

Brave New Farm?

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In our mind's eye the farm is a peaceful place where calves nuzzle their mothers in a shady meadow, pigs loaf in the mudhole, and chickens scratch about the barnyard. These comforting images are implanted in us by calendars, coloring books, theme parks, petting zoos, and the countrified labeling and advertising of animal products.

The reality of modern farmed animal production, however, is starkly different from these scenes. Now, virtually all poultry products and most milk and meat in the U.S. come from animals mass-produced in huge factory-like systems. In some of the more intensive confinement operations, animals are crowded in pens and in cages stacked up like so many shipping crates. In these animal factories there are no pastures, no streams, no seasons, not even day and night. Growth and productivity come not from frolics in sunny meadows but from test-tube genetics and drug-laced feed.

Animal factories allow producers to maintain a larger number of animals in a given space, but they have created serious problems for consumers, farmers, and the environment, and they raise disturbing questions about the degree of animal exploitation that our society permits.

The animal factory is a classic case of technology run horribly amuck: it requires high inputs of capital and energy to carry out a simple, natural process; it creates a costly chain of problems and risks; and it does not, in fact, produce the results claimed by its proponents. Moreover, the animal factory pulls our society one long, dark step backward from the desirable goal of a sane, ethical relationship with the natural world and our fellow inhabitants.

Factories Come . . . Farms Go

Right under our noses agribusiness has wrought a sweeping revolution in the ways in which animals are kept to produce meat, milk, and eggs. It began in the years before World War II, when farmers near large cities began to specialize in the production of chickens to meet the constant demand for eggs and meat. By supplementing the birds' diet with vitamin D, they made it possible for them to be raised indoors without sunlight. The first mass-producers were able to turn out large flocks all the year round. Large-scale indoor production caught on fast around the urban market centers, but the new methods created a host of problems. Nightmarish scenes began to occur in the crowded, poorly ventilated sheds. Birds pecked others to death and ate their remains. Contagious diseases were rampant, and losses multiplied throughout the budding industry.

The boom in the chicken business attracted the attention of the largest feed and pharmaceutical companies, which put their scientists to work on the problems of mass-production. Someone found that losses from pecking and cannibalism could be reduced by burning off the tips of chickens' beaks with a blowtorch. Soon an automatic "debeaking" machine was patented, and its use became routine. Richer feeds made for faster-gaining birds and a greater number of "crops" of chickens each year. Foremost of the developments, however, was the discovery that sulfa drugs and antibiotics could be added to feed to help hold down diseases in the dirty, crowded sheds.

Chickens themselves were not entirely ready for mass-production, and the poultry industry set about looking for a better commercial bird. In 1946, the Great Atlantic and Pacific Tea Company (now A&P) launched the "Chicken of Tomorrow" contest to find a strain of chicken that could produce a broad-breasted body at low feed cost. Within a few years poultry breeders had developed the prototype for today's "broiler" – a chicken raised for meat who grows to a market weight of about five pounds in seven weeks or less. The pre-war ancestor of this bird took twice as long to grow to a market weight of about three pounds.

The egg industry went to work on engineering their own specialized chicken – the "layer" hen, who would turn out eggs and more eggs. Today's model lays twice as many eggs per year as did the "all-purpose" backyard chickens of the 1940s. Egg producers also tried to follow the "broiler" industry's factory ways, but they were faced with a major problem: confined

hens produce loads of manure each week. “Broiler” producers had the manure problem with their large flocks too, but the birds were in and out within twelve weeks, and accumulations could be cleaned out after every few flocks. (Today, it can be years between complete litter changes.) Egg producers, however, kept their birds indoors for a year or more, so they needed a means of manure removal that would not disturb the hens or interfere with egg production. Unfortunately for the hens, they found it: producers discovered they could confine their chickens in wire-mesh cages suspended over a trench to collect droppings. At first they placed hens one to each cage, but when they found that birds were cheaper than wire and buildings, crowded cages became the rule. Although crowding caused the deaths of more hens, this cost was considered “acceptable” given the increased total egg output.

Having reduced chickens to the equivalent of living machinery, entrepreneurs and government scientists began looking about for ways to extend factory technology to other farmed animal species. In the 1960s they began developing systems for pigs, cattle, and sheep that incorporated the principles of confinement, mass-production, and automated feeding, watering, ventilation, and waste removal. The wire cage, which made everything possible for the egg industry, would not work for these heavier, hoofed animals. But slatted floors – rails of metal or concrete spaced slightly apart and built over gutters or holding pits – did much the same job. Now large numbers of animals could be confined indoors and held to rigid production schedules, for the laborious tasks of providing bedding and mucking out manure had been eliminated.

The basics of factory husbandry had been established. Now the job of refining mass-production systems and methods fell to husbandry experts, opening up a great new field for them. It opened up, as well, great new markets for the agribusiness companies that could profit from the expanded sales of feed, equipment, drugs, and the other products required by the new capital-intensive technology. Humanity and concern retreated further as animal scientists – funded by these companies and by government – worked out the “bugs” in the new systems.

The Factory Formula

Factory methods and equipment vary from species to species, but the principles are the same: keep costs down and manipulate animals’ productivity

upward. These principles ensure that animals are crowded in barren environments, restricted, stressed, and maintained on drug-laced, unnatural diets.

The modern chicken comes from the sterile laboratories of a handful of “primary breeders” worldwide. In the U.S., these companies sell animals for breeding to some 300 “multipliers” or hatcheries (down from 11,405 in 1934), which in turn produce the chicks who are used for egg and meat production. At the multipliers, birds have the run of the floor in the breeding houses, for freedom and exercise promote health and a higher percentage of fertile eggs.

If the hatchery is turning out birds for egg factories, the first order of business is to destroy half the “crop” of chicks. Males don’t lay eggs, and the flesh of these specialized layer breeds is of poor quality – “not fit to feed,” as one hatchery worker put it. These chicks, by the millions annually, have for decades been thrown into plastic bags to be crushed or suffocated. Large-scale hatcheries have moved toward the use of gas asphyxiation or “macerators,” which grind up the live chicks at high speeds. About three-fourths of the female chicks (“pullets”) are reared in cages, the other fourth raised loose in floor facilities. Shortly before they begin to lay eggs, at between eighteen and twenty weeks of age, they are moved to the egg factory.

Today, 98 percent of commercial layer hens in the U.S. are caged. At an industry average of eight birds per cage, each hen gets about 50 square inches of floor space. In 2002, under pressure from public opinion, the industry trade group United Egg Producers announced “Animal Care Certified” guidelines that will, over a six-year period, gradually increase the space allowance to a minimum of 67 inches per hen, or seven birds per cage. Studies have shown, however, that hens require 71–5 square inches of space just to stand and lie down, and about twice that much space to stretch their wings. In major egg-producing states, operations with flocks of 100,000 hens are common, some housing as many as 200,000 hens in a single building. The owner of a planned 2.4 million-hen facility explained: “We used to have one person for 10,000 chickens. Now we have one for every 150,000.”

After a year in the cages, hens’ egg productivity wanes and it becomes unprofitable to feed and house them. The manager may decide to use “force molting,” a procedure which causes the birds to grow new feathers and accelerates and synchronizes another cycle of egg production. This is usually accomplished by reducing light and depriving the hens of food for ten to fourteen days. In a large study, mortality doubled during the first week of the molt and then doubled again during the second week. Aggression also increases among the starving birds. After a force molt or two the hens are

deemed “spent” and are removed from the cages to make room for the next flock. There is a poor market for the birds in these days of mass-produced “broiler chickens,” so they, too, are thrown into macerators, buried alive, or killed by having their neck broken. Now that these gruesome methods have created controversy, a few firms are beginning to experiment with other ways of killing hens, such as electrocution and gassing. Whatever the method of killing, millions go to renderers to be turned into companion-animal food and feed supplements, to incinerators, or to landfills.

With “broiler chickens,” both sexes are kept and raised for meat. The chicks are dumped into a huge “shed” with some type of litter covering the floor. Not that these birds have it all that much better than their cousins in the layer cages: generations of inbreeding for rapid growth have produced crippled birds prone to heart attacks and a slew of other health problems. They spend their short lives packed together by tens of thousands on manure-soaked floors, breathing dust and ammonia. The situation is similar for turkeys, and the numbers are huge: roughly nine billion birds go through factory systems to slaughter each year in the USA alone (up from about 1.6 billion in 1960).

Specialized buildings similar to those used in the poultry industries are used to breed, wean, and fatten (“finish”) pigs. About 83 percent of female pigs used for breeding (“sows”) give birth in total confinement facilities, and some 82 percent of piglets are put in total confinement nurseries. While some operations keep male and female pigs to produce litters of piglets, most pigs marketed today are probably produced by artificial insemination. Roughly 70 percent of sows are artificially inseminated for at least their first two matings, according to United States Department of Agriculture (USDA) figures.

The factory sow’s misery deepens in the “gestation crate,” a stall so narrow that she cannot turn around or groom herself. It is the most common type of housing for female pigs used for breeding. She remains in it for her entire four-month gestation period. Her normal urges to forage, socialize, and build a nest are completely frustrated. As with cows, and birds used to breed fast-growing offspring, to prevent the sow from gaining weight and becoming unable to reproduce, her feed will be severely restricted, resulting in extreme hunger and distress. She may be fed only once every two days or so.

About a week before her piglets are due, she is moved to a narrow “farrowing crate.” This device permits her to lie and stand, but she cannot walk or turn around; its purpose is to keep her in position only to eat, drink,

and keep her teats exposed to the baby pigs. Soon after birth, the piglets' teeth are clipped; their tails are cut off, their ears are notched for identification, and males are castrated – all without any anesthetic. In a few weeks, the sow goes back to the breeding area, and the piglets are moved to pens in the “finishing” buildings, where they spend about sixteen weeks until they reach a slaughter weight of about 250 pounds.

Most of the milk produced in the U.S. comes from cows in intensive confinement, most commonly kept tethered to a stall. Increasingly popular in the West and Southwest are drylots: dirt or concrete lots devoid of vegetation and often without shade. They are only thoroughly cleaned once or twice a year, allowing manure to build up from the thousands of cows they hold. Partial tail amputation (“docking”), purportedly for cleanliness but actually for worker convenience, has become a popular practice.

From 1950 to 2000, owing to genetics and other factors, the number of cows used for milk production in the U.S. decreased by 67 percent while the amount of milk produced tripled. By 2002, over 20 percent of the 9 million cows were being injected with synthetic bovine growth hormone to increase milk production. (The drug is banned in other countries due to animal health concerns.) The dramatic increase in milk production has been accompanied by deterioration in most measures of cow health. High-producing cows are particularly prone to metabolic disorders, lameness, mastitis (inflammation of the udder, a disease that costs the dairy industry \$1.7 billion annually), and infertility. Crowding also leads to a higher incidence of “production diseases.” Although cows do not reach full maturity until four years of age, they are typically sent to slaughter by about five years. Even at that early age many are already debilitated, the problem of non-ambulatory (“downer”) animals being most common with the dairy industry.

Veal production has been considered by many to be the cruelest of all the confinement systems. In the U.S., every year about 750,000 calves – mostly males, who are of little use to the dairy industry – are taken from their mothers within a day of birth and turned into sickly, neurotic animals to provide the luxury-grade “milk-fed” veal preferred by gourmet cooks and fancy restaurants. The young calves, stressed by separation from their mothers, are placed in narrow wooden stalls, lined up row on row in the confinement building. For between eighteen and twenty weeks, each calf is confined to a space scarcely larger than his own body, and is tied at the neck to restrict movement further. He is fed only “milk replacer,” a liquid mixture of dried milk products, starch, fats, sugar, antibiotics, and other additives. The milk replacer is deficient in iron to induce subclinical anemia

– a necessary condition if the producer’s calves are to have flesh white enough to fetch the market price for “prime” veal. No hay or other roughage is permitted, for that too might darken the flesh. Even the wooden stalls and neck chains are part of the plan, as these restrictions keep the calf from licking his own urine and feces to satisfy his craving for iron.

In “beef cattle” feedlots, stress from crowding, exposure, and an unnatural diet adversely affect the animals’ health. Liver abscesses are common in these animals because their digestive tracts are geared more to roughage than to the steady diet of high-energy grain and growth promotants that they receive. Cattle may be dehorned and branded, and males are castrated, all without anesthesia.

Ducks are raised both for meat and to produce foie gras (“fatty liver”), which involves a most brutal practice. Total confinement housing is the most common method of raising ducks, with thousands of birds kept in a single, dark building. Being aquatic animals, they need to submerge their head in water in order to keep their eyes healthy. But the only water they are provided with is for drinking, from nipple-like devices. The tip of their sensitive bill is burned off with a hot knife, often resulting in chronic pain and debilitation. At about four months of age, ducks used for foie gras are put in small pens or are kept virtually immobilized in individual cages. For two to three weeks, up to two pounds of a corn/fat mixture are forced down their throat through a 12- to 16-inch pipe attached to a motorized pump. The massive quantities of food cause the bird’s liver to swell to up to ten times its normal size, a clinical disease state called “hepatic steatosis.” Many of the birds also suffer blindness, lameness, throat injuries, and ruptured livers.

Aquatic animals account for 16 percent of the animal protein consumed worldwide. Official figures on the number of aquatic animals killed for food in the U.S. are not kept but estimates exceed 15 billion annually. This is far more than all the other farmed animal species combined. Aquaculture, the factory farming of aquatic species, supplies 30 percent of all seafood consumed globally, up from 10 percent two decades ago. It’s a \$56 billion global enterprise that is rapidly being consolidated by a few big companies. About a third of the seafood consumed in the U.S., including nearly all of the catfish and trout and about two-thirds of the salmon and shrimp, is from captive-raised animals. With wild fish populations having been drastically reduced, in order to just maintain world fish consumption levels it is predicted that aquaculture will have to grow seven-fold in the next twenty-five years.

Aquaculture is being promoted as the “Blue Revolution,” an aquatic version of the Green Revolution which vastly multiplied agricultural output in non-industrialized countries. Critics warn of environmental havoc, as was seen with the Green Revolution. Algicides, pesticides, antibiotics, and other drugs are heavily used in aquaculture, and federal inspection of fish farms is lacking. Coastal waters are degraded by the discharge of aqua-farm chemicals and wastes, with shrimp farming said to be particularly destructive. Environmentally superior techniques are expensive and difficult to employ on a large-scale basis. Feed conversion is also inefficient. For example, between two and five pounds of other fish are needed as feed to produce one pound of farmed salmon.

Increasingly, fish are being raised in cages floating in the ocean. Sea lice proliferate in these crowded confines, boring holes in the skin of fish and feasting on their flesh. Schools of fish inevitably escape through torn nets, flooding, or accidental release during transport. Once free, they spread disease and compete with wild native fish. Genetically engineered fish, made to grow at much faster rates, pose an even greater potential threat.

Many farmed fish species spend most of their lives in steel buildings, crowded into shallow, cement troughs. According to the 2002 Compassion in World Farming report “In Too Deep,” twenty-seven one-foot-long trout share the equivalent of a bathtub of water. At high densities, fish exhibit abnormal behaviors, such as increased aggression; suffer widespread injuries, deformities, and disease; and have high parasitic infestations. Scientific research has shown that fish are capable of experiencing pain and distress. Veterinary medicine for fish is very limited, and pre-slaughter mortality rates are high.

Fish are commonly starved for seven days or more prior to slaughter. To increase shelf life, many are left to suffocate on bins of ice. Others are rendered immobile rather than insensible at slaughter, resulting in their being processed while still alive and fully capable of immense suffering. Stunning methods include clubbing and gassing. Slaughter methods include bleeding and electrocution. Less inhumane methods are being researched.

Factory Problems, Factory Solutions

The industrialization of animal production has provided farmers with tighter controls over their herds and flocks and it has eliminated much of the labor of feeding, waste removal, and other chores, but it has also created a whole

new set of problems for producers. These problems have in turn created whole new industries of research and experts who churn out increasingly elaborate management schemes and expensive inputs needed to keep the factory system producing. Continual manipulations of animals' heredity, anatomy, physiology, and environment are required to hold down health problems and maintain mass commodity production at a profitable level. Chief among these factory-caused health problems is stress.

In confinement, animals are subjected to a variety of stressors. In addition to acute stresses such as early weaning, debeaking, dehorning, tail docking, and castration, other causes of stress in the factory farm are constant. The animals have no relief from crowding and monotony. In a less restrictive environment they would relieve boredom by moving; confined animals cannot. Nor have they relief from social disturbances caused by factory conditions. When animals are crowded and agitated, they are more likely to fight. In the restricted space of confinement pens, less aggressive animals cannot get away to make the instinctive show of submission. With caged birds, for example, each cage contains a small "flock," with one member at the bottom of the social ladder. This unfortunate bird cannot escape her tormentors. When growing pigs are moved to larger pens and mixed with unfamiliar pigs, fighting can occur, leaving pigs injured or dead.

In pigs, stress-induced aggression or "cannibalism" takes the form of tail biting, best described by a swine expert for Hog Farm Management back in 1976, when such practices had not yet raised controversy and farming publications were more plainspoken than they are today: "Acute tail biting is often called cannibalism and frequently results in crippling, mutilation and death. . . . Many times the tail is bitten first and then the attacking pig or pigs continue to eat further into the back. If the situation is not attended to, the pig will die and be eaten."

In dealing with these stress-related problems, animal-factory managers manipulate both animal and environment rather than eliminate the primary underlying cause – crowded, inappropriate conditions. Prevented from forming stable social structures, birds may engage in abnormal and potentially injurious pecking behavior. (Genetics and other faulty management factors can also precipitate this.) To control it, birds are debeaked, an operation that removes the front third to one-half of the bird's beak. Chickens used by the egg industry and those used for breeding purposes are debeaked anywhere from one day to eighteen weeks of age. The procedure is sometimes later repeated. Turkeys and ducks are also debeaked, but today's "broilers" are not because they are too young and listless to become aggressive. According

to United Egg Producers, welfare impairments “may include the bird’s ability to feed itself following beak trimming, short-term pain, perhaps chronic pain, and acute stress.” Poultry ethologist Dr Ian Duncan explains that the tip of the beak is richly innervated and contains pain receptors. Therefore, cutting and heating the beak will lead to acute pain. Additionally, the behavior of debeaked birds is radically altered for many weeks, which, along with neurophysiological evidence, indicates the birds experience chronic pain. Dr Duncan states: “Chopping off parts of young animals in order to prevent future welfare problems is a very crude solution.” (Incidentally, the poultry industry coined the term “debeaking” and used it for generations until the controversies over factory methods surfaced; since then it has preferred the term “beak trimming.”)

At the same time they are debeaked, turkeys and some chickens have part of their toes amputated, often by the same hot-knife machine. This is done to prevent them from using their claws to cause injuries. The combs and wattles of males used for breeding are also cut off to prevent them from being injured, since injuries reduce production. All of these procedures are performed without anesthesia.

Problematic genetics and production demands take their toll on stressed animals in other ways. Pigs bred for leanness and rapid growth are prone to a condition that we would probably call “shock” if it occurred in humans; the pig industry calls it “porcine stress syndrome,” or simply “PSS.” Pigs may literally drop dead from stress when they are weaned, moved to a new pen, mixed with strange pigs, or shipped to market. Cattle bred similarly for meat production are also highly excitable, making them hard to manage and prone to injury. A condition affecting about a third of flocks in the U.S. egg industry is termed “caged layer fatigue.” The exhausted birds have brittle or broken bones and a pale, washed-out appearance in their eyes, combs, beaks, and feet. The relentless calcium demand for eggshell production causes the mineral to be withdrawn from hens’ bones and muscles. Afflicted birds are left unable to stand and may die if unable to reach food or water. It occurs only in caged birds, due to their lack of exercise, and is exacerbated by crowding. In “broiler” operations, “Acute Death Syndrome,” also known as “Flip-Over Syndrome,” occurs in fast-growing birds. They have been observed suddenly jumping into the air, giving a loud squawk, and falling over dead. Metabolic diseases associated with fast growth have become more of a problem than infectious diseases for the poultry meat industry. One chicken farmer wrote, “Aside from the stupendous rate of growth . . . the sign of a good meat flock is the number of birds dying from heart attacks.”

To speed up reproductive cycles, babies are prematurely separated from their mothers. In nature, a calf might nurse and run with his or her mother for about a year; on a dairy farm they're lucky to spend more than a day together. Sows and their piglets are left together an average of about nineteen days (down from fifty-six days). In addition to the manipulation of sex and reproduction, managers control lighting to increase production. Egg producers try to create the illusion of perpetual spring by keeping the lights on a little longer each day.

Biotech Barnyard

Not satisfied with the innovations described above, some scientists are now looking at the prospect of cloning and genetic engineering to further optimize production. These reproduction technologies raise grave concerns.

Cloning can be carried out with embryo cells or with somatic (i.e. body) cells. In the technically simplest form, egg and sperm from prized animals are "harvested" and combined in a laboratory to form an embryo. Once the cell has multiplied to a certain stage it is divided and each section is implanted as a separate embryo into a lesser valued surrogate mother for gestation. This enables more highly valued animals to be produced than could be through normal reproduction. This type of cloning, called "embryo splitting" or "embryo twinning," has been commercially employed for a decade or two but on an extremely limited basis due to its expense and the unpredictability of results. In the more highly publicized form of cloning, somatic cell nuclear transfer (SCNT), a nearly exact genetic copy of a parent animal is produced by putting the nucleus of a differentiated cell from the parent into a denucleated egg cell from a surrogate mother, who then gestates the embryo. In theory, farmed animals with particularly desirable characteristics can be mass-produced this way. In practice, however, hundreds of attempts are needed to produce a single healthy animal. In the U.S., the Food and Drug Administration has asked that animals produced this way, and products from them, not be allowed in the human or animal food supply on account of food safety and animal welfare concerns.

Genetic engineering has been used to insert genes from another life form – usually another species and not necessarily an animal – into animals in order to produce specific benefits for humans. It is hoped that these "transgenic" animals will have an increased quantity and quality of food and

fiber production, or will produce pharmaceutical proteins in their milk, eggs, or urine: animal “pharming.” Additional research is underway to produce transgenic pigs with organs that will be able to be transplanted into humans without being rejected.

Repeatedly subjecting individual animals to invasive procedures in order to obtain eggs for cloning is likely to cause them pain and distress. “Large Offspring Syndrome” occurs with cloned cattle and sheep, putting the animals used as surrogate mothers at increased risk for difficult pregnancies and caesarean sections. Attempts to clone animals through SCNT often produce deformed animals who suffer and die at an early age. Genetically engineered animals may also suffer from bizarre maladies. Additionally, opponents argue that these technologies will only benefit large corporations while further exacerbating the loss of small farms, and that poor countries won’t be able to afford them.

Human Health Concerns

“In current agricultural practice, raising animals for food depends heavily on the use of pharmacologically active compounds: drugs,” states a 1999 National Academy of Science report. (“Broiler chicken” feed, for example, almost always contains an antibiotic, a coccidiostat for internal parasites and improved feed efficiency, and arsenic to color the birds’ skin yellow and increase growth.) This is no wonder because factory animals are genetically more susceptible to infectious diseases, and the stresses of factory life further debilitate their immune defenses. Animal factories breed germs – leaner, meaner germs and more kinds of them – that easily spread throughout the crowded, dirty buildings. Stressed from discomfort and frustration, and breathing dusty, noxious air, factory animals are highly vulnerable to infection. If not suppressed with drugs and chemistry, flocks and herds would be even more disposed to disease epidemics.

Antibiotics have been the main tool for growth promotion and disease control since the 1950s. Nearly all U.S. factory animals – poultry, pigs, cattle in feedlots, and calves raised for veal – routinely get antibiotic-laced feed. In 2001, the Union of Concerned Scientists (UCS) “conservatively” estimated that 24.6 million pounds of antibiotics was administered to U.S. cattle, pigs, and poultry for non-therapeutic purposes. According to UCS, this was equivalent to 70 percent of the country’s total anti-microbial use, and eight times the amount used in human medicine.

Individual bacteria that are able to withstand the effects of antibiotics can multiply, creating resistant bacteria. As bacteria evolve very rapidly, many species have developed resistance to our “wonder drugs.” For example, the types of bacteria that cause diarrhea, septicemia, salmonella, gonorrhea, pneumonia, tuberculosis, typhoid, and childhood meningitis have long developed drug-resistant strains. Harmless bacteria that develop resistance can transfer resistant genes to infectious bacteria. So, if you are infected by one of these strains, a course of antibiotics will not help as it might have a decade or so ago. Because of this, the World Health Organization (WHO) and the American Medical Association recommend that antibiotics not be used to promote animal growth. The European Union is set to ban the practice in 2006. It has already been banned in Denmark and Sweden.

The factory system has also created an alarming new kind of pollution. Reportedly, up to 75 percent of an antibiotic may pass undigested through an animal’s body. The trillions of pounds of manure produced in the U.S. every year (1.4 billion tons in 1997) contain antibiotics and astronomical amounts of bacteria, including antibiotic-resistant bacteria. Much of the manure is used as fertilizer, from which resistant bacteria can leach into the soil and groundwater, altering microbial ecosystems in the environment.

Top “broiler” companies recently announced that they are phasing out the use of certain antibiotics that are similar to ones used in human medicine, and leading fast-food chains say they are no longer purchasing chickens treated with certain antibiotics. The National Chicken Council claims overall antibiotic usage in animals of all kinds has been in decline since 1999. However, industry data don’t provide specifics about antibiotic use and the government doesn’t collect such data. If there has in fact been a decline, at least part of the reason for the industry change may be because antibiotics have lost much of their growth-promoting effectiveness.

Over the past three decades, many studies have pointed to the dangers posed by rampant chemical and pharmaceutical use and abuse in animal factories. There are many instances of widespread sales and abuse of illegal drugs, and there are many instances of abuses of legal drugs. For example, in late March 2004, U.S. federal regulators discovered that growth hormones were being used in up to 90 percent of calves raised for veal production, an illegal practice the industry admitted to having engaged in for decades. USDA testing for drugs in animal tissues has been much criticized. A string of reports, including ones by the Government Accountability Office, have concluded that the government’s inspection and testing programs are inadequate to protect the public from either drug residues or bacterial contamination.

Aside from drug-resistant diseases, people (and other animals) can come down with “ordinary” food poisoning caused by the animal factory’s prolific production of germs. Some of these cases are not so ordinary, with factory farms and the debilitated animals in them providing the ideal environment in which pathogenic bacteria and viruses can become more virulent. The Centers for Disease Control and Prevention (CDC) estimates that food-borne diseases cause approximately 76 million illnesses, 325,000 hospitalizations, and 5,000 deaths in the U.S. each year. Other public health authorities put the food-poisoning estimates at 250 million illnesses and 9,000 deaths each year. In an analysis of food-borne illnesses occurring between 1990 and 2003, the Center for Science in the Public Interest found seafood, poultry, beef, and eggs to be among the top five vehicles for which a single food was identified as responsible. Collectively, they were responsible for 88 percent of the outbreaks and 79 percent of the cases. Two of the most common pathogens, salmonella and *E. coli*, are most frequently linked to animal waste that can contaminate produce via the billions of pounds of manure spread on cropland as fertilizer. In addition to acute illness, animal products pose long-term risks to human health due to their cholesterol and fat content, and their lack of fiber and complex carbohydrates. This combination is implicated in heart disease, cancers, obesity, kidney disease, diabetes, hypertension, and other chronic illnesses.

The recklessness of the factory system manifested for industry, governments, and consumers when “mad cow disease” (bovine spongiform encephalopathy [BSE]) was identified in 1986. The disease, caused by feeding cattle the rendered remains of sheep, also infected human beef consumers. Since then, there have been some 190,000 reported cases of BSE in twenty-five countries, with several million cattle killed in an attempt to eradicate the disease. There have been 153 cases of the human form of the disease, new variant Creutzfeldt–Jakob Disease, which is always fatal. It has now been found that the disease can spread through the blood supply. Some scientists warn that the human cases may just be the beginning of a “timebomb.”

Avian influenza (AI) is another disease that has crossed the species barrier. Wild aquatic birds are the natural hosts of AI. The viruses ordinarily do not cause disease in them, but in a new host, such as chickens, they dangerously mutate. According to Dr Robert Webster, director of the World Health Organization Collaborating Center for Studies on the Ecology of Influenza in Animals and Birds, humans have created optimal conditions to generate flu epidemics. A single factory farm provides hundreds of billions of

replication cycles with an exponentially greater risk of a pathogenic strain arising. In early 2004, virulent AI raced through Asia, infecting thirty-four people, twenty-three of them fatally. An estimated 200,000,000 birds were killed in an attempt to control the disease. If avian virus merges with a human virus, it could more easily transmit between people and rapidly spread. Some scientists fear avian influenza may become the human plague of the twenty-first century.

Farmers (and the Rest of Us) Are Victims Too

Ironically, the trend toward complex, expensive husbandry systems hurts farmers and rural communities. Those huge buildings full of specialized floors and feeding equipment don't come cheap. Financial burdens are so great that factory farmers must continuously keep their buildings at capacity, working longer and harder than ever just to meet their loan payments. The tendency to operate at capacity in order to cover capital costs creates chronic overproduction in the poultry, pork, and dairy industries and drives down market prices. In this situation, many smaller and non-factory farmers cannot make a living so they quit raising animals altogether. Moreover, the high capital investment required tends to attract agribusiness companies, urban investors, and other non-farm interests with deep pockets. Thus, more and more production has fallen into the hands of the largest, most intensive operations. Government subsidies have also helped accelerate this trend.

The poultry industry, the originator of factory systems, offers a clear example of how the trend toward capital intensification affects farmers. Chickens and eggs, along with pigs, used to be the mainstay of the small, independent family farm before the poultry scientists and agribusiness companies got involved. In 1950, independent operators raised 95 percent of the chickens produced for meat. Today, nearly all chickens raised for meat are produced and processed under contracts between "growers" and processors. Prior to 1950, nearly all egg production was conducted by independent operators. Today, nearly 40 percent of eggs are produced under contract, with the remainder produced through vertical integration (whereby various stages of production and processing are controlled by a single company). The farm family has been reduced to the status of "poultry peons" who turn out company birds on company feed according to company schedules and specifications. Similarly, in 1970 nearly all pigs were sold on the open

market. By 2001, only about 25 percent were, the rest having been produced under contract.

There are many, many costs in the new factory methods and systems for raising animals, although agribusiness experts would have us hear only their talk of benefits. They are fond of using cost/benefit analyses to justify crowding animals, the use of antibiotics in feed, and converting farming communities to factory towns. They assert that the benefits to consumers from these practices outweigh the risks involved. But if this sort of test is to have any validity in agricultural affairs it must take into account all the costs of factory methods, which harm:

- farmed animals, who are restricted, mutilated, manipulated, and ultimately killed;
- the health of consumers, who are put at much greater risk for both acute and chronic disease;
- the land, much of which is used to grow animal feed or is degraded by overgrazing;
- wildlife, whose habitat is destroyed and who are killed by agricultural predator control programs;
- the environment, polluted by pesticides and toxic animal wastes;
- our limited supply of fossil fuels, their procurement causing environmental destruction and escalating international strife;
- the atmosphere, polluted by fossil fuel use and methane gas, generated by the immense numbers of ruminant farmed animals, adding to global warming;
- prospects for alleviating world hunger, by the depletion of fresh water and other natural resources;
- farm families and rural communities, whose livelihood is stolen by high-tech factory systems;
- citizens, who pay for subsidies that prop up costly systems, and farmers – and ultimately all residents – in other countries who are unable to compete with the “cheap” imports;
- human dignity and self-respect, as a result of carrying on all of the above and on such a massive scale.

Quite possibly the greatest threat factory farming poses now is its expansion in “developing” countries. Worldwatch Institute’s *State of the World 2004* explains:

Global meat production has increased more than fivefold since 1950, and factory farming is the fastest growing method of animal production worldwide. Industrial systems are responsible for 74 percent of the world's total poultry [meat], 50 percent of pork production, 43 percent of the beef, and 68 percent of the eggs. Industrial countries dominate production, but developing nations are rapidly expanding and intensifying their production systems. According to the U.N. Food and Agriculture Organization (FAO), Asia has the fastest-developing livestock sector, followed by Latin America and the Caribbean.

Laws and Standards

Farmed animals in the U.S. have little to no legal protection. Hundreds of millions of them die every year prior to the time they would be slaughtered, yet there is no federal law that regulates the treatment of farmed animals on farms. (Farmed animals are essentially exempted from the protections of the Animal Welfare Act.) The Twenty-Eight Hour Law prohibits the transport of animals across state lines for more than twenty-eight hours without being unloaded for at least five hours of rest with access to food and water. However, the law does not apply to trucks, by far the most common means of transporting farmed animals. Furthermore, the law is rarely enforced and the maximum penalty is only \$500. The Humane Methods of Slaughter Act requires that slaughter “be carried out only by humane methods” to prevent “needless suffering.” Yet birds and fish, who constitute about 98 percent of slaughtered animals, are not covered by the Act. In a 1996 slaughterplant audit commissioned by the USDA, 64 percent of the cattle plants and 36 percent of the pig and sheep plants were rated “not acceptable” or a “serious problem” in regard to stunning procedures. Enforcement of the law was found to be so lacking that, in 2002, Congress passed a resolution entitled Enforcement of the Humane Slaughter Act of 1958. In February 2004, the government's General Accounting Office reported that the Act was still not being adequately enforced.

In the absence of federal law, state law does little better. The majority of U.S. states exempt customary farming practices from their anti-cruelty statutes, and it is industry that determines what is customary. In other words, industry determines what is an acceptable way to treat farmed animals. Convictions are extremely difficult and infrequent, and fines are relatively minimal. Forty-one states currently have animal anti-cruelty statutes with felony penalties, but only in seven states do they effectively apply to farmed

animals. In Florida in 2002, a law banning gestation crates for pregnant pigs was passed by a 55 percent majority vote. It is said to be the first U.S. measure banning a particular farming practice on the grounds of cruelty. However, ballot initiatives are difficult and expensive, and twenty-six states do not allow them.

Industry – including farmed-animal trade groups, supermarkets, and fast-food restaurant chains – has recently responded to public pressure by formulating minimal, voluntary standards, some with third-party inspections. But there are grounds for skepticism about the efficacy of industry codes and standards. In the U.S., the United Egg Producers authorized the use of an “Animal Care Certified” logo to mark cartons of eggs from operations enrolled in their welfare standards program. In 2004, the Better Business Bureau deemed this logo misleading because the program did not ensure that animals were cared for. In the same year, an undercover investigation by People for the Ethical Treatment of Animals (PETA) at a slaughterplant operated by Pilgrim’s Pride, the second largest chicken company in the U.S., revealed sadistic abuse of birds, involving laborers, supervisors, foremen, and managers. In responding, the President and CEO assured the public that “Pilgrim’s Pride strictly adheres to the animal welfare program recommended by the National Chicken Council (NCC).”

The national organic standards, implemented by the USDA in 2001 after a decade of formulation, require outdoor access for farmed animals, with notable exceptions. However, the standards are vague about the type of space, and do not specify the amount of space or the length of time animals must have access to it.

Animal advocacy organizations have also formulated farmed-animal welfare standards. They include the Animal Welfare Institute, American Humane (“Free Farmed”), and Humane Farm Animal Care (“Certified Humane”), the latter two of which are predicated on the Freedom Food program of the UK’s Royal Society for the Protection of Animals (RSPCA). Additionally, Whole Foods Market, the world’s largest retailer of natural and organic foods, is in the process of devising standards (see Karen Dawn’s interview with John Mackey and Lauren Ornelas later in this volume). Promoted as “humane,” such standards lead to conditions that are at best less inhumane than conventional production practices. For example, Certified Humane – which is endorsed by the American Society for the Protection of Animals (ASPCA), Animal People, the Humane Society of the U.S., and ten other humane societies and SPCAs – does not require outdoor access for animals. It also, among other objectionable points, permits

castration, tail docking, dehorning, and debeaking, all without anesthesia, albeit with limitations.

Farmed-animal abuse didn't begin with factory farming nor is it unique to it. Welfare standards for alternative production are usually vague if not altogether lacking, and auditing programs are being questioned. While alternative, "humane" animal agriculture is growing in popularity and may be preferable to factory farming, virtually all animal agriculture involves a substantial degree of animal suffering and death. As long as eating meat is considered acceptable, farmed animals will not rise above the status of consumables. Eating eggs and dairy products may actually be worse than eating meat, since the hens and cows used to produce them are among the animals who suffer the longest and the worst, after which they, too, are killed. We need to question the very concept of marketing sentient beings. Welfare reforms can lessen their suffering but will not make it right.