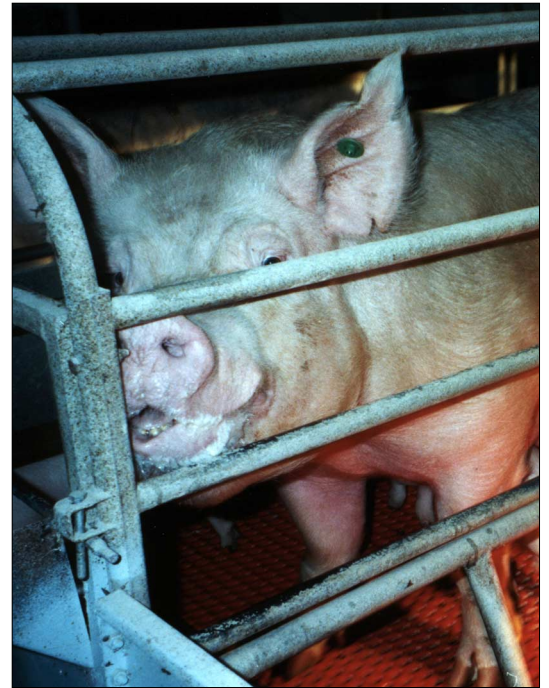


Factory Farms

Are they the best way to feed the nation?

Most U.S. meat, poultry, eggs and milk come from so-called factory farms or CAFOs (concentrated animal feeding operations), where thousands of animals are confined indoors. While they efficiently produce abundant supplies of affordable food, CAFOs also raise questions about animal welfare, public health and environmental degradation. Large livestock farms create huge quantities of animal waste, which produce noxious air emissions and contaminate water supplies when storage facilities leak or overflow. Overuse of antibiotics to keep animals healthy in crowded conditions helps generate drug-resistant bacteria and spread infections in humans. And many critics argue that long-term confinement in small enclosures or cages harms farm animals. Organic and free-range meat and eggs are increasingly popular, but they are more expensive than conventional meat and dairy products, and some organic suppliers are adopting industrial-style methods to keep up with demand.



Hogs on U.S. factory farms are typically confined indoors in narrow crates from birth until they go to the slaughterhouse.

INSIDE THIS REPORT

THE ISSUES.....	27
BACKGROUND	34
CHRONOLOGY	35
CURRENT SITUATION	39
AT ISSUE	41
OUTLOOK	43
BIBLIOGRAPHY	46
THE NEXT STEP	47

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THE ISSUES

- 27 • Do factory farms threaten public health? 43
 • Should pollution from factory farms be regulated more tightly?
 • Can environmentally friendly farming compete with factory farming?

BACKGROUND

- 34 **Free Range** 28
 Cattle and sheep grazed and pigs rooted on village commons well into the 1800s.

- 36 **Federal Rules** 35
 Congress passed the first Meat Inspection Act in 1890.

- 37 **New Technology** 36
 By 1945, only 16 percent of the U.S. workforce remained on farms.

- 38 **New Food Fears** 38
 Mad cow disease outbreaks revealed questionable feeding practices.

CURRENT SITUATION

- 39 **Farm Bill** 41
 Many livestock issues are on the agenda as Congress prepares to reauthorize farm programs.

- 39 **Labels, Monopolies** 45
 Organic advocates want mandatory country-of-origin labeling (COOL) for organic food.

- 42 **Outside the Beltway** 47
 Nine states have barred or restricted corporate farming.

OUTLOOK

- CAFOs Under Pressure**
 Factory farms are under stress from regulators, alternative suppliers and home builders.

SIDEBARS AND GRAPHICS

- Rise in Milk Production Reflects Trend** 28
 Factory farms produce more with less.

- How Much Manure Do Animals Produce?** 29
 A 1,400-pound dairy cow produces 22 tons annually.

- Chronology** 35
 Key events since 1862.

- Ethicist Sees Possible End to Factory Farming** 36
 Peter Singer cites change in public attitudes about animals.

- What Is a CAFO?** 38
 Size determines a factory farm's classification.

- Vermont Dairy Farm Harnesses Cow Power** 40
 Blue Spruce Farm generates electricity from waste.

- At Issue** 41
 Should manure be regulated under the Superfund law?

FOR FURTHER RESEARCH

- For More Information** 45
 Organizations to contact.

- Bibliography** 46
 Selected sources used.

- The Next Step** 47
 Additional articles.

- Citing CQ Researcher** 47
 Sample bibliography formats.

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Cover: Humane Society of the United States

Factory Farms

BY JENNIFER WEEKS

THE ISSUES

Inside a gestation barn on Rick Rehmeier's hog farm in Augusta, Mo., the air is dusty, warm and thick. More than 400 sows are penned in individual metal crates, each with a water trough and feed dispenser. The big animals can lie down but cannot turn around. Their excrement falls through floor slats into a pit, from which it is periodically flushed outside into a so-called lagoon. Acrid whiffs of ammonia waft up from the decomposing manure.

Two employees move down the rows, artificially inseminating sows with semen collected from the farm's four stud boars. Each sow will remain in its crate throughout its four-month pregnancy, and then give birth in a farrowing crate with an adjoining compartment for the piglets.

"In a loose pen, the sow will dig out a bed for herself, and if the piglets go into it, she can roll over and crush them," explains Rehmeier.

When the piglets are weaned at three-to-four weeks of age, the sows will resume the breeding cycle, going outdoors only when being moved between barns or shipped off to slaughter.

Such procedures are standard practice on today's industrialized hog farms. "Confinement is good for hogs," says Joy Philippi, president of the National Pork Producers Council, who runs a nursery with 2,000 pigs in Bruning, Neb. "The barns are climate-controlled and well-ventilated, so livestock are protected from the weather. We can deliver feed and water to them 24 hours a day."



Getty Images/Daniel Pepper

About 21,000 chickens are raised in this 500-foot-long Perdue Farms barn in Kentucky. Factory farms produce massive quantities of animal waste that can pose environmental hazards. Animal-rights activists say factory farms are inhumane, but growers say they provide climate-controlled, well-ventilated living conditions for the animals.

Farms that raise hundreds or thousands of animals in such close confinement are widely known as factory farms, or concentrated animal feeding operations (CAFOs). Large CAFOs are controlled under federal and state water pollution regulations because they produce massive quantities of animal waste that can pose environmental and health hazards if mishandled.

Whatever one calls them, factory farms represent the latest transformation of U.S. agriculture. Before World War II, crops and livestock came primarily from small family-owned farms that raised multiple products. Today most come from fewer, larger farms that specialize in a single commodity.¹

"We used to have about 50 hog farms in St. Charles County," says Rehmeier, whose family has raised hogs in Missouri for five generations. "Now there are five." His 12-person operation runs four sites with about 10,000 hogs.

Such concentration has been increasing in the poultry and livestock industries for decades. From 1982 through 1997, the number of farms with confined animals declined by 50 percent, but the number of medium-size CAFOs increased by 50 percent, and large farms more than doubled.²

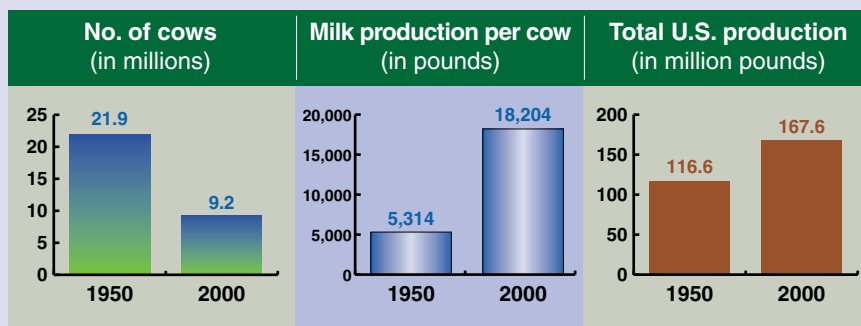
Large CAFOs — those with more than 1,000 "animal units" (1,000 beef cattle, 700 mature dairy cattle, or 2,500 hogs larger than 55 pounds) — represent only 10 percent of all factory farms but control half or more of the total animal inventory in some sectors. Concentration is especially high in the hog and poultry industries. (See graph, p. 32.)

Although factory farms can produce large quantities of food cheaply, animal-welfare advocates call them inhumane, and environmentalists and local residents say they generate pollution and noxious odors and byproducts. Runoff can pollute streams and groundwater with antibiotics, insecticides and pathogens and emit poisonous gases that are hazardous or create offensive odors. Some health experts argue that because CAFO wastes threaten nearby communities, neighbors should have more say in granting permits for CAFOs.

Groups such as the Sierra Club, the American Public Health Association and the Iowa Farmers Union — and even some counties and states — have sought or imposed moratoriums or outright bans on new CAFO construction

Rise in Milk Production Reflects Trend

The number of dairy cows fell by more than half from 1950 to 2000, but overall U.S. milk production still rose because production per cow increased more than threefold. The increase was largely due to the trend toward factory farming. Before World War II, crops and livestock came primarily from small family-owned farms; today most output comes from fewer, larger farms that specialize in a single commodity, rather than multiple products.



Source: U.S. Department of Agriculture, February 2001

or tightened permitting requirements for new farms.

Scientific and technical advances have made livestock farming much more productive in recent decades. Between 1950 and 2000 dairy cows' average annual milk yield more than tripled, thanks to milking machines, refrigerated bulk trucks, nutrition research and new breeding techniques.³ Confining animals lets farmers feed them indoors, saving labor and allowing farmers to milk cows more often.

Animal production has also undergone dramatic structural change as "vertical integration" has concentrated virtually every step of the process — from breeding to slaughter and processing — in the hands of individual, big corporations. In the pork and poultry industries — where vertical integration is most pronounced — many farmers raise animals for major "integrators" like Perdue Farms or Tyson Foods, that provide growers with everything from animals and feed to medications and detailed handling directions. The growers receive a fee for each animal raised to market age. The arrangement allows

farmers to avoid large capital investments for animals and feed and gives them guaranteed markets.

But there are drawbacks. "Farmers who produce on contract bear significant risk and don't get well compensated for it," says Chuck Hasselbrook, executive director of the Center for Rural Affairs, in Lyons, Neb. "Under contract, if you invest a million dollars in buildings and then the company decides to locate somewhere else or doesn't want to work with you, you're left holding the bag."

Contract production also allows large corporations to avoid environmental liability, says Ed Hopkins, director of environmental-quality programs at the Sierra Club. "They prescribe in detail the conditions under which animals are to be raised and leave contract operators to deal with the waste," he says.

Food companies argue, however, that they provide consistent, affordable products to Americans, who eat more meat than any other nation: 218 pounds per capita in 2004, up from 190 pounds in 1980. Inflation-adjusted retail prices have held steady over

the past 25 years at roughly \$1 to \$1.50 per pound for poultry and \$2.50 per pound for pork. Beef prices have stayed below \$4.50 per pound.⁴

Americans' high meat consumption worries nutrition experts. The American Heart Association recommends eating no more than six ounces a day of lean meat, poultry and seafood to reduce the risk of heart disease and stroke.⁵ And many environmentalists argue that meat-based diets — especially of grain-fed animals — consume more resources than vegetarian diets.⁶

Grain is resource-intensive, requiring large quantities of water and fossil fuel (a key ingredient of synthetic fertilizer) to grow corn feed for livestock, noted writer and activist Frances Moore Lappe. As early as 1972, she dubbed grain-fed beef "a protein factory in reverse" in her bestseller *Diet for a Small Planet*.

"The consequences of a grain-fed meat diet may be as severe as those of a nation of Cadillac drivers," she warned.⁷ A recent study indicates she was right. University of Chicago geophysical science professors Gideon Eshel and Pamela Martin found that the typical meat-heavy American diet generates as many greenhouse-gas emissions — compared to a vegetarian diet — as driving a sport-utility vehicle vs. a fuel-efficient sedan.⁸ When all of its impacts are added together, from clearing land to growing feed with fertilizer and managing manure, the global livestock industry generates more greenhouse gases than the transportation sector of the economy.⁹

Meanwhile, meat consumption is trending upward around the world, especially in developing countries like China. "Everyone likes meat. It's the first dietary item that people choose when they start to make some money," says Marion Nestle, a professor of nutrition at New York University and author of several books about nutrition and food policy. "We are omnivores, and meat has status." To accommodate

the rising demand, other countries are adopting the CAFO model.

Critics have long argued that many confined animal agriculture methods are inhumane. For example, poultry farms trim the ends off of chickens' beaks to keep them from pecking each other in tight quarters. To guarantee that veal calves will have pale, tender meat, farmers raise them on liquid diets in tiny stalls where they cannot exercise and develop muscle tissue.¹⁰

Many farmers argue that animals have easier lives indoors, where they are not exposed to blistering summers and freezing winters, and that CAFO practices are essential for raising animals in close quarters. For example, Rehmeier notes that his sows' ears and tails are scar-free because they live in separate crates. "They're very aggressive creatures, and if another sow gets in their way when they're eating, they'll fight," he says.

Many consumers support humane treatment of animals when they learn how their meat, poultry and dairy products are raised. In 2002 Florida voters banned gestation crates for pigs, and in 2006 Arizona voters outlawed crates for breeding pigs and veal calves. Growing demand for grass-fed and humanely raised meat also indicate rising interest in farm-animal welfare.

As Americans ponder the ethics and environmental implications of factory farming, here are some issues being debated:

Do factory farms threaten public health?

The U.S. food supply is safer and Americans are better nourished today than a century ago, thanks largely to scientific and technical innovations such as pasteurized milk, enriched breads and cereals and advances in veterinary medicine. Deaths from food-related illnesses such as diarrhea, typhoid fever and dysentery have fallen dramatically since the early 1900s, and nutritional deficiencies like scurvy, rickets and pellagra have been brought under control.¹¹

How Much Manure Do Animals Produce?

A 1,400-pound dairy cow produces about 22 tons of manure annually, while a 375-pound sow and its litter produce about four tons.

Approximate Annual Manure Production

Animal Type/Size		Manure Production	
Animal (Type)	Size (lbs.)	Manure (lbs./day)	Manure (tons/year)
Cattle			
Dairy cattle	500	43	7.8
	1,400	120	21.9
Beef cattle	750	45	8.2
	1,250	75	13.7
Swine			
Finishing pig	150	8.8	1.8
	200	13.1	2.4
Sow and litter	375	22.5	4.1
Poultry			
Layers	4	0.21	0.038
Broilers	2	0.14	0.026

Sources: Midwest Plan Service; University of Wisconsin-Extension

But some innovations have caused new problems, including the spread of antibiotic-resistant infectious agents and the proliferation of hormones in meat.¹² In addition, residents living near massive livestock operations say they suffer from a variety of air- and water-borne illnesses resulting from CAFO-related pollution.

Many large farm operators routinely use antibiotics not just to treat sick animals but also to promote growth. The Food and Drug Administration (FDA) has approved 18 antimicrobial drugs for growth promotion in food animals. Half of these, including penicillin and erythromycin, are chemically similar or identical to drugs used by humans.

Swine, poultry and beef cattle producers use from 16 million to 27 mil-

lion pounds of non-therapeutic antibiotics on animals every year.¹³ "It's a business decision," says George Saperstein, a professor of veterinary medicine at Tufts University. "The more efficiently your animals grow and put on muscle, the more profitable your business is."

Big livestock operations also give animals antibiotics as a preventative, because by raising only a few selected breeds their animals have less natural genetic protection against disease, and sickness spreads easily in close quarters. Stress from overcrowding also lowers animals' resistance.

To prevent excessive antibiotics from entering the food chain, animals treated with antibiotics must be held for a withdrawal period before being slaughtered so the drugs can clear

from their systems. But some develop antibiotic-resistant bacterial strains that can pass to humans through either the food supply, use of their manure as fertilizer or direct contact between animals and farmworkers.

Resistant organisms cause serious infections in humans, as Missouri pig farmer Russ Kremer learned when he was gored by one of his animals and his leg swelled to twice its normal size. Doctors discovered the infection was caused by antibiotic-resistant mutated staphylococcal bacteria. The most powerful antibiotic available finally knocked out the infection.¹⁴

Kremer learned that the animal that gored him had been given daily doses of penicillin by its previous owner in order to control a staph problem. Kremer stopped using antibiotics or growth hormones in his pigs and says his new methods not only are safer for humans but also save him \$12,000 a year on drug and vet bills.¹⁵

The World Health Organization recommended in 1994 that antibiotics used in human medicine not be used to promote livestock growth.¹⁶ In 1998 the European Union (EU) banned such antibiotics to promote animal growth, and in 2006 it barred any antibiotics for growth promotion. Levels of drug-resistant bacteria in Europe fell following the restrictions.¹⁷

“If we’re going to preserve antibiotics’ effectiveness, we should all stop using them so much,” says David L. Smith, an epidemiologist and infectious-disease ecologist at the National Institutes of Health (NIH). “There are alternatives to antibiotics in agriculture, just as there are in human medicine. But drug companies benefit from selling agricultural antibiotics, and they issue scathing responses when anyone calls for withdrawing them.”

U.S. regulators are beginning to restrict non-therapeutic use of antibiotics in animals. In 2005 the FDA banned Baytril in poultry because it may promote drug-resistant *Campylobacter*

bacteria. *Campylobacter* afflicts some 2 million Americans with diarrhea, fever and cramps and kills 50 every year.

Some large food purchasers have heeded the warnings. Since December 2005, McDonald’s has required that suppliers not use antibiotics that are important in human medicine for growth promotion. Over the past decade poultry producers representing nearly 40 percent of the U.S. broiler-chicken industry — Tyson Foods, Gold Kist, Perdue Farms and Foster Farms — have almost stopped using antibiotics for growth promotion.¹⁸

Treating dairy cows with the controversial recombinant bovine growth hormone (rBGH, also known as bovine somatotropin or rbST) to boost milk production has also raised health concerns. Using growth hormone increases production by 10 to 15 percent, and Monsanto, which makes rbST, claims that it helps the environment by allowing farmers to produce more milk with fewer cows, using less water and land and producing less manure. Farmers also use other hormones to promote muscle development in beef cattle.

The FDA says hormone residues in meat and milk are too minute to cause any health risks to humans and that any traces remaining in meat are far smaller than the levels humans produce themselves. But critics point out that no one has conducted large-scale health studies on whether hormones used in livestock contribute to early onset of puberty in children and that rBGH has not been in use long enough to measure suspected links between hormone-treated milk and breast cancer.¹⁹

“It would be nice to know more, but if the government doesn’t fund this research, it won’t be done,” says nutrition expert Nestle.

The EU banned imports of meat treated with growth hormones in 1989 and forbids treating dairy cows with it, arguing that the hormones threaten public health, animal welfare and

beef quality. The United States argues that there is no scientific evidence that hormones in meat are a health threat and calls the EU ban an unfair trade restriction. The United Kingdom’s minister of agriculture has also supported ending the ban, and in 1999 the World Trade Organization ruled that the U.S. was entitled to impose trade penalties on EU imports because the ban was hurting U.S. beef exporters. The United States and the EU are still arguing over what scientific evidence justifies banning growth hormones in beef.²⁰

U.S. cattlemen say science supports giving cattle hormones. “For about 50 years, growth hormones have helped us to safely meet growing demand for lean beef without impacts on human health,” says Michele Rossman, director of safety research for the National Cattlemen’s Beef Association (NCBA). “Our data show that this practice is safe and effective.”

Beef cattle are also a source of *E. coli* 0157:H7, a rare but deadly strain of harmless bacteria found in all human and animal intestines. *E. coli* 0157:H7 sickens about 73,000 Americans each year with stomach cramps and bloody diarrhea, and in September 2006 it killed three people and sickened 200 others in 26 states — an outbreak eventually traced to tainted spinach from California’s Salinas Valley. Cattle manure in fields adjoining the suspected spinach beds tested positive for the bacteria.²¹

The beef industry says it has worked to reduce the incidence of *E. coli* 0157:H7 at farms, feedlots and packing plants. “We have multiple interventions in place, including carcass washes and steam pasteurization,” says Rossman.

According to the Centers for Disease Control and Prevention (CDC), estimated annual *E. coli* 0157 infections in a 10-state sample decreased by about 29 percent from the 1996-1998 level through 2005, possibly due to better monitoring of ground beef.²²

Nevertheless, some consumers have begun buying beef from cattle raised exclusively on grass, which are less likely than factory-produced animals to contain *E. coli* O157:H7.²³

People who live near large livestock farms complain about many health issues, including headaches, runny noses, sore throats, diarrhea, burning eyes, coughing, bronchitis and shortness of breath. “Air polluted with ammonia, hydrogen sulfide and dust from CAFOs is harming the health of both workers and residents living downwind from these operations,” Robert Lawrence, associate dean of John Hopkins University’s School of Public Health, told the House Energy and Commerce Committee in 2005.²⁴ One recent study found elevated concentrations of antibiotic-resistant bacteria 150 meters downwind of a hog CAFO that had stopped using antibiotics four weeks earlier.²⁵

CAFO animal wastes also contaminate water with bacteria and nitrates, which can cause “blue-baby” syndrome (a disorder in infants that prevents red blood cells from carrying enough oxygen).²⁶ In May 2000, an estimated 2,321 people became ill and seven died from *E. coli* O157:H7 and *Campylobacter* infections in Walkerton, Ontario, after they drank well water that had been contaminated by livestock waste.²⁷

Agriculture groups contend that manure is not hazardous if it is properly managed, and that they are working with regulators to address health and environmental issues. Farmers say that their operations are highly regulated, and standards are

ratcheting upward. “Farm waste is more strictly controlled than human waste,” says Cecelia Conway, whose family owns two large dairy farms in Michigan and helps European dairy farmers relocate to the Midwest. “Our farms are designed very differently today than they were in 1997 — we’re implementing treatment ponds and multiple storage lagoons so that we can manage nutrients more efficiently.”



Liquefied manure flushed from the main hog barn at a farm in Fillmore, Ind., is stored in a large “lagoon” until it can be sprayed on fields as fertilizer. Pollution occurs when lagoons leak into streams or groundwater, or farmers apply manure to land faster than plants can take up its nitrogen and phosphorus, leaving excess that washes out of soils.

AP Photo/Michael Conroy

Should pollution from factory farms be regulated more tightly?

A single dairy cow produces more than 20 tons of manure annually, and a hog can produce more than two tons. According to the Sierra Club, livestock operations generate 500 million tons of animal waste a year.²⁸

Farmers wash manure out of barns and store it in tanks or “lagoons” until it can be applied to nearby farms as fertilizer. The stored, liquefied manure can leak or be washed away by big storms, contaminating nearby waters with bacteria, hormones, nutrients, antibiotics and toxic chemicals.

Excess nutrients from manure spills can cause large algae blooms in rivers

and lakes that deplete oxygen in the water and kill fish. In 2005, a manure lagoon in Lowville, N.Y., spilled several million gallons into the Black River, killing some 250,000 fish.²⁹ According to the Environmental Protection Agency (EPA), hog, chicken and cattle waste has polluted 35,000 miles of rivers in 22 states and contaminated groundwater in 17 states.³⁰

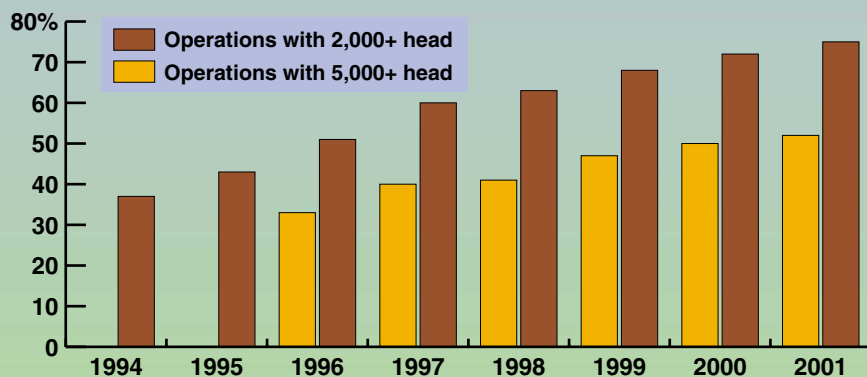
Nutrient pollution also occurs when farmers apply manure to land faster than plants can take up its nitrogen and phosphorus. In a North Carolina study, the amount of nitrates in groundwater beneath fields sprayed with liquid manure was five times the human health standard. One survey found 10 percent of the wells near factory farms had unsafe levels of nitrates.³¹

The Clean Water Act requires large concentrated feeding operations to obtain permits before discharging pollution into bodies of water. Typically, discharges are allowed only during unusually heavy and long-lasting storms. Farms that discharge pollutants without permits or that violate their permits are subject to civil and criminal penalties of up to \$50,000 a day. In 2003 the EPA directed all factory-farm operations to apply for discharge permits unless they could show that they had no potential to discharge pollutants. The agency also required permitted facilities to develop plans for handling manure and wastewater.

Environmental organizations called the new rules too lenient; farmers said they were too strict. In 2005 the Second U.S. Circuit Court of Appeals struck down several provisions and sent others back to the EPA for clarification. Specifically, the court held that the

Hog Farms Getting Bigger

The number of hog farms with 2,000 head or more accounted for nearly 75 percent of total U.S. hog and pig inventory in 2001 — twice the number in 1994. During the same period, the number of hog farms fell by more than 50 percent, from more than 200,000 farms to just over 80,000. The hog inventory, however, remained relatively stable, averaging about 60 million head.



Note: Operations with 5,000+ head were not reported before 1996.

Source: U.S. Department of Agriculture, "Farms and Land in Farms"

EPA could regulate only actual discharges, not potential discharges, so the factory farms did not have to automatically apply for permits.³²

In 2006 the EPA issued a new draft rule requiring CAFOs to apply for permits only if they plan to discharge pollutants, a rule environmentalists attacked as weak. The Sierra Club, Natural Resources Defense Council and the Waterkeeper Alliance — an environmental group dedicated to protecting rivers, lakes and bays — argued that it "would allow CAFO operators to decide whether their situation poses enough of a risk of getting caught having a discharge to warrant the investment of time and resources in obtaining a permit."³³

"EPA could have been more aggressive in writing the rule," says the Sierra Club's Hopkins. "I don't think they really want to regulate CAFOs that badly."

But the EPA says its requirements are clear. The proposed rule "outlines

several illustrative situations under which operators would have to apply for permits," says Allison Wiedemann, branch chief for rural issues in EPA's wastewater management office. And while it leaves the determination up to the operator, she explains, "that's the way the entire program works for other industries."

At big livestock operations, air pollution from decomposing manure, dust and gases produced by the animals can contain up to 160 separate chemical substances.³⁴ A recent study found unsafe airborne levels of hydrogen sulfide five miles from a manure lagoon, and hydrogen sulfide levels from a Minnesota CAFO lagoon exceeded safe levels for human health 271 times in two years.³⁵

Air emissions from factory farms can have a worldwide impact. A 2003 National Research Council study found that large-scale animal feeding operations produce nitrous oxide and methane — powerful "greenhouse

gases" that cause global warming. Other gases, like ammonia and hydrogen sulfide, are primarily local hazards, the report said.³⁶

But people who live near CAFOs complain that hog farm odors deprive them of the use of their own back yards. "They're stealing our fresh air from us," said Michigan farmer John Zachel, who lives across the road from a hog farm.³⁷

The National Research Council concluded, however, that available emission factors, rates and concentrations are so uncertain that they "provide a poor basis for regulating or managing air emissions" from the big factory farms. The odors could be caused by a mix of hundreds of compounds, the report said.³⁸

In response, the EPA offered factory farmers the option of installing up-to-date air-pollution control equipment and allowing the agency to monitor emissions. If the agency finds that factory farms are violating air-emission limits, it will then publish methods for estimating emissions. In exchange, the agency pledged not to sue the farms for past violations of the Clean Air Act or toxic and hazardous-waste laws.

Environmentalists complain this approach was too deferential to the industry. "EPA has authority under the Clean Air Act to require farms to produce this data. We don't think it needed to give amnesty to these facilities," says Hopkins. "And they're not going to monitor many sites, so we're concerned that the information won't be scientifically valid, and it will just be a long delaying game."

But Jon Scholl, counselor to the EPA administrator, calls the plan an "innovative approach" that "will result in more compliance than a traditional approach of addressing violations case by case."

Some regulators have tried to control CAFO pollution by suing farms for water discharges under the so-called Superfund law, which makes polluters

liable for the cost of cleaning up their hazardous wastes. * Tulsa, Okla., settled a case against Tyson Foods for pollution from large chicken farms in 2003, and Waco, Texas, settled a similar suit with 14 dairy operations in 2004. Oklahoma is suing large poultry producers in both Oklahoma and neighboring Arkansas for allegedly contaminating Oklahoma rivers and lakes.

Industry groups say manure should not be regulated by the Superfund law. "Manure issues are covered under the Clean Water Act and the Clean Air Act," says Tamara Thies, director of environmental issues for the National Cattlemen's Beef Association. The group is seeking legislation to exempt animal-feeding operations from both the Superfund law and another law that requires companies to immediately report hazardous-waste releases. (See "At Issue," p. 41.)

Environmentalists counter that it's legitimate to hold agricultural polluters liable for damages and that talk of turning farms into Superfund sites is a scare tactic. "Not a single farm has been put on the Superfund list because of manure," says the Sierra Club's Hopkins. "We're talking about cost recovery for cleaning up contaminated water supplies."

Can environmentally friendly farming methods compete with factory farming?

Debates about food safety, chemical additives, animal welfare and farm pollution are driving many Americans to look for healthier, more natural eating options, such as organic foods. Since Congress required national standards in 1990 for labeling products as organic, the market for food produced without synthetic pesticides or chemical additives has been one of the fastest-growing sectors in American agriculture.

* The Clean Air and Clean Water Acts levy fines on polluters but do not require them to pay for cleanup.

U.S. organic food sales totaled \$12 billion in 2004 — about 2.5 percent of retail grocery sales — and are rising by 14 percent annually.³⁹ More than half of organic sales are for dairy, egg, meat and poultry products, presumably representing consumer concern about conventional methods of producing animal products.⁴⁰ The number of animals raised on organic poultry and livestock farms increased from about 73,000 in 1992 to nearly 9 million in 2003.⁴¹

But because organic farming is more labor-intensive and yields are generally lower, organic food usually costs about 25 percent more than conventional products. Organic milk costs even more — about \$3.60 per half gallon, roughly double the price of conventional milk.

Converting to organic production requires a costly, multi-year certification process. But more and more farmers are switching to organic production because they can get higher prices for their commodities. Conventional farmers' profits are low due to many factors, including overproduction, global competition and rising energy and fertilizer costs.

"Farmers are getting astoundingly higher prices for organics," says Ronnie Cummins, executive director of the Minnesota-based Organic Consumers Association. "Why wouldn't they switch?"

Booming sales are also drawing big chains into organics. Since 2000, more organic foods have been sold at conventional grocery stores than at so-called natural-food stores. Now mega-retailers like Target and Costco are entering the market, and in 2006 Wal-Mart — which began selling organic milk and produce in 2001 — announced that it would double the number of organic products in its 4,000 stores.

The trend sounds good for U.S. organic farmers: Big, new buyers would dramatically increase demand for organic products. But organic farmers

fear the new buyers will use their clout to push suppliers to adopt large-scale production methods to drive down costs. Industrialization of the U.S. organic-food market could trigger a weakening of organic-production standards and hasten the globalization of the organic market, they argue. Indeed, Wal-Mart vowed to offer organic foods at no more than 10 percent above conventional food prices.

"Because of its scale and efficiency and notorious ruthlessness, Wal-Mart will force down the price of organics," wrote Michael Pollan, author of *The Omnivore's Dilemma: A Natural History of Four Meals*. While that's good news for consumers and the world's environment, he added, unless consumers are vigilant, "the drive to make the price of organic goods competitive with that of conventional foods will hollow out the word and kill the organic goose, just when her golden eggs are luring so many big players into the water."⁴²

Already some farmers have set up "organic CAFOs" — farms with thousands of dairy cows being housed in indoor feedlots and fed organic grain. Two companies, Horizon and Aurora, supply organic milk from several such farms in Texas, Colorado, Idaho and Maryland to Wal-Mart, Costco, Safeway and other chains. The Cornucopia Institute, a Wisconsin-based watchdog organization, has filed complaints with the U.S. Department of Agriculture (USDA) charging Aurora and Horizon with violating federal organic standards by not providing dairy cows adequate access to the outdoors, as required in federal organic regulations.

Cornucopia also has filed a complaint against Wal-Mart for allegedly misidentifying conventional items as organic.⁴³ In response, a company spokesman said, "We believe strongly that USDA standards for organic products must not be compromised. Our customers who buy organic products expect them to meet those standards, so we feel they must be maintained."⁴⁴

The USDA is clarifying its access-to-outdoors regulation, and many organic food advocates — including Horizon — say it should be stricter. Executives from the Whole Foods retail chain visited Horizon's Idaho dairy farm in 2006 and concluded the company was upgrading conditions for its cows. (Horizon is adding more than 3,000 acres of pasture to its Idaho farm.) But company President John Mackey agreed that some organic dairy farms "have no real commitment to either animal welfare or pasture access" but are merely "commercial dairies using organic feed."⁴⁵

Whole Foods representatives visited Aurora's Colorado farm in May 2006 and found it "unacceptable," according to a Whole Foods spokesperson. Aurora is reducing the number of cows at the site to allow more grazing, but it also defends its practices. "Our record of animal welfare is certified by an independent third-party expert," said marketing head Clark F. Driftmier. "Our animals are outside all year long; they're never locked into barns."⁴⁶

Raising animals in confinement is especially problematic for organic farms, critics say, because diseases spread easily in close quarters, and organic farmers cannot use antibiotics to treat sick animals.

Demand is also growing for "natural" meats, grass-fed beef and products from humanely raised animals, such as eggs from "cage-free" hens. "The market is increasingly segmenting into different niches — one for the lowest-cost product, where industrial producers compete against each other, and different markets for natural producers," says Hassebrook, at the Center for Rural Affairs. "The biggest opportunities today for small farmers are in niche markets where family farms have a competitive advantage. Consumers care about health and the environment, and they trust small farmers to produce safe food

in an environmentally responsible manner."

But that assumption isn't automatically correct, says Tufts veterinary professor Saperstein. "Treatment of animals varies widely, and small farmers don't always meet the best standards," he says, noting labels like "Humanely Raised" or "Cruelty-Free" are not regulated like organic standards.

But major suppliers of such products are enjoying strong growth. Niman Ranch, a leading natural-meat producer, is growing by 35 percent annually with revenues near \$100 million in 2006.⁴⁷ Research by industry groups indicates that natural pork could win up to 25 percent of the fresh pork market.⁴⁸

"The demand is there, and the market will continue to grow. People are realizing that it makes sense to spend money on good food because it's better for them," says Scott Sechler, president of Bell & Evans, a Pennsylvania company that raises uncaged poultry using all-natural feed and no antibiotics.

But even with demand rising, niche suppliers face big challenges. It takes time to develop natural production methods, says Sechler. "Some people think there's big money and a quick buck in it, but on the farm things don't move that quickly. Almost nobody out there has the patience to build things up and do it for the right reasons."

Structural barriers also exist. Many distributors pay higher rates to producers who can guarantee delivery of large quantities on schedule. And small farmers have less access to slaughterhouses and milk processors, which often focus on large-volume customers. Processing services are important even for farmers who sell directly to consumers, because meat products from livestock must be packaged in a facility that is federally or state-inspected, and many states forbid sale of unpasteurized milk.

Some retailers are working to raise standards for animal agriculture. Whole

Foods already sells meat from animals raised humanely and without antibiotics or hormones but plans to introduce new, more stringent animal-treatment standards in 2008. Wild Oats, another large natural-food chain, buys only humanely raised beef produced without hormones or antibiotics. Both companies sell only cage-free eggs.

Conventional stores focus more closely on profit margins than on production standards, says Sechler, who has turned down requests to supply Bell & Evans poultry to large retail chains. "They have no passion for doing anything right. They just want to drive costs down, and they don't care how you do it," he says. ■

BACKGROUND

Free Range

In early America, animal agriculture was all about open space. Cattle and sheep grazed and pigs rooted on village commons — land owned jointly by all town residents — well into the 1800s. Livestock ranching had developed on a larger scale by the late 1700s in Spanish-settled regions of what are now Texas, New Mexico and California.

In the 19th century, settlers took their animals along as they pushed west across the Great Plains. Farmers raised cows, pigs or chickens along with their crops and slaughtered them when forage grew scarce in winter.

Cincinnati, located at the intersection of fertile Midwest lands and major navigable rivers, became an early meat-packing center, nicknamed "Porkopolis." During the Civil War, Chicago became the industry hub, as large companies like Swift and Armour built up extensive packing and processing complexes near railroad lines.

Continued on p. 36

Chronology

1900-1930s

Government begins to regulate meat industry.

1906

Upton Sinclair's *The Jungle* reveals filthy conditions in the meatpacking industry. . . . Congress passes the Pure Food and Drug Act, giving the government power to regulate food safety.

1921

Congress passes the Packers and Stockyards Act to maintain competition and prevent unfair pricing in the livestock industry.

1933-34

President Franklin D. Roosevelt creates price supports to shore up farm income and orders surplus hogs and cattle slaughtered.

1940s-1970s

Advances in science and technology increase agricultural yields; major environmental laws adopted.

1945

Farm productivity rises with mechanization, rural electrification and advent of inexpensive nitrogen fertilizer.

1951

Food and Drug Administration approves use of antibiotics as feed additives for farm animals.

1954

U.S. Department of Agriculture (USDA) approves hormone treatments for farm animals.

1970

Environmentalists organize the first Earth Day celebration.

1972

Clean Water Act creates a national permitting system for pollution discharges into U.S. waters, including concentrated animal feeding operations (CAFOs).

1973

Minnesota passes legislation restricting corporate farms.

1980-Present

Vertical integration of agricultural production increases. Concerns about large-scale farming foster alternative options.

1982

Nebraska voters ban corporate farming.

1988

Great Britain bans the feeding of meat and bone meal from cows, sheep and goats to other ruminant, or grazing, animals to limit the spread of mad cow disease.

1989

European Union bans imported meat treated with hormones, setting off a trade dispute with the United States.

1990

Organic Foods Production Act authorizes national organic standards, creating base for a new food industry.

1993

Environmental Protection Agency (EPA) approves use of bovine growth hormone in dairy cows.

1995

A manure-storage lagoon ruptures in North Carolina spilling 25 million gallons of hog waste into the New River.

2001

Wal-Mart starts selling organic milk.

2003

The first U.S. case of mad cow disease is detected in a dairy cow imported from Canada. . . . Legislation proposed by then-Rep. (now Sen.) Sherrod Brown, D-Ohio, and Sen. Edward M. Kennedy, D-Mass., calls for banning the non-therapeutic use of seven classes of antibiotics as feed additives unless producers show using the drugs would not promote human resistance.

2005

FDA withdraws the antibiotic Baytril from use in poultry because of increases in resistant *Campylobacter* bacteria. . . . Whole Foods and Wild Oats grocery stores pledge to sell only cage-free eggs. . . . A second case of mad cow disease is confirmed in the United States.

2006

Wal-Mart expands sales of organic products. . . . Whole Foods sets a goal of selling only humanely raised meats by 2008. . . . An outbreak of *E. coli* 0157:H7 poisoning that kills three people and sickens 200 is traced to spinach grown in California, with cattle manure as a possible contamination source. . . . A third U.S. case of mad cow disease is confirmed. . . . Eighth U.S. Circuit Court of Appeals rules Nebraska's ban on corporate farms is unconstitutional; nine states — Oklahoma, Nebraska, South Dakota, North Dakota, Wisconsin, Minnesota, Kansas, Missouri and Iowa — have anti-corporate farming laws.

2007

Reauthorization of the farm bill is expected, with industry groups hoping for increased funding for conservation initiatives, such as improved handling of manure on CAFOs.

'If You're Going to Eat Meat'

Princeton University ethicist Peter Singer offers alternatives

Princeton University ethicist Peter Singer has argued for more than 30 years that animals can feel pain and suffering and that we should treat them as fellow beings, not material resources to be exploited. With debate over factory farming growing in intensity, public opinion may be moving in his direction.

Singer's 1975 book *Animal Liberation*, which opened with the proposition that "All Animals are Equal," condemned so-called factory farming and the use of animals in scientific experiments. In 1980 Singer and attorney Jim Mason coauthored *Animal Factories*, a grisly tour of large-scale animal farms that shocked many readers with descriptions of practices like debeaking chickens. In their new book, *The Way We Eat: Why Our Food Choices Matter*, Singer and Mason show what has and hasn't changed on large animal farms and look at what foods people buy, why they make their choices and the impacts of their decisions.

"There's huge interest now in animal agriculture," says Singer. "A lot of people are concerned about animal welfare, a significant number are worried about health and many others care about supporting local farmers."

Comparing U.S. animal-welfare policies to steps already taken in the European Union (EU), such as banning hog gestation crates, Singer says the United States would rate a zero or a 1 on a 10-point scale, while the EU might be a 5. But he does-

n't think public attitudes on the issue in the United States are very different from those in Europe.

"There are significant differences in the political systems. Public attitudes in the EU have more influence on legislation," Singer argues. "Florida and Arizona voters have both given thumbs-down to hog gestation crates, and those are not terribly liberal states. American politicians are the ones lagging behind Europe, not American voters."

Although he's a vegetarian, Singer does not believe that renouncing meat is the only moral way to eat. Nor does he think that all food animals should be raised outdoors. "Europe isn't abandoning confinement, but they are outlawing sow crates, and we could do better without moving all the way to open-range grazing," he says. As an example, he notes that Niman Ranch — a major producer of natural, humanely raised meat based in Marin County, Calif. — lets its farmers raise pigs indoors, but they have to give the animals outdoor access, more indoor space than pigs have in CAFOs (concentrated animal-feeding operations), and deep straw for bedding.

In *The Way We Eat*, Singer and Mason shop and eat with three American families. One household eats the "standard American diet," buying lots of conventional meat, dairy and processed foods at Wal-Mart. The second family, described as "conscientious

Continued from p. 34

Grazing flourished after the war, as U.S. troops pushed Indian tribes onto reservations, and open-range ranching expanded onto unsettled federal lands.⁴⁹ But ranchers overgrazed many Western lands, and when a series of hard winters struck from 1885 through 1890, up to half of the cattle on the Northern Plains died.⁵⁰

Those losses and steady encroachment from homesteaders forced ranchers to settle down on private holdings, although they still grazed livestock on public lands. Conservationists denounced the visible scars left across many Western states by grazing: Naturalist John Muir called domestic sheep "hoofed locusts, sweeping over the ground like a fire and trampling down every rod that escapes the plow as completely as if the whole plain were a cottage-garden without a fence."⁵¹

In the 1890s, the federal government began carving out national forests and restricting their use — an early skirmish between livestock farmers and environmental regulators.

Federal Rules

The growing meat industry soon came under other federal controls. After some European countries limited imports of U.S. meat, Congress passed the first Meat Inspection Act in 1890 and strengthened inspection standards in 1891 and 1895. Muckraking journalist Upton Sinclair's 1905 book *The Jungle* exposed filthy and dangerous conditions in the meat-packing industry, galvanizing public support for national regulation of the food supply. In 1906 Congress passed the Pure Food and Drug Act — barring interstate sales of mislabeled or

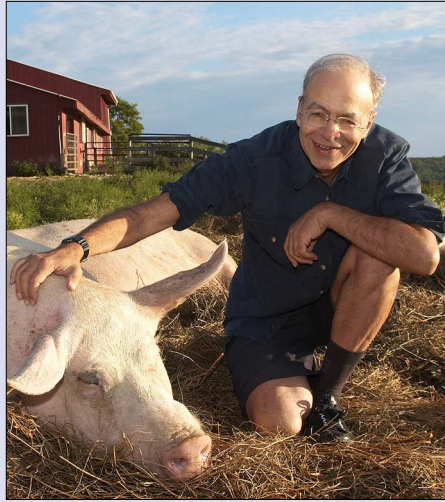
adulterated food products — and the Meat Inspection Act, which created sanitation standards for meat slaughtering and processing plants and mandated USDA inspection of livestock before and after slaughter.

Reformers also challenged the market power of large meatpacking companies. In 1905 the Supreme Court ruled that Congress had the power to regulate anti-competitive practices such as price-fixing in the meat industry.⁵² After further investigation the Federal Trade Commission charged the five biggest meatpacking companies with collusion, and they agreed to divest themselves of stockyards, railroads and cold-storage facilities and not to participate in retail markets. In 1921 Congress passed the Packers and Stockyards Act, which sought to maintain competition in the livestock industry by banning price discrimination and other unfair and deceptive practices.

omnivores,” tries to buy organic and humanely raised products that also provide fair returns to workers. The third family eats a vegan diet, avoiding meat, poultry, fish and dairy products. Comparing how each approach affects animals and the environment, Singer and Mason conclude that the standard American diet is cheapest and easiest but not an ethical choice, especially since alternatives are available nationwide.

“If you’re going to eat meat and dairy foods, you should avoid factory farm products,” says Singer. “Find a source that doesn’t get them from large, confined systems. It’s more expensive, but spend the same amount of money on better-quality products made from animals that have had better lives, and make up the difference with grains and other substitutes. You’ll consume less animal protein, so you’ll do yourself a favor healthwise as well.”

Singer believes that growing concerns about animal agriculture could reshape the U.S. food system in the coming decades. “It’s quite possible that within 20 years, raising animals in per-



Derek Goodwin

Ethicist Peter Singer believes growing concerns about animal agriculture could reshape the U.S. food system.

manent, close confinement could become illegal,” he predicts. “Eliminating systems that concentrate large numbers of animals and feed them on grain would take longer, because that would cause significant price hikes. But we might decide, for example, that raising cattle on grain is too wasteful of fossil fuel and contributes too much to global warming.”

Not everyone is willing to spend more for alternative meat and dairy products, as Singer urges. But Singer and Mason argue that while conventional products seem cheap, they impose hidden costs outside of the production chain — like water pol-

lution from CAFO discharges and increased risks of antibiotic-resistant infections. “It is understandable that people on low incomes should seek to stretch their dollars by buying the lowest-priced food, but when we look at the larger picture, the food produced by factory farming is not really cheap at all,” they write. ¹

¹ Peter Singer and Jim Mason, *The Way We Eat: Why Our Food Choices Matter* (2006), p. 222.

Food prices were high through most of this period, but exports fell after World War I, reducing farm income. Farmers responded by boosting productivity, aided by tractors and other new technologies. As the need for hands-on farm laborers declined, Americans began migrating from rural areas to cities. Commodity prices collapsed, however, during the Great Depression and worldwide recession of the 1930s, and farmers were left without markets for their products.

The Roosevelt administration created commodity price supports for pork, beef and milk to curb overproduction and raise prices. It also ordered the slaughter of more than 6 million hogs in 1933 and thousands of beef cattle in 1934, distributing the meat to relief programs.

“Some people may object to killing pigs at any age . . . but we have to think about farmers as well as hogs,”

declared Agriculture Secretary Henry A. Wallace. “And we must think about consumers and try to get a uniform supply of pork from year to year at a price which is fair to farmer and consumer alike.” ⁵³

The USDA created nationwide school lunch and milk programs to use up the surplus food. Land-grant universities and the USDA’s Agricultural Extension Service taught farm families home gardening and poultry production, marketing and other skills to help them survive the Depression years.

To supply U.S. troops and allied nations during World War II, the government subsidized production of meat, milk and other commodities deemed essential. Price supports for hogs and poultry were not ended until 1950, however, when the economy was growing and farming was back on its feet.

New Technology

In 1900, agriculture employed 41 percent of the workforce. By 1945 only 16 percent of workers remained on farms. Productivity continued to skyrocket after the war, however, as mechanization, rural electrification and synthetic chemical fertilizers enabled fewer farmers to manage more acres and animals. By 1954 the number of tractors surpassed the number of horses and mules on farms. With fewer work animals, there was less demand for feed crops like oats, so farms began specializing in high-value crops or livestock breeds.

Other advances helped transform livestock farming from an art into a science. In 1951 the FDA approved adding the antibiotic tetracycline to animal feed, and three years later the first hormone treatments for cattle were authorized.

What Is a CAFO?

Concentrated animal feeding operations are defined under the Clean Water Act's National Pollutant Discharge Elimination System. An operation is a CAFO if it confines at least the number of animals in any of the following categories:

Animal Sector	Large CAFOs (No. of animals)	Medium CAFOs (No. of animals)
Cattle or cow/calf pairs	1,000 or more	300-999
Mature dairy cattle	700 or more	200-699
Veal calves	1,000 or more	300-999
Swine (over 55 pounds)	2,500 or more	750-2,499
Swine (under 55 pounds)	10,000 or more	3,000-9,999
Horses	500 or more	150-499
Sheep or lambs	10,000 or more	3,000-9,999
Turkeys	55,000 or more	16,500-54,999
Laying hens or broilers (with liquid manure handling system)	30,000 or more	9,000-29,999
Chickens other than laying hens (with non-liquid manure handling system)	125,000 or more	37,500-124,999
Laying hens (with non-liquid manure handling system)	82,000 or more	25,000-81,999

Source: Environmental Protection Agency

Advances in genetics produced new animal strains that maximized profits — broiler chickens that grew faster, hens that produced more eggs and cows that gave more milk. Agricultural extension agents and land-grant universities spread these ideas nationwide.

Vertical integration hit the poultry industry first. Because chickens and turkeys mature within a few months of hatching, poultry genetics could be altered quickly so companies that controlled the entire process from hatching to distribution could easily create and market new products. By 1990 more than 82 percent of the nation's poultry and eggs were produced by farmers under contract for large integrators.⁵⁴

Dairy farmers also pursued economies of scale, aided by new techniques such as artificial insemination. The beef industry was more segmented: Many small-scale ranches in the West bred calves,

but growing numbers of ranchers shipped young steers to large feedlots that cropped up in the 1950s near major grain fields and at collection points in Kansas and Texas. The facilities fattened the cattle on grain, then handled the slaughter, processing and shipment.

New Food Fears

The revolution in animal agriculture filled U.S. stores with thousands of new products. As Americans became more health conscious and demanded convenient options, food producers responded with innovations like boneless, skinless chicken breasts and lean pork — “the other white meat.”

Meanwhile, a modest natural-food movement was also developing, spurred by environmentalists promoting organic farming.⁵⁵ In the 1950s and '60s organic food was a small-scale trend. But

it gained support from a growing environmental movement after the first Earth Day in 1970 and from consumer advocates lobbying to reduce the use of pesticides, dyes and food additives.⁵⁶

In the late 1980s and early '90s, when bovine spongiform encephalopathy (BSE), or mad cow disease, killed dozens of Europeans, consumers were shocked to learn that the disease was caused by cows being fed ground-up cattle parts — including brain and spinal tissue from infected cows.⁵⁷

Regulators in Europe and North America barred feeding ruminants (cattle, sheep or goats) supplements containing meat and bone meal from other ruminants and banned potentially unsafe cattle products from human food and medicine. But once consumers learned that cattle routinely ate animal parts — along with other cheap protein such as poultry litter and feces — many either stopped eating beef or turned to alternatives such as naturally raised meat.

CAFOs began to draw attention in the 1990s as their number increased, especially in the Midwest and Southeastern states. In North Carolina, heavy rains in 1995 and '99 caused flooding that ruptured dozens of hog-waste lagoons, contaminating rivers and creating public health threats. In response, the state adopted a 10-year moratorium on new hog CAFOs in 1997. Other towns and counties across the nation passed similar bans or tightened their permitting requirements.

Then in 2003 and '04, a deadly strain of avian flu (H5N1) spread widely throughout poultry flocks in Asia and killed more than 75 people, spurring fears of a worldwide pandemic.⁵⁸ U.S. poultry farmers began testing birds for the H5N1 virus in 2006.

Many critics and some experts argued that poultry CAFOs were the main route for spreading H5N1. “[F]ar more likely to be perpetuating the spread of the virus is the movement of poultry, poultry products or infected material from poultry farms,” the British medical journal *Lancet* editorialized in

2006. "This mode of transmission has been down-played by international agencies, who admit that migratory birds are an easy target since nobody is to blame." ⁵⁹ Like mad cow, avian flu showed that animal-borne diseases could spread readily through a centralized national food industry. ■

CURRENT SITUATION

Farm Bill

Several livestock issues are on the agenda as Congress prepares to reauthorize farm programs in 2007. With the prospect of tighter water-quality and air-pollution regulations, livestock producers support more federal funding for conservation programs, such as improved manure-management systems at CAFOs.

Under the 1996 Environmental Quality Incentive Program (EQIP), the USDA shares the cost of conservation upgrades with farmers. From 2003 through 2005, EQIP paid \$1.2 billion to livestock producers, of which two-thirds went to beef-cattle producers. Before 2002, EQIP funds went to small farmers, but the 2002 farm bill removed size restrictions.

Environmentalists oppose paying CAFOs to clean up their pollution. "These are public subsidies to an inherently polluting industry, and we

shouldn't continue to underwrite costs to large companies," says the Sierra Club's Hopkins.

But other groups disagree. The American Farmland Trust — a nonprofit that works to protect farm and ranch land and preserve the environment — proposes converting existing price supports into "green payments" to help guarantee farm income and reward all farms, regardless of size, for good environmental performance. ⁶⁰

Public-health advocates may try to use the farm bill to address the overuse of antibiotics. The Preservation of Antibiotics for Medical Treatment Act — first introduced in 2003 by then-Rep. (now Sen.) Sherrod Brown, D-Ohio, and Sen. Edward M. Kennedy, D-Mass. — would have banned within two years the non-therapeutic use of seven classes of

and extension services focused on organic issues. In 2005, the USDA's Agricultural Research Service spent about 0.35 percent of its \$1 billion budget — or about \$3 million — on organic projects, and Congress provided less than \$2 million per year in 2004 and 2005 to support farmers transitioning to organic production.

"The European Union understands that preserving family-scale farms is important and that the future of agriculture is organic," says Cummins of the Organic Consumers Association, "so they use a large part of their subsidies to help farmers convert." Farmers converting to organic should receive price supports while making the transition, Cummins argues, because they must adopt lower-yield methods but cannot sell their products until they are certified as organic.

More funding of research on alternative methods could help diversify U.S. agriculture, says Hassebrook of the Center for Rural Affairs. "We've spent hundreds of millions of dollars on research to refine these confined-production systems, and you can still raise hogs almost as efficiently in an old shed," he argues. "If we'd had a balanced research portfolio that also focused on improving the efficiency of smaller farms, the industry would look very different today."



Hogs on a typical factory farm are raised in two-foot-by-seven-foot crates that allow them to lie down but not turn around. Manure is collected in pits under the cages.

Humane Society of the United States

antibiotics as feed additives unless producers show using the drugs would not promote human resistance. Nearly 400 organizations endorsed the bill, including the American Medical Association, Consumers Union and the Humane Society.

Organic-farming advocates want more funding for research, education

Labels, Monopolies

Organic and small-farm advocates also want Congress to implement a provision of the 2002 farm bill requiring mandatory country-of-origin labeling (COOL) for beef, lamb, pork and other agricultural commodities.

Vermont Dairy Farm Harnesses Cow Power

Green farmers turn manure into electricity and extra profits

The approximately 1,000 milking cows at Blue Spruce Farm in Bridgport, Vt., produce about 24 million pounds of milk a year. Along with several hundred other cows, they also generate roughly 10 million gallons of manure, an unwelcome threat to Vermont's air and water quality. But in 2005, brothers Ernest, Earl and Eugene Audet started generating a new non-dairy product — electricity from cow manure.

Inside an anaerobic digester installed at the farm by the local electricity provider, Central Vermont Public Service (CVPS), bacteria break down manure in an airless environment. The process generates methane, a principal component of natural gas that can be burned to generate electricity. The process also yields odorless solids that make good bedding for cows, plus waste heat that can be used to heat water or buildings. Use of the byproduct for animal bedding alone could save Blue Spruce Farm up to \$60,000 annually.

The Audets expect to produce about 1.7 million kilowatt-hours (kWh) of energy per year. CVPS sells the electricity at a premium price to customers who sign up for Cow Power, then passes the premium back to the farmers. Subscribing costs an extra 4 cents per kWh, which works out to between \$5 and \$20 per month for residential customers, depending on whether they get all or part of their electricity from the program. "Cow Power has done everything we'd hoped it would do for us, and more," said Earl. "It's given us a new income stream, reduced our costs, provided us options for handling our manure and virtually eliminated the odor of manure spreading."¹

Basic anaerobic digester (AD) systems have existed since the 1850s, but they are attracting new interest as a way to generate renewable energy and turn farm waste back into an

asset. According to the Environmental Protection Agency, 82 digesters were operating at dairy, swine, and poultry farms in 23 states at the end of 2006, with another 19 projects planned. State and national renewable-energy incentives, including a Department of Agriculture grant program created in the 2002 farm bill, have helped to more than double the number of projects since 2004.² Hundreds of farm digesters are operating in Europe.

The AD isn't a cure-all for manure management: It works best when it can be designed into a new facility, and it is

not economical for farms with fewer than several hundred cows or pigs. In states that have set ambitious renewable-energy generation goals, green power typically sells for a premium, and public and private funding is available to install digesters. More than one-third of planned and operating AD projects are in three such states — California, New York and Wisconsin. Effective marketing also helps: CVPS lets Cow Power subscribers advertise their participation to show that they support Vermont farmers and the environment, and offers bright yellow "Energy Happens" T-shirts for \$15. More

than 1,000 CVPS customers have signed up for Cow Power, which is also supplied by three other Vermont farms.

"Many of our customers want to vote for renewable energy with their wallets," CVPS spokesman Steve Costello said. "Support of farmers, the environment and renewable energy are key factors. People seem to like that it's local, it's practical and it's benefiting people who work the land and help keep Vermont looking like Vermont."



An anaerobic digester at the Blue Spruce Farm in Bridgport, Vt., turns manure into odorless solids that can be used for cow bedding, as well as methane that can be burned to generate electricity.

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¹ Quoted in "Grants Fund Cow Power Generators at Four Vermont Farms," *Renewable Energy Access*, April 6, 2006, www.renewableenergyaccess.com.

² U.S. Environmental Protection Agency, *AgSTAR Digest*, winter 2006, www.epa.gov/agstar.

COOL has been required for most other U.S. imports since the 1930s, but livestock and meat products do not have to carry COOL after slaughter or processing in the United States.⁶¹ The 2002 labeling requirement was de-

layed under two subsequent laws (for all food products except seafood), and is currently scheduled to start in October 2008.

Organic advocates argue that COOL will show consumers which retailers are

importing organic foods from abroad, where standards may be lower. Industry groups say COOL would increase marketing costs by billions of dollars per year, but economists say the costs

Continued on p. 42

At Issue:

Should manure be regulated under the Superfund law?



KELLY HUNTER-BURCH
*CHIEF, ENVIRONMENTAL PROTECTION UNIT,
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FROM TESTIMONY BEFORE THE HOUSE ENERGY AND
COMMERCE SUBCOMMITTEE ON ENVIRONMENT AND
HAZARDOUS MATERIALS, NOV. 16, 2005

the animal agriculture industry should be held responsible for the release of hazardous substances, such as arsenic and phosphorus, to the same extent that every other industry is held responsible. CERCLA already provides an exemption for the normal application of fertilizer, but it does not provide an exemption for massive disposal of animal waste far in excess of crop needs and the resulting releases of hazardous substances. . . .

In considering this issue, it is important to understand that the waste produced by today's animal feeding operation is substantially different from the waste produced by the family farmer in the past. It is not "naturally occurring" and it is not composed of only ammonia, phosphorus and hydrogen sulfide. According to the Environmental Protection Agency, the primary pollutants most commonly associated with animal waste are phosphorus, nitrogen, ammonia, organic matter, solids, pathogens, odorous compounds, trace metals, pesticides, antibiotics and hormones. Trace elements in manure that are of environmental concern include arsenic, copper, selenium, zinc, cadmium, molybdenum, nickel, lead, iron, manganese, aluminum and boron.

In order to achieve the growth rates [that] make it possible for a single poultry house to raise 5.5 flocks in a year, broiler feed has been carefully engineered. Arsenic, copper, selenium and zinc have all been added to the feed to promote growth and inhibit parasites. As a result, the waste which comes out of the birds and goes into the waste stream coming out of these poultry houses is laden with these metals. . . .

In the first half of the 20th century, a farm might have a chicken coop or brooder house that might hold 500 chickens; a large one might hold 1,400 birds. A "smaller" modern poultry house can house a 25,000-bird flock at a time producing an average of 5.5 flocks per year and 125 tons of poultry waste. . . .

The amendment you are considering is not an effort to protect the family farmer, as is so often claimed by poultry industry public-relations efforts. It is a blatant attempt by a multibillion-dollar industry to protect its practice of dumping waste in an environmentally damaging manner. No other industry in the country has that kind of protection. Since adoption of the federal clean water and air legislation, no other industry has so callously polluted our land and waters.



ROBERT T. CONNERY
NATIONAL CATTLEMEN'S BEEF ASSOCIATION

FROM TESTIMONY BEFORE THE HOUSE ENERGY AND
COMMERCE SUBCOMMITTEE ON ENVIRONMENT AND
HAZARDOUS MATERIALS, NOV. 16, 2005

CERCLA [the Comprehensive Environmental Response, Compensation, and Liability Act, or Superfund law], was passed in the wake of Love Canal for the purpose of dealing with the "legacy of hazardous substances and wastes which pose a serious threat to human health and the environment," and "to clean the worst, abandoned hazardous-waste sites in the country." The legislative history contains a litany of references to "synthetic," "manmade" chemicals, "chemical contamination" and the results of "modern chemical technology" as the problems CERCLA intended to address. It contains no reference to an intention to clean up manure or urea, or their byproducts, from cattle or any other animal agricultural operations. . . .

Congress also indicated the scope of the activities it intended to cover in the provision it made for funding the "Superfund" to pay for cleanup. The tax it imposed focused on "the type of industries and practices that have caused the problems that are addressed by Superfund"; Congress chose to impose the tax "on the relatively few, basic building blocks used to make all hazardous products and wastes." These building blocks, or chemical "feedstocks," are comprised of petrochemicals, inorganic raw materials and petroleum oil because "virtually all hazardous wastes and substances are generated from these. . . . Manure, urea and their byproducts, are clearly not among these materials.

Cattle and other animal agriculture operations are subject to a vast array of federal, state and local environmental laws and authority to deal with every conceivable environmental problem presented by them. They include the Clean Air Act, Clean Water Act, Resource Conservation and Recovery Act, Toxic Substances Control Act [and] soil conservation, dust and odor control, as well as nuisance laws. . . .

The Superfund laws, by contrast, were adopted for the most serious and drastic environmental problems, where all of the environmental laws had proved inadequate, and extraordinary remedies were called for. . . .

Could Congress have intended to impose such liability on the hundreds of cattle operations across America's heartland without even mentioning them? Of course not. In fact, in every instance where possible application of Superfund laws to biologic and natural processes was discussed, Congress was clear to exclude those processes.

Continued from p. 40

would be much lower. A roughly 5 percent jump in demand for beef and pork over 10 years would offset the added costs of implementing COOL, a study found.⁶² In fact, USDA currently projects that U.S. per capita meat consumption will rise by about 5 percent from 2005 through 2015.⁶³

Harkin, D-Iowa, the new chair of the Senate Agriculture Committee, strongly supports a ban on packer ownership.

Harkin and Sen. Charles E. Grassley, R-Iowa, have asked the Justice Department to investigate a proposed merger between the nation's two largest pork producers, Smithfield Foods and Premium Standard Farms (PSF). Together,

In 2005, a federal district court ruled that Nebraska's ban on corporate farms violated the Commerce Clause of the Constitution. In December 2006 Nebraska's appeal was rejected by a three-judge panel of the Eighth U.S. Circuit Court of Appeals. Many states with similar bans filed briefs supporting Nebraska, as did dozens of farmers' associations. Nebraska Attorney General Jon Bruning said he would appeal the decision to the U.S. Supreme Court.

"Corporate-farming bans don't keep people out of farming," says the Center for Rural Affairs' Hassebrook, "but they make them take personal liability for their operations, which corporations don't want to do. The point is to level the playing field, because family farmers assume liability and pay taxes as individuals. Bans don't drive all large farms out, but they make family farms stronger competitors."

But there are mixed views on the ban in Nebraska. "The state does not need this misguided and legally dubious attempt to insulate the ag economy against reality," commented the *Omaha World-Herald* after the appeals court ruling.⁶⁶

CAFOs are under pressure in several states — including Iowa, Indiana, Michigan and Ohio — where criticism from neighbors is drawing unfavorable press coverage and prompting local officials to consider new limits on large farms. In September, a Jackson County, Mo., jury awarded \$4.5 million in damages to three families who sued PSF over smells from one of its CAFOs with 350,000 hogs. Other lawsuits are pending against more than 20 other PSF hog farms in Missouri.⁶⁷

But CAFO-related jobs and tax revenues still speak powerfully to many politicians, especially in economically struggling regions. Hog CAFOs expanded in North Carolina in the 1980s and '90s because contraction in the tobacco industry made lots of cheap agricultural land available. Today, although many

"Some people in other states, including North Carolina, are proposing hog projects in Indiana. We think that is a good thing."

**— Thomas W. Easterly,
Commissioner
Indiana Department of Environmental Management**

Questions about market concentration could also resurface in the farm bill. Critics argue that a few large meatpacking companies dominate the industry and distort markets because the Packers and Stockyards Act is poorly enforced. Some question whether meatpackers should be allowed to own livestock, because they are less inclined to offer competitive prices to independent producers if they own their own herds. The Senate version of the 2002 farm bill initially banned packers from "owning, feeding or controlling" livestock more than 14 days before slaughter, but the provision was dropped from the final bill.

Not surprisingly, industry groups oppose restrictions on packer ownership. "Government intervention must not inhibit producers' ability to take advantage of new marketing opportunities and strategies geared toward capturing more value from our beef," National Cattlemen's Beef Association President Mike John told the House Agriculture Committee in September 2006.⁶⁴ But Sen. Tom

they would own more than 1 million sows — 20 percent of U.S. hog production. "Very openly, CEOs of major corporations have told farm groups that if you want to know why we own livestock for slaughter, it's because we can butcher our own stuff when prices are high, and when prices are low we can buy from farmers," Grassley told Justice's Antitrust Division.⁶⁵

Outside the Beltway

To limit the economic impact of large-scale farms and make smaller producers more competitive, nine states have barred or restricted corporate-owned farms. South Dakota and Nebraska went so far as to write the bans into their constitutions. Most of these policies exempt existing farms and make exceptions for family-owned corporations, cooperatives and nonprofit corporations.

Indiana communities are concerned about CAFO impacts, Republican Gov. Mitch Daniels' economic-growth initiatives include doubling hog production in the state by 2025.

"Some people from other states, including North Carolina, are proposing hog projects in Indiana. We think that is a good thing," said state Environmental Management Commissioner Thomas W. Easterly, who is expediting hog farm permits.⁶⁸

Categories can be misleading, however: Not all CAFOs are corporate-owned, and not all family businesses are small. "Just because you have to hire other people doesn't mean it's not a family business," says Missouri hog farmer Rehmeier. "Most hogs are still raised on family farms."

Michigan dairy farmer Conway echoes this view. "There's a misconception that because your operation is big, you're a corporation," says Conway. "There's room in the market for all different types of farming."

Organic-food advocates don't see it this way, especially when it comes to what they view as industrial organic farms. The Organic Consumers Association in Minnesota has organized a boycott against Horizon organic dairy products, creating a public-relations headache for Horizon.⁶⁹ "Green-minded consumers are starting to get political," says the group's Cummins. "In the absence of a decent USDA, we have to rely on consumer power to enforce standards."

On a positive note, many organizations are promoting goods raised locally using small-scale methods. Examples include Slow Food, an international organization that works to protect "the heritage of food, tradition and culture," and Chefs Collaborative, a national network of professional chefs that promotes local and sustainable foods, including sustainably raised meat.

Some consumers are joining Community Supported Agriculture programs, in which they pay a local farm

for a "share" of its output and receive weekly deliveries of whatever is in season. The concept was introduced in the United States in the 1980s and had grown to more than 300 farms by 2000.⁷⁰

"People who think seriously about food have come to realize that 'local' is at least as important a word as 'organic,' *The New York Times* commented recently.⁷¹ ■

OUTLOOK

CAFOs Under Pressure

CAFOs produce large shares of many meat and dairy products, but they are under stress from regulators, alternative suppliers and residential developments that put farms in close contact with exurban neighbors. In this environment, bad practices in the industry can have impacts far beyond one farm.

"Large farms are more visible, so you're always in the spotlight," says Michigan dairy farmer Conway.

Rehmeier, who has never had a nuisance complaint filed against his hog farm near St. Louis but worries about development spreading west from the city, seconds this view. "Being here first just doesn't matter any more. You have to do things right," he says.

New air-emission limits and bans on breeding crates could cut into producers' already-narrow profit margins, although large farms may be better-positioned to adapt than small operators who cannot afford major facility upgrades. If Congress increases support for organic farming and local markets in the 2007 farm bill, more farmers may seize the opportunity to switch from conventional production. Conversely, if support for alternative producers remains a tiny fraction of

U.S. agriculture spending, alternative meat and dairy products will remain high-priced specialty goods available on a limited scale.

Public concern about antibiotics and hormones in food is also squeezing factory livestock farmers, who use such additives to increase their output at low cost. "A lot of farmers were reluctant to use rBST but did it to stay in business," says Tufts University veterinary Professor Saperstein. "Now they're financially exposed if their customers tell them to change. Eventually all of these products are going to be banned or fall out of use because of consumer perceptions that manufactured foods are unnatural. But it's all economically driven, and the FDA has approved these products for animal use, so market forces will have to change the regulatory field."

If more big purchasers like McDonald's require meat and dairy suppliers to use humane and environmentally friendly methods, farmers and large food companies will have to adapt. But large-scale change is unlikely as long as U.S. agricultural policy emphasizes the cheapest possible food supply. Unless advocates can persuade Congress and the USDA to enforce food-quality standards more vigorously and invest more money in alternative methods, CAFOs will remain part of the system.

Change could come with the Democratic takeover of Congress. Democrats are less supportive than Republicans of proposals like exempting manure from Superfund requirements and may be more willing to spend money on alternative agriculture methods.

But changing the U.S. food industry is like turning around an ocean liner. And as long as most Americans eat a lot of mass-produced food from conventional suppliers, there will be only limited demand for change. As writer Pollan observes, "Many people today seem perfectly content eating at the end of an industrial-food chain, without a thought in the world."⁷² ■

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About the Author

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Humane Farming Association, P.O. Box 3577, San Rafael, CA 94912; (415) 771-CALF; www.hfa.org. An advocacy group that publicizes the impacts of factory farming and opposes inhumane treatment of farm animals.

Keep Antibiotics Working, P.O. Box 14590, Chicago, IL 60614; (773) 525-4952; www.keepantibioticsworking.com. An alliance of health, consumer, environmental, agriculture and other organizations working to end overuse and misuse of antibiotics in animal agriculture.

National Agriculture Compliance Assistance Center, U.S. Environmental Protection Agency, 901 North 5th St., Kansas City, KS 66101; (888) 663-2155; www.epa.gov/agriculture. Provides information about environmental laws and regulations that affect farmers, including air and water pollution, pesticides and animal waste.

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