degree to their environments, including painful or stressful ones, although the adaptation may be accompanied by suffering. In addition, the use of antibiotic growth promoters, hormones, and other stimulants to increase growth rates, keep females reproducing continuously, and control disease confound the usefulness of growth rate and reproductive performance as welfare measures.

Productivity thus is not a sufficient indicator of an animal's welfare. However, productivity also may not be a necessary indicator of welfare. A neutered animal may live a long and healthy life (physically and psychologically) even though it is not producing offspring.

Scientists of animal welfare explain that quantitative production performance can only tell us that quality and quantity of nutrients, the water supply, and the microclimate are adequate, that the animal did not contract any clinically-proven illnesses which influenced production yield, and that there are possibly differences between animals.⁷ It cannot tell us if the environmental requirements of the animal for locomotion, resting, comfort, social behavior, or predictability and control over its own circumstances are met or not. Each of these affects the animal's welfare.

Welfare needs of farm animals (including poultry) may be species-specific (e.g., nestbuilding by sows that are about to farrow or dustbathing by chickens to groom the feathers) or they may be needs common to all animal species, such as free access to fresh drinking water, thermal comfort, exercise, social contact, or the ability to behave normally and interact meaningfully with their environment.

The Emergence of Animal Welfare Science

Scientific investigation into the welfare of farm animals began in earnest following the 1965 publication of a report of the Technical Committee appointed by the British government to inquire into the welfare of animals kept under intensive livestock husbandry systems.⁸ Chaired by an eminent zoologist, F. Rogers Brambell, the "Brambell Committee" was the British government's response to the public outcry that arose after the publication of Ruth Harrison's *Animal Machines: The New Factory Farming Industry*, published in Great Britain in 1964.⁹ Harrison documented the abuses that were being visited on farm animals by the new, modern methods of intensive confinement production and the implications of these new methods for human welfare.

The Brambell Committee members received evidence from a broad range of organizations and individuals and visited intensive animal production units in the United Kingdom, Denmark, and The Netherlands. Committee members considered each farm animal species separately and made recommendations designed to safeguard its welfare.

The Brambell Committee members expressed concern over the lack of freedom and environmental deprivation in which farm animals in factories existed. Having seen many systems in which these basic freedoms were not available to the animals, the committee specified that a farm animal at minimum should have five basic freedoms. It should be able to: 1) turn around; 2) groom itself; 3) get up with ease; 4) lie down with ease; and 5) stretch its limbs. In addition, the committee stated its disapproval of "a degree of confinement which necessarily frustrates most of the major activities which make up an animal's behavior."¹⁰ The Committee stressed the importance of good husbandry to animal welfare. The Committee recommended that scientists study animal behavior, as a way of learning

about the effects of intensive systems on the welfare of farm animals and making recommendations for improved systems.

The Brambell Committee Report was "the first careful examination and frank discussion of the welfare aspects of intensive animal-husbandry in any country."¹¹ Another significant outcome of the report was the formation of the International Society of Veterinary Ethology in 1967. With the establishment of this society, for the first time the science of ethology (animal behavior), which formerly had been focused on the study of undomesticated animals in the wild, was turned to the study of domesticated animals. Basic and applied research programs were designed to identify indicators of well-being and suffering in various production environments and to identify key behavioral activities and requirements of farm animals. The Society's formation met another expectation of the Brambell Committee, that "the evaluation of welfare must consider the scientific evidence available concerning the feelings of animals that can be derived from their structure and functions and also from their behaviour."¹²

The new research emphasis led to two landmark ethological experiments conducted in manmade, semi-natural environments designed to simulate the natural habitat of wild boar. The first, in a "pig park" near Edinburgh, Scotland, was conducted by Wood-Gush and Stolba in 1978.¹⁷ The second was conducted from 1983-1987 in a "pig park" near Stockholm by Jensen and others.¹⁸ The experiments demonstrated that, despite decades of selective breeding for intensive confinement, domesticated pigs released into semi-natural environments are resourceful individuals who soon acclimate to their surroundings and engage in the same critical survival behaviors as their ancestors and wild cousins. Many of the natural behaviors that ethologists observed provided clues as to why pigs in animal factories, deprived of the opportunity to fulfill critical species behaviors, suffer.

In addition to clinical detection of disease and injury and behavioral observations, neuroendocrine analysis also is applied to determine an animal's state of being. Scientists also developed preference tests, for example, to allow chickens to demonstrate their preferences between solid floors covered with litter and floors made of bare wire netting.¹³ Animal welfare science became a special discipline, with scientists focusing on the needs of animals rather than exclusively on how to get them to peak productive and reproductive performance and, more recently, on criteria for production environments that would afford positive experiences to animals in addition to alleviating the suffering caused by inappropriate environments.^{14,15}

The emphasis of the Brambell Committee on the importance of behavior

has been the basis of laws in Europe and Scandinavia that require animal production systems to be designed and managed so as to allow animals to behave naturally, according to species-specific needs. For example, Sweden's 1988 Farm Animal Protection Acts specifies that housing and management should be designed and conducted so as to allow farm animals to perform most of their natural behaviors.¹⁶ Swedish farmers express this philosophy as "fitting the system to the animal instead of fitting the animal to the system."

Pigs are curious and resourceful animals, ranking behind humans, primates, and dolphins (and before dogs) in learning ability. They enjoy novelty. They are gregarious and social and communicate constantly with each other.¹⁹ Scientists have identified over twenty different vocalizations, although the purpose of them all is not known.²⁰ Pigs seek out and enjoy close contact with each other and with friendly people. They are clean animals, dunging as far away from feeding and nesting areas as possible, but because their sweat glands are inadequate, they often seek out mud or water in which to coat their skin or to bathe.^{21,22} Pigs are good swimmers. Their snouts are highly developed sense organs and were made for foraging, nibbling, manipulating objects, and rooting in the soil for morsels of food.

In the pig parks, scientists observed that pigs were very active during the day, foraging, socializing, and exploring their environment.²³ They maintained social organization and built nests for night rest. Sows isolated themselves, gathered materials, and built nests before giving birth.^{24,25}

Nestbuilding and farrowing behaviors are regulated by hormonal activity, meaning that sows are compelled by their biological nature to perform them.²⁶ Sows finding more sheltered sites built less elaborate nests than sows whose nestsites were more open to the elements, however, indicating that nestbuilding is not entirely driven from within but that the sow responds appropriately to cues from the environment.²⁷ In the wild, finding a secure nest site away from the group avoided accidental injury to piglets by other members of the group and allowed the piglets to bond with the mother, contributing to the survival of the group and of the species.

Sows also managed the socialization and integration of their piglets into a larger group of sows and piglets when the piglets were strong enough to abandon the nest. This social integration process lasted up to eight weeks after birth.²⁸ Smaller family groups consisted of two or more sows and their young. Littermates formed relationships that persisted after weaning.²⁹ Playfighting while they were young taught piglets how to manage aggression when they became adults.

Today, there is a special body in the Council of Europe determining policy on farm animal welfare, scientific journals for publication of farm animal behavior and welfare research have been launched, progressive legislation has been enacted in some European countries, animal welfare groups have developed humane protocols farmers can use to help their animals live gentler lives and to add value to their farm products, and universities have created centers and departments dealing with farm animal welfare.

That all of these scientific activities, primarily occurring in Europe, were set in motion by *Animal Machines* in 1964 indicates the power of Ruth Harrison's words and the credibility of her scholarship, the importance the public attaches to the welfare of farm animals, and the potential for meaningful change that can occur when the public is made aware: (1) of how farm animals are abused in animal factories, and (2) of the humane alternatives that could exist if the public were to unite to demand them.

Despite the knowledge that is now available, however, agribusiness resistance has created considerable obstacles to regulation of industry practices and implementation of alternatives to factory farming.

Welfare at Risk: The Paradigm of Extractive Animal Production

On the industrialized hog farm, pigs' natural resourcefulness is not considered a useful quality; rather, it is a nuisance to be suppressed. Feed energy cannot be dissipated in exercise or in letting pigs do what they want to do. Every calorie of food and every supplement must go to fuel lean muscle deposition and reproductive performance. Subtherapeutic antibiotic feed additives support the immune function in these stressful environments so that feed energy can be directed to growth or reproductive efforts. In 1995, 93% of pigs in the United States received antibiotics in the diet at some time during the grow/finish period.³⁰ Antibiotics were used in the diets of breeding females (sows) on 45.5% of U.S. operations and in the diets of breeding males (boars) on 38.4% of U.S. operations.³¹ Both figures increased substantially in 1995 over 1990 figures for sows by 6.1% and for boars by 27.5%.

Providing space for pigs to relate to each other normally is considered too costly in an animal factory. Therefore, to avert the "vices" that otherwise would be caused by crowding, the pig is altered or restrained. Pigs tails are cut off (docked) shortly after birth to prevent pigs from using penmates' tails as playthings in the barren pen environments in which they will live in the future. Nibbling penmates' tails, possibly drawing blood, opens the door for cannibalism.

Other species also suffer from industrialized animal production. In an egg

factory, or battery for laying hens, hens are crowded into cages stacked one on the other, four or five to a small cage without room to spread their wings, and have only wire to stand on. Some cages are not high enough for birds to stand upright. Crowding and stress leads to feather pecking, which can lead to cannibalism. Debeaking got its start around 1940 when a California farmer discovered that searing the top beaks of chickens with a blowtorch prevented them from pecking at each other's feathers.³² Today, the practice of mutilating the top beak of chicks is accepted as part of the modern system of industrialized laying hen production.

It has been known for some years that laying hens housed in battery cages have lower bone density than hens that are allowed to run free in yards.³³ When a caged hen's egg laying life is over, she is known as a "spent" hen. These spent hens have deteriorated physically over their short lives and have little meat on their weak bones.³⁴ They often are sold to provide meat for soup production. Almost a third of spent or out-of-lay hens have at least one broken bone by the time they get to the processing plant, a cause of severe suffering for the hens.³⁵ By the time they have been hung on the processing line prior to slaughter, 98% of birds have broken bones. Lack of exercise and intensiveness of production contribute significantly to bone deterioration, but rough handling by human workers who are transferring hens from their battery cages and into transport cages several at a time, each held by one leg, does the actual breakage.

On modern, mechanized dairy farms, the tails of dairy cattle are docked. This prevents them from getting caught in milking parlor gates and from switching their manure-clad tails into the faces of the people milking them. It also robs cows of a way to keep away flies.

In the industrialized system of agriculture, there is little motivation to implement housing systems where sand or dirt can be made available and chickens have the space to exercise, scratch and dustbathe, or to add straw or other natural materials to pigs' environments for them to chew and manipulate instead of each other's tails, or to design milking parlor gates that do not catch cows' tails, because it is cheaper to alter the animal.

Administration of recombinant bovine somatotrophin (rBST) to dairy cattle via injection marginally improves the milk production of high performance dairy cows, but reduces their welfare by increasing the incidence of mastitis and rate of physical deterioration, resulting in greater use of antibiotics to treat infections and often a higher culling rate.³⁶ Increased use of antibiotics to treat mastitis increases selective pressure on antibiotics to develop resistance and increases the probability that antibiotic residues will be in milk that reaches consumers, which would result in health problems for consumers allergic to antibiotics.³⁷ Increased levels of IGF-1, another hormone stimulated by rBST use, may also

persist in milk and some scientists believe this may increase the risk of breast and prostate cancers in humans drinking the milk.³⁸

Welfare of the Breeding Hog

Despite evidence of the importance of humane handling³⁹ to pigs' well-being, they may never experience it in a hog factory. The emphasis on mechanization allows hog factory owners to hire the cheapest possible labor with the consequence that hired workers in many animal factories are low-paid, unskilled at animal handling, and apathetic. Permanently restrained in their crates, sows are easy targets for abuse by angry, bored, frustrated or apparently sociopathic workers. In July 1999, a North Carolina grand jury handed down felony indictments against factory farm workers whom an undercover investigator from People for the Ethical Treatment of Animals videotaped beating pregnant sows on several occasions, skinning and cutting the leg off a conscious sow, and removing a stick that had been forced up a sow's vagina.⁴⁰ The indicted workers' employer, Belcross Farms, owns 22 other factory hog facilities.

In the vast majority of hog factories, pregnant females are stored inside long, low buildings, in metal "gestation" crates on slatted floors constructed over manure pits for their nearly four-month pregnancy. The crates measure approximately 2 feet by 6 or 7 feet, and mature animals often are forced to hunch their backs continuously to fit them. They cannot walk, turn around, socialize freely or root in a bed. They may get little, if any, sunlight. Feeding is restricted and animals that would otherwise spend many hours in the day foraging for food gobble up all the concentrates that are provided in a few minutes and suffer chronic hunger for the rest of the day.

Lesions on the shoulders and backs of breeding hogs are acquired from lying in one position on bare cement floors and/or being abraded by the bars of crates. As such lesions do not seem to affect production they seldom are treated. However, animal scientists at Iowa State University recently determined that the presence of lesions affects the way in which sows lie down, potentially endangering small pigs that may be crushed beneath their mothers, spurring a search for solutions.⁴¹

When it is time for sows to farrow, or give birth, they are transferred from the gestation crates to farrowing crates. A farrowing crate is approximately the same dimension as the gestation crate. Some have movable bars to restrict the sow's getting up and lying down movements. The farrowing crate also has side extensions for piglets to get away from the sow when she is lying down. The crate is elevated over a shallow manure collection pit that continuously emits anaerobic gasses, and the

sow and pigs live above the pit on perforated floors. Piglets are taken from the sows when they are, on average, between 10 to 15 days of age; but often weaning age can range anywhere from five to 20 days of age. After weaning, the sows are moved back for rebreeding to the cage they lived in during their pregnancy.

In intensive confinement, sows paw and root at the bottom of their crates before farrowing, but their desire to search out a suitable nest site and build a secure nest in which to give birth is thwarted.

The legs of breeding sows on factory farms become weak from disuse. Over time, crated or tethered sows lose both bone mass and muscle.⁴² They often require assistance at birth. Laxatives are added to protein-rich diets to compensate for lack of fiber and exercise.⁴³ Sows may collapse in their crates and never be able to regain their feet. In this case, employees may have to drag the sows from their stalls to dispatch them a painful and terrifying process for the sows and a frustrating one for the employees. As revealed in the undercover PETA video, where a downed sow is repeatedly stomped, kicked, and jeered at, the animal is irrationally punished and ridiculed for being in a condition induced by human engineering.

Sows confined to crates or tether stalls may exhibit redirected or repetitive behaviors known as "stereotypies." Stereotypies are behaviors that may have had roots in a real situation (for example, biting the bars of the crate while waiting for food) but now are disconnected from reality. They have been described as similar to the repetitive, meaningless behaviors of people with psychiatric disorders, such as continuous handwringing.⁴⁴

Endorphin release has been found to accompany stereotypies performed by sows that have been continuously tethered or tied to stalls, implying that the sow has been unable to cope by her own volition and internal mechanisms have taken over.⁴⁵ At some time in the long confinement, mourning behaviors and a condition known as "learned helplessness" may result.

Sows are kept in constant, often accelerated production. One technique used to shorten the time to rebreeding is to inject the sow with a hormone to bring on estrus soon after she gives birth. The sow then cycles again three weeks later and is rebred. Genetically selected for leanness, breeding sows may have few bodily resources to fall back on. Sows are not machines. Lean sows, especially, are not built for the pressure of production systems in which they are pushed through the breeding-gestation-farrowing-nursing-weaning-rebreeding cycle at top speed.

In some of the largest hog factories 20% of the breeding sows die prematurely,⁴⁶ and these deaths continue despite replacement and opportunity costs of \$500 or more per dead sow.⁴⁷ Despite years of selecting pigs for adaptability to slatted flooring and crates, sow mortality is increasing.⁴⁸ Sows are being pushed closer to their biological limit.⁴⁹ About 50% of sow mortality occurs in the first three weeks after sows have farrowed (given birth); and approximately 27% of mortality is in sows that have not farrowed, as sows are bred at younger and younger ages.

Breeding males, or boars, when present on factory farms, often are housed in crates and removed only when a worker collects semen. Vasectomized boars may also be taken to the weaned sow area where they are used to detect sows in estrus.

When a boar's useful life is over, a common practice is for workers to bash in his nose before loading him in the cull truck.⁵⁰ The pain prevents him from fighting with other culled pigs. Using gates to isolate him from other pigs on the truck could also prevent fighting. Another hallmark of animal factories is that no accommodation is made for the instinctive behaviors of animals. Management is often by force.

Slatted and perforated floors allow feces and urine to drop or be hosed into storage pits beneath the barns. The animals are continuously exposed to ammonia, methane, and other gases emitted from the pits. When ventilation systems fail, an entire barn full of pigs can be killed by asphyxiation. Carbon monoxide given off by poorly-maintained heaters operating in sow barns has been known to cause stillbirths and abortions.⁵¹ During Hurricane Floyd, millions of farm animals and poultry perished trapped in animal factories. Estimates of hog losses in the floods range from under 30,000 (industry estimate) to half a million (environmental groups' estimates).⁵²

Life of the Weaned Pig

In the United States, the procedure known as SEW, or segregated early weaning (or sometimes medicated early weaning), is used to reduce piglets' exposure to disease by weaning them before the colostrum in the mother's milk runs out. It also has the effect of increasing the number of litters to which individual sows give birth in a year because the sows can be rebred sooner.⁵³

Segregated, early-weaned pigs are taken from their mothers when they are between five and 15 days old and transported to a secured and sterile nursery site that may be miles away from the site where they were born.

At such an early weaning age, many piglets have not learned to eat from watching their mothers and they have not had the chance to develop their own natural immunity by being exposed to microorganisms in the mother's environment. When they are 60 pounds, they are moved from the nursery to a finishing site. Without their own antibodies, they are unprotected from disease, except by the prophylactic administration of antibiotics.

Segregated early weaning (SEW) pigs are called "high-health" pigs. However, in off-site nurseries there can be high morbidity and mortality rates. Small pigs may waste away and die from starvation and unknown causes. "Post-weaning multi-systemic wasting syndrome" is the name given to a disease that emerges toward the end of the SEW nursery phase (five to seven weeks) and also in the early finishing phase (up to 14 weeks of age). Piglet death loss can range from five to 15%.⁵⁴ These results are not surprising. Years ago scientists learned that when pigs are weaned at less than five weeks of age, physiological changes detrimental to cellular immune reactivity occur.⁵⁵

In finishing facilities, market hogs are crowded into pens barren of features. As the pigs grow, the space per pig is reduced to the point that little free movement is possible, causing high stress levels and encouraging cannibalism, or chewing on ears and other body parts until blood is drawn.

The continued mass production of farm animals has resulted in a changed "disease panorama" across animal agriculture.^{56,57} With confinement, new animal diseases, especially enteric and respiratory diseases, have emerged that are difficult to treat. The distress associated with extreme confinement lowers farm animals' immunity levels.

Scientists have expressed concern that controlling respiratory diseases in swine has become more challenging than ever before, as the "global industry has evolved into ever larger, more intensely managed production units, especially true in the United States."⁵⁸ There is pervasive porcine reproductive and respiratory syndrome (PRRS), and the emerging postweaning multisystemic and wasting syndrome, for which experts as having a hard time discovering precise causes and solutions.⁵⁹ Today, salmonellosis in hogs is prevalent.

Morbidity rates for pigs in finishing facilities from porcine respiratory disease complex can be 30 to 70% in some herds, and mortality rates can be from 4 to 6 % from this type of respiratory disease alone. Problems of factory hog finishing farms include onset of acute pneumonia in 16- to 20-week-old SEW pigs.⁶⁰

Population density inside factory farm buildings causes disease to spread rapidly in the herd. In intensive production areas, diseases can be spread to farms along the way when diseased animals are transported. For example, in The Netherlands, where there are nearly as many pigs as people, it is not uncommon to see signs along highways warning animal transport vehicles that traveling through a particular area or community is forbidden, especially when a disease outbreak has been reported.

Industrial rearing of farm animals has resulted in loss of individual fitness and genetic diversity;¹⁴ increased incidence of environmentally-induced animal illnesses, diseases, and injuries; increased frequency of abnormal behaviors indicative of severe mental distress; and excessive death losses.⁶¹⁻⁶⁶ And, as expressed in 1987 by Christine Stevens, President of the Animal Welfare Institute, industrialized farming has "taken the joy out of the lives of millions of calves and pigs, and billions of hens."⁶⁷

Obviously, in biological and ecological terms, there are great inefficiencies in the industrialized hog production model and its manifestations with respect to disease and death losses. In 1999, it was estimated that 48 hogs an hour, or 420,000 market hogs a year, were dying prematurely on premises at Seaboard Corporation's hog factories.⁶⁸

So, with all the problems of industrialized agriculture, why do the industry, government, and land grant universities continue to cling to this model? The economies of space that factory farms gain by crowding and immobilizing farm animals are among the most significant economies contributing to the industrialization of livestock farming. They enable non-farmers to engage in and dominate pork production without paying the full costs of production. To be economical, highly capitalized factory farms rely on a high volume of market hogs and low gross profit margins per hog sold.⁶⁹ To lower costs per unit of investment, factory farms have a strong incentive to enclose the highest population of animals physically possible in their buildings.

Little value is placed on the individual animal in high population herds. Economies of space and labor per unit of capital make up for losses of individuals.⁷⁰ The use of antibiotics at subtherapeutic levels helps to suppress diseases that otherwise would be facilitated by crowding and stress. Growth promoting effects of antibiotics are used to make up for insufficiencies in the animals' environment. Regarding the high level of stocking in animal factories, Ruth Harrison quoted the *Farmer and Stockbreeder Journal* of January 22, 1963:⁷¹

A few pigs have died from unexplained reasons, which might be due to the stress conditions associated with high

density stocking. These deaths in no way nullify the extra return obtained from the higher total output.

Disease and its Human Implications

About 150 different diseases can be passed from animals to humans.⁷² A number of potential pathways for these diseases exist. Workers who come into contact with contaminated animal feces, either in confinement facilities or in slaughterhouses, can become infected. Fecal contamination of carcasses at the slaughterhouse can also allow pathogens to slip through to final retail packaging, infecting consumers of the meat. Liquefied or inadequately composted manure, if used as a fertilizer for plants or fruits intended for direct consumption by humans, can transmit pathogens such as *E. coli* directly to humans through consumption of contaminated plant foodstuffs.^{73,74}

The farms on which farm animals and farm animal products destined for food originate are critical control points for zoonoses, or animal diseases of human significance, such as salmonellosis.⁷⁵ However, with "modernization" and industrialization of animal farming, many of these diseases are increasing rather than decreasing in prevalence.⁷⁶ An estimated 76-80 million cases of foodborne disease occur annually in the United States and an estimated 5,020 deaths result.^{77,78} Research completed by the U.S. Department of Agriculture's Economic Research Service (ERS) indicates that meat and poultry sources account for an estimated \$4.5 to \$7.5 billion in costs stemming from food borne illnesses in the United States each year.⁷⁹ These costs include medical costs and costs of lost productivity resulting from both acute and chronic illnesses and death.

According to ERS, the number of people in the United States who are highly susceptible to microbial food-borne illnesses is growing due to a higher number of elderly people and children in the population.⁸⁰ Microbial pathogens are also adapting, as in the case of antibiotic resistance, to conditions in their environments.⁸¹ Some pathogens, such as *Campylobacter*, associated with consumption of contaminated poultry and pork products, leave lasting legacies in the form of chronic, debilitating syndromes and illnesses that have high personal and social costs. This aspect of foodborne illnesses is being newly appreciated.⁸² Guillain-Barré Syndrome, which may follow some *Campylobacter* infections and infection by other enteric pathogens, is an autoimmune reaction of the body that affects the peripheral nerves and causes weakness, paralysis, and occasionally death.

What Can Be Done

In the 36 years since Ruth Harrison first called the public's attention to the

widespread abuses of animal factories in *Animal Machines: The New Factory Farming Industry*, little has changed about the basic model of industrial animal production, especially in the United States.^{83,84}

Shortly before her death from cancer, Rachel Carson wrote the foreword to Harrison's *Animal Machines*. In words that could easily have been written today, Carson noted:⁸⁵

The modern world worships the gods of speed and quantity, and of the quick and easy profit, and out of this idolatry monstrous evils have arisen.

As a biologist whose special interests lie in the field of ecology, or the relation between living things and their environment, I find it inconceivable that healthy animals can be produced under the artificial and damaging conditions that prevail in these modern factorylike installations, where animals are grown and turned out like so many inanimate objects....

Although the quantity of production is up, quality is down.... The menace to human consumers from the drugs, hormones, and pesticides used to keep this whole fantastic operation somehow going is a matter never properly explored.

Sydney Jennings, a past president of the British Veterinary Medical Association, wrote in the preface to *Animal Machines*:⁸⁶

[Harrison's] whole book is a timely warning to man to halt in the surge forwards into new methods of farming so that he may quietly and philosophically consider where it is all leading.

Four decades later, U.S. agriculture still has failed to change direction and adopt a more humane, sustainable model of animal production. Why did the warnings go unheeded; or, if heeded, why were they not acted upon by the industry and government despite public concerns?

During the 1970s, 1980s, and early 1990s, magazines and newsletters directed to farmers were filled with articles describing the dangers to agriculture of extremists who questioned industry practices, such as intensive confinement and subtherapeutic antibiotic use. In particular, powerful interests in the U.S. livestock industry and academia squelched debate by misrepresenting the implications of growing public concern

about the welfare of farm animals.⁸⁷

These interests blurred the distinction between advocates of meatless diets and those who advocate changing how farm animals are raised.⁸⁸⁻⁹⁰ They claimed that growing public concerns about the welfare of farm animals were based on sentimentality and ignorance, threatened the existence of animal agriculture, and would lead to mass starvation.⁹¹ The American Farm Bureau Federation described animal welfare advocates as "anti-human," "atheistic," and "animalistic."⁹²

Many readers of these magazines and newsletters were small farmers who did not use extreme confinement but were led to believe they would have to give up livestock rearing. The tactics also discouraged environmental, small farm, religious, and consumer organizations from including farm animal welfare among their concerns for fear of being dubbed anti-farming. Yet, animal humane organizations were among the first organized groups, and arguably were the first, to recognize and attempt to act on their understanding of the full implications of the trend toward industrialization of animal agriculture.

Important opportunities for coalition-building among these organizations and for obtaining the critical public support for curbing the industrialization of animal farming were lost from the 1970s through the mid-1990s, when the most important structural changes were occurring.

The Civilized Alternative

In Sweden, Denmark, and Great Britain, gestation crates have been banned. In Sweden, deep-bedded, loose housing systems for pregnant sows and spacious pens for boars were in place well before that country enacted its 1988 Farm Animal Protection Act.⁹³ The Swedish see a positive correlation between improved animal welfare, environmental quality, and farmers' successful adjustments to the 1986 ban on using antibiotics as growth promoters.^{94,95}

The best production environments both correct negative conditions and provide positive ones. In Switzerland, where nest boxes and perches are required by law, profitable alternative layer systems have been invented and are in use.⁹⁶ Alternative systems for laying hens are also being investigated and tried on farms in Denmark.⁹⁷ In Sweden, a long-standing ban on tail-docking and more recent laws requiring straw and banning subtherapeutic antibiotic feed additives, gestation crates, and tethers, led to development of production systems based more closely on the natural behaviors of pigs.

Weaning pigs when they are between five and six weeks of age allows young pigs to build natural immunities by being exposed to microorganisms in their environments. It gives them time to learn to eat by their mothers' sides. Weaning pigs onto deep-straw beds protects pigs from disease-causing pathogens that can be present on bare, urine or manure covered floors and eliminates the need for adding antibiotics at subtherapeutic levels to their feed or water. Five or six week weaning on deep-straw beds is one of the adaptations Swedish farmers made to the new production environment created by the ban on subtherapeutic uses of antibiotics in animal feeds.⁹⁸

Space on pasture or in finishing barns allows pigs to get away from aggressors. Pigs are curious and intelligent animals whose exploratory behaviors are highly oral in nature. The possibility of foraging on pasture and engaging more or less freely in exploratory and maternal behaviors adds to the pigs' quality of life in outdoor production systems. Rotating pastures with crop production prevents disease cycles from taking hold. It is not necessary to feed continuous subtherapeutic doses of antibiotics with feed. Indoors, a continuous supply of clean straw provides a natural material for chewing. Straw beds are highly suitable for rooting and otherwise occupying time and attention. It is unnecessary to dock the tails of pigs finished on pasture or in clean, well-managed, deep-bedded pens.

More natural production methods also hold benefits for farmers, judging by what farmers say:

I'm in the best quality you can get pork business. We raise pigs for food. I like the natural system and our customers are willing to pay for our husbandry practices. Sows are allowed to make a nest. It generally takes them half a day. They arrange everything very carefully and then they lie down and have their pigs. When sows are farrowing, we don't live with them. That's their job. [From one through five weeks of age] the milk the mother is producing is the best food for the pig to get at that stage of life.⁹⁹

For decades, pigs were just something to be exploited and that's what the confinement system does. More indigenous societies have a certain respect for this animal that we American farmers don't.¹⁰⁰ [With more natural systems, pigs can] bring joy to their owners, and to my way of thinking allow pigs to know joy in return.¹⁰¹

The sows and piglets are in a much more natural environment so they are very content and easy to work with. We have always felt you should treat your animals

*with respect and patience. Now we are looking at a pork industry in this country that looks at their pigs in terms of how much money they will generate first and the pigs' well-being second. I see an industry that is quickly alienating its customers and is starting to worry about the quality of its product too late.*¹⁰²

Why Farm Animal Welfare is Today an Urgent Issue

Over the past 10 years, with little local opposition, factory farm owners and supporters have fought for and won major revisions in state anticruelty laws, arguing that their cruel practices are standard in the industry. In some states, farm animals have been the losers in political tradeoffs between state humane societies (not affiliated with the H.S.U.S.), that want stronger penalties for cruelty to pets, and agribusiness interests, that want to weaken cruelty statutes for farm animals. In place in 30 states (as of 1999) are laws exempting farm animals from those states' anti-cruelty statutes.¹⁰³ Twenty-five states prohibit the application of their anti-cruelty statute to all accepted, common, customary, or normal farming practices. Idaho's amended statute states that when these practices are applied to farm animals, "they are not construed to be cruel nor shall they be defined as cruelty to animals, nor shall any person engaged in the practices, procedures, or activities be charged with cruelty."¹⁰⁴

In revising state animal cruelty laws, state legislatures have handed the agribusiness community "the power to decide for itself what constitutes cruelty to animals."¹⁰⁵ This argument was rejected by Mr. Justice Bell in the "McLibel" verdict:¹⁰⁶

[the argument was presented that] any practice which accorded with the norm in modern farming or slaughter practices was thereby acceptable and not to be criticized as cruel. I cannot accept this approach. To do so would be to hand the decision as to what is cruel to the food industry completely, moved as it must be by economic as well as animal welfare considerations.

In a number of states only veterinarians or agricultural extension agents are allowed to make a determination of cruelty with respect to a farming practice, while state humane societies retain jurisdiction over acts committed against non-farm animals. The animal agriculture industry thus not only controls the definition of what is cruelty to farm animals, but, "effectively build[s] a barricade to prevent anyone but the farming community discovering what actually occurs on the farm. The role of a prosecutor or judge is nonexistent."¹⁰⁷

Ironically, the creation of legal exemptions for acts specifically toward farm animals is a tacit admission that, prior to the exemptions, the acts were considered cruel under the law and thus would have been criminal offenses. Elected representatives thus are creating a legally protected sphere wherein any act, if it is viewed as customary by agribusiness, is not to be found cruel and any future practice, if it becomes customary, is allowed no matter how horrific it is.¹⁰⁸

These laws excuse factory farms from ethical animal production practices. By exempting livestock agriculture from liability for practices that would be construed to be cruel were they to be done to any non-agricultural animal, such as deprivation of movement, social interactions, light, and other quality of life factors, these laws give factory farms a major competitive advantage over farms that do not engage in these practices. They also eliminate a potentially effective tool with which citizen groups could have effectively opposed the establishing of animal factories.

Farmers who treat their animals with respect for their natures are internalizing the costs of providing a humane environment for them. Animal factories externalize those costs by evading that responsibility. The first to bear these externalized costs are the animals, but the costs of the failure to farm in ways that respect the welfare of farm animals extend beyond the boundary of the farm. Everyone ultimately bears the costs of the reduced effectiveness of antibiotics. Taxpayers and natural resource users bear the costs of soil and water pollution by liquid manure spills. Future generations will bear the costs of global warming and depleted resources.

Conclusions

Until production systems meet the species-specific needs of farm animals, we are farming beyond their ability to adapt.¹⁰⁹ Ultimately, ignoring the welfare of production animals makes animal agriculture unsustainable.

Polls have revealed that the American public cares about how farm animals are raised.^{110,111} Some already pay more for meat and other products from animals raised respectfully.¹¹² However, many, possibly most, consumers remain ignorant of the hostile conditions for animals inside animal factories.

Understood as a basic biological and ecological issue influencing sustainability, food safety, environmental quality, and the preservation of a viable independent family farm structure of agriculture, animal welfare is a factory-farm issue around which farmers can be mobilized. As an ethical and public health issue, it is a factory-farm issue around which consumers

can be mobilized.

However, there also are compelling ethical reasons for treating farm animals with respect for their natures. Rachel Carson concluded her foreword to *Animal Machines* as follows:¹¹³

The final argument against the intensivism now practiced in this branch of agriculture, is a humanitarian one. I am glad to see Ruth Harrison raises the question of how far man has a moral right to go in his domination of other life. Has he the right to reduce life to a bare existence that is scarcely life at all? Has he the further right to terminate those wretched lives by means that are wantonly cruel? My own answer is an unqualified "no." It is my belief that man will never be at peace with his own kind until he has recognized the Schweitzerian ethic that embraces decent consideration for all living creatures – a true reverence for life.

Some Strategies and Action Alternatives for Improving the Welfare Of Animals Raised for Food

1. Support efforts by animal welfare groups to inform the public about the high toll factory farm practices take on farm animal health and welfare, and how these practices, in turn, harm people and the environment.
2. Support efforts by animal welfare groups to inform other anti-factory farm organizations about common interests and encourage cooperation among these groups.
3. Stop agribusiness and its supporters from eroding more state anti-cruelty statutes to make it easier for factory farms to set up shop, stay in business, and use their economies of size to compete with independent family farmers. Animal factory investors will try to scare small farmers and lead them to believe that animal welfare regulations would put small farmers out of business, thus hiding behind the favorable image the public has of independent family farmers.
4. Educate children and young adults about the natural behaviors of farm animals, to remind them that farm animals are individuals with their own needs and interests and that they are worthy of our respect.
5. Support research and development efforts regarding welfare-

compatible alternatives to factory farming at institutions working in collaboration with animal welfare and sustainable agriculture organizations.

6. Help establish markets for farmers rearing their animals according to welfare protocols prepared and verified by legitimate animal welfare organizations, publicize and promote those markets, and help farmers network to solve problems adjusting to new production practices.
7. Enact legislation that would ban the use of gestation crates and require hog factories to provide sufficient pen space for gilts and pregnant sows to move freely, preferably in stable groups, that would require bedding for all animals, and that would prohibit mutilations such as taildocking of pigs and dairy cattle and debeaking of chickens that are performed solely to make animals fit into an industrial system.
8. Prohibit the use of antibiotic feed additives for growth promotion and disease prevention because such use promotes resistance and makes animal and human bacterial diseases harder to treat.
9. Prohibit the use of somatotrophins and other technologies that are applied to promote growth or enhance performance at the expense of animal well-being.
10. Work with organic groups to help keep organic standards strong with respect to raising animals with access to the outdoors and bedding, and without restrictive confinement, alterations, mutilations or drugs.
11. Support farmer information programs that are designed to overcome the negative and inaccurate impressions farm media and farmer advisory services have conveyed concerning animal welfare and its implications for their livelihoods.

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VII. Stop the Madness!

Eight Organizing Strategies for the Future:

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Stop the Madness!

The inadequate performance of state and federal agencies, with respect to protection of the public, the environment, and farm animals from the impacts of animal factories, has required that citizens organize and join forces to fight the battles for family farms, environmental quality, public health, animal welfare, community well-being, and social justice on their own.

Below are eight strategies that citizen organizations are following. The information was taken from descriptions sent by the organizations themselves. Specific organizations and activities are mentioned only for illustrative purposes. Many other organizations around the nation work on these issues and the organizations mentioned below may work on other issues as well.

Eight Organizing Strategies for the Future

Strategy 1.

Retaining an Independent, Family Farm Structure of Agriculture

Helping Independent Family Hog Farmers Develop Markets

By featuring special characteristics or qualities related to their production methods and marketing their pork through non-conventional channels, independent family farmers add value to their own products and garner a higher price than they would receive for the same hogs on the commodity market. The *Missouri Rural Crisis Center* organized the Patchwork Family Farms Project, marketing a full line of sustainably produced pork products to restaurants, grocery stores, and food coops. Niman Ranch of California processes lamb, beef, and pork from independent farms that meets its quality standards, including a protocol for humane hog farming developed by the *Animal Welfare Institute*. It distributes the products to upscale restaurants nationally, meat markets, Whole Foods stores in Northern California and mid-Atlantic region, Williams-Sonoma catalog, and Trader Joe's in the western U.S. During the price crisis, independent farmers selling through niche markets and direct to consumers may have been the only farmers selling hogs for prices meeting costs of production. The *Land Stewardship Project* is developing a special label program called Food Choices that will help independent family farmers operating sustainable systems sell their pork for a premium price.

Helping Farmers Regain Control of Their Checkoff Dollars.

The *Campaign for Family Farms* organized a drive to obtain signatures on petitions for a referendum on the pork checkoff. For every \$100 of hog revenue a producer makes, a mandatory "contribution" of \$0.45 is deducted for the National Pork Board. The stated purpose of the checkoff fund is to support research, promotion, and consumer education efforts that benefit hog farmers (pork producers). Most of the checkoff funds go to the National Pork Producers Council (NPPC), which conducts its own research grant program. Smaller, non-industrialized farmers feel that the research funded by the Board/Council is geared disproportionately toward providing research benefits to hog factory operators. Making the checkoff voluntary, which is the aim of hog farmers signing the petition, would enable smaller producers to use the additional dollars as they see fit and put a stop to smaller producers' dollars being used to benefit primarily a few large entities.

The signatures of nineteen thousand independent hog farmers were sent to the U.S. Department of Agriculture, Agricultural Marketing Service, for verification on May 24, 1999. Subsequently, the National Pork Producers Council made a Freedom of Information Act request to obtain all 19,000 signatures. The Campaign for Family Farms, with legal help from *Farmers Legal Action Group*, filed suit to block the release of the names to protect the privacy of signers and out of concern that individuals might be subject to retaliation by meatpackers, which also benefit from checkoff dollars. In September, 1999, a U.S. District Court granted a preliminary injunction preventing the Agriculture Department from releasing the names and addresses of hog farmers who signed the check off petition. On appeal, the injunction was made final. In February 2000, citing bureaucratic mismanagement in the handling of the checkoff petitions and noting the importance of democratic process, U.S. Secretary of Agriculture Dan Glickman announced he would let the checkoff referendum go forward. The National Pork Producers Council, primary beneficiary of the pork checkoff dollars, planned to continue efforts to stop the referendum.

Fighting for Antitrust Regulation

Recent mergers in the meatpacking and hog producing sectors of the livestock industry have given cause for concern about purchasing agreements and trade practices that discriminate against independent producers. Farmers Legal Action Group provides legal analysis and recommendations to citizen groups regarding how to achieve enforcement of the Packers and Stockyards Act's unfair and deceptive trade practices and anti-trust provisions. Western Organization of Resource Councils and Dakota Rural Action work to get anti-trust laws enforced and to propose rules that would stop monopsonistic practices by meatpackers in the beef industry. They plan to extend their efforts to the hog industry. The Land

Stewardship Project publish a special report describing how meat packers force independent hog farmers out of the market through exclusive contracts.

Fighting to Save Minority Farmers

When hog factories moved into North Carolina, among the hog farmers that hog factories displaced were Black farmers, who have waged a decades-long struggle to stay in business and retain their land holdings and independence. The Land Loss Fund (regional) and the Black Farmers & Agriculturalist Association (BFAA) (national) are two non-profit organizations fighting for Black farmers. In North Carolina, the Land Loss Prevention Project, a non-profit legal agency, provides free legal services to individual Black farmers in danger of losing their land and to organizations helping Black farmers retain their land. In the latter part of 1999, Native American farmers also sued the U.S. Department of Agriculture for discrimination claiming they were shut out of loan programs, disaster assistance, and other farm aid because of their race.

Increasing Consumer Awareness of the Costs of Factory Farming and Options Available to Them

Informing consumers about the real costs of meat, dairy, and poultry products from animal factories, and about the availability of more sustainably produced products, is a critical aspect of sustaining markets and livelihoods for independent farmers. Organic Consumers Association builds public awareness of food safety issues (including genetic engineering issues) within the industrialized food system and advocates for safe food and strong organic standards.

Solidarity abroad

As the factory hog industry "goes global," independent family farmers in all parts of the world will benefit from cooperation and solidarity to fight for their independence and to learn from each other how to produce competitively and ecologically, in harmony with nature and society. The Sustainable Food Systems Project of the Institute for Agriculture and Trade Policy (IATP) provides a global policy context for local food system work. IATP's Trade and Agriculture Program works to ensure that future trade rules promote family farms, biodiversity, sustainable food security and human rights.

In September 1999, the Animal Welfare Institute invited leaders of Poland's farmers' unions, including Andrzej Lepper of Samoobrona and Roman Wierzbicki of Rural Solidarity of Independent Farmers, to visit with independent hog farmers in the United States and learn about their

struggle to compete with hog factories similar to those Smithfield Foods, Inc. hopes to build in Poland. The AWI continues to work with Polish farmers and help get them advice from U.S. farmers about profitable and ecological alternatives to both Smithfield's hog factories and the collective hog factories that remain from communist times.

Strategy 2.

Clean Water Act Enforcement

The Clean Water Act (CWA) is the federal law that governs the quality of U.S. rivers, lakes, estuaries, and coastal waters. It is administered by the U. S. Environmental Protection Agency (EPA).

The Act's traditional focus has been on protecting surface waters by controlling wastewater from manufacturing and other industrial facilities, termed point sources. Most agricultural activities are considered nonpoint sources of pollution since they do not discharge wastes from clearly identifiable pipes, outfalls, or similar conveyances.

Since 1972, the Clean Water Act has defined large animal factories (or confined animal feeding operations (CAFOs)) as point, rather than nonpoint, sources, subject to the Act's prohibitions against discharging pollutants into waters of the United States without a permit.

Although the law provides for it, EPA has not reviewed or revised CAFO standards since they were promulgated in the mid-1970s. Nor has the National Pollution Discharge Elimination System (NPDES) been administered effectively to curb pollution from hog factories.

In 1998, increased publicity surrounding manure spills, lawsuits by environmental groups against EPA and the states, and a 1997 directive by Vice President Al Gore to develop an Action Plan for strengthening water pollution control efforts, led EPA to draw up a draft plan. Public hearings were held across the country. In November 1998, a joint EPA/USDA draft unified national strategy for all animal feeding operations was released, defining roles and responsibilities for implementing the EPA plan on animal feedlots.

Environmental groups consider the EPA/USDA strategy very weak. The proposed seven-year timeline to implement EPA's strategy (i.e., issue CAFO permits) is too slow, fails to address current ineffective animal waste practices, and allows CAFOs to proliferate in the meantime. Some groups have proposed a federal moratorium on new or expanded feedlots until EPA and the states develop and implement new programs.

The Clean Water Network's Feedlot Workgroup is a network of 200 organizations in close to 40 states that propose stronger federal policies to regulate feedlots. The Feedlot Workgroup is coordinated by Natural Resources Defense Council (NRDC). Along with the Clean Water Network, NRDC published a national report on feedlot pollution in 30 states, [America's Animal Factories](#) which was released in December 1998.

Pursuant to a Consent Decree with EPA, NRDC also secured an agreement to have EPA revise its technology standards for feedlots and regulate land application of manure. These standards are an important part of the EPA/USDA Draft Strategy for Animal Feeding Operations.

The Southern Environmental Law Center (SELC) of North Carolina has initiated legal action against polluting hog farms to force the implementation of federally-mandated permitting requirements and challenge the fallacy that land application systems do not discharge waste to surface waters. SELC has also facilitated public participation in hearings about the statewide general permit.

Strategy 3.

State Legislation

At the state level, Clean Water Act enforcement is poor. According to [America's Animal Factories](#), fast-track permits are given to factory farms. The Environmental Protection Agency (EPA) has authorized some states to issue their own permits to hog factories under the National Pollution Discharge Elimination System (NPDES), administered in most states by the EPA itself. Most states have adopted "general permits" under the federal Clean Water Act that routinely accept at face value the factory farm owner's assurance that the feedlot can comply with existing statewide requirements. Permitting under NPDES rules is lax or nonexistent among states that have been given authority by EPA to issue NPDES permits. To protect their water resources, various groups have been active in getting state legislation enacted.

South Carolina

In 1995, North Carolina's large hog factories made national news as waste lagoons breached and contaminated the state's rivers. Taking note, its neighbor state South Carolina passed a law that is one of the most protective of water quality in the country. When the bill was passed, two factory slaughterhouses withdrew the permits they had pending in South Carolina.

The South Carolina Coastal Conservation League served on a working group to correct problems with the South Carolina Department of Health and Environmental Control's initial draft of regulations written pursuant to the Confined Swine Operations Act. The new regulations either violated the earlier law or severely weakened it. Another attempt upheld the law and filled in important details on manure management. In 1996, a compromise in the legislature allowed DHEC to write a final set of regulations that would replace the Act and first set of regulations, although DHEC must justify scientifically any deviation from the original law.

Oklahoma

Safe Oklahoma Resource Development (SORD) was formed in 1993, in response to Oklahoma residents' experiences with Seaboard Corporation. SORD worked to get strong legislation passed regulating the activities of corporate hog factories.

Of special concern, besides odor, was groundwater extraction and pollution. At the site near one SORD board member, Seaboard dug three wells to get enough water for its 300,000 plus hogs. Working with the *Kerr Center* and Yale University Law School, SORD formulated the proposed legislation.

On March 3, 1998, a one-year moratorium was enacted on construction or expansion of large (5,000 swine over 55 pounds or 20,000 weaned swine under 55 pounds) swine feeding operations. The moratorium included a prohibition on the issuance of permits for the use of water for swine animal feeding operations within 3 miles of real property, and water wells used for a public water supply.

The moratorium was repealed, effective August 1, 1998, and the same law established stricter setback requirements, well monitoring requirements, and odor abatement plans in new applications. It authorized an 80-cent per-animal-unit fee for monitoring facilities with a capacity exceeding 1,000 animal units. It required waste education and training for all persons involved in the treatment, storage or application of animal waste from licensed facilities and mandatory licensing for all managed feeding operations greater than 1,000 animal units (LMFOs). The Oklahoma Department of Agriculture can deny licenses based on evidence that property values will be harmed significantly.

Colorado

The Colorado Environmental Defense Fund worked closely with the National Farmers Union (NFU), an organization representing independent farmers, to obtain passage of Amendment 14, a ballot initiative drafted by

the NFU, that required monitoring of large hog lots to ensure they meet strict environmental standards.

On November 4, 1998 Colorado voters approved Amendment 14 and defeated Amendment 13, a constitutional amendment alternative backed by the hog industry. Amendment 14 deals primarily with potential water contamination and odor from manure and wastewater. Hog farms with a minimum of 800,000 pounds of swine (approximately 2,000 to 5,000 hogs, depending on the type of facility) are affected.

The Amendment restricts the amount of manure and wastewater that can be applied to crops or land. Commercial hog facilities must obtain state permits for discharge of wastewater. The state must regulate odors from hog facilities. Amendment 14 allows local governments to impose regulations that are stricter than those contained in the proposal.

Minnesota

The Clean Water Fund/Clean Water Action Alliance of Minnesota is a statewide network of over 1,200 activists and organizations working on the factory farming issue. Both the Clean Water Fund/Clean Water Action Alliance and the Land Stewardship Project have been instrumental in organizing concerned citizens to testify before the legislature against weakening the anti-corporate farm law, which would allow hog factories to set up limited liability corporations that could protect them from liability for environmental damages.

The two groups also succeeded in preventing legislation that would allow hog factories to exceed the state's hydrogen sulfide limits during times of manure spreading and lagoon emptying. Both organizations made hundreds of calls to citizens asking them to call the governor and urge that he veto the bill. Governor Ventura vetoed the bill but suggested he would be willing to work administratively to lift the rules during peak manure spreading times. Land Stewardship Project then collected 500 signatures from people who agreed that the state's air quality standard should be upheld and asked the governor not to lift the standards.

Strategy 4.

Liability Litigation

Hog factories try to get out of liability for damages caused by their operations in a number of ways. One way is to form limited liability corporations, in which they are protected not only from financial liability but also from liability for environmental and other damages. Citizens'

groups can litigate against corporate hog factories, but only if the hog factories are not protected by limited liability status.

Kentucky

Democracy Resource Center in Lexington, Kentucky, assisted grassroots groups and individuals in getting local ordinances passed and pressing the governor for a moratorium on new animal factory permits and strict environmental regulations. Resident concern led to a 90-day moratorium and the development of new regulations, including integrator liability for cleanup and closure. Kentucky enacted emergency swine regulations that include provisions to make the swine integrator share in the environmental responsibilities.

South Dakota

In South Dakota, Senate Bill 239, signed March 3, 1998, imposes legal responsibility and tort liability for environmental damages caused by the negligent entrustment of livestock to another or negligent control or specification of design, construction or operation of livestock facilities.

Litigating against polluters

Missouri

One hundred nine Northwest Missouri residents were plaintiffs in a lawsuit, filed in 1996, against Continental Grain, which began operating hog facilities in Daviess, Gentry, Grundy and Worth Counties in 1994. The case went to trial in St. Louis District Court in January 1999.

Citizens testified about respiratory problems, nausea, stress, even a spray of pig manure on their vehicles from a device that shoots the waste onto farm fields.

According to plaintiffs' attorney, Continental Grain had promised to create jobs and adhere to strict environmental standards at its 200,000-pig farms. But internal memos suggested the company lied to its neighbors, cut corners, deceived state environmental officials, put hogs in facilities that were not yet permitted in a rush to begin operations, and deflected problems by using strategies devised by its public relations and engineering consultants.

On May 1, 1999, after more than a week of deliberation, a St. Louis jury determined that Continental Grain owed \$5.2 million to 52 neighbors of its hog factories in northwestern Missouri.

North Carolina

In the aftermath of Hurricane Floyd, North Carolina Governor Hunt established a \$5.7 million voluntary program to buy out hog farms in the 100-year floodplains. State regulators at first prohibited farmers from rebuilding in flood-prone areas and from restocking hog houses if they could not comply with waste management plans in effect prior to Floyd. Regulators also limited the amount of waste that could be sprayed on already saturated land.

In November, under pressure by the industry and with a promise by Smithfield Foods, Inc. to spend \$15 million investigating new waste disposal techniques, the North Carolina Soil and Water Conservation Commission (SWCC) relaxed those prohibitions with the consent of Governor Hunt and allowed farmers to reduce the estimated 2.5 to five billion gallons of wastewater in their lagoons by spraying onto saturated land at twice the permitted levels. The SWCC also removed the prohibition against farmers' restocking their hog facilities. These new temporary rules could be extended for up to one year.

In December, the Southern Environmental Law Center (SELC) filed suit, on behalf of the Neuse River Foundation, the foundation's riverkeeper, Rick Dove, and the Alliance for a Responsible Swine Industry, to suspend the new SWCC policy and said that restocking the facilities would allow farmers to create more waste, not simply get rid of the waste left from Floyd. On the other side of the issue were the State, Smithfield Foods, Inc., and the North Carolina Pork Council, who said suspending the new SWCC policy would deprive farmers of ways to lower lagoon levels.

Citing the pollution potential, Senior Administrative Judge Fred Morrison ordered a halt to the increased spraying pending a full hearing on the matter on December 20. The North Carolina Attorney General agreed with Judge Morrison's decision although it went against the State. The Department of Environment and Natural Resources told growers to restrict their spraying but then hired a private lawyer and joined Smithfield Foods, Inc. and the North Carolina Pork Council to ask a Superior Court Judge to throw out Judge Morrison's order. That judge rejected their case without comment. The case went back to Judge Morrison who extended the temporary restraining order until January 21, 2000, to allow the groups to negotiate. Before January 21, the SWCC and SELC attorneys negotiated a settlement that revised the earlier SWCC policy.

Strategy 5.

Citizen Organizing

Clean Water Fund has been effective in Minnesota and Colorado in building a grassroots political base and implementing campaigns to change local, state, and federal agriculture and environmental policies. Clean Water Fund is implementing a broad-based consumer campaign to build grassroots political power and create a training program for organizers in strategic parts of the country.

Dakota Rural Action is an 11-year-old grassroots, nonprofit, nonpartisan, membership organization of low and moderate-income rural people whose mission is the empowerment of disenfranchised individuals and communities through direct action organizing. DRA has also organized to reform state and county institutions and regulations that govern the siting, regulation, and enforcement of large-scale hog confinement facilities. Through community organizing and statewide issue campaigns, DRA has initiated local zoning ordinances in previously unzoned counties. It has worked with county governments to improve existing zoning laws. It has held local and state politicians accountable to open meeting laws and has participated in public hearings to improve the state's general permit for concentrated livestock operations. It also has worked at the state legislative level to toughen state regulations regarding water quality and protection, zoning, liability and siting of factory farms.

A number of groups provide useful websites for activists. Families Against Rural Messes (FARM) is a citizen's group organized in 1996 to advocate for a fair balance between individual and community, agriculture and economic development, and industrial and ecological interests in rural Illinois. Their website helps them educate the general public, their membership, and legislators about the large-scale livestock industry. FARM also pushes for new laws to promote responsible agriculture and regulate large-scale livestock corporations. The Missouri Rural Crisis Center (MRCC) also maintains a comprehensive website on the impacts of factory hog farming and provides agricultural content for *In Motion* magazine, also available at the MRCC website.

Strategy 6.

Public Health and Worker Safety

Unwise use in human medicine is a source of antibiotic resistance and must be corrected, but it is not the only source of resistance (see Part 2). The problem of antibiotic resistance also stems in significant part from the routine low-level, non-therapeutic use of antibiotics in farm animals to suppress disease outbreaks and promote growth. It is important to curtail inappropriate prescription of antibiotics for human ailments to preserve their effectiveness in treating human disease. Antibiotics also are very

important, from a welfare standpoint, in treating farm animals for diseases of bacterial origin. Therefore, it is desirable to discontinue non-therapeutic uses in animal agriculture that contribute to resistance.

Several groups are making antibiotic resistance a priority issue this year. Scientists at the Union of Concerned Scientists are working with counterparts in Environmental Defense and the Alliance for the Prudent Use of Antibiotics (at Tufts University) to look for ways to use available data and new studies to demonstrate effectively that non-therapeutic drug use in animals contributes to the problem of antibiotic resistance in treating human diseases. They also hope their work will show the need for more humane, sustainable approaches to farm animal production. Together with food-related organizations, such as the Center for Science in the Public Interest, they are lobbying Congress and federal agencies for strong legislative and regulatory approaches. Concerns are that the U.S. Food and Drug Administration's framework for restricting antibiotic use in farm animals does not go far enough to solve the problem.

Hog farm workers are not unionized. Most of the work being done, to provide information to support reform of hog factory practices and protect farmers and farm workers, comes out of schools of medicine and public health at universities. Dr. Susan Schiffman of Duke University School of Medicine and Dr. Kelley Donham of the University of Iowa conduct scientific investigations and research into the impacts of hog factory air quality on the health and safety of workers. They are extending their work to health impacts of hog factory emissions on nearby residents.

Strategy 7.

Humane Treatment of Animals

Efforts to promote the welfare of animals reared for food include: publicizing the cruelty of factory farming, searching for and promoting alternative production methods that incorporate animal welfare requirements in ways that are sustainable and profitable to the farmer, lobbying for changes in laws regarding treatment of farm animals, and assisting and promoting farmers who are rearing their animals sustainably, with dignity and respect.

The Humane Society of the U.S. works to promote cooperation among national and regional sustainable agriculture organizations and humane groups on the issue of factory farming and engages in public education. The Animal Welfare Institute's sister organization, Society for Animal Protection Legislation, lobbies Congress for humane treatment of animals. The Institute itself helps educate the public about humane farming methods, works with farmers to help them adopt welfare-compatible and

sustainable production methods, and promotes family farmers using such systems through its association with the Niman Ranch special marketing program.

The Humane Farming Association funded and helped spearhead the litigation of the Concerned Rosebud Area Citizens in South Dakota to stop the Rosebud factory hog farm development and has been active in opposing veal calf crates, rBST use in dairy cattle, factory hog production, and inhumane slaughterhouse practices.

In Illinois, HumanePAC is formulating legislative proposals to ban inhumane practices in factory farming of hogs and poultry.

These and similar initiatives on behalf of more humane methods of raising farm animals can be expected to have crossover beneficial effects on human health, environmental quality, and independent family farmer survivability.

Strategy 8.

Sustainable Agriculture Research and Demonstration

Combined, the Midwest Sustainable Agriculture Working Group (MSAWG) and the Sustainable Agriculture Coalition (SAC) have 27 member organizations, many of which are also included in this report.

Since 1992, MSAWG and SAC have provided a strong and active coalition of organizations which are dealing not only with large-scale factory farm operations, but also with the development and demonstration of environmentally sound, economically viable, and socially just alternatives to factory farm animal production.

MSAWG and SAC developed a consensus policy for sustainable livestock production, culminating in the May 1998 release of the policy paper, "Sustaining Land, People, Animals & Communities: Policy Principles for Sustainable Livestock Development," which has been endorsed by 17 MSAWG member organizations. The policy paper also includes recommendation for the regulation of large-scale CAFOs.

MSAWG/SAC are working to ensure that USDA and EPA consider sustainable livestock production systems as alternatives to factory farms within the regulatory system, rather than trying to techno-fix a myriad of factory farm problems at public expense.

A number of groups are working with sympathetic institutions to conduct research and provide demonstrations of sustainable farming methods.

Practical Farmers of Iowa works closely with Iowa State University's Leopold Center for Sustainable Agriculture to conduct and report on on-farm research using sustainable animal production methods.

The Research and Demonstration Farms division of the Department of Animal Science at Iowa State University has demonstrated alternative swine production methods, such as the Swedish deep-bedded group housing systems, pasture production methods and hoop houses, and made the results available to farmers. Animal Welfare Institute and the American Society for Prevention of Cruelty to Animals helped organize tours of farms using deep-bedded group housing systems in Sweden for farmers and Iowa State University faculty and personnel so they could talk with Swedish farmers and see their systems in operation.

Institute for Agriculture and Trade Policy organized a U.S. farmers' tour of European sustainable farms, farmers' cooperatives, and alternative and organic markets to bring home to the U.S. ideas and inspiration for organizing similar ventures here.

In 1997, Land Stewardship Project (LSP) lobbied the state legislature and worked with sympathetic legislators to pass a bill authorizing \$125,000 for research and promotion of alternative hog farming methods, such as the Swedish deep-bedded systems, pasture farrowing, rotational grazing for hogs, and systems compatible with low-cost hoop buildings. This initiative led to the formation of an Alternative Swine System Task Force and Program at the University of Minnesota, overseen by MISA and the Energy and Sustainable Agriculture Program of the Minnesota Department of Agriculture.

Organic Farming Research Foundation sponsors research and acts as an organic advocacy group, disseminating information on organic farming practices and research results to farmers, supporting a grower-based knowledge system for organic methods, and advocating increased federal funding for organic farming research.

The effort to develop humane, sustainable, alternative forms of animal farming must go hand in hand with efforts to end animal production that is exploitive of people, animals, and future generations and wasteful with respect to THE care and use of natural resources. Without viable and preferable alternatives, an old paradigm will not be displaced.

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VIII. Funder to Funder

Sub-sections:

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[What can private foundations do about the alarming issues raised in this report? Why should we care?](#)

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Funder to Funder

Our Perspective on the Role of Foundations

Intensive livestock operations or CAFO's (Confined Animal Feeding Operations) stick out like a sore thumb. Why? Because they are creating unprecedented and harmful effects on human health, animal health, water quality, and the economic sustainability of independent farmers. Some might say that nothing can get too big. Like the growing market dominance of gigantic corporations, the increasingly concentrated and monopolistic ownership of our food system, and the vast network of multi-national timber, mining, oil and gas companies, CAFOs are another example of what can go wrong when the scale of operations becomes too big. The result is business that is too big, unsustainable and in the unending pursuit of profits, disrespectful of creatures, people and communities. Unfortunately, CAFOs are not an isolated issue but related to the globalization of our economy. To us then, this report is not anti-business but anti- "too big" business.

Like it or not, this report confronts us with the profound changes that have occurred since WWII in the way our food is produced. Over time, the evidence of the measurable effects of "modern" agricultural practices on human health, the environment, and the sustainability of rural economies is mounting. This report focuses on one facet of the "path of industrialization" that agriculture has followed during the past 30 - 40 years: the emergence of large-scale, capital-intensive "factory farms" for the cultivation of beef, hogs, turkeys, and chickens for human consumption.

Let's face it: most of us see the world through our consumer eyes and know only the bright side of US agriculture: the post-war growth in our productive capacity; the comparatively low cost (so we're told) of food; the appearance of high quality of our food products; the breadbasket for the world. The problems with CAFOs are parallel to those associated with concentrated crop production: monoculture growing, fence row to fence row planting, increased reliance on fossil fuel based inputs, non-point source pollution, monopolistic markets, and food products with chemical residues. Our agriculture and food systems are now based on the industrial model of production rather than ecological principles. "Too big" agriculture reveals the mistaken belief that more technology will fix the problems that have been caused by technology. Our current food production system, and CAFOs in particular, make us ask just how far from nature do we think we can bend natural systems without breaking them?

This report exposes the darker side of our country's "path toward industrialization." It offers a variety of factual data and observations that suggest that our relatively short-lived experiment with factory-style farming for the production of food has gone awry. Its conclusion is that the unintended consequences of factory hog farms and confined animal feeding operations in general are reaching critical and ominous proportions.

What can private foundations do about the alarming issues raised in this report? Why should we care?

Perhaps the greatest asset of private foundations is the freedom they have, coupled with limited resources, to respond creatively to issues of values, ethics, public policy, and human welfare that others don't have the courage, political will, sensibility, or power to address.

Who is speaking out about the harmful effects of these large-scale, factory style, industrial farms? Some include, independent farmers (some of whom are quoted in this report), who oppose the trend toward CAFO's and contract-farming; residents of local counties in which these factory farms are active; a relatively small number of environmental groups; animal welfare groups; and a handful of university-based public health researchers. Are these people credible? Yes, for the most part. Many of the farmers in this chorus are literally fighting for their economic survival.

Who are the apologists for factory hog farms? They are a very small number of corporations that have masterfully achieved dominance in livestock and poultry production during the last 20 years; their contract growers; their hired mouthpiece, the Farm Bureau, and the US Department of Agriculture.

At the risk of being crass, which of these two groups has the most power? Is there any wonder why we have not heard more about the ethical, economic and public policy questions raised in Halverson's report? And as long as we can buy lean and cheap pork chops at our conveniently located supermarket, who cares?

This report documents a multitude of reasons for caring about this issue: cutting-edge public health issues with large-scale human implications (e. g., the creation of antibiotic-resistant bacteria); environmental quality and health (e.g., contamination of groundwater supplies, the adverse effects of airborne compounds on human health and the viability of other forms of life); the sustainability of rural communities and their often fragile economies; the welfare and humane treatment of the animals that are bred and raised by these extreme and unnatural methods; and the long-term supply, cost, and security of our food sources; to mention a few. This

report presents strong evidence that these catastrophic effects are already happening and that the deck is stacked against those questioning the safety and sustainability of factory style hog farm operations.

But what can private foundations, specifically, do?

Why should private foundations get involved with this issue, at this time?

Our experience tells us that a relatively small amount of grant support can go a long way to encourage, support, and legitimize the voices of farmers, neighbors, scientists, activists, and policy-makers. Despite their obvious differences, these interested parties share a common quest: to be heard and to get their concerns placed on the public agenda for closer scrutiny and informed debate.

We commend the way this report raises the tough and compelling issues associated with factory style hog and other livestock farming operations. If you and your foundation are interested in participating in future efforts to explore these issues and their resolution, we encourage you to contact the representative of any of the foundations listed Appendix D of this report.

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IX. Animal Welfare Institute Husbandry Standards for Pigs

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Section IX

Animal Welfare Institute Husbandry Standards for Pigs

- Housing for animals shall be designed to allow the animal to behave naturally.
- Housing shall be sufficiently spacious to allow all animals to lie down in full lateral recumbency at one time and to move freely.
- Pigs are active, social animals by nature, and close confinement in crates is prohibited unless briefly required for vaccination, feeding, marking or veterinary procedures, or in the rare event that a sow may savagely attack her piglets, and then only temporarily until the sow is calm.
- Pigs shall have continuous access to pens bedded with straw or chopped corn stover, or pasture or dirt yards in which they can root, explore, play or build nests. Substitutes for straw and corn stover may be used only with the approval of the Animal Welfare Institute. Straw is the preferred bedding for farrowing sows and nursing piglets.
- Even when bedding is not needed for warmth, straw or other approved material shall be provided to hogs that do not have continuous access to pasture or dirt. The bedding shall be provided in quantities sufficient to give hogs material in which to play, explore, and root.
- Pigs housed outdoors shall have continuous access to shelters that protect them from the heat, wind, cold or rain. Adequate straw shall be provided to keep pigs comfortable in cold weather. In the case of pigs loose-housed in groups, in deep-bedded systems, there shall be sufficient amount of litter to create a deep litter bed in which composting can start and be sustained to provide warmth and destroy pathogens.
- New buildings shall be constructed with windows or openings that let in daylight.
- The equipment and fittings in buildings and other premises that house pigs shall be designed so that they do not inflict injuries or entail risks to the health of the animals. The fittings and other equipment shall not prevent the animals from behaving naturally,

no unwarrantably limit their freedom of movement or otherwise cause them distress.

- Persons who transport live animals shall attend to the animals and take the necessary steps to ensure that the animals are not injured or caused to suffer during loading, transport and unloading.
- Hot prods or electric shocks shall not be used on the animals. Boar bashing shall be prohibited.
- The animals' living quarters shall be cleaned by procedures that ensure satisfactory hygiene. The surfaces of deep litter beds shall be kept dry and be of good hygienic quality.
- Pigs shall be given sufficient space to keep dunging and lying areas separate from eating areas.
- The routine use of subtherapeutic antibiotics, hormones, or sulfas to control or mask disease or to promote growth is not permitted. Feeding of animal products to pigs is not allowed.
- Animals shall have a feeding plan that will guarantee a sufficient, varied, and well-balanced diet. Animals shall have access to their feed as long as is necessary for them to satisfy their feed requirements. Animals shall have free access to water.
- In the event a pig suffers an accidental injury on the farm, that animal shall receive individual treatment designed to minimize its pain and suffering. Ill or injured animals shall not be transported in the same compartment with healthy or uninjured animals.
- If the injury is serious enough for the animal to be slaughtered, it shall be euthanized on the farm. In addition to meeting the above criteria, each farm shall be a family farm. An individual or family member must do all of the following:
 - a) own the hogs;
 - b) depend upon the farm for its livelihood; and
 - c) provide the major part of the daily labor to physically manage the hogs and the rest of the farm operation.This shall not prohibit networking among family farmers as long as all criteria listed herein are adhered to by each and every member of the network.

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THE PRICE WE PAY FOR CORPORATE HOGS

Photo Gallery: People



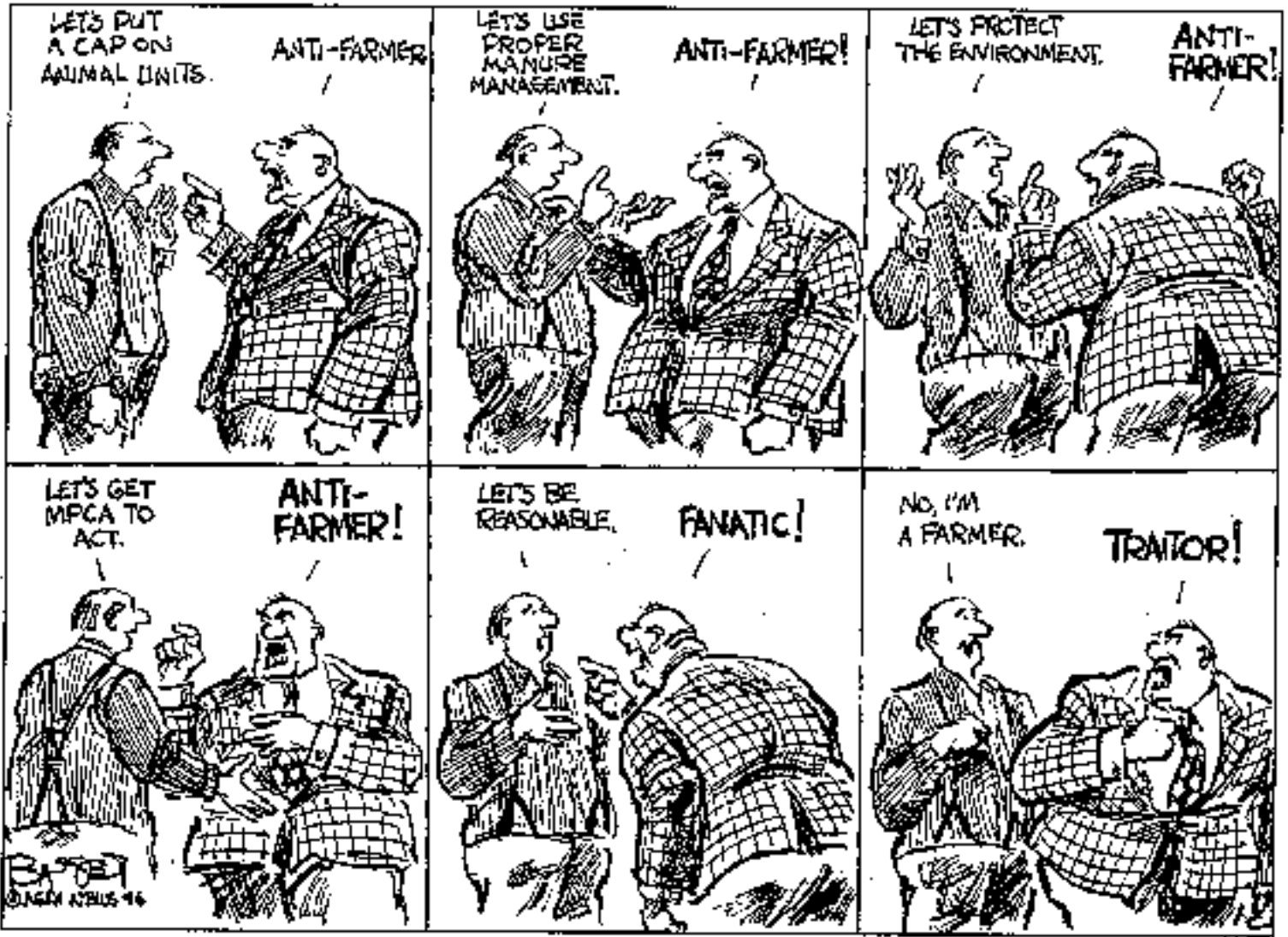
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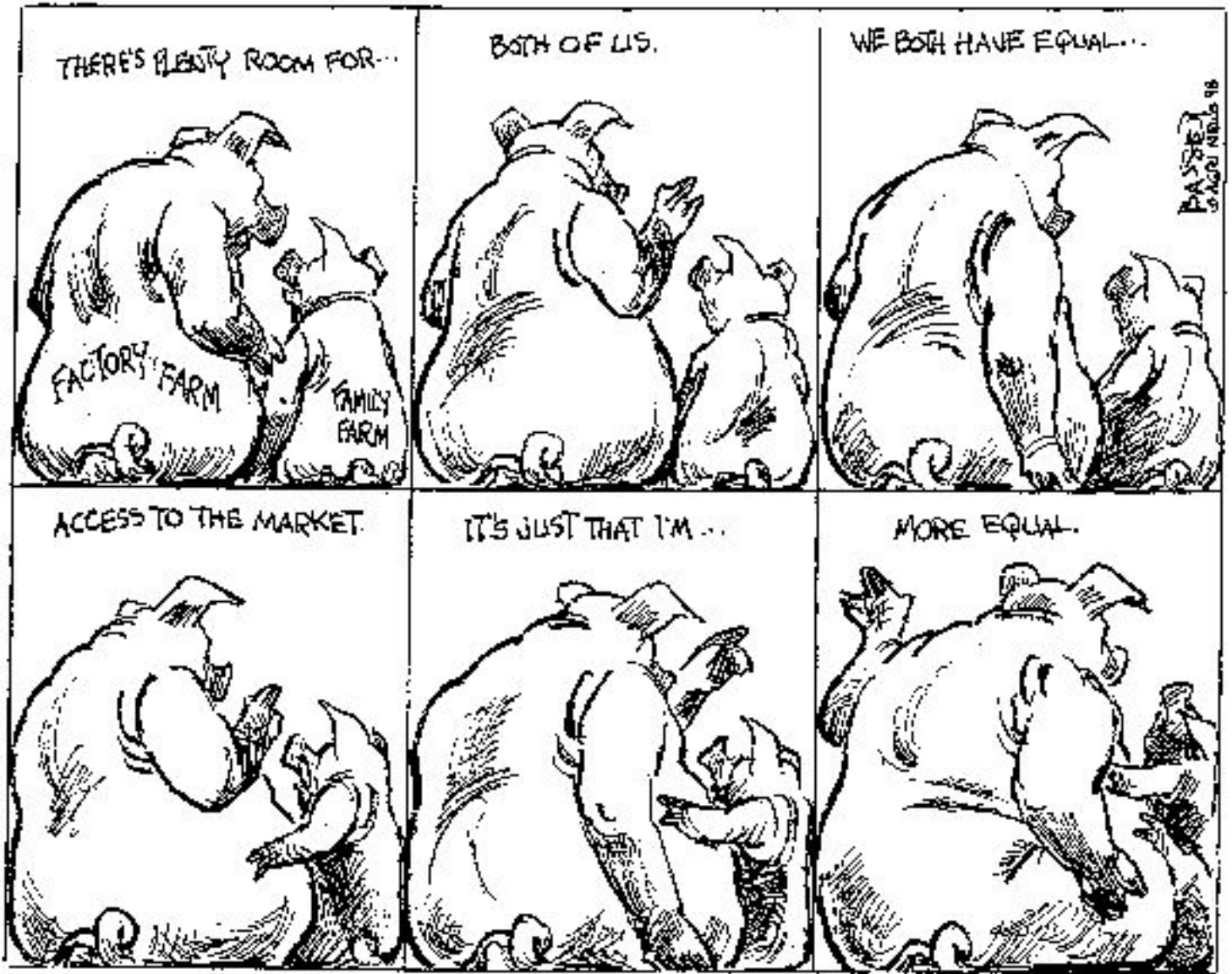
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"LET US NOW MOVE ON TO ISSUES OTHER THAN GIANT PIG LOTS."

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"THE BAD NEWS... HE'S DYING. THE GOOD NEWS... WE'RE NOT READY TO BURY HIM YET."

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THE MINNESOTA LEGISLATURE IN ACTION.

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"PATIENCE. WE AT THE USDA ARE STUDYING HOW YOU CAN BE MORE COMPETITIVE WITH BIG AG."

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"WE HAVE MET THE ENEMY AND HE IS US."

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"JUST TRY TO POINT OUT WHO INFECTED YOU WITH E. COLI."

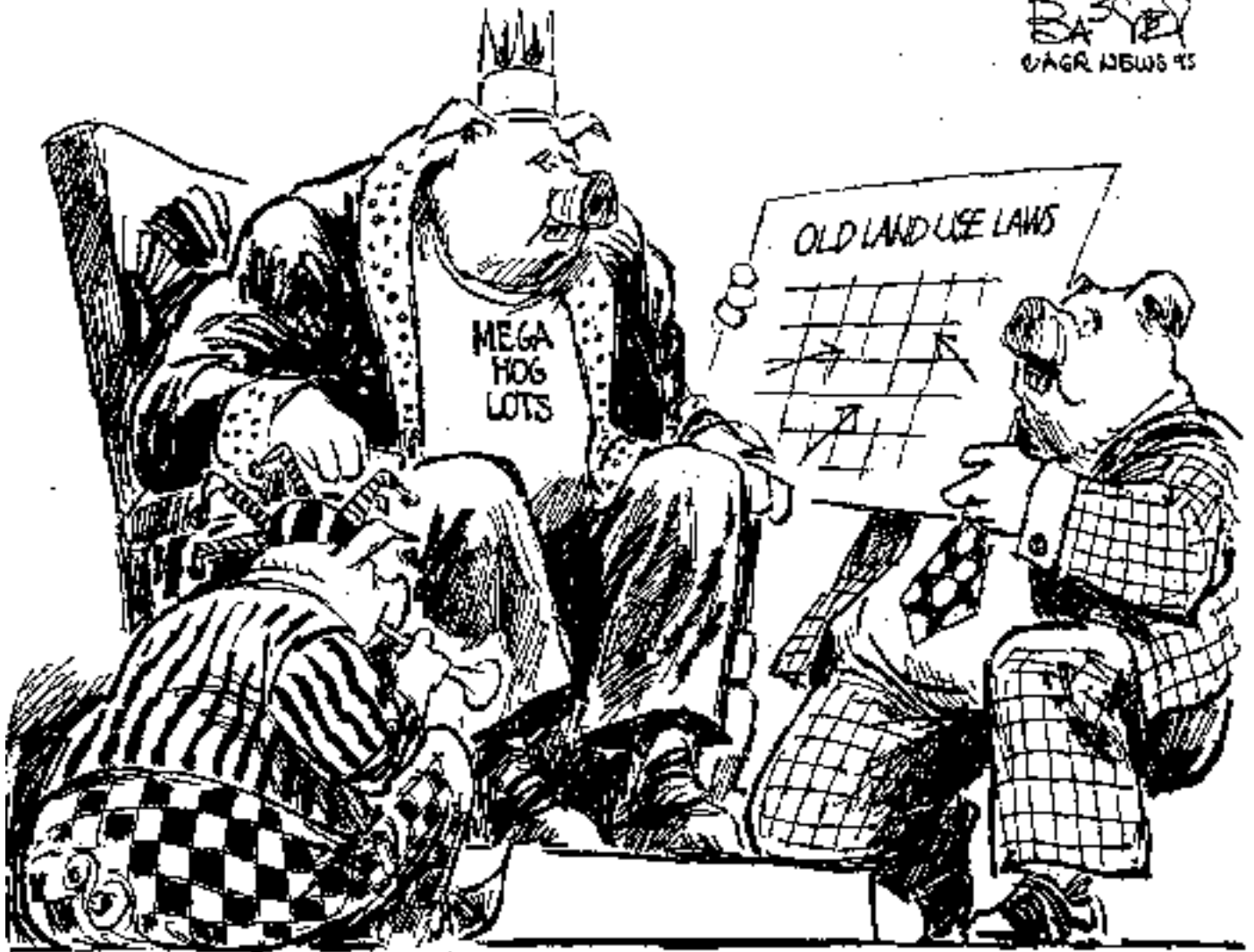
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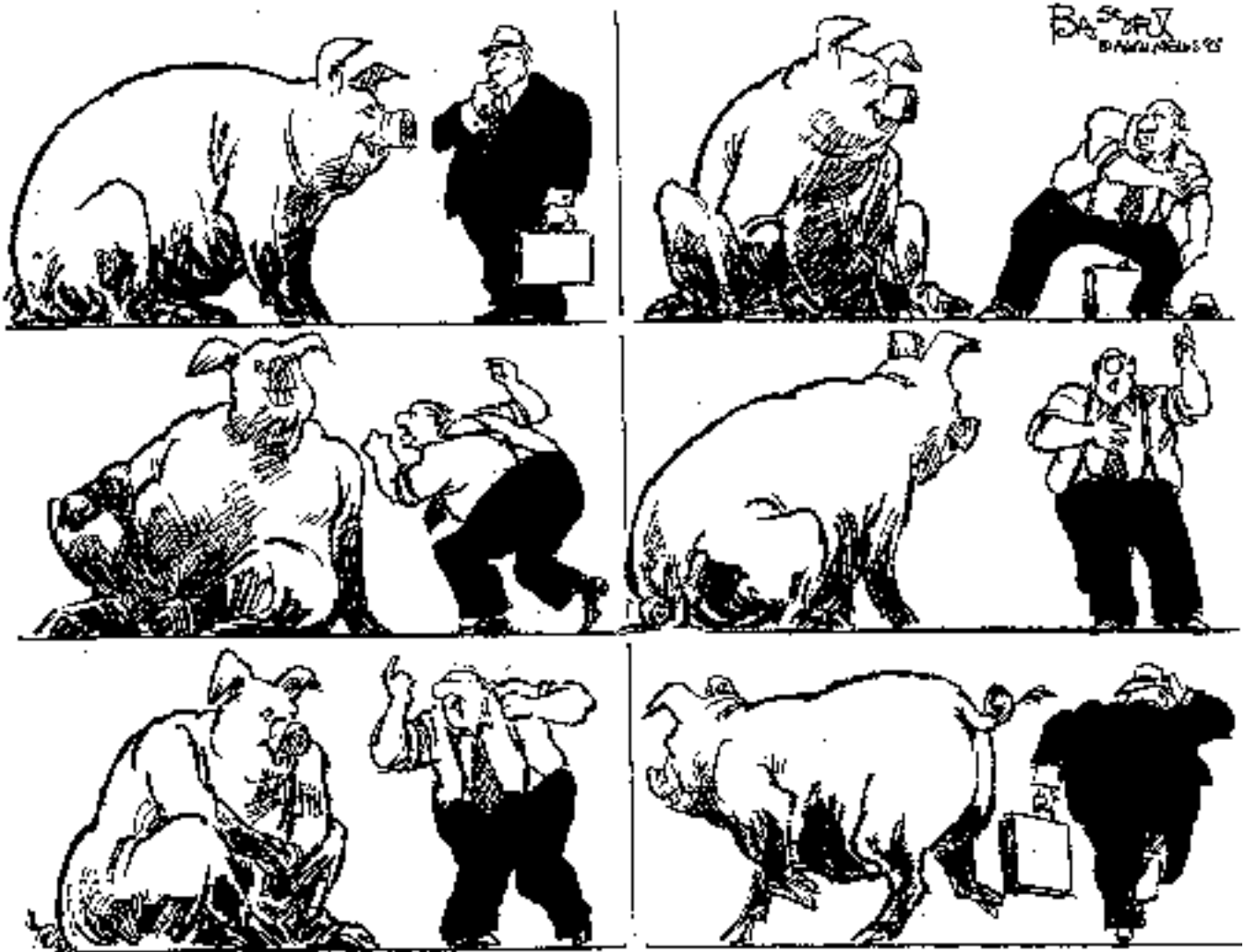


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"TROUBLE, SIRE. THERE'S TALK OF MAKING CHANGES IN OUR REALM."

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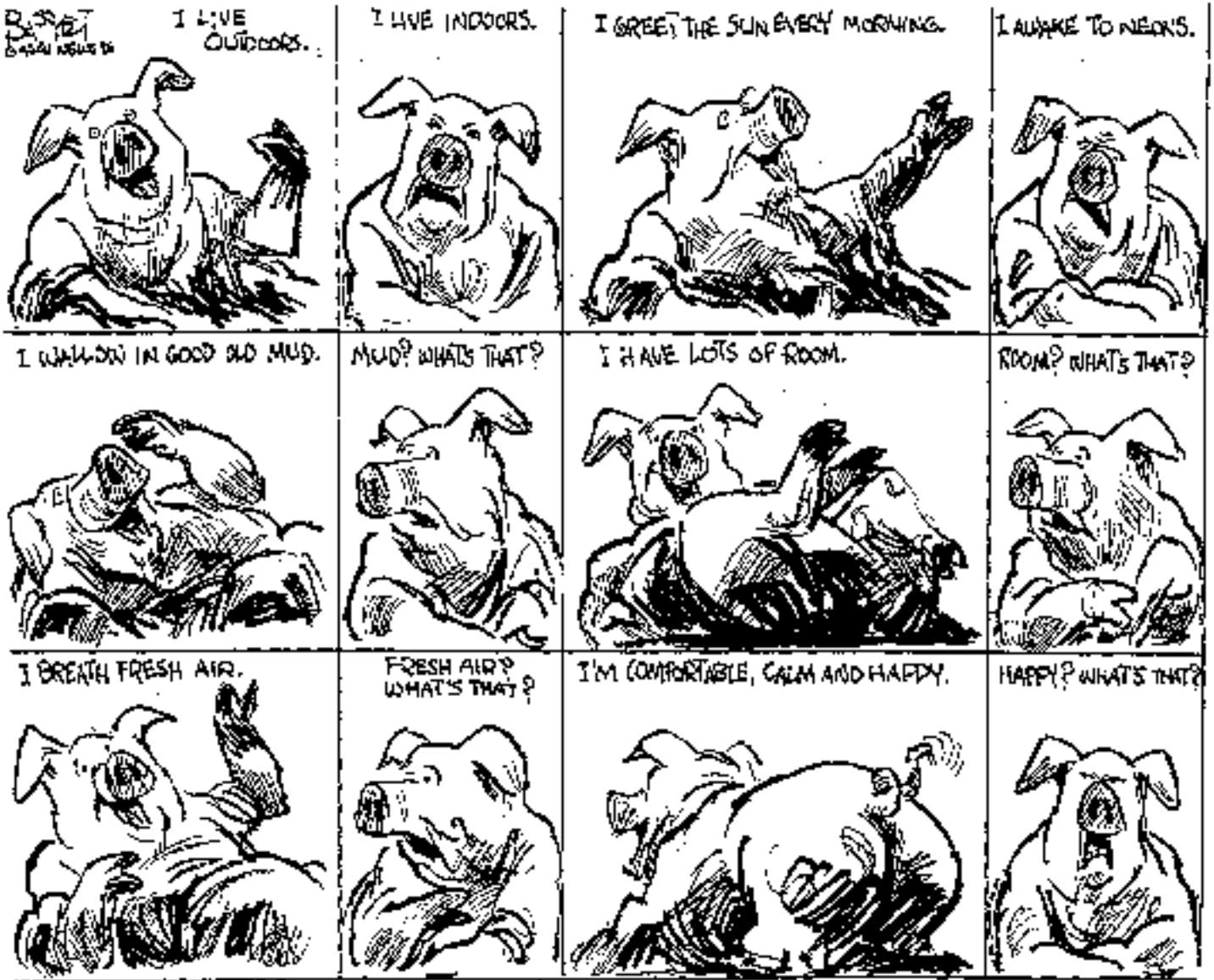


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NEWS ITEM: POLITICIAN GRAPPLES WITH HOG LOT ISSUES.

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For more information, contact Candace Falk at (612) 870-3453

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