

Current Status and Future Trends in American Agriculture: Farming with Grass

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Abstract: The growing popularity of organic, grass-fed, and locally grown foods reflects a growing consumer rebellion against an industrial, global food system. Declining supplies of fossil energy, rising concern for global climate change, and growing social and economic inequities will exert even greater pressures on industrial agriculture in the decades ahead. These are all ultimately issues of national and global food security. Eventually, society must confront the problematic reality: the current industrial food system is not sustainable – ecologically, socially, or economically. Confinement animal feeding operations (CAFOs) will be among the first casualties of this confrontation because CAFOs epitomize the inherent lack of sustainability of a profit-driven, fossil-energy-dependent, industrial agriculture. Grass farming, on the other hand, epitomizes the potential for a quality-driven, *solar*-energy-dependent, sustainable agriculture. Animal agriculture will be needed to help feed the world in the post-industrial twenty-first century, and most animals in the future will be raised on grass.

Key words: industrial food system—sustainable agriculture—fossil energy—climate change—social inequity—grass farming

The American food system is in the final stages of industrialization. Industrialization is quite commonly associated with manufacturing, but the transition from agrarian to manufacturing economies is only a consequence, rather than the essence, of industrialization. The fundamental purpose of industrialization is to enhance productivity and economic efficiency by making it possible to produce a greater value of output from a given amount of input. The basic strategies of industrialization are specialization, standardization, and consolidation of control. As agriculture became more specialized and standardized, it could be mechanized and routinized, thus allowing—at times forcing—individual farmers to consolidate more land, labor, and capital under their control. As farms became larger, many farmers were “freed from farming” to take the jobs in the factories and offices in urban centers, manufacturing things that couldn't be produced on farms or produced as efficiently in rural areas. The factories and offices in urban areas were only the most obvious symbols of the industrial economy, as they employed the strategies of industrialization in their pursuit of ever greater productive and economic efficiency. The American food system as a whole has followed the same basic path of specialization, standardization, and consolidation and today is in the final stages of global consolidation of corporate control.

While industrialization has brought tremendous economic benefits by reducing cost and increasing the availability of food, it has done so by imposing significant costs on nature and society through environmental degradation and growing social inequity. Public concerns about the American food system have mounted as the ecological and social cost have increased and have become increasingly visible. The emerging public consensus is that an industrial agriculture is simply not sustainable over the long run. Consequently, as the industrialization of food approaches its pinnacle, it is also approaching its end.

Current Status of American Agriculture

The industrialization of food has been documented extensively in countless statistics and voluminous reports related to the evolving structure, conduct, and performance of the farming and food processing, distribution, and retailing sectors of the U.S. economy. Several recent books have synthesized the more relevant of these facts and statistics in documenting the industrialization of America's food system. *Fast Food Nation* (Schlosser 2001) and *Omnivore's Dilemma* (Pollan 2006) awakened many people in mainstream society to the dramatic changes in the ways their foods have been produced, processed, distributed, and marketed over the past few decades. Schlosser focused on food processing and retailing and Pollan on farm policy and production but they both provided extensive documentation of changes in the entire food system. These books describe a food system that has homogenized the landscape, widened the chasm between rich and poor, fueled an epidemic of obesity, and promoted American cultural imperialism around the world. These “best-sellers” sparked the interests of other investigative authors, resulting in books such as *The End of Food* (Roberts 2008) which focuses more on food retailing, and *American's Food* (Blatt 2008) which covers virtually all aspects of the food system. These books are filled with facts and figures and are referenced extensively, representing the best available scientific literature related to the American food system as a whole. They all tell the same basic story.

The industrialization of the American food system began with food processing, most notably with the meat packing industry in the late 1800s, as documented in *The Jungle* (Sinclair 1906).

The meat packing industry eventually was brought under government control with the Packer and Stockyards Act of 1921. However, government enforcement of all forms of antitrust legislation had fallen out of favor by the 1980s and consolidation of control in meat packing, as well as other sectors of food manufacturing, has gone largely unchecked for the past thirty years. Today, four meat packers control 80% of the beef market (p. 74, Roberts 2008). Virtually every food processing sector of the economy today is also dominated by a few large corporations. As corporations gain positions of economic dominance in one sector, they often use their economic and political power to become dominant players in other sectors, globally as well as nationally.

The industrialization of food retailing began with regional supermarket chains replacing the “mom and pop” grocery stores in the late 1940s. By the 1970s, many of the smaller regional chains were consolidated into larger national chains. The consolidation process continued virtually unchecked during the 1980s, and in the early 1990s, Wal-Mart used its position of dominance as a discount retailer to broaden its span of control into foods, quickly becoming America's largest food retailer. The other national food retailers responded by buying or merging with other national chains to increase their span of control and market power. Today, more than half of the food market is controlled by six corporate chains (p. 62, Roberts 2008).

A similar process occurred in the “away from home” food market. McDonald's “golden arches” started displacing local restaurants in the late 1950s. Others, such as Pizza Hut and Kentucky Fried Chicken (now KFC) quickly followed the McDonald's franchising model, buoyed economically by housewives moving into the workforce and out of the kitchen. Today, approximately one-half of all dollars spent for food is spent for meals away from home, more than one-half of which is spent for “fast foods.” Many of the different fast food franchises today are owned by far larger food corporations. For example, Yum! Brands Inc. owns Pizza Hut, KFC, Taco Bell, Long John Silver's, and A&W restaurants. A few large corporations now largely control the away from home food market, nationally and globally.

The industrialization of agriculture occurred more slowly than other food sectors and only recently has taken on the classic characteristics of industrialization. The processes of specialization, standardization, and consolidation of control in agriculture have been documented extensively in books such as the *Unsettling of America* (Berry 1977), *The Next Green Revolution* (Horne and McDermott 2001), and *Crisis and Opportunity: Sustainability in American Agriculture* (Ikerd 2008). The process began with mechanization of agriculture in the late 1800s but didn't begin to reshape farming and rural communities until after World War II. Following the war, chemical warfare technologies were quickly adapted to formulate agricultural pesticides and munitions manufacturing plants were converted to produce cheap nitrogen fertilizers. Farmers could then begin to standardize, routinize, and further mechanize agricultural production, opening the door for consolidation of small farms into larger farms.

Additional waves of new production-enhancing chemical, mechanical, and biological technologies followed throughout the twentieth century, virtually ensuring periodic over-production, depressed prices, and farm financial crises. The new technologies were invariably designed to increase productivity through larger-scale production, thus each new financial crisis forced thousands of farmers out of agriculture, making their land available for consolidation into still larger farms. However, agriculture was among the least well-suited of the sectors to which the industrial model has been applied. Living biological systems are inherently holistic, diverse, interdependent, and thus difficult to industrialize. As a consequence, the economic benefits have been fewer, the ecological and social costs have been greater, and the process has been slower.

Nonetheless, the number of farms in the United States dropped from more than six million in the 1930s to about two million by end of the century. Even more significant, the largest 10% of U.S. farms now account for more than two-thirds of the total value of production and more than 40% of total U.S. production sold under contract arrangements with the agribusiness corporations that control agricultural processing and distribution (MacDonald and Korb 2008). Non-farm corporations *own* only a small portion of U.S. farms and farmland, but their span of control, achieved through various contractual arrangements, is quickly approaching one-half of U.S. agriculture.

The final phase of industrialization is *vertical* consolidation, which occurs *across* the various stages or functional levels of production, including production, processing, distribution, and retailing. In contrast, horizontal consolidation occurs *within* the various stages of production. *Horizontal* consolidation of the American food system began first in food processing and then food retailing. It began early but advanced more slowly in farming. The corporations with the greatest *horizontal* span of control were in the strongest position to expand *vertically*. For example, the largest food processors were the first to expand into production and distribution. As early as the 1930s, vegetable processors in the United States were growing their own vegetables as well as contracting with independent growers. All of the large food processors eventually replaced the food wholesalers or jobbers with their own sales forces, storage facilities, and fleets of trucks or railcars. Control can be achieved either through outright ownership or through comprehensive contracts, most common in livestock. Contract animal production began in the 1960s when feed manufacturers expanded into poultry production. The large meat packers brought contracting to cattle feeding in the 1970s and to hog production in the 1990s. Today's CAFOs are increasingly controlled by large corporate processors through comprehensive contractual arrangements, under terms dictated by the contractors.

Farmers lack the economic or political power to exert control over the other sectors of the food economy. This leaves farmers largely at the mercy of the large food corporations, both in the marketplace and in contractual negotiations. For several decades, food processors were able to exert considerable influence over food retailers, although they were never able to dominate the supermarket chains. The processors' power in the retail marketplace came from their ability to establish consumer preferences for "branded products," such as those advertised and promoted by Kraft, Dole, Campbell's, Kellogg, Swift, and Coca Cola. If the retailers refused to stock the major food brands they were sure to lose market share to other retailers that did. However, as early as the 1960s, the supermarket chains had begun to develop their own "private labels." They often contracted with second-tier processors, those with quality products but without dominant brands, to provide the products sold under supermarket labels.

The balance of power began to shift from food processors to food retailers during the 1990s, with the entry of Wal-Mart into food retailing and the actions taken by the other large food retailers to defend their market shares. Today, a few large corporations have an important "shared monopoly" in food retailing. They control all *direct access* to food consumers, the ultimate source of all economic value in the food system. The dominant food retailers today are so large and powerful that they can easily prevent smaller retailers from succeeding in their respective market areas. Lacking a public mandate to enforce antitrust laws, the government does little if anything to restrain such predatory tactics. Food manufacturers today routinely pay large "slotting fees" to retailers just to get their branded products on retail shelves, where they have to compete with heavily discounted private brands. Many smaller food processors can't afford the

slotting fees and thus are precluded from competing for food customers, even if they have better products and lower costs.

Other large food retailers have begun to follow the Wal-Mart model of using their market power to drive down prices of all products, including the manufacturers' brands, to their lowest possible level. Some retailers force their suppliers to “open their books” to prove that their products cannot be produced or sold at any lower cost without threatening the economic survival of the supplier. Retailers may suggest alternative means of reducing production costs, such as importing more food products from foreign suppliers. Smaller suppliers may be required to produce exclusively for a given retailer, eliminating the possibility of seeking a higher selling price elsewhere. (Suppliers that can't meet minimum quantity requirements don't get a chance to compete on either quality or price.) However, if the retailer finds another supplier with lower costs, current suppliers may be left without a market for their products. Increasingly, this pressure to reduce costs and prices to the lowest possible level is permeating all levels of the food system from the supermarket shelf to the farm.

The span of corporate control of today's food system now reaches around the world. Many of the largest seed companies, agrichemical companies, and food processors have established joint ventures, strategic alliances, and various contractual arrangements that effectively consolidate control without consolidating actual ownerships. Mary Hendrickson and Bill Heffernan of the University of Missouri have been following these developments for more than a decade. Their studies indicate that control of the global food systems is now centered in five or six corporate “global food chain clusters,” defined by a variety of business arrangements (Heffernan and Hendrickson 2002). This allows the food corporations to easily move their capital and technologies capital around the world. In addition, the large global food retailers are able to exert a great deal of control over the food system without mergers, acquisitions, or binding long-term agreements, by simply exerting their economic and political power. The industrialization of the food system is in its final stages; there is little of economic significance left in the world to consolidate.

Inadequacies of Economic Efficiency

On the surface, lower costs and lower food prices might seem quite logical and even a highly-commendable societal objective. However, economic value is inherently individualistic and self-centered, rather than societal. Economic value must at least be expected to accrue during the lifetime of the individual decision maker or investor. It makes no economic sense to do anything for the sole benefit of someone else and certainly not someone of some future generation. Contrary to popular belief, the “invisible hand” of free markets that Adam Smith suggested would transform the pursuit of self-interests into greater societal good cannot function effectively in today's capitalist economy. In order for free markets to function for the collective good of society, there must be a large number of buyers and sellers in each market, it must be easy for people to start new businesses and to liquidate existing businesses, buyers and sellers must have accurate information concerning the usefulness of all products, and consumers' tastes and preferences must be accepted as they exist, without coercive marketing or persuasive advertising. Only under these conditions will free markets provide people with the things they need and want at the lowest possible costs.

None of these conditions exist in today's U.S. or global food system or any other sector of the global economy. Any assurance that foods in the supermarkets today are being produced at the lowest possible economic cost is very different from an assurance that the foods being offered for sale in the supermarket are providing consumers with the foods they really need or even want. The food corporations are quite logically choosing products and marketing strategies that maximize economic returns to their investors. To accomplish this, they must stifle the true economic competition that would be needed to ensure even the collective, individual well-being of their customers. Furthermore, they quite logically use all of the political power at their disposal to maintain their positions of economic power in the marketplace.

More important, even if food markets were economically competitive, minimizing costs and maximizing economic efficiency would *not* ensure the well-being of the American people as a whole or ensure the future of humanity. People are inherently social and ethical beings and economics simply does not value relationships or ethics, at least not in any sense other than their potential contribution to individual self-interests. In addition, all economic value must be extracted from natural or human resources, meaning from either nature or society. While the economy provides strong incentives to use the resources of nature and society for individual purposes, it provides no incentives to do anything for the societal or common good, unless it promises an economic return. In addition, the economy provides no incentives to conserve, protect, or regenerate the resources of nature that will be needed to sustain future generations. If the resources of society and nature are ultimately depleted, there will be no source of future economic value. An economy driven solely by the economic bottom line, by the objectives of productivity and economic efficiency, may be very productive and efficient in the short run, but such an economy quite simply is not sustainable over time (Ikerd 2004). Corporations that seek to maximize economic returns for their stockholders are inevitably driven by the economic bottom line and economies dominated by such corporations are not sustainable. They inevitably degrade, and eventually will deplete, the natural and human resources upon which they ultimately must depend for their productivity.

Emergence of a New Food Economy

Growing concerns about the lack of sustainability of American agriculture has fueled a counter-industrial food movement dating to the “back to the land” movement of the 1960s. The “natural foods” movement was begun by the so-called “hippies” who dropped out of society and formed their own communities or communes. They produced their own foods using organic farming methods and started local farmers markets to sell their surplus production to people who shared many of their values but not their lifestyles. They were concerned primarily with the pesticides and chemical fertilizers that were becoming commonplace with the industrialization of American agriculture. The popularity of Rachel Carson's classic book, *Silent Spring* (Carson 1962), broadened the early natural foods movement well beyond the hippie communes by focusing on the human health and environmental risks associated with a chemically dependent agriculture.

The growing popularity of natural foods provided the conceptual and economic foundation for the organic food movement of the 1980s and 1990s, which quickly spread beyond the farmers markets and natural food cooperatives and eventually into the food marketing mainstream. The organic foods movement was concerned about far more than pesticides and fertilizers; it was a

rejection of industrial agriculture in general. Over time, use of animal growth hormones, antibiotics, and genetically modified organisms and reports of E-coli O157:H7 and “mad cow” disease added to a growing list of concerns about industrial foods. Concerns about food quality and nutrition joined concerns for food safety in a nation suffering from increasing obesity, heart disease, and other diet related illnesses. Mechanical harvesting, processing, storage, and shelf life had become more important than freshness, flavor, and nutrition in the geographically-specialized, mass-production, mass-marketing, industrial food system of the 1970s and 1980s. Throughout the decade of 1990s, sales of organic foods grew at an annual rate exceeding 20% per year, doubling every three to four years. Organics was by far the fastest growing segment of the food market. By the turn of the century Whole Foods, a *natural* foods retailer, had become the fastest growing supermarket chain in the United States. Soon afterwards, the mainstream supermarkets, including Wal-Mart, began stocking and promoting organic foods. Organic foods still represent a fairly small segment of the retail food market, less than 4% in 2007, but organic sales continue to grow at rates that would allow a doubling every five years.

In 2007, The New Oxford American Dictionary chose “locavore” as their word of the year. A locavore was described as someone who shows a strong preference for foods made with locally grown ingredients and takes advantage of seasonally available foodstuffs that can be bought and prepared without the need for extra preservatives. Locavores clearly have strong preferences for foods very different from the industrial foods found in mainstream supermarkets today.

The local food movement is but the latest phase in the rebellion against industrial foods that began in hippie communes back in the 1960s. With the growth in organic foods, many of most popular *organic brands* have been purchased by mainstream food corporations. This has put pressure on organic growers to give greater priority to cost of production than to the ecological or social integrity of their processes and products. As they grew larger, organic food retailers came under increasing pressure to adopt the corporate model of minimizing economic costs, even at the cost of society and the environment. Locavores are searching for something more than an industrial version of organic foods. They are searching for, and are willing to pay for, foods that have ecological and social integrity.

The local foods movement is perhaps best characterized by Slow Food, a worldwide organization with more than 80,000 members. The Slow Foods (2008) website states, “We believe that the food we eat should taste good; that it should be produced in a clean way that does not harm the environment, animal welfare or our health; that food producers should receive fair compensation for their work, and that all people should have access to good and clean food.” Slow Food clearly goes beyond food quality, health, and environmental concerns by addressing issues of animal welfare, equitable economic return for food system workers and farmers, and access for all people, regardless of income, to good food. *Good, clean, and fair* have become the watchwords of the local food movement. Chefs Collaborative is a network of more than 1,000 American chefs who promote the joys of local, seasonal, and artisanal cooking. The Chefs Collaborative (2008) website proclaims, “Cultural and biological diversity are essential for the health of the earth and its inhabitants. Preserving and revitalizing sustainable food, fishing, and agricultural traditions strengthen that diversity.” The natural, organic, and local foods movements all represent a continuing quest by a small, but growing segment of American society for foods that have ecological, social, and economic integrity—foods that are produced sustainably.

Trends Shaping the Future of Agriculture

The powerful forces likely to drive a continuing quest for agriculture sustainability over the decades are readily apparent today. Kelly Cain of the University of Wisconsin-River Falls refers to “peak oil” and global climate change as the “evil twins.” The two are inextricably related by the fact that global warming is a direct consequence of greenhouse gasses released by the use of fossil energy. Meeting the challenges of the “evil twins” ultimately will require fundamental changes in virtually every aspect of life in all industrial nations, including their industrial food systems.

The entire industrial era has been based on cheap and easily accessible energy, first old growth forests, then surface coal, and for most of the past century, relatively shallow deposits of oil. The world is not running out of fossil energy; by most estimates about half of the earth's total fossil energy reserves are still in the ground. However, all of the easy sources of fossil energy are gone. Forests now have to be grown before they can be harvested. Whole mountains are now being destroyed to gain access to the remaining reserves of coal. The remaining reservoirs of oil and natural gas are deep beneath the floors of deep oceans or in remote areas hardly touched by civilization. All alternative sources of energy – nuclear, wind, water, and photovoltaic – will be more costly to generate and more difficult to use. The industrial era of the past two centuries is coming to an end.

The concept of “peak oil” refers to the fact that once a new oil field is discovered, it takes about 30 to 40 years to bring an oil field into peak production (Murphy 2008). Past records indicate that by the time a field reaches peak production only about half of the total quantity of recoverable oil remains in the ground. However, the remaining half is more difficult and costly to retrieve. More wells have to be drilled deeper to pump a given amount of oil and the oil pressure that once pushed oil toward the surface has to be replaced with water or steam pressure. Equally important, it is no longer possible to sustain peak production after the peak has been reached. U.S. oil discoveries peaked in the late 1930s and early 1940s, with major discoveries in Oklahoma and Texas. U.S. oil production peaked in 1971 and has been declining ever since. The Alaskan oil discovery caused but a temporary “blip” in an otherwise persistent downtrend. The United States has been powerless to significantly increase its domestic oil production and remains so today. The peak in *global* oil discoveries occurred in 1962, indicating a peak in global production sometime in the early 2000s. Experts disagree about the exact timing of the peak, with estimates ranging from the peak having already occurred in 2005 to as late as 2025. Global production has been essentially flat since 2005, in spite of record high oil prices. However, even the major oil companies, such as BP, Exxon-Mobil, and Chevron-Texaco, have begun to focus their attention on energy alternatives for the future.

All other sources of fossil energy have patterns of discovery, production, and depletion similar to oil, although each has its distinctions. A peak in natural gas production isn't expected for another couple of decades but the decline in production afterwards is expected to be much more abrupt than for oil. Coal is the most abundant of all fossil energy resources. However, if it is used to make up the shortfalls in oil and natural gas – instead of relying on wind, water, direct solar, and energy conservation – the estimated 200-year supply of recoverable coal could be largely depleted within 50 years.

The greatest limitation of coal is that the remaining reserves of coal will be costly to use, both economically and ecologically. Coal is already a major contributor of greenhouse gasses

and the remaining coal reserves not only are less “energy dense” but also “dirtier” and thus pose even greater threats to the environment. An increase in reliance on energy from coal could result in major disruptions on global climate patterns over the next century. While there may be no scientific consensus concerning the causes of global warming, the preponderance of scientific evidence certainly indicates that industrialization has been a major contributor (Gore 2006).

Basic science and simple logic indicates that the buildup of carbon dioxide and other greenhouse gasses in the atmosphere is a direct consequence of the inevitable release of carbon, nitrogen, and other elements from fossil fuels in the process of extracting their stored energy. All fossil energy is biological in origin, solar energy captured in the tissues of biological organisms and stored beneath the earth's crust. The energy is stored in the bonds that connect molecules of carbon, hydrogen, and oxygen, the major elements forming the tissues of living plants. When fossil energy is released, these bonds are broken and the various chemical elements, including carbon dioxide and other greenhouse gasses, are released into the natural environment. This problem is inherent in all fossil fuels and is certainly not limited to coal. Society cannot replace declining supplies of petroleum by relying on any other sources of fossil energy without exacerbating the risks of global climate change.

Biofuels have been touted as the renewable replacement for fossil energy. However, biofuels have very limited potential as a replacement for fossil energy in that all of the energy collected by all of the green plants in the United States is equivalent to only about one-half of total U.S. fossil energy use, not considering the fossil energy necessary to convert solar energy into biofuels. In addition, most of those green plants are not on farms (Pimentel and Pimentel 1996). If the whole of U.S. agriculture were devoted to energy production, the resulting biofuels would only replace about one-sixth of current fossil energy use. There are no more cheap and easy sources of energy. The industrial era is coming to an end, and with it, the industrial food system. The priority for agriculture in the future will be on finding ways to produce more food while using less fossil energy rather than producing replacements for fossil energy. Various studies indicate that on-farm fossil energy use can be reduced by 30 to 60% by pursuing various strategies of sustainable farming (Norberg-Hodge et al. 2002; Pimentel et. al. 2005). The challenge will be to bring such strategies into widespread use among farmers and to achieve even further reductions in fossil energy dependence in the future.

The other major drivers of agricultural sustainability during the twenty-first century will be social and economic. Until recently, the growing disparity of incomes between the rich and the poor in the U.S. and around the world had been largely ignored. At no time since the “gilded age” of a century ago have common people benefitted so little from economic growth. The poorest *one-half* of Americans currently now lives on only one-eighth of total U.S. income while the top *five percent* takes in more than one-fifth. In fact, the top *one percent* makes as much money as the bottom half. In the words of Alan Greenspan, former Federal Reserve Chairman (Greenspan 2005), “The income gap between the rich and the rest of the U.S. population has become so wide, and is growing so fast, that it might eventually threaten the stability of democratic capitalism itself”. There is little doubt that economic policies of the past 25 years have benefitted corporate investors far more than they have benefitted American workers.

It's equally obvious that these policies have not resulted in a stronger U.S. economy. Recent U.S. federal budget deficits have routinely set new records as the government continues borrowing money, rather than raising taxes, to fund the wars in Iraq and Afghanistan. Over time, the U.S. has shifted from the world's largest source of investment capital to the world's largest

debtor nation. More importantly, much of the U.S. federal debt has been borrowed from other countries, notably China, rather than from American citizens. U.S. international trade deficits also have reached historic highs as Americans have come to rely on cheap imports from low-wage countries such as Mexico, India, and China. The value of the U.S. dollar has declined precipitously in relation to other world currencies, as the Federal Reserve has reduced interest rates in attempts to stave off a domestic recession. American consumers are also suffering under the burden of too much debt. However, the government's response to the current credit crisis has been to distribute unfunded tax rebates to consumers to encourage even more spending and to bail out the financial institutions responsible for reckless and irresponsible lending practices. Such economic and social policies are not sustainable.

These economic and social problems relate primarily to the U.S. However, when the U.S. has problems, the whole world has reason for concern. The U.S. is a big country – economically, geographically, and militarily – and seems unwilling, or perhaps is unable, to keep its problems at home. The current problems in the U.S. are but the symptoms of its unwillingness or inability to adjust to the domestic and global forces that are bringing the industrial era to an end.

Food quality, food safety, nutritional health, fossil energy, global warming, social inequity, economic instability; these are all ultimately issues of food security. There is no more important responsibility of any government than food security. Early U.S. farm policy, during the 1930s and 1940s, was focused on keeping enough family farmers on the land to ensure that the nation could feed itself. During the 1950s and 1960s, farm policy shifted to food security through production efficiency, as it became apparent that industrial agriculture could produce more food with fewer farmers. When these new policies resulted in persistent surpluses of agricultural commodities, the focus shifted again to food security through international trade. The nation's farmers were encouraged to continue focusing on their global competitive advantages in crops such as corn and soybeans; the nation's food suppliers would simply buy foods from other countries when something could be produced at a lower cost elsewhere. Over time, the focus of farm policy has subtly shifted from food security to economic opportunity. However, in today's turbulent, uncertain, and sometimes hostile world, many Americans are quite logically concerned about becoming as dependent on the rest of the world for food as they are today for oil.

In the long run, a nation that cannot feed itself is no more secure than a nation that cannot defend itself. Furthermore, no nation will be able to confront the ecological, social, and economic challenges of the future while relying on a specialized, standardized, corporately controlled, industrial agriculture for its food. The early U.S. farm policy was right. The only true food security of any nation is in the natural productivity of its land and the commitment of its farmers to maintaining the ecological health of the land not only for their own benefit but also for the benefit of others of current and future generations. Food security is not the same as self-sufficiency in that food secure nations may participate freely in trade that allows them to enjoy a variety of foods from around the world. Strategic food alliances based on shared values and mutual trusts need not be subject to the whims of global markets. But a nation that relies on global markets for the foods essential for its survival is never really secure. Markets respect only economic means, not human needs. A nation is no more food secure than the sustainability of its agriculture and humanity is no more food secure than the sustainability of global agriculture.

The End of CAFOs; The Return to Farming with Grass

As the industrialization of the food system approaches its pinnacle, it is also nearing its end. The two might appear to be contradictory but all natural, economic, and social phenomena tend to go through cycles of peaks and valleys. New trends develop whenever it becomes apparent that the old ways of doing things are no longer working. A new trend accelerates as the new ways of doing things are found to be successful in solving problems and realizing opportunities under a variety of circumstances. At some point, the new way of thinking is no longer new and the problems and opportunities that it can address effectively by the once-new thinking process have already been addressed. By then, however, the approach to problem solving has become so commonplace that it is applied routinely, without really thinking, in situations where it is not appropriate. These inappropriate applications begin to create new problems instead of solutions. Regardless, the trend continues toward its pinnacle, driven solely by habit and convention rather than logic and rationality. As benefits decline and costs rise, the trend is ripe for a reversal and new ways of thinking emerge to start a new trend. This is the state of industrial agriculture today. Industrialization has outlived its usefulness and overrun its logical course; it is creating more ecological and social costs than economic benefits. The future belongs to the new way of thinking needed to create a sustainable agriculture.

Concentrated animal feeding operations represent the pinnacle of industrial agriculture. CAFOs specialize in one species of livestock or poultry, often in only one phase of production for one species. The facilities, equipment, breeds, feeds, medications, and procedures are all standardized so they can be mechanized and routinized, like stages on an assembly line. This allows millions of animals to be consolidated under the centralized control of a single corporation. CAFOs are not farms; they are industrial production systems.

CAFOs have been controversial since their inception. They are invariably promoted as a logical rural economic development strategy and the only reasonable means of maintaining a viable local agricultural economy. CAFOs invariably are opposed by some community members because of concerns about noxious odors and pollution of streams and groundwater—which ultimately are health concerns—and about the impacts of CAFOs on the overall quality of life in rural communities. Local public officials are invariably put in the uncomfortable position of trying to decide whether the potential economic benefits of CAFOs are worth the ecological and social costs.

In the early days of CAFOs, the controversy was understandable because previous research related to industrial agriculture had focused on crop farming. However, virtually every study conducted on CAFOs in the past 20 years has confirmed the negative community impacts, similar to those of industrial agriculture. A study commissioned by the North Dakota Attorney General's Office, for example, reviewed 56 socioeconomic studies concerning the impacts of industrial agriculture on rural communities. It concluded: “Based on the evidence generated by social science research, we conclude that public concern about the detrimental community impacts of industrialized farming is warranted. In brief, this conclusion rests on five decades of government and academic concern with this topic, *a concern that has not abetted but that has grown more intense in recent years, as the social and environmental problems associated with large animal confinement operations [CAFOs] have become widely recognized*” (italics added) (Stofferahn 2006). In those cases where CAFOs have contributed to local employment or economic activity, they have also contributed to costs of public services and have invariably resulted in greater income inequity and associated social conflicts and instability. Despite

arguments to the contrary, the economic promises of CAFOs are largely without scientific support or credibility.

A growing body of scientific evidence has also confirmed the existence of significant human health risks associated with CAFOs. In calling for a nationwide moratorium on CAFOs, the American Public Health Association (2003) cited more than 40 scientific reports indicating health concerns related to CAFOs. A two-year study commissioned by the Pew Charitable Trust (2008) concluded, “The current industrial farm animal production system often poses unacceptable risks to public health, the environment and the welfare of the animals... the negative effects of the system are too great and the scientific evidence is too strong to ignore. Significant changes must be implemented and must start now.” Despite the continuing corporate defense of the industry, the preponderance of scientific evidence leaves little credible doubt that CAFOs represent significant environmental and health risks to people in rural communities.

As additional information about CAFOs becomes public, the ultimate negative public reactions could well place the future of animal agriculture at risk. However, virtually all of the ecological, social, and economic concerns about CAFOs can be addressed effectively by producing animals in smaller, outdoor non-confinement facilities – in a natural environment, free range, on grass. Products from animals on grass can be produced sustainably – ecologically, socially, and economically. Grass farmers can meet the demands of consumers who are concerned about food safety, nutrition, and ethical issues. They can avoid the growth hormones, antibiotics, and genetically engineered organisms, minimize the risks of salmonella and E-coli O157:H7, and eliminate the risk of “mad cow” disease. Grass-fed meat and milk also offer distinct nutrition and health benefits over grain-fed animal products by improving the ratios of healthy to unhealthy fats. From an ethical perspective, it's far easier to treat animals humanely in pasture-based systems than in concentrated animal feeding operations. In addition, through intensively managed grazing, valuable nutrients are returned to the soil and pollution of surface and groundwater can be kept to a minimum if not eliminated. Grass farming has also eased the transition to organic production for an increasing number of dairy and beef operations. Some grass farmers have joined the local food movement by processing, packaging and marketing their own meat, milk, and animal products directly to local consumers who choose to buy their food from people they know and trust.

In the future, grass farmers will have even greater advantages in addressing the public concerns associated with peak oil, global warming, economic equity, and food security. By keeping the land covered with perennial grasses, grass farmers and ranchers are able to reduce soil erosion and compaction and can maintain the natural productivity of the soil, reducing the need for energy-intensive fertilizers and pesticides. Under current conditions, range cattle require less than one-third as much fossil energy per kcal of animal protein as finished cattle in feedlots, while utilizing grasses and forages that cannot be utilized directly by humans (p. 81, Pimentel and Pimentel 1996). Furthermore, management intensive grazing can significantly increase production per acre over conventional range management while reducing the need for the fossil energy still further (Andrae and Hancock 2008). Grass farmers also have advantages over cattle feeders in reducing greenhouse gas emissions. For example, a 12-ounce beef steak from a grain-fed animal results in about 1.6-pounds of emissions – including emissions from grain production but not transportation (Tisch 2008). The same steak from a grass-fed beef animal results in about 0.3-pounds of CO₂, only about one-fifth as much as the grain-fed steak. Ongoing field trials at

the Rodale Institute indicate that a shift from conventional to organic farming—with restoration of the organic matter levels needed for healthy, productive organic soils—could sequester significantly more CO₂ in the soil than U.S. agriculture currently emits (Sayre 2003).

Energy concerns could accelerate a growing trend toward vegetarianism, which up to now has been motivated largely by religious, ethical, and animal welfare concerns. A shift from a vegetarian diet might reduce fossil energy use and related greenhouse gas emissions by about one-half (p. 146 Pimentel and Pimentel 1996). However, about one-third of the protein consumed by humans globally is of animal origin, more than 60% from animals fed grasses and forages that cannot be consumed by humans (p. 77, Pimentel and Pimentel 1996). Animals are also important to the nutrient cycles and energy flows that characterize healthy, productive natural ecosystems. A shift from grain feeding to grazing would address the energy, greenhouse gas emissions, and animal welfare concerns currently associated with animal agriculture. Such a transition will be essential in meeting the protein needs of a post-industrial society without compromising the ecological integrity needed for long run food security.

Grass farming also provides greater economic and social opportunities for farmers and ranchers and people in rural communities. Most grazing operations are smaller than otherwise similar confinement operations simply because intensively managed grazing systems require hands-on, eyes-on, thinking management, which doesn't fit well with the corporate contract approach to livestock production. Sustainable grass farming is management intensive, which increases the challenges but also increases the potential economic returns to decision makers on farms and ranches, rather than to managers and investors in the global corporations. Grass farmers have to seek out discriminating customers who value the nutritional and health benefits of grass-fed meat, milk, and cheese. They typically find these customers through farmers markets, community supported agriculture organizations (CSAs), Internet websites, and other marketing methods that are unfamiliar to most farmers. Consumer acceptance of the sensory characteristics of grass-fed animal products also may require unusual animal genetics and unconventional forage and animal management practices. Grass farmers who find ways to meet these challenges can expect to reap and retain the economic rewards, rather than pass their profits on to corporate investors.

Grass-based operations also provide an aesthetically pleasing, safe and supportive environment in which to raise a family, with children taking on increasing responsibilities as they mature. Grass farmers and ranchers work in harmony with nature and need not detract from the quality of the natural ecological environment. They make good neighbors and, unlike CAFOs, can help build stronger local communities, socially as well as economically. For the past several decades, the priority for agriculture has been on productivity and profitability. Sustainable productivity will require a greater emphasis on agricultural ecology, but perhaps even more important, a greater appreciation of farming as a way of life.

Summary

The opportunities for grass farming will be virtually unlimited, as people seek ways to confront the ecological, social, and economic challenges of the future. The physical health and happiness of people, the viability of economies, and the very future of humanity ultimately depend on the sustainability of agriculture. Animal agriculture will be essential in meeting the food security needs of a growing global society in the post-industrial era of global warming, fossil energy

depletion, and a commitment to greater social equity. Farming with grass has distinct advantages over confinement animal feeding in meeting the ecological, social, and economic challenges of the future – locally, nationally, and globally.

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