Economic Implications of Confined Animal Feeding Operations

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Introduction

The economic model that became capitalism is based on efficiencies from standardization, specialization and concentration of productive resources. As capitalism developed and this model was applied to production activities, social and environmental problems such as child labor, unhealthy working conditions, unfair labor practices, and polluting activities often occurred. Over time, these issues were dealt with through a framework of laws and regulations.

Recently, agriculture has begun to move toward an industrial model of production--Confined Animal Feeding Operations (CAFOs)--that exceeds the carrying capacity of the land on which it is located. Animal producers usually define carrying capacity as the ability of the land to feed some number of livestock. However, any piece of land is also capable of naturally processing only a certain amount of animal waste. In the most fundamental sense, the ability of the land to naturally process animal waste defines the limits of sustainable agriculture. Agriculture can only be viewed as sustainable if it produces no more waste than the land can absorb. Waste that is produced in excess of this amount is often transferred off the land in the form of air or water pollution and when this occurs, the costs of this waste are shifted away from the land where the waste is generated.

Unfortunately, agriculture's shift to industrial CAFOs outpaced the laws and regulations governing agricultural activities--laws and regulations that were meant for a non-industrial sector. This occurred partly because agriculture is viewed by the state and by society in general through a lens colored by the assumption that the enterprise of agriculture is a "closed system" where:

1. animal waste generated on the land is used/processed on the land.
2. the density of animals is compatible with the land's ability to recycle animal waste.
3. animal waste is not as toxic as human waste.
4. animal waste can be "treated" to remove pathogens by exposing it to sunlight and microbial activity in the soil.

Laws to regulate industrial waste arose after it was recognized that the assumption of a closed system did not apply to industry. Industrial waste often polluted the environment of those who lived around (or many miles from) the industry and laws were necessary to prevent the harm to society that might come from contact with this pollution. The laws governing industrial waste forced industry and the consumers of its products to "internalize" (pay for) the costs of dealing with this pollution.

The assumption of a closed system is no more applicable to CAFOs than it is to any other industrial operation, but CAFOs, masquerading as agricultural enterprises, have used the absence of laws governing agricultural pollution to avoid paying the costs of the waste generated by their operations. The reason CAFOs must shift the costs of their waste to someone else is that they are faced with diminishing returns in their operations.

Diminishing Returns to Large Confined Animal Operations

The waste generated by concentrated groups of animals and the disease problems that arise when animals are housed in close proximity to one another mandate that the maximum efficient size of an animal raising operation is relatively small. For example, a number of scientific studies have shown that hog CAFOs are no more efficient than a significant percentage of conventional hog producers.[1] These studies have also 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." Further "...total confinement...had...the highest risk [and]...the pasture system provided more stable returns, thus a lesser amount of risk." [2]

When one chooses to build a CAFO instead of following a conventional agricultural model costs begin to increase as larger and larger amounts of waste must be handled and as more animals are crowded into confined spaces. For a CAFO to compete with other agricultural producers, these costs must be offset by benefits from other phases of the operation such as:

(1) using animal waste for methane generation or fertilizer application or

(2) offsetting the problems of proximity through the efficiencies that come from reduced labor requirements and/or standardization.

If these benefits cannot compensate for the increased costs of CAFO operation, the additional costs arising from diminishing returns are shifted away from the CAFO producer so they are not reflected in the cost of production.

Whether or not the costs of preventing disease through crowding are recouped through efficiencies that arise from reduced labor and standardization is irrelevant to this discussion because these costs and benefits are completely overwhelmed by the costs of handling the animal waste. As a result, the economic viability of a CAFO must be evaluated by comparing the costs and benefits of handling animal waste. For example, take the case of swine production in a CAFO where:

(1) each hog produces 1.9 tons of waste annually.

(2) each hog generates .064 pounds of nitrogen per day or 23 pounds per year.

(3) each hog generates .0213 pounds of phosphorus per day or 7.8 pounds per year.[3]

The Cost of CAFO Waste

The primary goal of 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). Anaerobic decomposition in animal waste lagoons is less effective at eliminating human pathogens and BOD, and it leaves heavy metals in the lagoon.

Exposure of land-applied wastes to sunlight and microbial activity in the soil will generally finish the job of pathogen control, and the nutrients that affect BOD may be used by crop plants. In

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[1] See: "Iowa Livestock Enterprise Summaries," Iowa State University Extension, EJS 206, ASB, Ames, Iowa, 1992, 1993, 1994.
and
Lasley, Paul; Duffy, Mike; Ikerd, John; Kliebenstein, Jim; Keeney, Dennis; and Lawrence, John, "Economic Development," Understanding the Impacts of large-scale Swine Production, Proceeding from an Interdisciplinary Scientific Workshop, Des Moines, Iowa, June 29-30, 1995, p. 123.

[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] "Hog Waste," Get the Facts: Fact Sheets, Environmental Defense Fund, 1999.

effect, application to farm land is a final step in the "treatment" of animal waste if the amount of land to which it is applied is sufficient to perform this function.[4] The need to apply animal waste from CAFOs to the land to destroy human pathogens in the waste exists whether or not methane is generated from the waste to create power. This, in turn, requires the construction of lagoons to hold the effluent until it can be applied to the land.

Lagoon Seepage Costs

Waste lagoons, even with clay liners, allow waste to leach into the ground below the lagoon. In fact, lagoon specifications allow leakage through the clay liners at a rate up to 0.036 inches per day. At the maximum allowable rate, a three acre lagoon could legally leak more than a million gallons a year.[5] The cost of remediating this pollution can be significant and it should be levied against the CAFO using the lagoons and incorporated into the price of its products.[6] Instead, CAFOs shift these costs to other users of the land and aquifer, and when the CAFO ceases its operations it often abandons the waste lagoons. This is a major problem in states like North Carolina, where 643 abandoned hog waste lagoons currently threaten water quality.

Health Costs

Another cost of hog CAFOs is the health costs they levy on off-site neighbors For example, the State Health Director of North Carolina has stated that

> people living near hog farms report more adverse health effects (including respiratory and irritation symptoms and emotional disturbance) than people living away from hog farms... as a preventive public health policy, the State Health Director considers exposure to hog farm odors as a public health risk and recommends that efforts be made to minimize odor exposures.[7]

Further, a Minnesota Pollution Control Agency study found that hydrogen sulfide levels could be expected to violate the state standard as far as five miles downwind from confinement sites. Ammonia could be expected to violate proposed standards as much as 1 1/2 miles downwind.[8] These kinds of

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[4] Lasley et.al., Op. Cit., pp. 14-15.

[5] "Hog Waste,"Op. Cit.

[6] For example, see Ruhl, James F. "Quantity and Quality of Seepage from Two Earthen Basins Used to Store Livestock Waste in Southern Minnesota, 1997-98--Preliminary Results of Long-Term Study," US Geological Survey, Mounds View, MN, 1999, a paper presented at the conference on "Animal Feeding Operations--Effects on Hydrological Resources and the Environment," Colorado State University, Fort Collins, CO, August 30-Sept 1, 1999. A study of an earthen basin with above-grade, earth-walled embankments and compacted clay liners with a manure-water mixture from a 5000 pig gestation barn showed seepage from the basin ranged from 400-2200 gallons per day except during 1 month and three month periods when it reached 3800 to 6200 gallons per day. The seepage had concentrations of 11 to 100 mg/L of chloride, 2.58 mg/L or less of ammonium-N, 25.7 mg/L or less of nitrate-N, and organic-N concentrations of .92 mg/L or less. Nitrate-N concentrations in the seepage exceeded the US Environmental Protection Agency drinking water standard of 10 mg/L in 17 of 22 samples.

Also see Ham, J.M., "Field Evaluation of Animal Waste Lagoons: Seepage Rates and Subsurface Nitrogen Transport," Depart of Agronomy, Kansas State University, Manhattan, KS, 1999, a paper presented at the conference on "Animal Feeding Operations--Effects on Hydrological Resources and the Environment," Colorado State University, Fort Collins, CO, August 30-Sept 1, 1999. A recent study of lagoonsbuilt with compacted soil/bentonite liners and ranging in size from .5 to 2.5 ha (1.24 to 6.2 acres) with waste depths between 1.5 and 5.6 m (4.92 to 18.4 feet) found average seepage rates of 1.2 mm/day (.05 inch). Calculated nitrogen export losses from seepage were 2000-3000 kg/ha/year (1826 to 2738 pounds/acre/year).

[7] "Public Health Aspects of Hog Farm Odors," Memorandum from State Health Director A. Dennis McBride, M.D., M.P.H., Distributed to the Beaufort County Commission, February 2, 1999, in Beaufort County NOW, North Carolina, February 08, 1999.

[8] "New Fear from Hog Lots: Odor May Spread Illness--Evidence Mounts That Neighbors Are At Risk," The Des Moines Register, Des Moines, Iowa, October 25, 1998.

costs should be paid for by CAFOs and counted against any benefits that might arise from the use of animal waste. Instead, these costs are currently shifted to those who reside around the CAFO.

Costs of Land Application of Hog Waste

A number of additional problems arise when hog manure is applied to the land as fertilizer. First, it increases the odor from the CAFO and decreases the quality of life in communities located around CAFOs. Second, the animal waste is so rich in nitrogen and phosphorus that the CAFO must have large tracts of land on which to spread the waste to avoid over application and contamination of aquifers. This land cannot contain ground crops (such as potatoes, beets, etc.) that will be used for human consumption. Third, due to the feeding practices of CAFOs, hog waste has a high concentration of heavy metals that can pollute the land. And fourth, the large amount of water required for land application makes such practices undesirable in arid areas or those regions with limited ground water resources. Each of these problems has costs that can easily exceed the benefits of fertilizing land with hog waste, and the combined effect of all of these problems has caused many hog CAFOs to propose operations that no longer involve application of animal waste to crop lands. These proposals call for indefinite waste storage in lagoons and thus, they still have the costs associated with lagoon leakage. In addition, non-application plans often involve methane power generation since benefits from the fertilizer value of manure are no longer available to offset CAFO costs.

Costs of Non-Application of Hog Waste

When a CAFO decides to no longer apply animal waste to agricultural land, storage lagoons must contain the accumulated waste and some way must be found to safely deal with the pathogens and the biosolids in the lagoons. This situation, where concentrated numbers of animals generate waste that the land cannot absorb, is most similar to that encountered when humans inhabit places in such numbers that the land cannot absorb their wastes. If hog waste is treated in the manner law and sanitation standards mandate for human waste, the mid-range costs for waste treatment alone would be $173 per head at the national average sewage disposal cost. In addition, each hog generates 122 to 244 pounds of biosolids per year that must be safely disposed of.[9]

Thus, the true costs of dealing with hog waste in a manner that does not shift the costs of waste pollution away from the CAFO owner are either

(1) the cost of lagoon seepage plus the $173 per head per year cost of responsible sewage disposal plus the cost of responsible biosolid disposal or

(2) (if land application of animal waste is used) the cost of lagoon seepage plus the combined costs of air pollution, water pollution, heavy metal pollution and aquifer depletion.

The Benefits of CAFO Waste Use

To make a hog CAFO economically viable, the costs enumerated in the previous section for dealing responsibly with hog waste must be offset by the benefits from methane generation or fertilizer application. The true costs of waste application to cropland will exceed the benefits unless water is plentiful and cheap, heavy metal contaminated sludge can be cheaply and safely disposed of, huge areas of non-ground crop land are available to the CAFO for waste application, and the CAFO is so isolated that its odor and potential health problems cannot adversely affect its neighbors. Many of these conditions are essentially mutually exclusive; i.e. if water is plentiful and cheap and there is adequate cropland, population density will be high enough to be affected by odor and health problems. Thus, the likelihood of any, let alone all of these conditions occurring in a region is very small.

[9] Colorado Springs Utilities, 1998 Fact Book, Colorado Springs, CO, June, 1998, p. 10-15.

If, instead, methane generation is used to create economic benefits from CAFO waste the cost/benefit breakdown still does not look promising. For example, the costs and benefits of a methane powered manure system for hogs with a 10 year design lifetime would be (in $1999):

(1) Gas recovery costs for hog farm systems using 100% of the manure are $38-90/animal.
(2) Cost of gas utilization equipment depends on equipment size and energy demand. At a 5,000-head hog farm, generators cost $27/head.
(3) Annual O&M costs are $3/head.[10]
(4) At an electric price of $0.07/kWh, annual benefits from on-site electric generation at hog farms with over 1000 head are about $10/head (using 100% of manure).[11]

Thus, even if the lowest operating and construction costs for methane generation were achieved, it would still take over 8 years to simply recover the costs of building and maintaining a methane system whose life span is only 10 years. This is clearly not a sufficient benefit to offset the massive costs associated with CAFO waste.

The fact that costs exceed benefits simply confirms what any economist would suspect must be true: diminishing returns to scale quickly lead to costs of animal confinement that overwhelm any benefits of CAFOs. Since this implies that CAFOs operate at an inefficient scale, why have CAFOs been able to capture a large and increasing share of the hog market over the last thirty years?[12] There are three reasons: First, the costs of dealing with animal waste from CAFOs have been successfully avoided by CAFO owners and shifted to the surrounding regional population. Second, CAFOs have been major beneficiaries of industrial and agricultural tax breaks and industrial and agricultural subsidies. And third, CAFOs have benefited from a degree of vertical integration of giant agribusiness firms that appears to be in violation of US antitrust law. The US packing industry is a regulated industry governed by the Packers and Stockyards Act of 1921. This Act specifically prohibits the kinds of anti-competitive practices (such as captive supplies) that come from vertical integration. However, USDA reports continually show packer's captive supplies at near 100% for the first three to four trading days of each week. And USDA data also show producers have lost over $300 per head of their share of the

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[10] For Dairy Cattle the costs/benefits would be ($1990)

Installation costs for gas recovery systems on dairy farms using 15% of the manure are $65-160/cow; installation costs for dairy farms using 55% of the manure are $110-210/cow. On a 1000-head dairy farm, gas-fired chillers cost $24/head; wash water heaters cost $6/head (using 15% of the manure) to $11/head (using 55% of the manure); power generators cost $24/head (using 15% of the manure) to $53/head (using 55% of the manure).

Annual O&M costs for heating and cooling on dairy farms with 500-1000 head are $2.2/head; annual O&M for power generation costs $2.3/head (using 15% of manure) to $8.5 (using 55% of manure).

At an electric price of $0.07/kWh, annual benefit from gas recovered for on-site dairy farm power generation at dairy farms is $17/head (using 15% of manure) to $43/head (using 5%). Annual benefits from recovered gas for heating dairy wash water is at least $8/head.

American Society of Agricultural Engineers. 1988. Manure Production and Characteristics, ASAE Data: ASAE D384.1. American Society of Agricultural Engineers, St. Joseph's, MI.

and

US Environmental Protection Agency. July, 1993. Options for Reducing Methane Emissions Internationally - Report to Congress, Kathleen B. Hogan (ed.), EPA 430-R-93-006.

and

US Environmental Protection Agency. October, 1993. Opportunities to Reduce Anthropogenic Methane Emissions in the United States: Report to Congress, EPA 430-R-93-012.

[11] American Society of Agricultural Engineers. 1988, Op. Cit.

and

US Environmental Protection Agency. July, 1993, Op. Cit.

and

US Environmental Protection Agency. October, 1993, Op. Cit..

[12] 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.

consumer beef dollar at the same time that four-firm beef packer concentration has increased from 36% to over 80%.[13]

Thus, the ability of CAFOs to compete against other agricultural firms and to gain increasing market share can be directly traced to competitive advantages given to CAFOs through subsidies, cost shifting and vertical integration. These advantages have been able to compensate for declines in production efficiency at CAFOs due to diminishing returns. As a result, successful CAFOs must be specifically designed to take full advantage of cost shifting, subsidies, and vertical integration. As the following section will show, this means that CAFOs cannot assist in regional economic development.

CAFOs and Economic Development

There is a significant difference between regional economic growth and regional economic development. Economic growth concentrates on short-term changes in jobs or price while economic development creates a diversified economy capable of providing jobs, economic stability and economic growth for the citizens of a region over the long term. In this context, the underlying assumptions about the agricultural nature of CAFOs lead to another set of assumptions about their regional economic impact. When one views CAFOs as farms instead of factories, one tends to assume that

(1) the number of jobs created by CAFOs and their economic impact are the same as conventional agricultural operations. [This does not recognize that CAFOs are industry, not agriculture.]

(2) agricultural jobs are created relative to the amount of spending at the CAFO. [This does not account for capital intensive operations where jobs may be reduced by the amount of spending.]

(3) any jobs created by a CAFO are assumed to be in the region where the CAFO is located [This fails to account for the use of imported inputs and exported outputs.]

Because these agricultural-based assumptions do not hold for industrial CAFOs, CAFOs neither diversify rural regional economies nor improve the long term economic health of a region. Instead, these projects generate short term gains for developers and investors.

The subsidies, cost shifting and vertical integration that account for the success of CAFOs against other forms of production can be attributed to four characteristics of all CAFO operations:

(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 and local, state and federal subsidies to the corporation.

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

(4) Reducing the costs of production by shifting the costs of health problems, traffic, social problems and pollution (odors, chemical and particulate air pollution; chemical, pathogen, and particulate water pollution) to someone other than the CAFO.

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 specifically structured to limit these kinds of payments. For this reason, the four characteristics of CAFOs listed

[13] Callicrate, Mike, “Critics Say KS Ag Prof Flunked Marketplace Economics at Nebraska Governors Ag Forum,” Cattlemens Legal Fund, November 15, 1999.

above are fundamentally incompatible with regional economic development. In fact, the issue is not that a CAFO is unlikely to aid regional economic development, the issue is that CAFOs are structured so that 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.[14] In addition, while the employment multiplier for agriculture is about 1.8 for every direct employee, if one treats CAFOs as industrial operations, the multiplier would only be about 1.35.[15]

It is likely that even this figure overstates the economic impact on rural counties. For the employment multiplier to operate at the levels specified in the Department of Commerce RIMS II model, all employees must both live and work in the county. Given the ability to commute, it is likely that many workers will live well outside the region and that the actual employment multiplier will be further depressed.

The size of the employment multiplier further depends on amount of purchases a CAFO makes in the region. However, large scale animal production facilities are more likely to purchase their inputs from a great distance away, bypassing local providers in the process.[16] 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.[17]

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.[18]

(2) Constraints on Regional Economic Development Due To Taxes

Federal, state and local taxes are levied on taxable amounts calculated on federal returns. The numerous tax write-offs that are possible because CAFOs are sometimes treated as industries and, at other times, treated as farms, 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, and repairs. 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.[19] Colorado counties that have experienced increases in livestock operations have also reported

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[14] Park, Dooho, Lee, Kyu-Hee, and Seidl, Andrew, "Rural Communities and Animal Feeding Operations," Department of Agricultural and Resource Economics, Colorado State University, Ft. Collins, CO, 1988.
[15] RIMS II, Department of Commerce, Bureau of Economic Analysis, Washington, DC, October, 1997.
[16] Lawrence, John D., et al., "A Profile of the Iowa Pork Industry, Its Producers, and Implications for the Future," Staff Paper No. 253, Department Of Economics, Iowa State University, 1994.
[17] Chism, John, and Levins, Richard, "Farm Spending and Local Selling: How Do They Match Up?," Minnesota Agricultural Economist, no. 676, University of Minnesota Extension Service, Spring, 1994.
[18] Hayes, Dermot, Iowa's Pork Industry--Dollars and Scents, Iowa State University, January, 1998.
[19] Duncan, M.R., Taylor, R.D., Saxowsky, D.M., and Koo, W.W., "Economic Feasibility of the Cattle Feeding Industry in the Northern Plains and Western Lakes States," Agricultural Economic Report No. 370, Department of Agricultural Economics, North Dakota State University, 1997.

increases in the costs of roads, but specific dollar values are not available. [20] 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. [21]

(3) Constraints on Regional Economic Development Due To Vertical Integration

Vertical integration requires purchases from and sales to other members of the vertically integrated company, not from local producers and suppliers. Thus, vertically integrated companies stimulate regional economies only to the extent that all elements of the company are located in the region. Historically, this factor has severely limited the economic impact of CAFOs on the regions in which they are situated. For example, Lawrence found that in Iowa smaller hog operations (less than 700 head annually) purchased 69 percent of their feed within 10 miles of the operation. Large hog operations (2000 or more hogs per year) that are more likely to be vertically integrated only purchased 42 percent of their feed within 10 miles of the operation. [22]

(4) Constraints on Regional Economic Development Due To Cost Shifting

The previous three sections have described the reasons inherent in the structure of CAFOs that most of the money from a CAFO will either be directly spent outside the region or it will quickly migrate there. However, through cost shifting the CAFO will leave the costs of its odor, health risks, surface water pollution, ground water pollution and in the long run, its abandoned lagoons and facilities for the region to deal with. This directly effects both long and short run economic development.

Put bluntly, every company has many choices of location and active recruitment is practiced by most regions. Quality of life is a major factor in decisions to locate in a region, and most companies would never consider locating in an area where a CAFO is operating. In addition, CAFOs such as large hog farms adversely impact the value of neighboring property in the region.

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. A 1997 update 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. [23] 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 by 40%, within 1 mile by 30%, 1.5 miles by 20% and 2 miles by 10%.[24]

Conclusion

CAFOs do not diversify a regional economy already dependent on agriculture. Instead, they damage the ability of a region to attract diversifying economic growth and they cause property values around the CAFO to decrease. They do this because they can only compete with conventional agriculture firms if they can shift the costs of their operations (such as air and water pollution) to others, if they can receive heavy subsidies from both agricultural and industrial sources, and if they can

[20] Park et al., op. cit.
[21] Ibid.
[22] Lawrence et al., op. cit.
[23] Palmquist, R. B. et al., "The Effects of Environmental Impacts from Swine Operations on Surrounding Residential Property Values," Department of Economics, North Carolina State University, Raleigh, North Carolina, 1995.
[24] Park et al., op. cit.

maintain a vertically integrated structure that adversely affects market competition by restricting the ability of conventional producers to market their goods. As a result, the legacy of pollution, site abandonment, destruction of conventional farms, and market problems that accompany CAFOs hinders long-term economic development and makes any region where a CAFO is located a magnate for other dirty operations who are looking for contaminated, brown field sites that can be used for further contaminating operations.

As a result of all these issues, proposed CAFO use of land should be evaluated based on the following questions:

1. Does the proposed use make sense in light of budgetary, political, environmental and health considerations?
2. Does the proposed use make sense in terms of the region's ability to host such a facility based on geologic, environmental, water, and social considerations?
3. Have all costs of health problems, site remediation, waste treatment, etc. been fairly considered along with the potential benefits?
4. What are the short run and long run economic impacts?
5. Who benefits from this land use? Who does not benefit?
6. Do proposed uses of the land create an environment that helps the region maintain a stable economic base?
7. Will proposed land use contribute to economic diversity in the region?

Further, given the anti-competitive, anti-market environment that CAFOs create, both lawmakers and local citizens should insist that:

*Agribusiness corporations accept responsibility for all the environmental impacts of CAFO production at their contract farms. These corporations should be legally liable for violations of permits, waste management plans, and other environmental requirements.

*No CAFO be permitted unless air-tight, written contracts cover every phase of CAFO operation and every promise, statement of intent, and assurance given to the local region. Further, every contractual element should be bonded and additional bonds should be required to assure that resources will be available to close and clean up waste lagoons and restore the natural environment around them.

*Legislation to deal with agricultural pollution and market problems be guided by and constructed with input from conventional ranchers and farmers and local communities, not CAFO operators or their representatives and not representatives of corporate agricultural interests.

*Agricultural subsidies be directed solely toward conventional farmers who responsibly account for all their costs of production.

*The US government enforce the Packers and Stockyards Act of 1921.