The True Cost of Big Farms[1]

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Does farm size affect the true cost of food? The short answer: Yes! The increase in size of U.S. farms has been motivated by the quest for economic efficiency in an effort to reduce the economic costs of food. However, the "true" cost of food also includes economic costs that are not currently reflected in costs of production but are "externalized" or imposed on society and the nature. Internalizing external economic costs is the primary focus of this conference: *The True Cost of American Food*. The *external* economic costs of farming have risen as farms have grown larger, so it's reasonable to believe a relationship exists between farm size and external economic costs. Furthermore, the true cost of American food must include the non-economic social and ecological costs that cannot be converted into economic costs or internalized. There are good reasons to believe the non-economic costs of large farms may matter even more than the external economic costs.

An implicit assumption of "true cost accounting" is that costs should include the cost of sustainability – in the case of food, including the full economic, social, and ecological costs of sustainable farming. Previous concerns for ecological and social externalities have merged into concern for sustainability: an ability to meet the needs of all in the present without diminishing opportunities for the future. Most advocates of sustainable agriculture seem to believe that in farming size *doesn't* matter. They contend that farms can be managed sustainably or unsustainably regardless of how large or small they may be. I readily admit that most small farms today probably are unsustainable. However, I believe today's so-called modern large farms would need to be managed like well-managed small farms in order to be sustainable.

Admittedly, my conclusions reflect how I distinguish between large and small farms. I consider a farm to be a single management unit – meaning a combination of land, labor, and capital, managed as a single farm or economic entity. The size of a farm then reflects the number of acres of land, dollars invested, and hours of labor that are managed as a single economic entity. Labor is a bit more complex than land and capital. The work of farming traditionally combines the functions of management and labor. Farmers are not inanimate machines but thinking workers and working thinkers. As farms grow larger managers tend to replace thinking workers with mechanical and digital technologies, employing fewer people as workers as well as fewer managers. So smaller farms tend to be more "human-intensive" than large farms as well as more management-intensive. Also, as management becomes less intensive, farms must grow larger in value of production in order to maintain an acceptable total return to management.

A single management unit can obviously include far more acres, laborers, and dollars of investment in some types of farming operations than in others. For example, a small beef cattle

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ranch would be very large chicken farm, at least in terms of acres of land. A larger market garden would also be a small corn/soybean or wheat farm. That said, for similar types of farming operations, and for farms in general, the greater the management intensity or human intensity, the smaller the size of the farm in terms of land and capital and in total value of production. The less-intensive or more-extensive the management, the larger the farm or ranching operation.

Farm size matters because management intensity matters. Management intensity determines whether the economic benefits go primarily to farmers or instead go mostly to those who own farmland and have capital to invest in farming. So, management intensity determines how much economic benefit remains in rural communities and how much of it leaves to feed financial markets. But even more important, management intensity matters because the sustainability of a farming operation depends on the intensity with which farms are managed. The stereotypical large farms of today's agriculture are not unsustainable because they are large, they are large because they are managed unsustainably. They are unsustainable because they are managed "extensively" – meaning they rely more on land and capital and less on thinking people.

Sustainable farms, by definition, must meet the basic food needs of all in the present without diminishing opportunities for the future. Today's large farms obviously are doing neither. The primary justification for government programs that have subsidized large farms was to reduce food costs so everyone would have enough good food to support active healthy lifestyles: food security. The percentage of people in the U.S. classified as "food insecure" today is about three-times larger than during the 1960s. More than 15% of Americans are classified as food-insecure and more than 20% of our children live in food insecure homes.[1]

In addition, typical American diets today are higher in calories and apparently lacking in essential nutrients, as reflected in an epidemic of obesity and other diet-related health problems, including diabetes, heart disease, hypertension, and various diet-related cancers.[2] As America's farms grew larger during the latter 1900s, the percentage of American's disposable income spent for food dropped by one-half, while the percentage of GDP going to health care more than doubled.[3] Simple correlations do not prove causality, but there is reason to believe this relationship is not coincidental.[4] The challenge of food security simply cannot be met by making food cheaper. It is a problem of social and economic inequity rather than economic inefficiency. The quest for economic efficiency has actually made the hunger problem worse, not better.

That said, the primary focus of this "True Cost of American Food Conference" is on the failure of the American food system to leave equal opportunities for future generations to meet even their basic need for food. Today's large, unsustainable farms are degrading the health of soils and mining the productivity of the land; polluting the air, streams, and aquifers with agrochemical and biological wastes; and degrading and demeaning the agricultural workforce; all are resources essential for the future productivity of American agriculture. With nearly 80% of total value of agricultural production the U.S. accounted for by farms with more than $350,000 in gross farm cash income, the lack of long-run sustainability of American agriculture obviously cannot be blamed on mismanagement of America's small farms.[5]

Farms in America were much smaller prior to the 1940s – the years preceding World War II. Most pre-war farms were diversified farms, with a number of different crops and livestock

enterprises managed so as to maintain the fertility of the soil and to manage weeds and other agricultural pests. Post-depression, pre-WWII U.S. farm policies had been focused on increasing the productivity of intensively-managed family farms as a means of ensuring domestic food security by keeping diversified family farmers on the land to produce enough food to meet the needs of all. These traditional family farms were as much way of life as a means of making a living. They balanced the economic, social, and land stewardship traditions of family farming – earning an economic living in order to pursue a chosen "way of life."

Following World War II, the chemical and mechanical technologies developed for warfare were transformed into the agricultural technologies that became critical in supporting the industrialization of American agriculture. Farmers no longer needed to rely on diversified, integrated crop and livestock systems to maintain soil fertility or manage pests; they could use cheap synthetic fertilizers and commercial pesticides. Farmers could plant, cultivate, and harvest far more acres with tractors than horses. Land devoted to horse feed would be converted to cash crops, generating far more income than the cost of cheap fossil fuels. The vagaries of nature were being tamed with new industrial technologies; allowing farmers to specialize, routinize, and accumulate capital to consolidate existing small farms into fewer large farming operations.

Equally important, the transition to the industrial system of agriculture was supported by government programs, including public research and education, which promised lower food costs for American consumers and more profits for American farmers. Industrialization of agriculture replaced supporting family farms as a means of ensuring domestic food security – although the "family farm rhetoric" of farm policy continues even today. Agricultural production increased and Americans were able to spend a smaller share of their income for food as small diversified, family farms were replaced by larger specialized, industrial farm businesses.

Between 1940 and 1980, farms in the U.S. dropped from 6.1 million, 175 acre farms to 2.4 million, 426 acre farms, and the percentage of the U.S. workforce employed in agriculture dropped from 18.0% to 3.4%.[6] Eventually large cropping and livestock operations were organized and managed like factories without roofs and fields and feedlots functioned as biological assembly lines. Land and capital were substituted for thinking workers. Small, intensively-managed family farms were replaced by large, extensively-managed industrial farms.

The negative economic externalities of large farms obviously were not widely anticipated and still remain largely unappreciated. The public mandate of agricultural industrialization was to increase economic efficiency. Economic value is different from intrinsic value. Economic value is a reflection of scarcity, not human necessity. Scarcity means there is not enough of something for everyone to have all they want. For example, while air is intrinsic or essential for human life, air has no economic value until clean air is made scarce by pollution. Food is valuable only because it is scarce – meaning not enough of it for everyone to have all they want. The driving force of the agricultural economy and supportive agricultural policies was to reduce the *economic* costs of food. With the preoccupation was on reducing the economic costs of food, little attention was given to the impacts on food quality or quality of life in rural communities.

The increases in economic efficiency associated with consolidation of small farms into managed farms brought a growing list of public concerns, including pollution of air and water

with chemical and biological wastes, the demise of family farms, and economic and social decay of rural communities. These large, extensively managed farming operations resulted in the same basic negative economic externalities as those experienced by other industrial sectors of the U.S. economy. Unlike other industrial sectors, industrial agriculture remained largely unregulated. The outdated public image of farming is still that of the traditional diversified, small-scale, family farm; the reality is quite different.

The management ability required to manage a large, industrial farm may be as great as the management ability required for a small, sustainable farm. However, the type of management required would be different for large and small farms. In addition, by definition, the manager of a large farm will be managing more land and capital and possibly more workers. Thus the management required per acre farmed and per dollar invested will be less, meaning the "management intensity" will be less, for a large farm than for a small farm.

As late as the 1950s, the ecological and social risks of industrial farming were still largely unknown. The natural ecosystems of rural areas seemed capable of absorbing and neutralizing any pollution industrial farms might generate. The new commercial fertilizers and pesticides made soil quality and soil conservation seem less important and less economically valuable than before. Rural communities epitomized the strong social fabric of America and seemed immune to economic or social decay. Industrial agriculture had created a surplus of farmers and rural communities, so neither farmers nor farming communities had much economic value.

In summary, the negative social and ecological *externalities* of increasing farm size were not appreciated or counted during the early days of agricultural industrialization because they were of negligible economic value. There was simply too little economic value to be lost and too little economic costs imposed on society and nature to be of significant concern. However, as large, extensively-managed farms became more prominent, their negative ecological and social impacts grew. Their negative economic impacts eventually became apparent with the ecological and social decay of rural communities. Today's call for "true cost accounting" is a direct consequence of increasing scarcity and rising economic cost of the external ecological and social impacts of industrial agriculture – the true economic costs of extensively-managed, large farms.

While a step in the right direction, meeting the challenge of agricultural sustainability ultimately will require more than true cost accounting. Sustainable farming will require an approach to farm management that is fundamentally different from the industrial management paradigm that characterizes today's large farms. As Wendell Berry writes in *Solving for Pattern*, "A good solution is good because it is in harmony with those larger patterns – and this harmony will, I think, be found to have a nature of analogy. A good solution acts within the larger pattern the way a healthy organ acts within the body."[7]

The pattern of large farms is that of a machine or mechanism – of industry. The natural ecosystems and rural cultures within which farms must function are living systems rather than machines – organisms rather than mechanisms. In fact, a farm itself is an organism – a living systems made up of soil, plants, animal, and people that constitute an integral whole. The ecological and social externalities of large farms are a natural consequence of the inherent

disharmony and conflict between the industrial extensive-management paradigm that cause large farms to be large and the ecological and social context within which they must function.

The new public mandate or purpose of American agriculture must be ecological, social, economic sustainability rather than maximum economic efficiency – "good, clean, fair food"[8] rather than "cheap food." This new purpose will require farms of a fundamentally different kind – small farms. Within nature, size conforms to function. Organisms are genetically designed by nature to fulfill their purpose within the larger whole of natural ecosystems. As noted management guru Peter Drucker wrote, "It would surely be counterproductive for a cockroach to be big, and equally counterproductive for the elephant to be small,"[9] For human-created organizations – such as farms – organizational and management patterns must be chosen to fulfill specific purposes. The size of an organization then evolves to accommodate its purpose with its larger context.

Sustainable farms must be organized and managed to function in harmony with healthy, diverse, dynamic, individualistic, interdependent *living systems*. Only healthy living systems are capable of balancing the efficiency, resilience, and regenerative capacity essential for sustainability. Healthy living systems must be adapted to accommodate nature rather than engineered to subvert nature. They must be nurtured and encouraged rather than manipulated or controlled. Thus, sustainable farmers must have the knowledge, understanding, and management skills to work with nature. They must manage their farms in ways that meet the needs of people without degrading the health and natural productivity of their farms.

Sustainable farmers must also understand and appreciate human nature – particularly the value of human relationships. They must understand how to meet the needs of their customers without diminishing the quality of life of others within their communities and societies. The must see the economy as a means rather than an end – a means of pursuing a social and ethical way of life. They must care about their land to be caretakers of the land. They must care about people if they are to be caretakers of society. Sustainable farms must be both management-intensive and human-intensive, and thus accordingly small.

The lack of sustainability of American agriculture today is a natural consequence of a management paradigm chosen to maximize economic efficiency, which inevitably conflicts with ecological and social integrity. Today's large farms are perhaps the right size for economic efficiency but are clearly too large for ecological, social, and economic sustainability.

The ultimate purpose of true cost accounting is to build public support for consumers' food purchasing decisions and government farm policies that reflect an understanding of the full ecological, social, and economic impacts of farming by internalizing externalities. The process of internalizing the external costs of industrial agriculture may seem quite simple or straight forward to many of its advocates. We should simply assign appropriate economic values to all "external" ecological and social costs. This would allow farmers, consumers, and other decision makers to consider the "true cost" of food production when making economic decisions. A variety of public policies are available for such purposes. We could make polluters pay for the economic damage they inflict on the environment by taxing their pollution or charging them for "pollution rights." Innate

The government could require producers to pay for the full economic value of use rights to natural resources – air, water, soil, minerals, energy. Resources such as clean air and clean water, are of great value to society as a whole, but if their use cannot be restricted or controlled by anyone in particular, they are not economically *scarce* and thus of no economic value. When public policies are devised that restrict resource pollution or extraction, the resources become scarce and thus take on economic value. Strategies such as "cap and trade" places limits on total pollution and allow markets to allocate limited levels of pollution to the highest valued economic uses. "Market-based" policies such as cap-and-trade have become increasingly a popular means of addressing environmental externalities.

However, the economic internalization process is not as simple as it might seem. First, it is difficult to link a specific ecological or social externality to a specific source. Externalities often have multiple sources that are difficult if not impossible to isolate, as in the case of diet related health problems. Even if the source of externalities can be identified, problems arise as to how to place economic values on resources that are not currently bought or sold in competitive markets.

Economic value is ultimately a transactions value: a value that is "discovered" by buyers and sellers in competitive markets, rather than created by anyone in particular. The economic value of externalities are fairly straight forward when some people are forced to pay economic costs that are imposed on them by others. For example, when large confinement animal feeding operations diminish the market value of their neighbors' property or cause illnesses that require medical attention, the economic value of such externalities are market determined. However, government policies sometimes "create" scarcity where none previously existed, rather than discover existing economic values. For example, clean air and water and scenic landscapes have no market value as long as they are not sufficiently polluted or degraded to create scarcity.

The inevitable questions when scarcity is created by government policy are: how much scarcity is enough, too little, or too much? If we choose too little, the problems will continue. If we choose too much, the problem will be made worse. In fact, we could internalize all economic value by privatizing everything and allowing markets to discover the full economic value of everything. All natural resources would then be private property – including air, water, and even access to nature – allowing their value to be discovered by economic transactions. Who then would be willing or even able to pay the full economic costs of food – or anything else?

Economists recognize more than a half-dozen "dollar-based ecosystem valuation methods."[10] Disagreements regarding the magnitude of external economic costs and benefits often turn out to be little more than intellectual duels among economists using different methods and models with different initial assumptions. I have reviewed and critiqued a variety of economic impact assessments and have found none that could not be challenged or discredited by using different approaches or just different sets of reasonable and logical initial assumptions. External economic impacts on *society* are even more difficult to estimate using such models than impact on *nature*.

Nearly all economic valuation methods are based on some unstated but implicit assumption regarding the *rights* of individuals. In fact the whole concept of external costs assumes that

someone is "imposing costs" upon someone else who has the *right* to be protected from such impositions. The legitimacy of internalizing the economic costs of air and water pollution, for example, assumes that people have a basic *right* to clean air and water. The right to clean air and water is not encoded in the U.S. constitution and thus is widely contested.

Those who oppose stringent environmental regulations claim that people have a basic *right* to engage in business activities in our so-called free market economy. They have a right to use their land, labor, and capital by any *legal* means. All economic value ultimately is derived from nature by way of society; so people must rely on natural and human resources to create things of economic value. Many industrial farmers claim that environmentalists would be imposing economic costs on farmers if the government restricts farmers' ability to use air, water, and soil for economic purposes. Internalizing the external economic environmental and social costs of farming would inevitably impose added economic costs on American food consumers as well as food producers. Costs that are *internal* to people as citizens are *external* to people as consumers. So, internalizing externalities is not as simple as it might seem.

In an attempt to cope with competing "rights," the U.S. government has relied heavily on cost-benefit analyses. Before a new government regulation is imposed that would restrict the economic rights of businesspersons, an attempt is made to evaluate both the potential economic costs to businesses and consumers and the potential economic benefits to the general public or to people in common. No explicit judgment is made regarding whether our rights as economic beings are superior or inferior to our rights as social and ethical beings. This decision is left to the legislators and regulators. Furthermore, no attempt is made to consider the "non-economic" social or ethical costs that are imposed on society and humanity.

Economic value, at least as we know it today, is a transactions value – value in exchange. The economy values only those things that can be bought, sold, or traded. Thus economic value is inherently impersonal. You can't buy, sell, or trade a *personal* relationship with a spouse or a friend or the personal sense of belonging or connectedness to a local church, school, or community. Yet, we all know these things have tremendous personal value. It's just common sense, because we are innately social beings. We need to care and be cared for and we need to love and be loved, if we are to realize a personal sense of well-being and happiness.

Economic value also is instrumental – a means to some further end. It doesn't make economic sense to invest in anything for the sole benefit of someone else – and certainly not for the benefit of some future generation. Yet, we as humans have a responsibility for the well-being of others, including future generations. A life without some sense of responsibility or purpose is empty and without meaning. We need to do things that we know in our heart are right and good, even when we know we cannot possibly receive anything of tangible or economic value in return. We are ethical and moral beings. The things we do simply because they are the right thing to do are essential to happiness and quality of life.

Sustainability ultimately is an ethical choice, because intergenerational equity has no economic value. Those of future generations will never be able to compete in today's markets to create scarcity and economic value for the resources essential to meet their needs. Claims to economic resources at some time in the distant future will never be as scarce or economically

valuable as claims to similar resources today or in the near future. That's why borrowers willingly pay interest on borrowed money and lenders expect interest on loaned money. That's why corporate planning horizons rarely extend more than 3-5 years into the future. Sustainability is ultimately an ethical challenge. There can never be adequate economic incentives to ensure sustainability. Assigning economic value to the whole of nature and society through privatization would simply accelerate the pace of extraction and exploitation.

There is at least one approach to internalizing externalities that allows evaluation of economic, ecological, and social impacts without arbitrarily *creating* or assigning economic values to things that are fundamentally non-economic. This approach utilizes the basic economic concept of opportunity costs to evaluate the true cost of one approach to farming in terms of the value of an alternative approach that could have been chosen instead – the opportunity foregone.

This approach is similar to "contingent valuation" used by ecological economists. Ecological economists use contingent valuation to assign economic value to the natural equivalents to alternative man-made means of performing the same basic function – such as detoxifying and assimilating pollution. However, the opportunity costs of any alternative is simply the value of the alternative opportunity foregone.

This approach requires no judgement regarding competing rights of individuals affected but does not preclude the possibility of doing so. Thus, assessment of costs and benefits need not be limited to economic costs and values but can just as easily be assessed for non-economic social and ethical values. All things of value simply cannot and need not be "boiled down" or translated into economic value. The social costs of one alternative can be compared to social costs of another and the ethical costs of one alternative compared to the ethical costs of another – just as easily as comparing economic value. While social and ethical impacts are valued differently by different people, in reality, so are economic impacts. We just pretend that the value of a dollar to one person is the same as the value of another, when we know it simply is not true. Maybe, we should call this approach "common sense cost accounting."

While this approach recognizes the internal economic benefits typically attributed to conventional/industrial farms, it also considers their negative external economic impacts of rural economies, and diet- and environmental-health issues linked to farming. More important, this approach to cost accounting considers the social costs of industrial agriculture that are frequently overlooked. Social disruption may impose minimal economic costs but still greatly diminish the quality of life in rural communities. Perhaps most important, common sense cost accounting focuses on the undeniable fact that sustainability is ultimately an ethical challenge and will require choices that give ethics priority over economics. We can change the laws that regulate economies and define the legal rights of people, but we can't change the basic laws of nature.

This approach can be illustrated by an example comparing the economic, social, and ethical costs of a typical conventional 500 acre corn/soybean farms in the Midwest and 25 acre full-time market "gardens" or small vegetable operations producing for local markets – such as farmers market, CSAs, and local restaurants. The local foods section of the analysis in Table 1 indicates that a dollar spent for food grown locally on small vegetable farm generates about four-times as much local economic activity as a dollar spent for foods in the local supermarkets that are grown

on large, industrial farms – using an approach that is typically of many economic comparisons. The greater local impact for small farms is a consequence of a higher percentage return to management due to greater management intensity on small farms.

Table 1. Comparing Conventional Foods (large farms) versus Local Foods (small farms)

Example: Local economic impacts of each $1.00 spent for food….

Conventional Food	Local Food
4¢ - to local farmers (20¢ farm value; farmers keep 20% of 20¢ as farm income)	50¢ - to local family farmers ($1 farm value; farmers keep 50% as farm income)
4¢ - locally purchased farm inputs & labor (50% of 80¢ input cost spent locally; only 10% stays in local economy)	27¢ - local purchases of farm inputs & labor (90% of 50¢ input cost spent locally; 60% stays local – mostly labor)
10¢ - local retail food store employment	■ No local food store employment
18¢ Total Local Economic Impact	77¢ Total Local Economic Impact

Example: Common Sense Cost Accounting

Type of Farm	Econ Cost/Benefits	Social Cost/Benefits	Ethical Costs/Benefits
Large/Industrial Commodity Farm 500-acre farm	B- 10% lower retail food costs N*- $50,000 return to management C- 18¢ local impact per $1.00 food C- diet-related healthcare costs C- environment-related health care	C- employs 1 farmer on 500 acre farm C- fewer farm families: schools, churches, etc. C- sub-clinical, chronic ill health – low QOL C- social conflict in rural communities C- loss of rural culture	C- violates rights to clean, healthy local environment C- major contributor to water pollution & global climate change C- degradation of soil productivity – rights of future generations C- violates stewardship ethic of sustainability
Small/Sustainable Market "Garden" 25-acre farm	C- 10% higher retail food costs N - $50,000 return to management B- 77¢ local impact per $1.00 food B- healthy food B- reduced cost of health care	B- Employs 1 farmer & 2 farm workers on 25 acres: 20 farmers & 40 farm workers – 500 ac. B- more farm families B- healthy adults/kids B- local food networks build community B- restores rural culture	B- respects rights to clean environment B- mitigates water pollution – global climate change B- respects rights of future generation B- builds and sustains ethic of stewardship

Note: All figures are general estimates of the author; based on long-term average estimates -- not any particular study. * Neutral: total returns to management equal for both farms.

If this approach to cost accounting is widely adopted, an analytical format eventually may emerge as being superior to others. However, this approach would seem to accommodate a wide

range of formats and analytical approaches. The opportunity costs selected for consideration can focus on questions of most importance or interest in any given situation. For example, in comparing the smaller organic dairy operations, such as those addressed in a plenary session at this conference, with a single large confinement dairy operation, the matrix in Table 2 comparing complete costs and benefits might be of interest to policy makers.

Again, this common-sense approach to cost accounting shows an economic cost advantage for the large confinement dairy operations, although economic analyses indicate that most economies of scale in milk production are achieved at very modest herd sizes of 100 to 200 cows. In the case of organic production, the organic price premium offsets the conventional production cost advantage over organic production. In addition, smaller family operations provide more employment opportunities for owner-operators, hired workers, and family members. Even if family members are sometimes unpaid, their work contributes to the economic viability of the family dairy enterprise. Most of the other cost/benefit comparisons for large confinement and small organic dairy operations are similar to the comparison for large commodity farms and smaller farm market gardens. The analyses show clear and compelling social and ecological advantages for small, management-intensive dairy farms.

Table 2. Complete Cost Accounting: Large Confinement Dairy vs. Small Organic Dairy

Type of Farm	Econ Cost/Benefits	Social Cost/Benefits	Ethical Costs/Benefits
Large Confinement Dairy - 1000 cows	B- $450,000 return to management B- $5/cwt. lower cost of production C- lower net return per cow: management unpaid labor C- 50% debt/assets C- diet-environment healthcare costs	C- employs 1-mgr & 15 workers/milkers C- fewer farm families: lose schools, churches C- odors and pollution cause social conflict in rural communities	C- violates right to clean, healthy local environment C- major contributor to water pollution & global climate change C- inhumane treatment of animals C- violates culture of stewardship essential for sustainability
Small Organic Dairy – 50 cows	C - $50,000 return to management C- $5/cwt. higher cost of production B- higher net return per cow: management & family labor B- 30% debt/assets B- healthy organic milk – environment	B- Employs 1 farmer & 1 milker per farm B- 30 farmers + 30 total employed = 60 / 1500 cows* B- more farm families; schools etc. B- small organic farms make good neighbors	B- respects rights to clean environment B- mitigates water pollution – global climate change B- humane treatment of animals B- builds culture of stewardship/sustainability

Note: Estimates are based on, but not taken directly from, various statistical summaries and analyses provided by Thomas S. Kriegl, University of Wisconsin Center for Dairy Profitability, University of Wisconsin-Extension Madison, WI. See http://cdp.wisc.edu for more information.

* Wisconsin records indicate that small organic dairy farms only produce about 2/3rds as much milk per cow as large, confinement operations. Thus, more even more cows and more jobs would be created on organic farms.

While the comparisons in these examples might at first seem a bit arbitrary, they are confirmed in principal by more than 50 years of socio-economic research comparing the economic, social, ecological impacts of large industrial farms and small traditional family farms on rural economies and communities. A 2008 Commission sponsored by the Pew Charitable Trust report concluded: "Economically speaking, studies over the past 50 years demonstrate that the encroachments of industrialized agriculture operations upon rural communities result in lower relative incomes for certain segments of the community and greater income inequality and poverty, a less active Main Street,' decreased retail trade, and fewer stores in the community."[11]

A 2006 study commissioned by the State of North Dakota Attorney General's Office reviewed 56 socioeconomic studies documenting the economic impacts of industrial agriculture in general on rural communities. The studies consistently "found detrimental effects of industrialized farming on many indicators of community quality of life, particularly those involving the social fabric of communities."[12] A presentation paper by Ikerd, "The Failure of Industrial Agriculture; Rethinking the Future of Food"[13], provides additional documentation of the *true* economic, social, and ecological costs of large-scale industrial agriculture.

The triple ecological, social, and economic "bottom line" of this discussion is that to meet the challenge of sustainability, we must "solve for pattern." The current industrial paradigm was selected by policy makers to ensure domestic food security by increasing the economic efficiency of agriculture. The quest for profits – economic rewards – is an aspect of the pattern that will remain the driving force of industrial agriculture. New technologies developed to reduce negative economic impacts do nothing to address the non-economic social or ecological impacts of industrial agriculture. Neither will there be adequate economic incentives to conserve and regenerate the natural and human resources essential to meet the food needs of future generations. Economic value – internal and external – will always be narrow-minded and short-sighted. Trying to force sustainability on large, industrial farms is like trying to force an elephant to do the work of a cockroach. We ultimately must solve for pattern. We simply cannot allow internalizing economic externalities, while necessary, to distract us from this reality.

A new public consensus for fundamental changes in farm policies, including public research and education, must support a new pattern or paradigm for farming and food production. First, government subsidies of industrial agriculture must be eliminated, including risk management programs such as commodity price supports and subsidized crop insurance. Policies can then be redirected to encourage and support management-intensive, human-intensive approaches to farming that are in harmony with the living ecological and social systems within which farms must function. There is no reason to believe government policies would be less effective in nurturing a sustainable agriculture than they have been in creating an industrial agriculture. All that is lacking is the public consensus and commitment. Complete cost accounting could help create that consensus – by giving the social and ethical dimensions of quality of life priority over our economic self-interests. Size matters. In meeting the challenges of sustainable living, eating, and farming, America's farms must become "appropriately small."

End Notes:

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