

The Regional Economic Implications of
Concentrated Hog Feeding Operations in
the Mahatongo Valley of Pennsylvania
A Study Prepared For
The Concerned Citizens of Lower Northumberland
County

By Dr. William J. Weida
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Concentrated Hog Feeding Operations in the Mahatongo
Valley of Pennsylvania**

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NOTE: Much of the analysis in this paper is based on the assumption that the proposed hog operation is using a slurry waste management system. The lack of a firm and complete proposal by the potential operators make this analysis preliminary and subject to revision once an adequate proposal is available.

Executive Summary

The proposal of Pleasant Valley Foods [Affiliated with Ruth Family farms and Trevorton Farms with further affiliations at Hatfield Foods and Wengert Feed] for a hog concentrated animal feeding operation (CAFO) in Northumberland County raises the following issues about the likely impact of this operation on the regional economy of the Mahatongo Valley and the Rebeck/ Greenbriar area. All of these issues have significant economic implications.

1. A significant amount of flushing and drinking water will be consumed by proposed Pleasant Valley Farms site. Based on statements made by the individuals proposing the site and on known usage and waste generation rates, the proposed hog farm will consume 7,140,800 gallons of water per year. This equates to 19,560 gallons of water per day.

2. Spreading the waste on crop land

Application is restricted during the winter and it must not exceed nitrogen or phosphorus requirements for the land. The proposed Pleasant Valley Foods operation would require 250 spreadable acres of land for nitrogen and about 850 spreadable acres of land for phosphorus.

When hog manure is knifed into the ground, the pathogens are not destroyed. Land application also allows heavy metals and salt to accumulate in the soil. Injection of waste is also likely to contaminate the water under the land with waste-borne pathogens.

3. Health considerations

Waste storage under buildings puts the hogs in the buildings and people working there at significant risk. Health risks are also levied on off-site neighbors. 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. Minnesota 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. Surveys of people living in rural North Carolina found that headaches, runny noses, sore throats, excessive coughing, diarrhea and burning eyes were reported more frequently near hog operations.

4. Regional economic development proceeds on the premise that the wages paid and purchases made by a company occur within the confines of the region and that they do not “leak” into other areas of the state or nation. Hog CAFOs are specifically structured so they cannot aid regional economic development for the following reasons:

- a. As a capital intensive company, a hog has been designed to minimize the number of workers involved. This also minimizes the economic impact of the proposed hog farm on the region. Maximum regional employment, both direct and indirect, from the proposed sow operation is likely to be about 16 employees.
- b. The numerous tax write-offs that are possible because hog CAFOs are treated as industries and not farms lower the amounts of taxes paid locally at the same time the operations of the hog CAFO create social, health and traffic costs that the local government must finance.
- c. Vertically integrated companies like hog CAFOs stimulate regional economies only to the extent that the other elements of the company are located in the region. Historically, this factor has dramatically limited the economic impact of hog CAFOs on the regions in which they are situated.

- d. 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 prospects for both long and short run economic development in the region.

Specific Issues

I. The following issues are raised by preliminary information about Pleasant Valley Foods' application for a concentrated animal feeding operation permit for 2800 hogs on a 250 acre site in the Mahatongo Valley of Pennsylvania. Based on the sketchy descriptions provided by those who are proposing the site, it appears to use a slurry waste system. This system uses less water than a flush system, but it relies on keeping the waste in the pits below the buildings agitated and keeping the buildings well ventilated. Use of a slurry system creates two problems: first, the requirement to agitate the waste and to immediately remove gasses from the waste increases the odor from the facility and second, if power fails, agitators break, or ventilation systems malfunction, gasses from a slurry system can kill the inhabitants of the barn over the pit.

A. Slurry System Water Use

The final hog population figures for the Pleasant Valley Foods operation are claimed to be 2800 sows with litters until 14 days. This will probably require cycles of 450 sows at a time in the farrowing shed. When waste is accumulated in a 2-foot-deep pit--as it is under the farrowing shed--it is usually mechanically scraped into a pit outside the shed. If the farrowing shed and the larger, breeding shed are connected by a tunnel or ditch, the waste could also be scraped into the larger, 9-foot-deep pit. Waste is removed from the pit(s) on an interval of roughly 6 months and taken to the fields for application. Application in this case is claimed to be by injection 8-10 inches below the soil level.

For the purposes of these calculations, I have assumed that both the 2 foot and 9 foot pits are used to arrive at the waste storage capacity claimed by Pleasant Valley Farms. I have also assumed that a 6 inch freeboard would be required in each pit. There also appears to be a shed for barrows, but the population of these animals has never been given and they have not been included in the following calculations. The inclusion of these hogs would increase the water use and waste generation given in the following sections.

Given these assumptions and restrictions, water use and waste generation for this facility and its population of sows and piglets can be calculated as follows:

a. Drinking Water(Source of figures:¹ and ²)

Gestating Sows: 5 gallons/head/day (169 days) (2 cycles) (2800 sows) = 4,732,000 gals/year.

Farrow Sows w/litter: 7 gallons/head/day(14 days)(2 cycles)(2800 sows) = 548,800 gals/year.

Total drinking water consumed = 5,280,800 gallons/year or 14,467 gallons/day

b. Waste Storage Capacity

Pleasant Valley Foods claims that the pits underneath its buildings will be of sufficient capacity to store 8 months accumulation of waste. There will be three buildings with two pits: a 65'X448'X8.5' pit for breeding/gestation and a 82'X218X1.5' pit for farrowing.

The large pit will hold about 248,000 cubic feet or 1,855,000 gallons.

The small pit will hold about 27,000 cubic feet or about 202,000 gallons.

Thus, total waste storage capacity is about 2,060,000 gallons

¹ National Average data from Raftelis Environmental Consulting Group 1998 Water Survey based on 137 water systems (1997 data). and

1998 Fact Book, Colorado Springs Utilities, City of Colorado Springs, Colorado Springs, CO, June, 1998.

² Donham, Kelley, and Thu, Kendall, "Introduction," Understanding the Impacts of large-scale Swine Production, Proceeding from an Interdisciplinary Scientific Workshop, Des Moines, Iowa, June 29-30, 1995, p. 14.

To be able to accumulate manure for 8 months as the developers of the hog farm claim, this amount of storage assumes a liquid accumulation rate of about 8600 gallons per day.

A barn with 1000 hogs generates about 400 gallons of airborne moisture in 24 hours.³ Thus, 2800 hogs will generate about 1120 gallons per day.

An average hog produces about 1.9 tons of waste or 3800 pounds annually. For 2800 hogs this equates to 10,640,000 pounds of waste per year. If one assumes all of this waste is liquid this would represent the minimum expected volume of waste--solids will increase this volume.

Then, 1 gallon of water weighs 8.35 pounds and the annual waste produced would be about 1,274,251 gallons. This equates to about 3,500 gallons of waste per day [or 1.25 gallons of waste per hog per day.]

Since the waste accumulation rate given by Pleasant Valley is about 8600 gallons per day, this implies about 5100 gallons of flush water would be used daily [or about 2 gallons per hog] or about 1,860,000 gallons annually.

In sum, total flushing and drinking water consumed at the proposed Pleasant Valley site are likely to be:
 $1,860,000 + 5,280,800 = 7,140,800$ gallons per year or
19,560 gallons of water per day.

B. Spreading the waste on crop land

If the effluent from the Pleasant Valley Foods operation is applied to the land, certain restrictions will apply:

- i. application should not occur during the winter,
- ii. application must not exceed nitrogen requirements for the land and,
- iii. to avoid runoff problems that could lead to eutrophication of waterways, application should also not exceed phosphorus requirements for the land.

Nitrogen application limits have been established by the state of Pennsylvania, but responsible waste management also mandates that hog waste not be applied at rates greater than the applicable rate for phosphorus. While nitrogen and phosphorus requirements will vary by crop and area, the following calculations provide general estimates of application amounts:

(a) Spreadable Acreage Requirements Based on Nitrogen

Total Nitrogen production⁴:

Gestating Sow: .0421 lb./head/day (169 days) (2 cycles) (2800 sows)
= 39,843 lb./year

Farrow Sow w/litter: .1318 lb./head/day(14 days)(2 cycles)(2800 sows)
= 10,333 lb./year

Total nitrogen production = 50,176 pounds per year.

Assume an average application rate of 200 lb./acre

³ Nikolov, Nick, HYGREX™ Dry Air Systems, P.O. Box 346, 11 Holland Drive, Unit 5, BOLTON, Ontario, L7E 5T3-Canada, February, 2000.

⁴ Source for nitrogen excreted per head: Nitrogen Estimate, Agri-Waste Technology, for Midwest Farms, LLC, Disk MWF 3, May 1, 1997.

Then the Pleasant Valley Foods operation would require 250 spreadable acres of land for nitrogen.

(b) Spreadable Acreage Requirements Based on Phosphorus

Hog waste, especially sludge from the bottom of pits and lagoons, is typically phosphorus enriched relative to crop needs. The ratio of available nitrogen to phosphorus from hog manure can be up to 1.5:1, whereas corresponding requirements for corn is about 5-6:1.⁵ For example, recent studies in Colorado found a nitrogen/phosphorus ratio of 5:1 for corn in Yuma County and "... Ohio has recently changed its recommendations, so that wastes are spread according to the phosphorus, rather than the nitrogen needs of the crop."⁶⁷

Given that ratios of nitrogen to phosphorus can be up to 1.5 to 1, assume a more conservative ratio of 2 to 1.

Total Phosphorus production:

Gestating Sow: .0211 lb./head/day (169 days) (2 cycles) (2800 sows)
=19,969 lb./year.

Farrow Sow w/litter: .0659 lb./head/day(14 days)(2 cycles)(2800 sows)
= 5,166 lb./year.

Total phosphorus production =25,135 pounds per year.

Phosphorus requirements are about 27-33 pounds per acre (note: these estimates are confirmed in actual crop tests by Al-Kaisi and Waskom.)⁸ A University of Pennsylvania publication demonstrates that even at rates of 40 lb./acre/year, phosphorus buildup in the first five inches of soil can approximate 75 PPM after 10 years. This can be compared with agronomic thresholds of 20 to 50 PPM in the states of Arkansas, Delaware, Ohio, Oklahoma, Michigan, Texas, and Wisconsin. In fact, for concentrations of more than 75 PPM, phosphorus application should be discontinued in most of these states.⁹

Thus, at an average application rate of 27-33 pounds per acre the Pleasant Valley Foods hog operation would require 837 spreadable acres of land for phosphorus.

Note that if one follows the spreadable acreage requirements based on phosphorus, only about one-third of nitrogen requirements will be applied to the land. This implies that expenses for commercial fertilizer will only be nominally reduced on land where hog waste is applied.

(c) Costs of Land Application of Hog Waste

A number of additional problems arise when hog manure is applied to the land as fertilizer. First, if hog waste is applied by spraying, it significantly increases the odor from the CAFO and decreases the quality of life in communities located around the CAFO. However, since hog waste contains a number of pathogens that are only destroyed by exposure to sunlight, spraying does allow this pathogen destruction to occur.

⁵ Pennsylvania State University, The Agronomy Guide 1995-1996, College of Agricultural Sciences, The Pennsylvania State University, University Park, PA, 1994.

⁶ Al-Kaisi, Mahdi, and Waskom, Reagan, Summary Report: Swine Effluent Study 1995-1997, Department of Soil and Crop Sciences, Colorado State University, 1998, p.5.

⁷ Understanding the Impacts of Large-Scale Swine Production, Proceedings from an Interdisciplinary Scientific Workshop, Des Moines, IA, June 29-30, 1995, p. 30.

⁸ Al-Kaisi, Mahdi, and Waskom, Op. Cit.

⁹ Managing Phosphorus for Agriculture and the Environment, Penn State, College of Agricultural Sciences, Cooperative Extension, 1999, p. 4, 12.

Second, if the waste is injected (knifed) into the ground, the pathogens are not destroyed and the spreadable acreage should not contain ground crops (such as potatoes, beets, etc.) that will be used for human consumption. Further, injection of the waste into the soil is likely to contaminate the water under the land with pathogens. Third, due to the feeding practices of CAFOs, hog waste has a high concentration of heavy metals that can pollute the land. And fourth, there is also likely to be a build up of salt contamination in the soil where the waste is applied. 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.

C. Health Considerations associated with the Pleasant Valley Foods hog operation

Pleasant Valley Foods claims that it will store the waste from its hog operations in pits under the hog buildings. Any plan to store significant amounts of hog waste under buildings puts the hogs in the buildings and people working there in great danger from hydrogen sulfide gas buildups and from explosive methane gas concentrations. In the past, OSHA has taken a very dim view of this kind of working environment unless a large amount of expensive equipment, gas-tolerant electrical wiring, and other modifications are made. All of this drives up the cost, increases the likelihood of massive hog die-offs in the buildings if ventilation systems fail, and makes the hog farm less competitive.

(a) Other Health Costs

A significant 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.¹⁰

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.¹¹ These kinds of costs should be paid for by CAFOs and incorporated in the costs of the animals they produce. Instead, these costs are currently shifted to those who reside around the CAFO.

Surveys of people living in three rural North Carolina communities suggest industrial hog farms both reduce the quality of life for people living near them and adversely affect their health. A University of North Carolina at Chapel Hill study found that "...headache, runny nose, sore throat, excessive coughing, diarrhea and burning eyes were reported more frequently in the hog community." More than half of respondents in the hog community, as compared to fewer than a fifth in the other two areas, reported not being able to open windows or go outside even in nice weather 12 or more times over the previous six months.¹²

¹⁰ "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.

¹¹ "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.

¹² Lazaroff, Cat, "Hog Hell in North Carolina," © Environment News Service (ENS) 2000, Chapel Hill, North Carolina, February 9, 2000.

II. Comments on the impact of Pleasant Valley Food's proposal on economic development in the Mahatongo Valley.

There is a significant difference between economic growth and economic development. Economic growth concentrates on short-term changes in jobs or price while economic development has the objective of creating a diversified economy that is capable of providing jobs, economic stability and economic growth for the citizens of a region over the long term. As opposed to this objective, the concentrated animal feeding operation (CAFO) proposed for the Mahatongo Valley neither diversifies the regional economy nor improves the long term economic health of the region. Instead, its primary effects will be short term gains to developers and investors. Whether or not this is an admirable goal, it does not contribute to the long-term economic development of the region.

A number of scientific studies have shown that hog CAFOs are no more efficient than a significant percentage of conventional hog producers.¹³ 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." Further "...total confinement...had...the highest risk [and]...the pasture system provided more stable returns, thus a lesser amount of risk."¹⁴ In spite of this, hog CAFOs have captured a large and increasing share of the hog market over the last thirty years.¹⁵ The success of hog CAFOs against other forms of production can be attributed to four characteristics of all hog 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 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 costs of health problems, traffic, social problems and pollution (odors, chemical and particulate air pollution; chemical, pathogen, and particulate water pollution) are transferred to the residents of a region and are neither paid by the company responsible for the costs nor included in the price of the products they market.

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

¹³ 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.

¹⁴ Kliebenstein, James B. and Slepser, 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.

¹⁵ 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.

structured to limit these kinds of payments. For this reason, the four characteristics of CAFOs listed 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) Employment effects of the Pleasant Valley Foods hog operation:

As a capital intensive company, a CAFO such as Pleasant Valley Food's proposed hog operation has been designed to minimize the number of workers involved and hence, minimize the economic impact of the hog farm's proposed operation on the Mahatongo Valley region. Pleasant Valley Food has claimed that the proposed CAFO will employ 5 people initially and 9 people when it is operating at full capacity. This would appear to be in line with a 1998 Colorado State University study that found that 3-4 direct jobs (jobs with the hog producer) are created for every 1000 sows in a CAFO sow farrowing operation.¹⁶ Based on this number of direct jobs, the Department of Commerce RIMS II model for Pennsylvania predicts that 7 to 8 additional jobs will be created in the region (or .85 additional jobs for every job at the hog farm) for a total of 16 to 17 total jobs in the region.¹⁷

It is likely that this figure overstates the economic impact on the Mahatongo Valley region. For the employment multiplier to operate at the levels specified in the RIMS II model, it is assumed that all employees live, work, and spend their income in the region. Given the small size of local communities such as Rebeck and Greenbriar and the relatively short commute to larger communities outside the region, it is likely that most workers will live and spend well outside the region and that the actual employment multiplier will be significantly depressed.

Average wages for swine workers in 1998 were:

Manager	\$33,022
Asst. Manager	\$26,067
Farrowing Manager	\$25,800
Herdsmen	\$22,463.

There are preliminary indications that the manager of the Pleasant Valley Foods hog operation will be someone who is already located at the operation site. However, while lower-paying jobs may be filled with local people, managers are usually recruited from outside the community.¹⁸ To the extent that hog farm workers live in the Mahatongo Valley, these wages would be spent in the local economy. However, the proximity of larger towns and the availability of housing near the hog operation are both likely to cause these expenditures to be shifted out of the region.

The size of the employment multiplier will further depend on amount of purchases that Pleasant Valley Foods makes in the Mahatongo Valley region. Because they are set up to maximize profit, large scale hog production facilities are likely to purchase their inputs from a great distance away, bypassing local providers in the process.¹⁹ 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.²⁰

¹⁶ 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.

¹⁷ RIMS II, Department of Commerce, Bureau of Economic Analysis, Washington, DC, October, 1997.

¹⁸ Park, et al., op cit.

¹⁹ 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.

²⁰ 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.

The Mahatongo Valley produces both corn and soybeans. It is reported that offers have been made by Pleasant Valley Foods to buy local corn for use as hog feed at inflated per bushel prices that are as much as 25% above market rates. While hog production can occasionally benefit local corn producers, this only occurs when the hog producer consumes all the corn produced in the region. If the region has to export even one bushel of corn, all the corn in the region must be priced at a level that will enable the corn growers to compete in the national market.²¹ While initial purchase offers at above-market rates are often extended by pork producers who are trying to get hog farms into an area, absent a binding long-term contract, it is obvious that these producers will quickly return to the lowest price source for feed once they are established in the area.

(2) Constraints on Regional Economic Development Due To Taxes

Federal, state and local taxes are levied on the taxable amounts calculated on federal returns. The numerous tax write-offs possible because hog 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 hog 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 decreases 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 road gravel costs increased by about 40% (about \$20,000 per year) due to truck traffic to hog CAFOs. Annual estimated costs of a 20,000 head feedlot on local roadways were \$6447 per mile due to truck traffic.²² 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.²³ 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.²⁴

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

The proposed Pleasant Valley Foods hog operation is part of a vertically integrated firm. 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.²⁵

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

The previous three sections have described the reasons inherent in the structure of hog CAFOs that most of the money from a hog 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

²¹ Hayes, Dermot, *Iowa's Pork Industry--Dollars and Scents*, Iowa State University, January, 1998.

²² 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.

²³ Park et al., op. cit.

²⁴ Ibid.

²⁵ Lawrence et al., op. cit.

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 large hog farms are operating. In addition, 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 value of 7.1 percent occurred for houses within one-half mile of a new facility in a low hog farm density area. [Note: this would mirror the situation in the Mahatongo Valley where hog farm density is currently low.] 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 \$60,800.²⁶

From what evidence does exist, it also appears that large hog facilities also have a negative impact on rural residences. Negative impact decreases as distance from the facility increases and in areas that already have a large number of hog operations.²⁷ 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%.²⁸

Conclusion

Hog CAFOs do not diversify a regional economy already dependent on agriculture. Instead, they damage the ability of the region to attract diversifying economic growth and they cause property values around the hog sites to decrease. In the long run, the legacy of pollution and site abandonment that accompanies hog CAFOs hinders long-term economic development and makes the region a magnet for other dirty operations who are looking for contaminated, brown field sites that can be used for further contaminating operations.

²⁶ 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.

²⁷ Lasley et al., op. cit., p. 123.

²⁸ Park et al., op. cit.