Considering the Rationales for Factory Farming

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Introduction

Proponents of factory farming claim factory farms and Concentrated Animal Feeding Operations (CAFOs) they often employ provide economic, social, and other benefits that do not accrue to conventional farms. These claims carry with them unstated assumptions. If the assumptions are not satisfied, these claims are likely to be incorrect.

For example, Adam Smith observed markets in 18th century England and developed a theory that competition in a free market results in the lowest price for the consumer. His theory was based on several critical assumptions, one of which was an absence of secrecy so both consumers and producers would have sufficient information to allow competition.[1] Information was easy to get in English markets by walking from one seller to another and comparing similar goods. However, if this assumption is violated—if one seller of apples covered his goods with a cloth so they could not be seen—there was no basis for fair competition and no guarantee prices in the apple market would be as low as possible. Under these conditions, Adam Smith's theory no longer guaranteed the lowest price.

Assumptions About CAFOs

A review of the unstated assumptions of CAFO operation shows many are routinely violated by CAFO operators to increase profits. For example, the CAFO industry claims many benefits accrue from the use of liquid animal manure as a crop nutrient. This claim rests on the assumption that liquid manure is applied to the land at agronomic rates—rates that adequately nourish the crops without providing more fertilizer than crops can use. However, a 2003 study by the USDA found many CAFO owners knowingly over-applied liquid manure to lands closest to their operations to reduce the transportation costs of moving heavy tanks of

liquid to distant fields.[2] By over applying manure close to the CAFO and reducing hauling distances the CAFO owners increased their profits, but over-application violates the fundamental assumption underlying nutrient management and in this instance it invalidates claims that applying liquid manure to crop land is a beneficial practice.

Among the many assumptions violated by the CAFO industry is the most basic assumption of all—that CAFOs and factory farms are agricultural enterprises. If this assumption is invalid, CAFOs should be regarded as industrial enterprises and should be subject to industrial regulation of their pollution.[3] Because regulation as an industry would force CAFOs to spend money to clean up their operations and reduce their pollution, substantial resources are expended by the agriculture industry to keep consumers, regulators, legislators and the residents of rural regions from questioning this fundamental assumption—even though it is demonstrably invalid. In terms of scale of operations, levels of emitted pollution, and production characteristics, CAFOs are clearly industrial entities.[4] The fact that the CAFO industry uses animals does not make it an agricultural enterprise any more than the fact that Ford uses iron in its automobiles makes it a mining enterprise.

Stacked on this invalid fundamental assumption is a large collection of additional assumptions—each of which is critical to some benefit claimed by factory farms. Some of these assumptions are required to support the theories and methodologies behind CAFOs and some simply arise from a desire to perpetuate the way we have been taught to view agriculture or the way it operates.

The CAFO industry realizes these assumptions are critical to maintaining an agricultural image.[5] Money and effort are continuously expended to create a picture of industrial agricultural production that agrees with the consumer's preconceived assumptions about agriculture. For example, advertisements show hogs in meadows instead of concrete-floored sheds, dairy cows are pictured in grass instead of mud and feces, and chickens always appear to be outside in barnyards instead of crammed into huge poultry barns or battery cages. The industry's unstated fear is obvious—if consumers realize what is really going on, purchases of the product will fall.

It is in this light that the assumptions underlying the claims of factory farming are considered.

The Claims and Critical Assumptions of Factory Farming

Claims about Efficiency and Price

1. Claim: CAFOs enjoy economies of scale that allow efficiencies from standardization, specialization and concentration of productive resources.[6]

Necessary Assumption: The average cost of producing a pound of meat continues to drop as CAFOs become larger.
Reality: CAFOs only confine animals in less space, they do nothing to reduce the amount of land needed to raise feed for the animals and they do nothing to reduce the amount of land ultimately needed to recycle the animal waste.[7] Costs stop declining as CAFOs get larger because the cost of waste disposal for a CAFO increases sharply after one surpasses the ability of the land to absorb the waste.[8]
Result: CAFOs try to avoid paying their increasing costs by shifting them to the surrounding region.[9] While the CAFO may be successful in doing this, the confined operation is still less efficient in an economic sense.

2. Claim: Economies of scale gained from size and mechanization enable CAFOs to produce cheap food.
   Necessary Assumption: The price of food produced in CAFOs reflects all the costs involved in their production.
   Reality: Many costs of CAFOs are shifted to their neighbors and their host region through air and water pollution.[10] These costs are not paid by the CAFO, thereby increasing its profit.
   Result: The price of food does not reflect its true cost and more food tends to be purchased, consumed and wasted because it is valued too cheaply. This results in a misallocation of national resources and leaves the bill for pollution cleanup with taxpayers in the state or region where the CAFO is located.

3. Claim: Cheap food saves consumers money.
   Necessary Assumption: The sticker price of food is the only cost paid by consumers.
   Reality: Many costs of CAFOs are shifted to others through air and water pollution which cause increased medical costs and increased tax costs for control and remediation.[11] These costs are not paid by the CAFO and are not included in the price of CAFO produced food.
   Result: The price of food does not reflect its true cost to the consumer.[12] When additional costs of pollution are added, the real costs of food rise. Individuals who consume the food may not pay these costs, but the costs are paid by society as a whole.

4. Claim: With free trade, surplus agricultural production from CAFOs in the US and Canada can simply be exported to other countries. This allows the price farmers receive for agricultural goods to remain high.

Necessary Assumptions: (1) David Ricardo, the economist who developed the theory of free trade assumed the factors of production (land, labor, capital) would not be exported to other countries.[13] (2) The US and Canada produce agricultural products more efficiently relative to other goods (such as manufactured goods) than their competitors.[14] (3) The US and Canada operate under the same environmental and business regulations as their competitors in the export markets.[15]

Reality: Factors of production are regularly exported to areas of cheap labor, cheap feed, and poor regulation.[16] US and Canadian production are only more efficient relative to other kinds of production if the costs of the pollution they generate are not considered. Neither the US nor Canada has a comparative advantage in labor-intensive activities and this forces both countries to resort to an industrial model of agricultural production to remain competitive in the global export market. However, because pollution regulation is often poor in export competitor nations, this industrial model is only competitive if environmental regulation is lax. As a result, producers who continue to operate in the US and Canada choose to locate their operations in regions with the poorest environmental regulation.[17]

Result: Agriculture has only two ways to compete: (1) adopt a complete industrial model without industrial pollution regulation and then shift the costs of their operations to others or (2) rely on massive government subsidies to feed producers and CAFO operators. Most US and Canadian operators benefit from both methods of operation. Subsidies lower the cost of food consumed in importing countries (at the expense of US and Canadian taxpayers) and pollution cost shifting lowers the cost of food consumed in importing countries at the expense of rural residents and regions where CAFOs are located. To sustain this system, there is considerable pressure in both countries to relax environmental regulations and increase subsidy payments.[18]

Claims About The CAFO's Place in Agriculture

5. Claim: Agriculture is the traditional method by which rural economies have run and factory farms are a logical continuation of this tradition and lifestyle.

   Necessary Assumption: Factory farms employ the same practices as traditional agriculture and if they create problems, those problems are of the same type and scale as those created by tradition agriculture.

   Reality: CAFOs are industries not agriculture.[19] They create industrial-sized pollution and waste problems. They masquerade as agriculture because pollution monitoring and pollution regulation are weaker in the agricultural sector.

Result: The regulatory structure, enforcement capabilities, and governing infrastructure of rural areas operate under the assumption they are dealing with agricultural problems.[20] They are incapable of adequately dealing with large factory farms. As a result, CAFOs are largely allowed to shift the pollution costs of their operations to the rural region in which they reside.

6. Claim: Modern concentrated feeding operations are normal, free market responses to the demand for food and they embody all the best attributes of capitalism by providing the most efficient form of production.
   Necessary Assumption: This method of agricultural production increases competition and lowers prices in a free market for agricultural goods.[21]
   Reality: Most factory farm production is controlled by a small number of vertically integrated or vertically coordinated companies. In the US these companies routinely violate the Stockyards and Packers Act and they buy from and sell to themselves.[22] They set prices at whatever level drives competitors out of the market and then recoup their costs in the final sale of the product to the consumer. Competition is limited or, through contracts with retailers, totally eliminated.[23] Factory farms are organized to capture subsidies and their success is often less related to capitalistic ideals than it is to government payments.[24] As a result, prices to consumers do not reflect the true cost of production because many costs are shifted to taxpayers and to the local community.
   Result: Most conventional producers are driven out of the market and consumers are faced with limited sources of supply most of which uses methods of production that rely heavily on antibiotics, unnatural feed supplements, and unsafe processing. Vertically integrated firms make large profits from consumer sales while prices for agricultural products remain at historically low levels.[25]

7. Claim: Only industrialized agriculture in the US and Canada can supply the ever-growing world demand for meat and animal products.
   Necessary Assumption(s): (a) World demand for meat protein will expand as rapidly as industrialized agriculture has expanded. (b) World demand for protein can best be satisfied by meat production by industrial agriculture in the US and Canada.
   Reality: Industrial production of meat protein has regularly exceeded world demand. Protein demand can be more efficiently met by non-meat products such as soy.[26] Many areas of the world (such as Mexico and Argentina) are better able to compete in the production of meat protein than the US and Canada.[27]

Result: The US is currently producing about the same number of hogs as it did in 1920—with far fewer farmers.[28] The price of pork has been flat and Canadian pork producers have not made a profit since 1998. Global import substitution is increasing as previous importers produce their own meat protein. US and Canadian meat markets are hostage to health-related bans on their products by trading partners. The pressure for US and Canadian producers to cut costs by polluting is increasing as they compete with other countries who have few, if any, environmental regulations.

8. Claim: CAFO owners are responsible for their own success and failure just like any other entrepreneur in free market capitalism.
   Necessary Assumptions: Those individuals who actually own or operate CAFO operations can be correctly identified and held legally accountable for the actions of the CAFO and the costs it may levy on the region where it is located.
   Reality: Contracting and vertical integration insulates corporations —and often, individuals—from responsibility.[29] Corporations are difficult to sue and ownership of the CAFO and the animals is difficult to trace.[30]
   Result: Corporations and individuals responsible for CAFO contract operations are often able to walk away after an enterprise collapses--and leave behind the costs of cleanup and remediation. These costs are then levied on the taxpayers of the region.[31]

9. Claim: In modern agriculture, a corporate entity is necessary if one is to accumulate the capital and resources to engage in modern agricultural production methods.
   Necessary Assumption: The corporation uses capital raised in national markets to create agricultural production facilities and then accepts fiduciary responsibility for the success or failure of those facilities.
   Reality: Agricultural corporations attempt to shift the risk of financing their operations to residents in the rural communities where they locate. Contract operators, who are required to finance their own facilities, are then used as a "safety valve" whose production can be quickly curtailed in times of falling prices.[32] Corporations can remove their animals and walk away from failing facilities with minimal financial exposure.[33]
   Result: Contract CAFO operations can be terminated at any time by the integrator for failing to be "competitive." If the CAFO contract is lost, fixed costs (such as loans) for the facility still must be paid. This threatens the existence of contract operators and may result in the loss of their farms. Investment capital is drained from rural communities where it could have been

used to promote solid economic development. When this capital is lost, it may result in the stagnation or destruction of the rural community.

10. Claim: Building CAFOS or engaging in CAFO contract operations are the best ways to keep farmers in agriculture during hard economic times.
    Necessary Assumption: Operating a CAFO will provide increased income without generating short or long run costs that threaten the viability of the farm.
    Reality: Switching to a CAFO requires a conventional farm to become a high fixed cost operation. Large investments in new facilities must be made. These investments are usually financed with loans secured by the facilities themselves and given (and renewed) only when binding contracts for the product have been secured. To keep these loans from being called, the CAFO operator cannot break away from his contract with the integrator.[34]
    Result: Since the 1930's research has consistently shown that the presence of these kinds of corporate agricultural operations reduces the economic growth and health of rural regions.[35]

Claims about CAFO Permitting and Regulation

11. Claim: Commissioners elected through representative democratic elections will act to insure that the property values and environment of the region are protected through a careful and critical review of conditional use permit applications by CAFOs.
    Necessary Assumption(s): (a) Permitting officials operate in the best interests of the public as a whole. (b) Their review of applications and regulations is both knowledgeable and unbiased.
    Reality: While there are exceptions, conflict of interest has been rampant during CAFO permitting decisions everywhere from Saskatchewan to Texas and from Pennsylvania to Washington.[36] Even Economic Development Corporations have been employed to front for CAFOs and to subsidize their operations if they locate around the community.[37] CAFO permit hearings are often held on short notice and many commissioners are incapable of evaluating proposed CAFO projects. To address these problems, many counties and municipalities have abandoned representative democracy for the direct democracy of petitions and recalls.
    Result: Short term solutions and questionable projects are often approved. Some members of the community are enriched at the expense of others unless the citizens of the region actively force the permitting process to operate in an unbiased manner. In the process, rural communities are torn apart and warring factions are created.

12. Claim: Rural regions and communities may rely on public regulatory agencies (like the Department of Environmental Quality) to protect public health and well-being from the excesses associated with CAFO operations.
    Necessary Assumption: Public agencies are free to act in the public interest and they operate without bias or outside influence.
    Reality: Control of permitting is removed from local level and placed at the state or provincial level where corporate agricultural interests can more easily influence the outcome of permit applications.[38] Pressure from agricultural interests results in the weakening of regulatory agencies and often, the removal of regulatory personnel who attempt to regulate agricultural activities.[39]
    Result: The public interest is sacrificed to the interests of powerful agricultural groups who reduce their costs (and increase their profits) by controlling the enforcement of regulations.

13. Claim: Regulations can be written and incorporated in the permitting process to protect the rural population from the harmful practices of CAFOs.
    Necessary Assumption: The regulations are enforced.
    Reality: Insufficient enforcement personnel, limited enforcement budgets, and a generally insufficient will to enforce agricultural regulations combine to create an environment where little or no enforcement occurs. As a result, industrial agriculture is generally left to police its own activities.[40]
    Result: Polluting activities by factory farms go unchallenged and, when they are monitored, are stopped only after major spills or incidents occur. Enforcement personnel who are too zealous are reassigned. Rural residents and neighbors of factory farms grow discouraged and stop reporting problems and incidents.

Claims about Economic Development

14. Claim: CAFOs contribute to economic development in the region in which they are located.
    Necessary Assumption: The money spent by CAFOs is spent within the region where the CAFO is located for products produced in the region.
    Reality: The larger the agricultural operation, the smaller the percentage of its money that it spends locally. Since many CAFOs are vertically integrated they buy from their own organization, not from local suppliers.[41]
    Result: CAFO buildings are normally built from materials brought into the region from the outside by a crew brought into the region from the outside. Feed is imported from the cheapest source and most major purchases come from the outside. The money made by the CAFO is sent back outside the region and waste generated by the CAFO is deposited in the region. The result is negligible economic stimulus for the region.

15. Claim: CAFOs increase the price paid for local feed grain and hay.
    Necessary Assumption: The CAFO will pay local producers more than the market rate for feed grain and hay.
    Reality: CAFOs are not charitable institutions. They will pay no more than the market rate for grain and local producers will receive the market rate unless the CAFO buys every bushel of grain produced in the region. More hay may be sold locally based solely on transportation advantages.[42]
    Result: The price of grain will remain unchanged although local producers may be able to recoup some of the transportation cost advantage. The CAFO will shop for grain in the national and international market and will only buy local grain when the price it pays is less than it would pay elsewhere.

16. Claim: The construction of CAFOs is the best way to create jobs in a rural agricultural region.
    Necessary Assumption(s): (a) CAFOs create more jobs in a region than they destroy. (b) CAFOs create substantial direct employment at the CAFO site. (c) CAFO workers spend their money locally and by so doing, create indirect jobs in the region.
    Reality: CAFOs are designed to use as little labor as possible. Further, that labor is exposed to hazardous conditions inside the barns. Thus, few jobs are created and these jobs are not desirable. CAFOs do not spend the same amounts of money locally as conventional farms so few additional jobs are created in the local economy.[43]
    Result: The CAFO creates fewer jobs than the activity it replaces. The presence of the CAFO reduces opportunities for jobs in other sectors. The overall employment impact on rural communities is often negative.

17. Claim: CAFOs provide the sole alternative for economic development for many depressed rural regions.
    Necessary Assumptions: CAFOs provide sound economic development and there really are no other alternatives for the region.
    Reality: CAFOs are specifically designed to limit the number of workers hired, the amount of local purchases, and the amount of local taxes they pay. Each of these factors severely limits their local economic impact. CAFOs also add both air and water pollution to a region and this reduces the opportunity for development of other economic sectors (such as tourism.)[44]

Result: Rural communities with large hog CAFOs have less economic growth than ones without large CAFOs and regions without corporate farming do better both socially and economically than ones with corporate farms. The stress of impending CAFO location in a community usually tears the community in two and may cause irreparable harm to the social infrastructure.[45]

18. Claim: CAFOs increase the tax base in regions where they develop.
Necessary Assumption(s): When a CAFO enters a region the amount of taxes paid in that region will increase. The CAFO will not cause greater costs to the region than it will generate in increased property taxes.
Reality: CAFOs attempt to pay as few taxes as possible. They file as either agriculture or industry, depending on which designation allows them to pay less at any given time. They drive down the value of surrounding residences and cause commensurate decreases in taxes revenues from those properties. They drive up the cost of infrastructure maintenance and repair in the region.[46]
Result: In most cases, regions with CAFOs lose property tax revenues while incurring larger charges for road and infrastructure maintenance and repair.[47] As a result, existing residents of the region face higher property taxes to retain the same level of services and potential in-migration to the region may be depressed by this higher level of taxation.

Claims about Property Use

19. Claim: All property owners—including CAFO owners—have the right to use their property for whatever use they believe is appropriate.
Necessary Assumption: Activities that occur on any given piece of private property do not negatively impact or change the value or use of neighboring properties owned by others.
Reality: CAFOs generate odor, air and water pollution, all of which have a direct impact on neighboring properties. The closer the neighboring property, the more severe the impact is likely to be.[48]
Result: The resulting loss of exclusive use by neighboring properties lowers their values and ultimately also lowers the taxes generated from these properties. Suing the offending party for these nuisance activities could potentially compensate the neighboring property owners. To prevent this, factory farming interests have attempted to sponsor legislation to prohibit nuisance suits for agricultural pollution.

Conclusion

There are valid reasons for Americans to award special status to agricultural activities. Agricultural property preserves substantial amounts of open space and

agriculture itself creates a supply of safe food that has met the needs of this country for hundreds of years. However, these are benefits of conventional, family farms. No one benefits from pretending that industrial CAFO sites operate like conventional farms except those few individuals who profit by shifting their costs to others.

However, perception can become reality. This has clearly been the hope of the factory farm industry. If historical perceptions about agriculture can be manipulated and reinforced CAFOs can continue to run industrial operations in agricultural settings—without complying with the rules governing industrial pollution.

The pressure to maintain this charade is mostly economic. Competition to produce cheap protein for world markets mandates that costs be cut as much as possible. When animals are involved, the ability to cut costs is significantly limited to shortcuts taken in the handling and disposal of waste. The costs of the resulting pollution are shifted to the region in which the CAFO is located. The owners of the CAFO pocket the profits.

Residents of most rural regions inherently realize that CAFOs will not operate responsibly even if they have not considered the critical assumptions that underlie responsible CAFO operations. For this reason, virtually no rural area would vote to admit CAFOs if the question was put on a ballot. Instead, CAFOs rely on loopholes in the permitting process, stealth hearing tactics, and the constant denial of the obvious to force themselves into rural areas—anti-democratic tactics that are coupled with vertically integrated, monopolistic operations that are inherently anti-free market and anti-competitive.

The bottom line is clear: permitting agencies and residents of rural regions ignore the assumptions that underlie CAFO operations at their peril. To protect the residents of the region, these assumptions provide the specific areas where CAFO performance should be guaranteed through bonding requirements and carefully monitored by regulatory agencies.

ENDNOTES

Introduction--Endnotes

[1] Adam Smith , An Inquiry Into The Nature And Causes Of The Wealth Of Nations, Chapter VII, 1776.

Assumptions About CAFOs--Endnotes

[2] Marc Ribaudo, Noel Gollehon, Marcel Aillery, Jonathan Kaplan, Robert Johansson, Jean Agapoff, Lee Christensen, Vince Breneman, and Mark Peters, Manure Management for Water

Quality: Costs to Animal Feeding Operations of Applying Manure Nutrients to Land.**,** Agricultural Economic Report 824, U.S. Department of Agriculture, Economic Research Service, Resource Economics Division, Washington, DC., June, 2003.

[3] Initially, operators of factory farms identified themselves as industries. For example, in the 1980's a major promotional group for factory farms called itself The Animal Industry Foundation. Later, when the implications of this name became clearer, this title was replaced with The Animal Agriculture Alliance and all web sites listing the original name were wiped from existence. For an industry explanation of this change, see http://www.poultryegg.org/IndustryPartners.

[4] Conventional agriculture is typified by high variable cost, low fixed cost operations—low investment in facilities and equipment, high investment in time and labor.) Conventional industries and factory farms are typified by high fixed cost and low variable cost operations—low investment in labor and high investment in buildings and equipment.

Aside from these operational distinctions, the amount of waste generated by factory farms clearly places them as industries. For example, an 8000 head dairy would send nearly twice as much ammonia into the air--350 tons per year--as a modern power plant and approximately the same amount given off by a large sugar beet plant. Industries are required to report emissions to a federal toxic release inventory if they produce more than 100 pounds of pollutants daily. Further, the sugar beet plant, with identical ammonia emissions, was forced to spend $12 million over five years to clean up its pollution. By these standards, dairies with 450 or more cows should be required to report emissions and should pay to clean up their pollution. See
Jennifer Sandmann, Dairy becomes first to report air emissions ... Environmental group says others should do likewise; industry says it's not required, Twin Falls, Idaho, January 21, 2004.
And
Michael McAuliffe, "Big dairy stirs dust-up over air quality Environment: DEQ says proposal would produce more ammonia than power plant proposed in Middleton", Idaho Press Tribune, February 21, 2003.
And
Joe Kohlman, "Amalgamated Sugar lobbies for emissions testing bill", The Idaho statesman, February 25, 2004.

[5] In 1990, the Animal Industry Foundation took a survey of consumers that showed both consumer recognition of, and resistance to, factory farming methods and products. See Endnote 3 and http://www.tufts.edu/vet/cfa/Surveys/farm.html

Claim 1 Endnotes

[6] The Efficient Size of CAFO Operations

If all the economic costs of CAFO operation are considered, two economic concepts--diseconomies of scale and diminishing marginal returns--both mandate that the efficient size of most animal feeding operations should be relatively small.

The first concept--diseconomy of scale—usually comes into play when problems associated with some element of a production process increase much faster than the size of the process itself increases. With hogs or chickens, such a situation occurs with attempts to control disease and the stress factors that occur during confinement, movement and transportation. The possibility of disease among hogs is so great that a heavy use of antibiotics, limitations with respect to shed populations, the requirement to maintain a sterile site, and time limits on how long hog operations can stay in one spot all act to create diseconomies of scale.

The second, more powerful economic concept called diminishing returns also ought to act to limit the size of efficient CAFO operations. Under this concept, when units of a variable resource (such as hogs) are added to a fixed resource (such as land) one reaches a point where the marginal product (the revenue gained from the last hog added to the operation less the cost of the last hog added to the operation) of the variable resource begins to decline. Because of the costs of handling animal waste responsibly, the point at which this decline occurs is closely related to the ability of the land on which the CAFO is located, and the land over which the CAFO will apply its waste effluent, to absorb and recycle the manure.

If diminishing returns to a CAFO did not exist, all the animals in the world could be raised on a single, small plot of land and this is clearly the philosophy of some in the hog industry who recognize no limits to Factory Farm growth. For example, Freese has stated that while "[c]ompletely comparable costs are not publicly available to distinguish between a declining or flat average cost curve in the long run, but what is clear is that diseconomies of size are not limiting the growth of firms with 95,000 sows." (Freese, 2000) Such a statement, which completely disregards the problems (and costs) associated with waste and confinement, is complete nonsense.

To overcome these costs, CAFOs have been designed to take full economic advantage of the tax and subsidy policies that create the economic environment in which CAFOs operate. This allows the CAFO to subsidize its operation, inflate the amount of profit available from CAFO operations, and generate short term gains for developers and investors.. Artificially inflated profits also draw more investment into CAFO operations, contribute to the proliferation of CAFOs, and provide an economic incentive for an organizational model that gives rise to the four common attributes of every CAFO:

(1) The use of capital intensive production methods. CAFOs use less labor and more machinery to achieve production output.

(2) Employment of a production methodology that maximizes the tax benefits of the corporation.

(3) The use of vertically integrated operations where separate divisions of the same company produce the different stages of a product and market their output to one another.

(4) The use of cost shifting to reduce the costs of production. Cost shifting occurs when the responsibility for costs of health problems, traffic, social problems and pollution (odors, chemical and particulate air pollution; chemical, pathogen, and particulate water pollution) is transferred to the residents of a region. The costs are neither paid by the company responsible for them nor included in the price of the products they market.

In sum, arguments about the efficiency of CAFO operations assume the purpose of the organization and the output of its operations, are both known and clearly specified; i.e., the purpose of a CAFO is assumed to be pork or chicken production within certain product specifications. Further, these arguments also assume that the CAFO and the more conventional

operation to which the CAFO is compared both have the same fundamental production objectives. However, as the above-listed attributes demonstrate, it is not clear that pork or chicken production is the primary objective of a typical CAFO. Indeed, because a typical CAFO is designed to

1. maximize tax benefits in both industrial and agricultural categories, and
2. maximize subsidies for both industrial and agricultural operations, and
3. shift as many costs as possible to the local region while
4. producing an agricultural commodity (raising animals),

it is not clear what weight if any, one should give to efficient sizes for pork or chicken production when discussing a CAFO operation.

Freese, B., "Pork Powerhouses," Successful Farming, October, 1995, pp. 20-22.

[7] David Ricardo, An Essay on the Influence of a Low Price of Corn on the Profits of Stock showing the inexpediency of Restrictions on Importation; with remarks on Mr Malthus' two last Publications", 1815.

[8] The primary goal of all waste treatment is to eliminate human pathogens. A secondary goal is to reduce the biochemical oxygen demand (BOD--the carbon and nutrient substrate for microbial decomposition) so that the waters that receive waste runoff do not become anaerobic. Finally, some heavy metals must be removed before the waste is discharged. In a sewage treatment plant for human waste, aerobic decomposition kills human pathogens and reduces the BOD while the settling process removes heavy metals to sludge (which then must be safely disposed of).

One reason the concept of diminishing returns should be a powerful deterrent to large CAFOs is that the cost of responsibly handling and treating animal waste is so high. Anaerobic decomposition in animal waste lagoons is less effective at eliminating human pathogens and BOD, and it leaves heavy metals in the lagoon. As opposed to assumptions about its "natural and thus, harmless, nature," livestock manure creates pollution with a strength that far exceeds raw municipal sewage. As the following table shows, the BOD concentration in undiluted livestock waste is 160 times more powerful than raw municipal sewage and ammonia is 200 times more concentrated. Even after it has been flushed to lagoons, manure effluent is still 57 times more powerful than raw sewage.

See: Understanding the Pollution Potential of Livestock Waste, Illinois Environmental Protection Agency, 1991.

Pollution Strength of Livestock and Municipal Waste

Type of Waste	BOD5 mg/l	Ammonia, NH_4N mg/l
Undiluted Livestock Waste	40,000	10,000
Manure Lagoon Effluent	14,400	-
Runoff From a Concrete Lot	1,000	-
Runoff From a Dirt Lot	500	-
Raw Municipal Sewage	250	50

Treated Municipal Sewage	30	1.5

[9] Marc Ribaudo, Noel Gollehon, Marcel Aillery, Jonathan Kaplan, Robert Johansson, Jean Agapoff, Lee Christensen, Vince Breneman, and Mark Peters, Manure Management for Water Quality: Costs to Animal Feeding Operations of Applying Manure Nutrients to Land.**,** Agricultural Economic Report 824, U.S. Department of Agriculture, Economic Research Service, Resource Economics Division, Washington, DC., June, 2003.

Claim 2 Endnotes

[10] Marc Ribaudo, Noel Gollehon, Marcel Aillery, Jonathan Kaplan, Robert Johansson, Jean Agapoff, Lee Christensen, Vince Breneman, and Mark Peters, Manure Management for Water Quality: Costs to Animal Feeding Operations of Applying Manure Nutrients to Land.**,** Agricultural Economic Report 824, U.S. Department of Agriculture, Economic Research Service, Resource Economics Division, Washington, DC., June, 2003.
And
Air Emissions from Animal Feeding Operations: Current Knowledge, Future Needs, Ad Hoc Committee on Air Emissions from Animal Feeding Operations Committee on Animal Nutrition, Board on Agriculture and Natural Resources, Board on Environmental Studies and Toxicology, Division on Earth and Life Studies, National Research Council Of The National Academies, The National Academies Press 500 Fifth Street, N.W. Washington, Dc 20001, http://www.nap.edu , Copyright 2003 by the National Academy of Sciences, February, 2003.

Claim 3 Endnotes

[11] Ibid.

[12] Among other things, the drive to lower food costs over the last 20 years has led to the feeding of poultry litter, blood, and animal parts to beef cattle—a practice undertaken with little knowledge of consumers. See:
Emily Green, Times Staff Writer, The high price of cheap food, Los Angeles Times, Copyright 2004 The Times Mirror Company, January 21, 2004, Home Edition.
And
Garry Mitchell, “Ban on poultry litter in feed could drive up cattle costs”, The Associated Press State & Local Wire, Mobile, Alabama, February 2, 2004.
And
Denise Grady and Donald G. McNeil, Jr., "Rules Issued on Animal Feed And Use of Disabled Cattle", The New York Times, Section A; Page 12, January 27, 2004.

Claim 4 Endnotes

[13] Ricardo's argument was that there are gains from trade if each nation specializes completely in the production of the good in which it has a "comparative" cost advantage in producing, and then trades with the other nation for the other good. The labor theory of value is not assumed to hold

across countries, Ricardo argued, because factors of production, particularly labor, are not mobile across borders.
See: David Ricardo, On the Principles of Political Economy and Taxation , 1817.
And
Charles Schumer and Paul Craig Roberts, "Second Thoughts on Free Trade," The New York Times, Section A; Page 23, January 6, 2004.

[14] Given the labor prices in the two countries, it is unlikely either would have a comparative advantage in any area where heavy labor input is required. To compete with overseas agricultural producers, both countries have employed an industrial agricultural model that removes, as much as possible, labor from the production chain. For example, in 2002 Saskatchewan Pork producers actively opposed government efforts to make fair labor standards apply to hog farm labor. And "Smithfield is
moving production to Mexico where labor costs are dramatically lower than in the U.S…" See: Steve Marbery, "Hog Industry Insider", Feedstuffs Magazine, | Issue 10 | Volume 74, March 11, 2002.
And
Smithfield is moving production to Mexico, Davenport & Company LLC
Equity Research--Consumer Cyclicals, Company Update, February 16, 2001.

[15] It is common knowledge that environmental regulation is more stringent in the US and in Canada than it is in most agrarian countries. This regulation drives up the cost of production and makes agricultural products from the US and Canada less competitive. Producers in the US and Canada can try to avoid these costs on existing facilities by shifting as many pollution costs as possible to the local region. For new facilities, they can seek areas where enforcement of regulation is poor and pollution costs will not be incurred. The following USDA studies indicate they are likely to do both:

John Sullivan, Utpal Vasavada, and Mark Smith, "Environmental Regulation & Location of Hog Production", Agricultural Outlook, Economic Research Service, US Department of Agriculture, September 2000, johnp@ers.usda.gov, vasavada@ers.usda.gov, mesmith@ers.usda.gov.
And
Marc Ribaudo, Noel Gollehon, Marcel Aillery, Jonathan Kaplan, Robert Johansson, Jean Agapoff, Lee Christensen, Vince Breneman, and Mark Peters, Manure Management for Water Quality: Costs to Animal Feeding Operations of Applying Manure Nutrients to Land., Agricultural Economic Report 824, U.S. Department of Agriculture, Economic Research Service, Resource Economics Division, Washington, DC., June, 2003.

[16] For an example of Smithfield's attempts to reduce the pollution costs it would normally be expected to pay in Poland see:
BBC (and Bankwatch) - Smithfield's Invasion of Poland, 12 Jan 2004, http://www.bankwatch.org/issues/ebrd/animex/downloads/bbc_report.mp3.

For examples of movement overseas by "Smithfield [t0] be positioned as a competitive, low-cost pork provider" and Purelean, which found that "Mexico is a challenge but…[t]he market for hogs is significant, and the industry is looking for ways to expand and to better deal with environmental issues." see:
Rod Smith, "Acquisitions give Smithfield pronounced role in U.S., world," Feedstuffs, September 4, 2000.
And
Michael Howie, "Pure Lean expands," Hog Industry Insider, Feedstuffs, | Issue 24 | Volume 74, June 17, 2002.

For movement of Factory Farms to other locals to find less enforcement of environmental regulation see:
John Sullivan, Utpal Vasavada, and Mark Smith, "Environmental Regulation & Location of Hog Production", Agricultural Outlook, Economic Research Service, US Department of Agriculture, September 2000, johnp@ers.usda.gov, vasavada@ers.usda.gov, mesmith@ers.usda.gov.

[17] Ibid.

[18] See endnote 24, Claim 6.

Claim 5 Endnotes

[19] See endnote 4 above.

[20] The physical relationship between the CAFO and the region is essentially predetermined by the rules and policies that are already in place in the region--and this set of rules and policies is based on the pivotal assumptions that

1. All agricultural operations are similar to the conventional, closed systems that previously dominated agriculture.
2. Animal waste, as a natural product, while annoying, is essentially harmless, and not as toxic as human waste.
3. Most animal-raising operations can be treated as if the waste that will result is from ruminate animals.

As a result, when a CAFO enters a region it may encounter rules that have been structured to control a kind of agricultural production whose inputs and waste byproducts are not representative—either in quantity or chemical composition—of the Confined Animal Feeding Industry.

Claim 6 Endnotes

[21] This assumption is justified only if increasing levels of concentration do not encounter the law of diminishing returns and continue to bring lower costs. However, extensive research shows that both dairy and hog operation encounter significant diminishing returns at levels of concentration far smaller than the average size of today's CAFOs. If these costs were included in the price of

the CAFO product, it is unlikely any economic advantage would accrue to large CAFOs. For example:

Estimates Of Actual CAFO Efficiency And Profit Margins

A number of scientific studies have shown that when all costs are considered, hog CAFOs are no more efficient than a significant percentage of conventional producers.[1] Indeed, studies have shown that "during relatively low input costs-output prices the pasture system provided the highest return above all costs per sow" and "the pasture system provided the highest income above variable costs per sow for the feeder pig production phase for all swine prices and feed cost levels studied." Since pasture costs are often sunk costs--the cost has already been incurred and further use is almost costless, this assessment is logical. Further "...total confinement...had...the highest risk [and]...the pasture system provided more stable returns, thus a lesser amount of risk."[2] In spite of this, hog CAFOs have captured a large and increasing share of the hog market over the last thirty years.[3]

At issue here is not whether large CAFOs have been able to show a profit--they obviously have or they would not be able to attract the amount of capital investment they have accumulated over the last ten years. Rather, the issue is whether this profit is an accounting profit that results from a failure of the form to account for the full costs of operation or whether this is an economic profit that incorporates a full consideration of the costs of CAFO operation.

Profit margins of large and small hog producers

The accounting costs and rates of profit in the hog industry are well known. In a University of Missouri study for the period 1969 to 1993, hog producers had an average profit of $4.18/cwt ($1999), or over a $10 ($1999)profit for a marketable hog (260 lbs.) for 24 years. This equated to an average profit of nearly 10% for 1969-93. The best one-third of these producers had a profit level was about double the average--$8.25 or almost 20%.[4] In 1988, farm records showed a range of about $14 ($1999) in average costs per cwt. between the best one-third and poorest one-third of producers in Iowa, while the bulk of the rapidly expanding large operations were understood to be operating at costs that were about $4.25 to $7 ($1999) per cwt. below the bulk of more traditional producers.[5]

However, these figures do not accurately reflect the highly variable nature of the hog industry. Bruns et al., in a six-year study using the Swine Enterprise records, showed substantial variation in performance by individuals from year to year. Of forty producers, 73 percent were among the lowest one-third in total production cost per cwt. in at least one of the six years but only 25 percent were in the lowest one-third in total production cost for four years or more. Almost no one was in the low-cost one-third for all six years.[6]

In 1978, the average accounting cost of producing hogs in Missouri was about $100/cwt of live pork in 1999 dollars. By 1993, these accounting costs had fallen to around $51/cwt in 1999 dollars, or just slightly over 50% of the 1978 costs. Much of this reduction in cost was due to more pigs/litter and more litters/sow/year, less feed per pound of hog produced and more pounds of lean meat per live hog.[7] For example, farms with over 2,000 pigs in inventory averaged 8.8 pigs saved per litter while farms with fewer than 100 pigs saved 7.3 pigs per litter.[8] And the largest hog firms report feed conversion of 3.0 pounds of feed per pound of live hog as compared to more than 4.0 pounds of feed in other hog operations.[9]

Since well-managed, relatively small producers, acting either independently or in cooperation with neighbors, can also employ some of the all-in/all-out production by site, split-sex feeding, phase feeding, producing specialized female breeding animals, specialization of labor, marketing and buying inputs used in large-scale production, smaller producers should be able to compete with most of the large operations. And some economies of smaller, independent producers--home-produced feed, family labor and pride of ownership--should also contribute to lower costs.[10]

However, the small producer who usually has a stake in the region and is often a long-time member of the community and he generates less waste because his operation is small. In addition, the small producer usually has more land per animal on which to spread and recycle the waste and since the production of hogs is only one of his activities, his property is usually good agricultural land with the costs and taxes that go along with that designation. Thus, while he shifts few costs to the local region, the small producer also pays his full share of the costs of using his land.

The large producer usually has less land per animal and thus, a smaller land cost for the property on which the animals are raised. Further, he may choose bad agricultural land, further lowering the cost of the site, and he will try to minimize the taxes and other costs by qualifying for both agricultural and industrial subsidies. The large producer usually shifts the cost of the animal waste to the region through over-application of waste to too little land or through accumulation of waste in lagoons whose final disposition is highly problematic. All these factors give accounting cost advantages to the large producer.

By 1995, many of the rapidly growing swine production firms claimed long-run total costs of $42 to $44 ($1999) per cwt. of live hog while the North Central benchmark ranged from $47 to $52 ($1999) in recent years.[11] Hurt estimated that specialized 1,200-sow farms have total costs of production that are $6.89 to $14.93 ($1999) per cwt. (15 to 28 percent) lower than those of 150-sow farrow-to finish farms."[12] However, those cost advantages decrease sharply with even modest increases in the number of sows. Hurt estimated a unit with 3,400 sows had a cost advantage of only about $2.15 ($1999) per cwt. of live hogs compared to one of 650 sows.[13] And Duffy has shown that average costs do not fall significantly beyond about 150 sows. Citing Swine Enterprise records from 1992, 1993, and 1994, he shows the average production cost for the top one-third of the responding producers to be approximately $42 ($1999) per cwt. in all years and average size of the top one third operations to be approximately 120 sows."[14]

Much of the disagreement in cost figures arises from differences in accounting practices, inventory measurements, and the type of data used. Good et al., using a budgeting approach, found budgeted costs for the 3,500-sow unit were estimated to be $39.37 ($1999)per cwt., compared to $41.39 ($1999)per cwt. for a 650 sow operation and $44.04 ($1999)per cwt. for a 250-sow operation. The various figures for the cost of raising hogs show a great deal of consistency in the 1990's. As Table 1 shows, large, rapidly growing firms have only a small advantage over small, 250-650 hog operations. This implies that the 650-sow operation could be cost competitive with a 3,500-sow operation with some minor changes in operations. Small operations could have an accounting cost disadvantage of only $4.38-$5.48 ($1999)per cwt., or about $11 ($1999) per head produced.[15]

Table 1
Cost per hundred weight ($1999)

Study	Date	Cost per CWT
University of Missouri--Average	1978	$100
University of Missouri--Average	1993	$51
Duffy--Top 1/3 of Producers	1992-1994	$42
Zering--Rapidly Growing Firms	1995	$42-$44
Zering--North Central Area	1995	$47-$52
Good et al.--3,500 sow	1995	$39.37
Good et al.--650 sow	1995	$41.39
Good et al.--250 sow	1995	$44.04

In sum, the data on costs and profits from hog production show a remarkably consistent picture. Not only have the costs incurred by both small and large hog raising operations declined consistently over the last twenty years, they are still quite closely matched. Further, differences in cost between farm sizes appear to remain relatively constant over the recent period of hog farm expansion. Table 2 shows that profits per hog for the best 1/3 of the producers--irrespective of size--can be as high as $20, but average profits per hog are more likely to be around $10.00.

Table 2
Profit per hundred weight ($1999)

Study	Date	Profit per CWT
Univ. of Missouri--Average	1969 to 1993	$4.18
Univ. of Missouri--Best 1/3	1969 to 1993	$8.25

The cost advantage for large producers depends heavily on the size of the firms used in the comparison. Table 3 shows that in the worst case, where the conventional producer has only 150 sows, the advantage to the large producer may be between $17.00 and $37.00. In the more likely case, where 250 to 650 sows are employed, the advantage shrinks to $5.00 to $11.00 per hog.

Table 3
Cost Differences per hundred weight ($1999)

Study	Date	Cost Decline per CWT
Iowa State University Swine Task Force—Rapidly Expanding vs. Conventional Farms	1988	$4.25 to $7.00
Duffy--over 150 sows	1992-1994	$0
Hurt--3,400 sows vs. 650 sows	1994?	$2.15
Hurt--1,200 sows vs. 150 sows	1995	$6.89 to $14.93
Duffy--over 150 sows	1992-1994	$0
Good et al.--3,500 sows vs. 650 sows	1995	$2.02
Good et al.--3,500 sows vs.250 sows	1995	$4.67

These data on the magnitude of the cost advantages of large hog CAFOs are the central issue in the discussion of efficiency. If one accounts for the costs of responsible waste handling—waste handling that would reduce the impact on the region of large CAFOs to the same level as the historical impact of conventional hog operations—and then adds these costs to the accounting costs already recorded by large CAFOs they appear to be no more efficient than smaller, more conventional operations.

The costs of responsibly managing liquid hog waste

Cost comparisons and discussions of efficiency differences between various sizes of hog operations must be balanced by the costs of responsibly dealing with liquid hog waste. While there is no set standard for this comparison on can establish upper an lower bounds for the likely costs.

As a lower bound, hogs raised in situations where they are allowed to roam across enough land to absorb their waste have a cost of responsible waste handling that approaches zero and the impact on the price of pork would also be zero. At the upper bound, hogs raised in confinement with liquid manure systems generate a waste stream that is similar to any municipal waste stream with one difference—it is far more potent based on BOD. (See endnote 6) If this waste was treated the way municipal waste is treated, the costs would be:

Costs to dispose of hog manure at the national average sewage disposal cost ($1997) = $115,335 to $230,670 in waste disposal costs per 1000 hogs at 1 hog = 2-4humans.

This produced a middle range cost of $173,000 per 1000 hogs or $173 per hog.

In addition (and not calculated in this computation, each hog would produce 122-244 pounds of biosolids per year that would have to be disposed of, and this waste would be contaminated with both heavy metals and salts.

Thus, the price of each hog should be increased by $173 to cover the externalities associated with waste treatment alone. That would result in a per pound increase of about 66 cents per pound of live weight to cover waste costs.

Actual increases in pork prices could be much higher. If one assumes that only 50% of the live animal weight made it to the sales counter, the end result would be to raise the price of pork about $1.35 per pound to account for the waste-related externalities only.

Dairy herd size and efficiency:

There is no support in the agricultural economics literature for large increases in efficiency as the size of dairy herds grows beyond 200-300. And there is no support for any claims of efficiency for dairy sizes of the kind found in the new, large dairy CAFOs where thousands of animals swamp the land's ability to naturally process the waste. In fact, all of the research conducted thus far on efficiency has been done on herd sizes that are so small that the waste generated by the herd should be easily manageable on a dairy farm of normal size. For example:

In 1999 Richards and Jeffrey found that the average Alberta dairy is highly efficient compared to the best farmers in the industry. Neither investment in human capital or feed quality were important in determining dairy efficiency. The maximum efficient herd size was about 70 cows.[16]

In 1989, Kumbhakar, Biswas, and Bailey found that for dairies of up to 160 cows some economies of size may exist. Large farms (of about 160 cows) are technically more efficient. [17]

Tauer and Belbase working with data on farms of 20 to 275 cows, found that while more cows made a dairy more efficient, they could only explain less than 10 percent of what contributed to successful dairy operations.[18]

In 1996, Ahmad and Bravo-Ureta studied 96 Vermont dairy farms with between 20 and 220 cows. They showed a significant negative relationship between herd size and technical efficiency; i.e., as herd size increased, efficiency decreased.. This finding was consistent with prior work by Bravo-Ureta (1986) and Byrnes et al. (1987) but conflicted with the results of Kumbhakar et al. above.[19]

In 1989, Bailey et al., looked at Ecuadorian dairy farms of from 11 to 130 cows. They found that efficiency increased with farm size, but that capital was a more important factor in efficiency increases.[20]

In 1990, Weersink, Turvey, and Godah found that for dairy farms in Ontario with herd sizes of 15 to greater than 50, efficiency slightly increased with herd size but farms of any size could be efficient.[21]

In 1986, Bravo-Ureta found statistically significant evidence that there was no relationships between dairy farm size and technical efficiency.[22]

Bravo-Ureta and Rieger, in a 1990 study, found that for dairy farms in New York and New England there was a weak relationship between dairy farm size and efficiency.[23]

Tauer found in 1993 that farms with an average of 108 cows were subject to some increasing returns to scale although milking stanchions were not more efficient than stalls and multiple daily milking was also not more efficient.[24]

In sum, the literature shows that there may be some small increases in efficiency when dairy farms expand from twenty to 250. This is logical since herd sizes in this range are small enough that conventional dairies would already have enough land to recycle the dairy waste from the increased herd size. However, when dairy herds grow to the size of those at the large dairy CAFOs, diminishing returns occur as the costs of responsible waste management rises. For example, when 1996 Minnesota Farm Business Management records were summarized by high and low profit groups within 6 herd size classes, results suggest production cost per 100 pounds of milk to be similar for the high profit farms within all size categories except the very smallest herd size group. The margin of difference between the low and high profit herd within the size groups diminished as herd sizes increased and the cost structure appears to change with different size herds.[25]

Citations for the Above Efficiency Section

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[2.] Kliebenstein, James B. and Sleper, James R., "An Economic Evaluation of Total Confinement, Partial Confinement, and Pasture Swing Production Systems," Research Bulletin 1034, University of Missouri-Columbia College of Agriculture, February, 1980.

[3] The number of hog farms in the US dropped from about 900,000 in 1970 to 139,000 in 1997 while pork production remained relatively constant. Drabenstott, Mark, "This Little Piggy Went to Market: Will the New Pork Industry Call the Heartland Home?", Economic Review, Q3, Vol. 83, No. 3, Federal Reserve Bank of Kansas City, Third Quarter, 1998, p. 82.

[4] Grimes, Glen, and Plain, Ron, "The US Swine Industry - Where to from Here?," Proceedings of Swine Strategies '95, Summer, 1995.

[5] Iowa State University Swine Task Force, The Iowa Pork Industry, Competitive Situation and Prospects, Iowa State University SFTI, December, 1988, pp. 59-63 in Rhodes, V. James, "The Industrialization of Hog Production," in The Industrialization of Agriculture, Jeffrey S. Royer and Richard T. Rogers, eds., Ashgate Press, Brookfield, VT, 1998, p. 225.

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Iowa State University Swine Task Force, The Iowa Pork Industry: Competitive Situation and Prospects, Iowa State University STF1, December, 1988, pp. 59-63.

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[7] Grimes, Glen, and Plain, Ron, "The US Swine Industry - Where to from Here?," Proceedings of Swine Strategies '95, Summer, 1995.

[8] US Department of Agriculture, Hogs and Pigs, National Agricultural Statistical Service, Washington, DC, 1984-1996.

[9] Zering, Kelly, "The Changing US Pork Industry: An Overview," in The Industrialization of Agriculture, Jeffrey S. Royer and Richard T. Rogers, eds., Ashgate Press, Brookfield, VT, 1998, pp. 55, 56.

and

Hurt, C., "Summary and Conclusions," Positioning Your Pork Operations for the 21st Century, ID-210, Cooperative Extension Service, Purdue University, July, 1995.

and

U.S. Department of Agriculture, Hogs and Pigs, National Agricultural Statistics Service, Washington, D.C., various, 1984-1996.

[10] Grimes, Glen, and Plain, Ron, "The US Swine Industry - Where to from Here?," Proceedings of Swine Strategies '95, Summer, 1995.

[11] Zering, Kelly, "The Changing US Pork Industry: An Overview," in The Industrialization of Agriculture, Jeffrey S. Royer and Richard T. Rogers, eds., Ashgate Press, Brookfield, VT, 1998, pp. 55, 56.

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[12] Hurt, C., "Summary and Conclusions," Positioning Your Pork Operation for the 21st Century, ID-210, Cooperative Extension Service, Purdue University, July, 1995, p. 185.

[13] Vansickle, J., "The Midwest Can Compete," National Hog Farmer, March 15, 1995, pp. 28, 30.

[14] Duffy, M., "Profitability in Farming: Today and Tomorrow," Paper presented at 5th Annual Conference, Leopold Center for Sustainable Agriculture, Iowa State University, Ames, Iowa, March 3, 1995, in Ginder, Roger G., "Alternative Models for the Future of Pork Production," in The Industrialization of

Agriculture, Jeffrey S. Royer and Richard T. Rogers, eds., Ashgate Press, Brookfield, VT, 1998, p. 260.

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[20] Bailey, DeeVon, Biswas, Basudeb, Kumbhakar, Subal, and Schulthies, Kris, An analysis of technical, allocative, and scale inefficiency, Western Journal of Agricultural Economics, Vol. 14, No. 1, 1989, pp. 30-37.

[21] Weersink, Alfons, Turvey, Calum G., and Godah, Abdulahi, Decomposition Measures of Technical Efficiency for Ontario Dairy Farms, Canadian journal of Agricultural Economics, Vol 38, 1990, pp. 439-456.

[22] Bravo-Ureta, Boris, Technical Efficiency Measures for Dairy Farms, Canadian journal of Agricultural Economics, Vol. 34, 1986, pp. 399-415.

[23] Bravo-Ureta, Boris, and Rieger, L., Alternative Production Frontier Methodologies and Dairy Farm Efficiency, Journal of Agricultural Economics, Vol. 41, 1990, pp. 215-226.

[24] Tauer, Loren W., Short-Run and Long-Run Efficiencies of New York Dairy Farms, Agricultural and Resource Economics Review, Vol. 22, 1993, pp. 1-9.

[25] Jacobson, Larry D., et al., Generic Environmental Impact Statement on Animal Agriculture, University of Minnesota, College of Agriculture, Food, and Environmental Sciences, http://www.mnplan.state.mn.us/eqb/scoping.html, September, 1999, p. D/E-121.

[22] For example, see:
The Associated Press, Ala. Jury Awards $1.28B in Tyson Case, New York Times, February 17, 2004, http://www.nytimes.com.
and
Christopher Leonard, "Hog farmers can sue Tyson, court says--Justices clear way for about 100 swine raisers to seek redress for canceled contracts", Arkansas Democratic-Gazette, 20 Feb 2004.

[23] Smithfield has admitted that it could not now legally do what it did to get control of the market:

> "Quite frankly," given the adverse environmental, political and regulatory situation…it's unlikely any other party can put together what Smithfield Foods Inc. has put together, according to chair, chief executive officer and president Joseph Luter III. Luter re-emphasized…that it would be difficult for any competitor to accomplish the level of vertical integration that Smithfield has today…because of the current regulatory situation.
> Rod Smith, "Smithfield describes scale, system that 'can't be duplicated'," Feedstuffs Magazine, August 27, 2001.

For the effects of vertical integration and coordination on agricultural markets see:
Peter C. Carsten , "Concentration And The Destruction Of Competition In Agricultural Markets: The Case For Change In Public Policy", Wisconsin Law Review, p. 531-546, 2000.
And
Mary Hendrickson, William Heffernan, Philip H. Howard, Judith B. Heffernan, Consolidation in Food Retailing and Dairy: Implications for Farmers and Consumers in a Global Food System, Report to the National Farmers Union, Depart of Rural Sociology, University of Missouri, January 8, 2001.
And
Philip Paarlberg, Associate Professor, Purdue University, Structural Change and Market Performance in Agriculture: Critical Issues and Concerns about Concentration in the Pork Industry, Testimony before the Senate Committee on Agriculture, Nutrition, and Forestry, February 1, 2000, http://agriculture.senate.gov/Hearings/2000_Hearing/paa0021.htm.

[24] The case for subsidies is that the alternative to subsidies is higher food prices or farmers going out of business and the amount of US agricultural subsidy per acre is far less than that in either the EU or Japan. However, subsidies don't lower food prices if the money for subsidies comes from substituting higher taxes for higher food prices.

When the federal goverment gives subsidies to food producers each taxpayer gives up the right to choose who gets his/her food dollars. As a result, the people who get our food money are often not those we would choose if we could spend our money the way we would like.

In today's market, where all phases of food production and marketing are controlled by a few large corporations, most farm subsidies are simply "pass throughs"--they go immediately to the seed company, the fertilizer company, the fuel distributer, etc. Each of these businesses can charge more to farmers because subsidy payments make up the difference. If agricultural subsidies stopped, the number of customers for these supplies would decline unless the suppliers dropped their prices.

Thus, while subsidies mainly enrich those whom the consumers might not choose to patronize, they also endanger small family farmers. The threat to these struggling operations is used to ensure that subsidies continue to flow, even though data show most subsidies go to big producers.

The fact our farmers get fewer subsidies per acre that those of the EU or Japan only shows US farmers are more efficient or they simply have more acres to farm. The object of economic policy is not to be the least stupid--it is to try to develop intelligent solutions to economic problems. And the only intelligent way to run a market is to allow consumers complete freedom of choice in their purchases. Subsidies remove that freedom. For recent examples of the subsidy dilemma see:
George Anthan, "Farm-aid study finds inequities", The Des Moines Register, DesMoines, Iowa, January 13, 2000, Business Pg.10.
And
Small Family Farmers and the Environment Suffer Under Department of Agriculture Program, , Midwest Environmental Advocates, Madison, Wisconsin, December 13, 2000.
And
Largest farms reap most subsidies, Environmental Working Group, April 26, 2000, http://www.ewg.org.

[25] As one would expect with integrated production, the price of pork has remained low at every point in the supply chain except for final sales to consumers. This has kept the returns to farmers in both the US and Canada low and has often resulted in losses. See:
Bob Burgdorfer, "Soaring corn prices hurting big U.S. hog producers", Reuters, March 2, 2004.
Michael Howie, "Looking for a buyer", Hog Industry Insider, Feedstuffs Magazine, Issue 09, Volume 76, March 1, 2004.

Since the late 1980's, Canada has embraced (and subsidized) large factory farms and it is a good case study of the effects of this policy on the agricultural sector. In Canada the following result occurred over 14 years of increasingly concentrated agricultural operations:

Note: Amounts adjusted for inflation and in 2002 Canadian Dollars.

	1988	2002
Canadian agri-food exports	$15.3 b	$28.2 b
Realized net farm income	$5.5 b	$4.1 b
Farm debt	$31.6 b	$44.2 b
Wheat: farm gate price	*$6.92/bu*	*$4.48/bu*
Bread: grocery store price	*$1.57/loaf*	*$1.46/loaf*
Number of farmer-owned grain co-ops	4	0
Dairy: % processed by farmer co-ops	60%	35%
Flour mills: Canadian ownership	50% of cap.	21% of cap.
Malt plants: Canadian ownership	95% of cap.	12% of cap.
Employment: agri-food processing	277,300 jobs	274,900 jobs
Freight rates (Saskatoon)	$10.03/ton	$35.68/ton
Fertilizer price (anhydrous ammonia)	$524/ton	$539/ton
Diesel fuel price (Alberta)	$.35/litre	$.335/litre
Machinery companies—number	6	3
Fed. Govt. farm support spending	$6.6 b	$3.5 b
Number of farmers in Canada`	293,089	246,923

Number of hog farmers	33,760	11,565
Pork chops: grocery store price	$9.65/kg	$9.54/kg
Hogs: farm gate price	$2.02/kg	$1.46/kg
Packing plant pay (starting wage)	$13.16/hour	$9.65/hour

Sources and Notes for Canadian Table (1988 source; 2002 source)

Inflation (CPI): Bank of Canada, Inflation Calculator, 20 February, 2004.

Exports: Agri-food Trade Service, International Markets Bureau; NFU estimate (2001 exports were $26.6 billion).

Net income: Statistics Canada, Agricultural Economic Statistics, Cat. # 21-603; Agriculture and Agri-Food Canada (AAFC), Farm Income, Financial Conditions, and Government Assistance Data Book, March 2002.

Debt: Statistics Canada, Agricultural Economic Statistics, Cat. # 21-603; NFU estimate (2001 debt was $40.8 billion).

Wheat: Saskatchewan Agriculture and Food, Stat Facts, #10.03; NFU estimate based on same and updated with July 25 CWB Pool Return Outlook.

Bread: Statistics Canada, Consumer Prices and Price Indexes, Cat. # 62-010; Statistics Canada, CANSIM Matrix v735175 - 326-0012.

Grain co-ops: Corporate annual reports and various articles in the Western Producer.

Dairy: Government of Canada, Co-operatives Secretariat, Profile of Canadian Agri-food Co-operatives (1986-1996); Estimate prepared by AAFC upon request.

Flour mills: Sosland Publishing Company, 1989 Milling Directory/Buyer's Guide (November 1988); Sosland Publishing Company, Grain and Milling Annual: 2002.

Malt plants: Based on several sources, especially AAFC, Bi-Weekly Bulletin, July 11, 1997 and January 25, 2002.

Employment: Available on request from AAFC, based on Statistics Canada's Labour Force Survey. See also: AAFC, A Profile of Employment in the Agri-Food Chain, April 1999.

Freight rates: Sask. Ag. and Food, Stat Facts, #10.03.

Fertilizer: Alberta Agriculture, Food, and Rural Development, Alberta Farm Input Prices, various months. The 2002 price is based on a six-month average (December 2001 to May 2002). The 1988 price is based on a comparable 1987/88 six-month average. Both prices are full-service, applicator included.

Diesel fuel: Same as previous.

Machinery companies: Survey of mergers and acquisitions, conducted online and through corporate annual reports, 1987 to current.

Federal spending: AAFC, Farm Income, Financial Conditions, and Government Assistance Data Book; NFU estimate adjusted to account for newly-announced federal spending.

Number of farmers: Statistics Canada, Census of Agriculture, 1986 and 2001, 1986 Census data used as a proxy for 1988; 2001 Census data used as a proxy for 2002.

Hog farmers: Statistics Canada, Livestock Statistics, Cat. # 23-603.

Pork chops: Statistics Canada, Consumer Prices and price indexes, Cat. # 62-010; Statistics Canada, CANSIM Matrix P219135.

Hog prices: Statistics Canada, Livestock Statistics, Cat. # 23-603. Prices are for Index 100 hogs, dressed, weighted average in Ontario using a six-month average (December-May).

Packing plant pay: Collective agreement with Burns Foods Limited, Brandon plant; Collective agreement with Maple Leaf Foods Inc., Brandon plant (semi-skilled 1).

Canadian National Farmers Union, Free Trade: Is it working for farmers?, July, 2002, www.nfu.ca/briefs/1988vs2002FINAL.bri.pdf.

Claim 7 Endnotes

[26] Brown, Lester, The Agricultural Link: How Environmental Deterioration Could Disrupt Economic Progress, Worldwatch Paper 136, August, 1997, p. 10-12.

[27] See Claim 6 Endnotes

[28] Hog inventory numbers (USDA December 1, U.S. hog inventory numbers) increased from the mid-30 million head range when records were first kept in 1867 to the mid-60 millions in the 1920s. Since the 1920s the long-term trend has been level at about 55-60 million head. See Larry D. Stearns, Timothy A. Petry, Hog Market Cycles, North Dakota State University, NDSU Extension Service, EC-1101,January 1996, http://www.ext.nodak.edu/extpubs/ansci/swine/ec1101w.htm.

Claim 8 Endnotes

[29] This occurs because the information held by the two parties to the agreement to host a CAFO—the CAFO and the residents of the region—is asymmetrical. This invariably leads to the creation of a moral hazard and the incentive to shift costs from the CAFO to the region.

A proposed CAFO will hide most important information about its planned activities from the rural residents of the region it is entering. Among the residents of the rural region, the rural residential community usually has more say than those living in rural agricultural areas—both in terms of numbers (votes) and in terms of the influence of business interests. When a CAFO enters a rural region, it strikes a bargain with the rural residents. This implicit contract is usually formed around stated, but not legally enforceable, promises of jobs and economic impact on the region. The CAFO promises these things in return for land, water, access, power and the other factors that are required for the CAFO to operate. This contract also implies a certain physical relationship with the region that manifests itself in the presence (or lack) of pollution, traffic, resource consumption, etc., that arise from the operation of the CAFO.

The CAFO is typically well informed about the legal contract with its vertical organization and the implied contract with the region because it signed the legal contract and it extended the offers on which the regional contract is based. But the residents of the region are privy to very little information about the CAFO's explicit contract with its organization. As a result, there is an incentive on the part of the CAFO to shift costs between the contracts based on each party's access to information about those costs. The party with the least information about costs is most likely to have those costs shifted in its direction.

Local, county, state, provincial and national laws and policies on the environment and on zoning are important determinants of the location of CAFO facilities (Hennessy and Lawrence, 1999, p. 53). When a CAFO enters a region it encounters a set of rules that have generally been

structured to control a kind of agricultural production whose inputs and waste byproducts are not representative--either in quantity or chemical composition--of the Confined Animal Feeding Industry. Thus, in addition to this contract being physically defined around incorrect assumptions, it will also be based on asymmetrical information that heavily favors the CAFO.

Asymmetrical information refers to a situation where one of two individuals in an agreement or contract possesses more information than the other individual about the nature of the bargain. If one individual possesses critical additional information about the contract, this individual can use his proprietary information to gain an advantage in the bargain. Such a contract is likely to increase the profits of the CAFO by shifting the operating costs of the CAFO to the residents around its operation. The certainty of this outcome follows directly from existence of asymmetrical information about the operation of the CAFO and from the motivation of the CAFO owners.

These factors create an agreement (contract) between a CAFO and the residents of the region based on non-enforceable promises of jobs and economic development, but for which most of the information needed to validly assess the impact of the CAFO on the physical, social and economic environment is withheld from the public and is available only to the owners/operators of the CAFO. The result is that the permitting agency has inadvertently created what economists call a moral hazard where one party is better informed than the other about the characteristics of the transaction. By definition, a moral hazard leads to lower efficiency and to higher costs to the party that is least informed (in this case, a higher cost to the region that hosts the CAFO).

This moral hazard is not uniformly spread across the region. Instead, it is concentrated on those rural agricultural landowners who are closest to the CAFO—and who have less political power in the permitting process. This moral hazard will manifest itself in loss of the right of exclusive use and it will create an incentive for these property owners to maximize the short-term gains from their property by moving out and selling to other CAFO owners.

Rural agricultural property owners are likely to find willing buyers because, having created a moral hazard, the region is now faced with a second economic condition called adverse selection. This provides an incentive for additional producers who also want to shift costs to the residents of the region to migrate to the area (Milgrom and Roberts, 1992).

Since the CAFO can only be trusted to act in its own self interest, the only way out of this situation is for the region to have knowledgeable regulators monitor the CAFO. Unfortunately, CAFOs use laws based on loose, conventional agricultural standards to avoid pollution controls that would more fully assign the costs of waste to the CAFOs. In addition, the factors that make it difficult to get information on proposed CAFO operations during the permitting process also complicate attempts to monitor CAFOs. This leads to a condition called low separability "...the feasibility to see who has done the work. With low separability, the principal [in this case, the region] will face either high control costs or intense cheating" (Sauvee, 1998, p. 55, 56).

So far, the history of CAFO operations shows that cheating is likely. And it is made even more likely by the separation between the rural community where it is approved and the rural agricultural area where it is located. If monitoring fails or is not effectively implemented, the only other option for controlling the behavior of the CAFO is through economic incentives. But a powerful economic incentive structure has already been formalized in the explicit contract between the CAFO, its own organization, and its investors. This contract directs the CAFO to

operate in such a way as to maximize profit, and if it can do this by shifting the costs of its waste to its neighbors in the region, that is how it will operate.

Hennessy, David A. and John D.Lawrence. 1999. *Contractual Relations, Control, and Quality in the Hog Sector*. Review of Agricultural Economics, vol. 21, no. 1.
Milgrom, P. and J. Roberts. 1992. Economics, Organization, and Management. Prentice Hall. Englewood Cliffs, NJ.
Sauvee, Loic. 1998. *Toward an Institutional Analysis of Vertical Coordination in Agribusiness*. The Industrialization of Agriculture. Jeffrey S. Royer and Richard T. Rogers, eds. Ashgate Press. Brookfield, VT.

[30] For example, the New EPA CAFO Regulations state that every CAFO shall develop and implement a Comprehensive Nutrient Management Plan (CNMP) at their facility and that the plan will be updated at least every 5 years, unless a significant change occurs at the facility. It further goes on to state that the authorized state agency is NOT required to review these plans, but the plans must be available to the authorized agent upon request.

The CNMP is prepared by the National Resource Conservation Service, a branch of the US Government. They will not and cannot release a copy of that plan to anyone without a signed letter of authorization from the individual that the Plan was prepared for. In other words the CAFO owner must sign a waiver that you may have a copy to review before you can get it

Further, states such as Illinois and Indiana have enacted laws that prohibit photographing activities at CAFOs. In January, 2004, Carol Blakney and her husband Able Alves were arrested in Muncie, IN and charged with trespassing on hog CAFO property after they had reported the CAFO was illegally dumping manure. They were arrested in a public street adjacent to the operation when they went back to see if the CAFO had cleaned up their mess and fined $1.00. For information on the Indiana and Illinois rule, see:
Seth Slabaugh, "Hog-farm trespassers fined $1", The Star Press, Muncie, Indiana, February 26, 2004.
"Lawmakers stand up for pigs' privacy", Chicago Tribune, April 30, 2002, www.Chicagotribune.com.

[31] For example, The Environmental Review Commission of the North Carolina General Assembly, in its Report on The Inventory & Ranking of Inactive Animal Waste Lagoons, April 25, 2000, found that the 1142 inactive lagoons in the state would cost $42,000 per acre, or $30 million, to remediate over an estimated five-year period. This expense is to be entirely borne by the taxpayers of North Carolina, not by the CAFOs that created the lagoons.

Claim 9 Endnotes

[32] Accepting the responsibility for the accumulation of capital also means assuming the risks of any financing involved. However, as problems with CAFOs and the risk of their failure have increased, the interest rates associated with CAFO financing have also increased. For example, in a December, 2002 interview with CBC radio host Rosalie Wyloski in Saskatoon, SK., Mr. Possberg, the owner of Big Sky Farms, said he faced interest rates of 20% for financing new hog barns. See:

Rod Smith, in “Smithfield plans huge note offering to use for expansion, acquisitions”, Feedstuffs Magazine, | Issue 20 | Volume 75, May 19, 2003, reported that

> Moody's Investors Service assigned a Ba2 rating to the prospective notes and said Smithfield's ratings outlook remains negative due to questions surrounding an oversupply of meat and poultry, which is containing margins in the company's meat processing business, and the slowness of recovery of the hog markets, which is containing margins in the company's hog production business.

High interest rates are a reflection of high risk, and they have caused CAFO operators to shift the risk (and costs) of financing away from their operations just as they have attempted to shift pollution costs. Financing risk is currently being shifted to the rural communities next to the CAFOs and to the contractors who raise the hogs for the vertically integrated companies. See:
Murray Lyons, “New Stake in Hog Industry”, The Star Phoenix, Saskatoon, SK, December 3, 2002.
And
Steve Marbery, Feedstuffs Managing Editor, Canada Contracts canceled, Feedstuffs Magazine, October 7, 2002.
And
Fate of a Tyson Contract Swine Grower, Swine Song: A Texarkana Gazette special report, Texarkana Gazette, September 01, 2002.
And
Associated Press, Arkansas Supreme Court Agrees To Hear 90 Hog Farmers' Tyson Foods Contract Termination Suit, January15, 2004.
And
Michael Howie, "Tyson case date set", Hog Industry Insider, Feedstuffs Magazine, Issue 03 | Volume 76, Jan. 19, 2003.

[33] For example, see: Ian Bell, “Investors walk from hog barn network”, The Western Producer, Saskatchewan, Canada, February 27, 2003.

Claim 10 Endnotes

[34] According to a 2001 Feedstuffs Magazine report, in the United States there were 110 operations that owned 50,000 hogs or more and these 0.1% of operations owned 45% of the total number of hogs in the U.S. There were 235 operations, or 0.3% of all operations, that owned 52% of the hogs and there were 500 operations, or 0.6% of all operations, that owned 60% of the hogs.

On the other extreme, there were 51,200 operations in the US that owned less than 100 head and these 60% of operations owned just 1.5% of the total number of hogs in the U.S. There were 64,900 operations, or 76% of all operations, that owned 7% of the hogs and there were 70,000 operations, or 82% of all operations, that owned 13% of the hogs.
Rod Smith, "Long-term trend continues toward fewer producers", Feedstuffs Magazine, April 23, 2001.

Also see endnote 27 for Canada.
Neither set of national data demonstrate that CAFOs keep farmers on the farm or that they provide more money for agricultural goods.

[35] In 1946, anthropologist Walter Goldschmidt used a number of social indicators to demonstrate that rural communities in California surrounded by large farms did not do as well as similar communities in areas where smaller farms were the rule (Goldschmidt, 1946). As the number of large, Confined Animal Feeding Operations (CAFOs) increased, particularly during the late 1980s and the 1990s, a substantial body of literature expanded, tested and generally confirmed Goldschmidt's work (Buttell, Larson and Gillespie, 1990; Lobao, 1990; Durrenberger and Thu, 1996; Lyson, Torres and Welsh, 2001; Welsh and Lyson, 2001).

Buttel, F., O. Larson and G. Gillespie. 1990. *The Sociology of Agriculture*. Greenwood Press.

Durrenberger, E.Paul and Kendall Thu. 1996. *The expansion of large scale hog farming in Iowa: The applicability of Goldschmidt's findings fifty years later*. Human Organization 55 no. 4: 409-415.

Goldschmidt, W. 1946. *Small Business and the Community*. Report of the Smaller War Plants Corporation to the Special Committee to Study Problems of American Small Business. Washington, DC: U.S. Government Printing Office.

Lobao, Linda 1990. Locality and Inequality. Albany, NY: SUNY-Albany Press.

Lyson, T.A., Robert Torres and Rick Welsh. 2001. *Scale of agricultural production, civic engagement and community welfare*. Social Force 80:311-27.

Welsh, Rick and Thomas Lyson. 2001. *Anti-Corporate Farming Laws, the Goldschmidt Hypothesis and Rural Community Welfare*. Paper presented at the Rural Sociological Society in Albuquerque, NM.

Claim 11 Endnotes

[36] For a study of this phenomena, see:
Douglas H. Constance and Alessandro Bonanno, Department of Sociology, Sam Houston State University, Huntsville, Texas, "CAFO Controversy In The Texas Panhandle Region: The Environmental Crisis Of Hog Production", Journal of Culture and Agriculture, Vol.21, No 1, Spring 1999, Pp 14-28.

In another case, the Dumas, Texas city council voted to give the city's water supply to a large hog integrator in spite of the opposition of 80% of the community and the knowledge that water for the town would be exhausted in ten to twenty years. See
Steve Marbery, Pipeline for Seaboard?, Hog Industry Insider, Feedstuffs Magazine, | Issue 4 | Volume 74, January 28, 2002.

The situation is similar in Canada where a Court of Queens Bench recently removed a councilor from the RM of Livingston. A by-election was held in the RM of Livingston on November 26, 2003 to replace Councilor Alex Strilaeff who was removed from his council position by an order from the Court of Queens Bench. The court ruled that Mr. Strilaeff had a pecuniary interest in matters before the council, namely possible financial profit from decisions

on the development of hog barns, Lac La Course Hogs Inc. and Big Sky Farms. The Court of Queens bench ruled that Mr. Strilaeff failed to disclose his interest contrary to section 45 of the Municipal Act. The court further ruled that the seat being Division 1 of the RM of Livingston be vacant and the respondent Mr. Stifaeff is disqualified from holding office in the municipality for a period of three years.

[37] For example, the Pampa, Texas Economic Development Council what Texas calls a 4A EDC. In 1992 Pampa voted to have an EDC corporation. The city commissioners then appointed a 5 board members and they employed a director. The city commissioners were suppose to oversee the PEDC but they later admited they had done a poor job. Meanwhile, the PEDC accumulated income from a 1/2 cent sales tax which yielded about $700,000 per yearIt also accumulated a debt of 2 1/2 million—all of which went to subsidize CAFO operations in the local area. See
Kate. B. Dickson, "Grand Jury to investigate vote allegations", The Pampa News, November 18, 2001.
Nancy Young, "Another shakeup on the PEDC board", The Pampa News, November 20, 2001.

Claim 12 Endnotes

[38] Removing control from local permitting agencies has occurred in Saskatchewan, Ontario, Nebraska, New York, Texas, Pennsylvania, Utah and a host of other locations. For a sample of these efforts see:
Greg Burton, "Farmer-Senator Pushes Immunity Measure", The Salt Lake Tribune, February 1, 2002.
And
Nancy Hicks, Sierra Club criticizes creation of livestock-zoning task force, The Lincoln Journal Star, Lincoln, Nebraska, February 1, 2002, nhicks@journalstar.com.
And
Proposed Law Would Strip Local Governments of Control Over Concentrated Animal Feeding Operations in Wisconsin, The Country Today, April 2, 2003, http://www.thecountrytoday.com/.
And
Steve Marberry, PA Senate seeks to steal away local control, Hog Industry Insider, Feedstuffs Magazine, July 23, 2001.

[39]For example, after several CAFOs were denied permits over issues associated with air and water quality, Idaho removed control of many environmental areas from the Department of Environmental Quality and gave it to the Department of Agriculture. In reports on the effects of CAFOs on the environment that occurred after this change, the Department of Agriculture omitted air quality assessments of CAFOs. When the Department of Environmental Quality persisted in reporting problems with dairies, their budget was cut to remove air quality testing. See:

Michael McAuliffe, "Big dairy stirs dust-up over air quality Environment: DEQ says proposal would produce more ammonia than power plant proposed in Middleton, Idaho Press Tribune, February 21, 2003.
And
Wayne Hoffman, "Air quality cuts will hurt, DEQ director says", The Idaho Statesman, February 25, 2004.

Claim 13 Endnotes

[40] The most common approach to limiting the enforcement of regulations has been through Right-to –Farm acts. For an analysis of the problems a representative act causes for regulation enforcement see:
Thomas Alan Linzey, Esq., Community Environmental Legal Defense Fund, "Technical Analysis of Senate Bill 1413", Quality of Life and Local Control Caucus of Township Supervisors, Pennsylvania, May 3, 2002.
Also see Endnote 39, section IV.

Claim 14 Endnotes

[41] The Effect of CAFOs on Rural Economies in the US

In 1946, anthropologist Walter Goldschmidt used a number of social indicators to demonstrate that rural communities in California surrounded by large farms did not do as well as similar communities in areas where smaller farms were the rule (Goldschmidt, 1946). As the number of large, Confined Animal Feeding Operations (CAFOs) increased, particularly during the late 1980s and the 1990s, a substantial body of literature expanded, tested and generally confirmed Goldschmidt's work (Buttell, Larson and Gillespie, 1990; Lobao, 1990; Durrenberger and Thu, 1996; Lyson, Torres and Welsh, 2001; Welsh and Lyson, 2001).

I. Direct Economic Losses by Neighbors of CAFOs

CAFOs are a point source of both water and air pollution that falls unevenly across the area surrounding the CAFO and air pollution generally imposes the most significant costs on surrounding residents. Those rural farmers and ranchers closest to the CAFO bear most of these costs.

The economic loss suffered by the neighbors of a CAFO can be significant. Costs shifted to the residents of the region by a CAFO lower the sales and taxable value of neighboring properties. Palmquist et al., in a 1995 study in North Carolina, found that neighboring property values were affected by large hog operations based on two factors: the existing hog density in the area and the distance from the facility. The maximum predicted decrease in real estate value of 7.1 percent occurred for houses within one-half mile of a new facility in a low hog farm density area. 1997 and 1998 updates of this study found that home values decreased by $.43 for every additional hog in a five mile radius of the house. For example, there was a decrease of 4.75% (about $3000) of the value of residential property within 1/2 mile of a 2,400 head finishing operation where the mean housing price was $60,800 (Palmquist, 1995; Palmquist, Roka, and Vukina, 1997, pp. 114-124).

A 1996 study by Padgett and Johnson found much larger decreases in home value than those forecast by Palmquist. In Iowa, hog CAFOs decreased the value of homes in a half-mile

radius of the facilities by 40%, within 1 mile by 30%, 1.5 miles by 20% and 2 miles by 10%. In addition, an Iowa study found that while some agricultural land values increased due to an increased demand for "spreadable acreage," total assessed property value, including residential, fell in proximity to hog operations (Park, Lee and Seidl, 1998).

An eighteen month study of 75 rural land transactions near Premium Standard's hog operations in Putnam County, Missouri conducted by the departments of Agricultural Economics and Rural Sociology at the University of Missouri found an average $58 per acre loss of value within 3.2 kilometers (1.5 miles) of the facilities. These findings were confirmed by a second study at the University of Missouri-Columbia by Mubarak, Johnson, and Miller that found that proximity to a hog CAFO does have an impact on property values. Based on the averages of collected data, loss of land values within 3 miles of a hog CAFO would be approximately $2.68 million (US) and the average loss of land value within the 3-mile area was approximately $112 (US) per acre (Mubarak, Johnson and Miller, 1999).

A compilation by the Sierra Club of tax adjustments by county assessors in eight states documented that lower property taxes follow these decreases in property value. Local property tax assessments were lowered in Alabama, Illinois, Iowa, Kentucky, Maryland, Michigan, Minnesota and Missouri by ten to thirty percent due to their close proximity to the corporate hog CAFOs. Real estate appraisers have also noted the problems associated with property values and large hog operations. In an article in the July, 2001 Appraisal Journal, John Kilpatrick found that

> [w]hile the appraisal profession has only begun to quantify the loss attributable to CAFOs,.....diminished marketability, loss of use and enjoyment, and loss of exclusivity can result in a diminishment ranging from 50% to nearly 90% of otherwise unimpaired value (Kilpatrick, 2001, p. 306).

As a result, diminishment effects continue to be considered when tax valuations are determined around large CAFOs. On September 14, 2001, Clark County, Illinois established an assessment abatement for fifty residential homes around the Welsh Farm (a hog CAFO) in northeast Clark County. For those homes within a half-mile of the hog production facility, there is a 30 percent reduction in the property assessment; 25 percent reduction within three-quarters of a mile; 20 percent within one mile; 15 percent within one and one-quarter miles; and 10 percent for one and one-half miles (Beasley, 2001).

II. Local Economic Effects of CAFOs

A CAFO is structured to view local residents as nuisances instead of assets. CAFOs crave isolation, and they are carefully designed to facilitate an isolated existence. They select areas close to good roads and railroads so they can import those things they need to build their facilities and local, county, state, and national laws and policies on the environment and on zoning are important determinants of the location of CAFO facilities (Hennessy and Lawrence, 1999, p. 53). In a USDA report published in 2000, Sullivan *et al.* found that

> "animal industries tend to move to areas with a lax environmental regulatory structure....[T]he more a state spends on environmental enforcement, the less likely a given firm will locate in that state. Differences in level of enforcement among nearby states, especially if competitors already operate in the area, may also affect location

> decisions...Location decisions, while important at the state level, also have an international context, with concerns about large production companies shifting investment outside the U.S. (Sullivan, Vasavada, and Smith, 2000, pp.22, 23).

In the last five years, CAFO owners have responded to the growth of county-level regulation by attempting to remove the ability to regulate air and water pollution from the counties and to locate it in state or provincial governments where political influence could be more easily exerted.

To reduce costs, the CAFO makes every effort to pay as few taxes as possible. This mandates locating in areas with existing infrastructure or infrastructure the public will finance. This also gives the CAFO an incentive to leave an area before the tax base deteriorates and before tax rates increase.

Because they are intent on finding isolated locations, CAFOs are also designed to use out-of-area suppliers. These may be other members of their vertically integrated organization, or they may simply be the lowest cost supplier who ships into the region using the rail or road infrastructure the CAFO specified as part of its site requirements. The transportation links the CAFO uses to bring its supplies into the region are also used to ship what it produces out of the region. The overall effect is that of the camper who brings what he needs, stays for a while, and departs--leaving behind whatever pollution and environmental damage were caused by the stay. Those rural residents who are affected by the pollution created by the CAFO, and who are likely to complain loudly as a result, are nuisances to be avoided or removed as expeditiously as possible.

Proponents of CAFOs often justify the construction of CAFOs on economic grounds and specifically, rural economic development. However, the economic characteristics that generally define a CAFO are fundamentally incompatible with rural regional economic development. Regional economic development proceeds on the premise that the wages paid and purchases made by a company are transferred to other individuals or companies in the region. The multiplier effect of these payments further assumes that they are again spent within the confines of the region and that they do not “leak” into other areas of the state or nation. However CAFOs are structured so they cannot aid regional economic development for the following reasons:

(1) Constraints on Regional Economic Development Due To Employment

As a capital intensive company, a CAFO is designed to minimize the number of workers and hence, minimize the economic impact on the region. A 1998 Colorado State University study found that only 3-4 direct jobs (jobs with the hog producer) are created for every 1000 sows in a CAFO sow farrowing operation (Park, Lee and Seidl, 1988). Ikerd calculated that a farrow-to-finish contact hog operation would employ about 4.25 people to generate over $1.3 million in revenue. His figures showed that an independently operated hog farm would employ about 12.6 people to generate the same amount of hog sales (Ikerd, 1998, pp. 281-283). Further, a number of studies have found that compared with small farms with an equivalent composite production value, a large farm tends to buy a smaller share of consumption and production inputs in nearby small towns (Chism and Levins. 1994; Henderson, Tweeten, and Schreiner. 1989, p. 31–35).

This is important because each farm job adds another job in local communities and another in the state outside the local communities. Similarly, each $1,000 of farm income adds

another $1,000 to local communities and another $1,000 to the state outside the local communities (Sporleder, 1997, p. 9). Either of these figures probably overstate the economic impact on rural counties. For the employment multiplier to operate at these levels all employees must both live and work inside the region. Given the ability to commute, it is likely that many workers will live well outside the region and that the resulting employment multiplier will be further depressed.

The size of the employment multiplier further depends on amount of purchases a CAFO makes in the region. Large scale animal production facilities are more likely to purchase their inputs from a great distance away, bypassing local providers in the process (Lawrence et al. 1994). A 1994 study by the University of Minnesota Extension Service found that the percentage of local farm expenditures made by livestock farms fell sharply as size increased. Farms with a gross income of $100,000 made nearly 95% of their expenditures locally while farms with gross incomes in excess of $900,000 spent less than 20% locally (Chism and Levins, 1994).

Confined animal production can occasionally benefit local grain sellers, but only when it consumes all the grain produced in the county. If the county has to export even one bushel of grain, all the grain in the county will have to be priced at a lower level that will enable the grain to compete in the export market (Hayes, 1998).

(2) Constraints on Regional Economic Development Due To Taxes

Federal, state, provincial and local taxes are levied on taxable amounts calculated on federal returns. Numerous tax write-offs that are possible because CAFOs are sometimes treated as industries and, at other times, treated as farms. These write-offs significantly decrease the amounts of taxes paid locally. At the same time, the operations of the CAFO create social, health and traffic costs that the local government must finance. The local government, in turn, must rely on increased taxes to pay these CAFO-induced costs--and this can decrease other economic activity in the region.

For example, additional costs associated with hosting a CAFO include increased health costs, traffic, accidents, road repairs, and environmental monitoring. One Iowa community estimated that its gravel costs alone increased by about 40% (about $20,000 per year) due to truck traffic to hog CAFOs with 45,000 finishing hogs. Annual estimated costs of a 20,000 head feedlot on local roadways were $6447 per mile due to truck traffic (Duncan, Taylor, Saxowsky and Koo, 1997). Colorado counties that have experienced increases in livestock operations have also reported increases in the costs of roads, but specific dollar values are not available. In addition, an Iowa study found that while some agricultural land values increased due to an increased demand for “spreadable acreage,” total assessed property value, including residential, fell in proximity to hog operations (Park et al., 1998).

(3) Constraints on Regional Economic Development Due To Adverse Local Business Impacts

In a 2001 study of farming dependent areas, Tweeten and Flora found that if they create environmental problems, newly developed or arrived CAFOs may undermine a community’s opportunities to expand its economic base. They also found that the vertical coordination structure used by large CAFOs can cause a loss of resources from farms and rural communities because CAFO facilities tend to be so large and because ownership and control may reside in distant metropolitan centers. All else being equal, they found the productivity gains attributed to

large CAFOs decrease aggregate employment and other economic activities in rural communities (Tweeten and Flora, 2001, p. 32).

Rural sociologists Thomas Lyson of Cornell University of Ithaca, N.Y. and Rick Welsh of Clarkson University of Potsdam, N.Y. found that agricultural counties without corporate farming laws generally had higher poverty and unemployment rates and lower cash returns to farming. 433 agricultural counties--defined as at least 75% of land in farms and 50% of gross receipts for goods and services from farm sales—were studied. Rural community welfare, measured by percentage of families in poverty, percentage unemployed and percentage of farms in a county realizing cash gains was higher in states with anti-corporate farming laws. States with more restrictive anti-corporate laws also fared better than states with less restrictive laws (Lyson and Welch, 2001).

A study of 1,106 rural communities by Gómez and Zhang of Illinois State University found that large hog farms tend to hinder rural economic growth at the local level.. All models in this study indicated an inverse relationship between hog production concentration and retail spending in local communities. Economic growth rates were 55% higher in areas with conventional hog farms as opposed to those with larger hog operations in spite of the fact that economic growth rates had been almost identical in all the studied communities before the advent of larger hog operations in the1990s. Data in the study also showed that communities with heavy hog concentration suffered larger population losses than those with conventional hog operations. According to the authors, the results of this study suggest that without public policy to protect rural communities, the most probable outcome is the continuing decline of rural communities in the future as the size of agriculture and livestock production units continue to increase (Gómez and Zhang, 2000).

A second study by Gómez of 248 towns in hog-producer counties covering the period 1981-1999 demonstrate that smaller hog farms contribute to stronger rural economies and large hog farms are associated with lower economic growth. While there were not significant differences in real retail spending across towns before 1990, if concentration in hog production was 1 percent lower in town A than in town B after 1990, then annual real retail sales were higher in town A by 0.27 percent. Such differences, compounded over a fifteen-year period, result in real spending in town A being higher by 4.13 percent than in town B (Gómez, 2002).

In February, 2002, the Iowa Concentrated Animal Feeding Operations Air Quality Study found important emerging issues surrounding "the intensification of livestock production that include the socioeconomic impacts in rural communities. These issues include...decline in local economic activity and increases in purchases of some animal production inputs from outside the local area, as CAFOs increase in size and number... Studies in Michigan, North Carolina, and Missouri found that the value of real estate close to CAFOs tended to fall. These and other data show that CAFOs are defined by present and potential neighbors as at least a nuisance" (Iowa Concentrated Animal Feeding Operations Air Quality Study, 2002, pp 5-15).

III. CAFOs and the Right of Exclusive Use

Laws that remove the ability of residents to control air pollution on their property attack the right of exclusive use, a fundamental legal principle which states that:

> those who have no claim on property should not gain economic benefit from enjoyment of the property. In other words, the right of use is exclusive to the property owner, and

> any violation of the right of exclusive use typically carries either payment of compensation to the rightful owner or assessment of a penalty. For example, if "A" trespasses on land owned by "B," then "A" will be guilty of a crime and a possible criminal penalty may be in order, as well as civil damages. Physical impairment, such as the odor or flies, in effect is a trespass on property rights and violates the right of exclusion (Kilpatrick, 2001, p. 303).

Both the legal and economics professions view the right of exclusive use as fundamental to the long term beneficial use of property. If exclusive use is violated, those who own the land cannot be assured of compensation for the use of their property and they will tend to adopt short sighted land use policies—for example, accepting the pollution of a contract hog operation in return for short-term economic gain. This lowers both the efficiency with which the property is used and the long-term societal benefits gained from use of the property (Snare, 1992; Stigler, 1992).

In the context of this discussion, just as the cost of airborne pollution falls unevenly on the neighbors of the CAFO, so does the loss of the right to exclusive use. This, in turn, means that the residents around the CAFO are more likely to act in a manner that increases their short-term gain at the expense of long term societal benefits. This is precisely the kind of activity CAFO owners desire because it leads to the creation of more CAFO sites. Unfortunately, the side effect of these actions is to hasten the depopulation of rural agricultural areas where CAFOs are located as more and more land is rendered uninhabitable due to air pollution.

One could claim that the setback provisions of any CAFO permitting regulation, whether they be county or state/province based, will prevent the loss of exclusive use that has been described in the previous paragraphs. This is unlikely for a number of reasons. First, setback requirements usually stipulate distances that are considerably less than those that have already been shown to be associated with losses in property and tax values. But even if one could assume that a setback requirement had been properly sized to reduce to zero all problems with airborne pollution, the setback itself establishes an area around a CAFO where normal development and normal residences are not permitted unless the owners are willing to waive all rights to exclusive use. In other words, potential residents within a setback radius could only build if they acknowledged that they were subject to air pollution and thus waived their rights to exclusive use. This means that every setback radius becomes a center of zero population growth.

IV. Creation of a moral hazard

When a CAFO enters a rural region, it strikes a bargain with the rural residents. This implicit contract is usually formed around stated, but not legally enforceable, promises of jobs and economic impact on the region. The CAFO promises these things in return for land, water, access, power and the other factors equired for the CAFO to operate. This contract also implies a certain physical relationship with the region that manifests itself in the presence (or lack) of pollution, traffic, resource consumption, etc., that arise from the operation of the CAFO.

The CAFO is typically well informed about the legal contract with its vertical organization and the implied contract with the region because it signed the legal contract and it extended the offers on which the regional contract is based. But the residents of the region are privy to very little information about the CAFO's contract with its organization. As a result, there is an incentive on the part of the CAFO to shift costs between the contracts based on each

party's access to information about those costs. The party with the least information about costs is most likely to have those costs shifted in its direction. When a CAFO enters a region it encounters rules that have generally been structured to control a kind of agricultural production whose inputs and waste byproducts are not representative--either in quantity or chemical composition--of the Confined Animal Feeding Industry. In addition to this contract being physically defined around incorrect assumptions, it will also be based on asymmetrical information that heavily favors the CAFO.

Asymmetrical information refers to a situation where one of two individuals in an agreement or contract possesses more information than the other individual about the nature of the bargain. If one individual possesses critical additional information about the contract, this individual can use his proprietary information to gain an advantage in the bargain. Such a contract creates an agreement (contract) between a CAFO and the residents of the region based on non-enforceable promises of jobs and economic development, but for which most of the information needed to validly assess the impact of the CAFO on the physical, social and economic environment is withheld from the public and is available only to the owners/operators of the CAFO. The result is that the permitting agency has inadvertently created what economists call a moral hazard where one party is better informed than the other about the characteristics of the transaction. By definition, a moral hazard leads to lower efficiency and to higher costs to the party that is least informed (in this case, a higher cost to the region that hosts the CAFO).

This moral hazard is not uniformly spread across the region. Instead, it is concentrated on those rural agricultural landowners who are closest to the CAFO—and who have less political power in the permitting process. This moral hazard will manifest itself in loss of the right of exclusive use and it will create an incentive for these property owners to maximize the short-term gains from their property by moving out and selling to other CAFO owners. And when they sell out, these rural agricultural property owners are likely to find willing buyers. Having created a moral hazard, the region is now faced with a second economic condition called adverse selection. This provides an incentive for additional producers who also want to shift their costs to migrate to the area (Milgrom and Roberts, 1992).

Since the CAFO can only be trusted to act in its own self interest, the only way out of this situation is for the region to have knowledgeable regulators monitor the CAFO. Unfortunately, CAFOs use laws based on loose, conventional agricultural standards to avoid pollution controls that would more fully assign the costs of waste to the CAFOs. In addition, the factors that make it difficult to get information on proposed CAFO operations during the permitting process also complicate attempts to monitor CAFOs. This leads to a condition called low separability "...the feasibility to see who has done the work. With low separability, the principal [in this case, the region] will face either high control costs or intense cheating" (Sauvee, 1998, p. 55, 56). So far, the history of CAFO operations shows that cheating is likely.

If monitoring fails or is not effectively implemented, the only other option for controlling the behavior of the CAFO is through economic incentives. But a powerful economic incentive structure has already been formalized in the explicit contract between the CAFO, its own organization, and its investors. This contract directs the CAFO to operate in such a way as to maximize profit, and if it can do this by shifting the costs of its waste to its neighbors in the region, that is how it will operate.

V. Conclusion

Community attempts to recruit CAFOs are usually based on fallacious assumptions about the potential of CAFOs to replace the economic activity lost through rural agricultural depopulation. Gale has noted that as rural residential areas have become more economically independent of rural agricultural areas, "[r]ural communities that can attract service jobs will be the best positioned to grow...the key to survival and growth for rural communities is to develop and attract service-sector businesses" (Gale, 2000, pp. 21,22). However, this kind of economic development is incompatible with the pollution CAFOs create—particularly when this pollution affects the locale where a service-based economy is developing.

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Claim 15 Endnotes

[42] See Endnote 41, section II (1) and
Hayes, Dermot. Hayes, Iowa's Pork Industry--Dollars and Scents, Iowa State University, 1998.

Claim 16 Endnotes

[43] See Endnote 41, section II (1)

Claim 17 Endnotes

[44] See Endnote 41, sections II and IV.
[45] For a good description of the social stress caused by the fight over the Rossburn hog barns see:
Lyndenn Behm, "RCMP, clergy appeal for peace in hog barn dispute", Brandon Sun, Brandon, Manitoba, July 09, 2001.

Claim 18 Endnotes

[46] See Endnote 41, section II (2).
[47] For tax benefits to accrue, the impact of a facility on a region should be at least tax-neutral and, hopefully, tax positive. In other words, hosting the company should create more tax revenues than the region has to spend to accommodate the facility. However, CAFOs are likely to be taxed only at low, agricultural rates instead of commercial or industrial rates.

The lack of tax revenues could be tolerated in a region if the CAFO cost the region little or no extra expenses. Unfortunately, CAFOs seek isolation because their presence imposes considerable social or environmental costs on the area in which they are located--costs that would not be willingly borne by the residents if they were fully understood. Most of these costs involve air and water pollution, wear and tear on roads, and resource depletion associated with the consumption of large volumes of water. They may also include social costs, other infrastructure costs, and finally, the cost of remediation after the company leaves.

In addition to these costs, recent studies show that the presence of a facility like a CAFO reduces overall tax revenues. Assessed evaluations of farms and houses around the facility are consistently decreased by ten to twenty percent in recognition of the loss of value that accompanies the odors and other forms of pollution from the CAFO. The resulting losses in property taxes are almost impossible to make up from the new taxes generated by the CAFO for two reasons: first, a CAFO is specifically structured to minimize the amount of local taxes it pays and second, a CAFO is capable of polluting a substantial area around its perimeter and this area is likely to have an assessed value that far exceeds that of the CAFO.

Finally, the ability of high taxes to reduce growth is well known. If a CAFO does not cover its costs, it imposes an additional tax burden on the region. If the region is rural, it doesn't take much to significantly increase the general tax burden on the area. If the facility also lowers the assessed valuation and hence, the tax base of the region because of its polluting activities, this further raises the tax burden on those parts of the region whose tax base has not been damaged. Further, the negative impact tax may not be in the specific area of the costs. For example, while road costs may be covered by a usage assessment on the CAFO, a decrease in property values may actually affect the quality of local schools.

Claim 19 Citations

[48] For example, a recent Iowa State University study found hard evidence that rural property values suffer when livestock confinements are located in the area. .See:
Living With Hogs in Iowa: The Impact of Livestock Facilities on Rural Residential Property Values," Iowa State University Center for Agricultural and Rural Development, Ames, Iowa, January, 2004, <http://www.card.iastate.edu>www.card.iastate.edu.
And
Endnote 41, sections I and III.