The Hog ILO, Its Implications for Rural Economies in Canada and the US
And
Comments on the Report to Joint Agricultural and Rural Affairs Committee and Planning and Development Committee and Council

By Dr. William J. Weida

Department of Economics
The Colorado College, Colorado Springs, CO

July 11, 2002

Introduction

One major reason hog ILOs locate in an area is that the area's ILO regulation and enforcement is more lax than that of its neighbors. 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).

Given the recent moratorium on hog ILOs in Quebec, this location rational has profound implications for Ontario. The stricter the environmental regulation and enforcement becomes in other areas, the more likely that pressure to build additional hog ILOs will increase in areas like those around Ottawa. Unfortunately, hog ILOs have an incentive to pollute to reduce their costs of production and the sole deterrent to this incentive is the ability to implement and enforce meaningful regulation.

Failure to enforce regulations can have dire economic consequences for regions in which hog ILOs locate. The pollution associated with hog ILOs is not compatible with the in-migration necessary to stimulate the economy of rural areas. In fact, this pollution, unless controlled, can stimulate out-migration. A 2000 study of 1,106 rural communities by Gómez and Zhang of Illinois State University found that economic growth rates were 55% higher in areas with conventional hog farms as opposed to those with larger hog operations even though these growth rates had been almost identical in the studied communities before the advent of larger hog operations. This study also showed that communities with heavy hog concentration suffered larger population losses than those with conventional hog operations (Gómez and Zhang, 2000).

This paper is comprised of two sections: Section I is a brief critique of some of the points raised in the Report to Joint Agricultural and Rural Affairs Committee and Planning and Development Committee and Council, 25 June 2002. Section II will present a review of the current research on the subject of hog ILOs and local economies as well as supporting evidence for the comments made in Section I.

SECTION I
Brief comments on pending rules and legislation

1. The difference between ILOs and CAFOs

The Report to the Joint Committee and Council attempts to show that

> An intensive livestock operation is, therefore, an agricultural use actively involved in crop production, which is not the case for "animal feeding operations" or "concentrated animal feeding operations."(Report, 2002)

This is a distinction and not a difference-- aside from the number of animal units that trigger the various designations. Appendix I in this paper has the section from the current EPA document that explains the existing definitions of an AFO and a CAFO and details what changes are proposed in those definitions. Note that the EPA states that :

> EPA interprets the current regulations to include discharges of CAFO-generated manure and wastewaters from improper land application to areas under the operational control of the CAFO as discharges from the CAFO itself. Otherwise a CAFO could simply move its wastes outside the area of confinement and over-apply or improperly apply those wastes, which would render the CWA[Clean Water Act] prohibition on unpermitted discharges of pollutants from CAFOs meaningless.

CAFOs in the US face similar nutrient management requirements and they must show that they own the land on which waste is to be spread or that they have written agreements to use land for spreading. As citizen outcry over the odor associated with spreading hog waste has increased, a very few hog CAFOs in arid areas of the US have proposed leaving hog waste in the lagoons and simply letting the effluent evaporate. However, this number of CAFOs is insignificant and there is no difference between the vast majority of US CAFOs and Canadian ILOs.

2. The objectives of legislation and rules

The proposed Legislative Assembly Bill 81, 2001: "An Act to provide standards with respect to the management of materials containing nutrients used on lands…." is based on the intent to reduce the adverse effects of ILOs on surrounding neighbors. These adverse effects are listed as:

> (3) The adverse effect mentioned in clause (2) (c) is an effect that is one or more of the following:
> 1. Impairment of the quality of the natural environment for any use that can be made of it.
> 2. Injury or damage to property or to plant or animal life.
> 3. Harm or material discomfort to any person.
> 4. An adverse effect on the health of any person.
> 5. Impairment of the safety of any person.
> 6. Rendering any property or plant or animal life unfit for human use.
> 7. Interference with the normal conduct of business (Bill 81, Part IV, 17(2)(c)Subsection 3).

It is presumed that Ottawa's attempts to regulate ILOs will support these objectives. However, this list brings up two important points. First, the adverse effects that are the targets of Bill 81 are known to be associated predominantly with hog ILOs and more specifically, with the air pollution

emanating from these facilities. And second, the time available to remediate these effects varies considerably depending on the kind of pollution involved. Air pollution is a fast-moving, transient phenomenon, and it must be treated accordingly.

3. The definition of nutrient management

The Report states that

> Determination of land application rates involves balancing the relationship between the volume and nutrient concentration of the manure, the nutrient content of the soil, and the nutrient requirements of the crop…..Through this process, an intensive livestock operation is required to own and/or have sufficient land to apply the manure produced by the livestock it accommodates and, more significantly, has to balance the crop nutrient requirements with the nutrient concentrations of the soil and manure (Report, 2002).
>
> The proposed nutrient management plans…require farmers with intensive livestock operations to be more proactive in addressing the potential impact of their farming operations, particularly in the land application of the manure, in order to reduce emissions to the air and to the surface and groundwater resources (Report, 2002).

Based on these statements, and based on the fact that hog manure generally contains about twice as much phosphorus as crops need if the manure is applied on a nitrogen standard, one would assume the Report would recommend applying hog waste on a phosphorus standard to avoid buildup of phosphorus on the land and subsequent leaching into waterways. The Report should also emphasize that hog waste contains a number of heavy metals and salts that tend to concentrate in the land and must be carefully monitored on an annual basis.

4. Animal unit conversion factors

In this writer's experience, the animal unit conversion factors used in the Report bear no similarity to those used anywhere else and have no apparent basis in reality. Similar conversion factors may be used in Ontario, but in virtually every other jurisdiction in North America, animal unit conversion factors are based roughly on average weight—following the assumption that the amount of excrement is related to the size of the animal. While such a rule does not take odor into consideration, it does allow gross estimates of the biomass that must be dealt with as manure is spread on the land.

A cursory view of the animal unit conversion factors proposed in the Report makes the case that something is terribly wrong with the factors listed. Sows weigh about 400 pounds. As a result, most conversion factors show 2.5 sows per animal unit. Sheep weigh about 150 pounds. And yet the suggested conversion factors in the Report have 4 sheep and 5 sows per animal unit (Report, 2002). In fact, the conversion factors allow the same number of Emus as sows—when there is clearly no comparison in terms either of size or output of excrement.

Since the conversion factors used for swine are twice a big as they should be, this means that in reality the animal unit designations proposed in the Report for a hog ILO—and for any other type of hog operation—are, in reality, twice as large as those listed in the Report. Thus, the proposed Sarsfield site is, in reality, 1120 animal units without even counting the weanling pigs and finishers (if any).

5. Odor control

The Report states that

> **Odour controls:** The three main sources of odours from livestock operations are the manure storage facility, the buildings housing the livestock and the method of manure application….Intensive livestock operations will be required to provide a cover, of any appropriate form or substance, on their manure storage facilities at all [time] and to use methods that reduce the occurrence and duration of odours during land application (Report, 2002).

As a general rule of thumb, 60 percent of odour comes from the hog barns (and the large exhaust fans needed to ventilate them) and 40 percent comes from the lagoons. In recent tests by a cover producer, lagoon covers have been shown to reduce odour by about 40-50 percent. This means a facility with a lagoon cover will put out 80 percent of the odour of a facility without a cover. This is unlikely to be sufficient to significantly reduce the impact on surrounding residents.

6. Leak detection

The report states that

> **Leak Detection from Manure Storage:** To prevent undetected leakage of manure from storage facilities, electronic monitoring devices are recommended around the storage facilities of all intensive livestock farms (Report, 2002).

Most leaks occur under the lagoon, not around it. As a result, leak detection on the perimeter of a lagoon can only confirm that the pollution has already escaped. To prevent leaks, all lagoons should be lined and leak detectors should be placed under the lagoons in prepared, underground effluent collection areas. This provides time to drain the lagoon when a leak is detected and before it contaminates the groundwater.

7. Monitoring and Enforcement

The Report states that

> Enforcement of this regulation will include both a complaint-driven process and inspections by City staff. With regards to complaints received from the public, all will be investigated(Report, 2002).
>
> Water samples are proposed to be taken on an annual basis from the monitoring wells adjacent to the manure storage facilities. This sampling procedure will be incorporated into the routine inspection conducted by the Public Health Inspectors (Report, 2002).
>
> Periodic inspections, perhaps twice per year to coincide with normal manure land application times of spring and fall, are also suggested to confirm nutrient management activities are conducted as planned (Report, 2002).

Complaint-driven enforcement does not work for air pollution. There are three main reasons why this is true. First, Air pollution conditions are transient, and unless the inspector happen to be at the site when the complaint is registered he/she is unlikely to be able to get to the site in time to record the condition. Second, odour complaints by average citizens are subjective. Odour inspectors must be trained and certified to register valid complaints and any other complaint will be countered by the ILO owner who will claim that the complainer is "just sensitive." And third, air pollution is highly sensitive to weather

and terrain features. As a result, people in one area are likely to be greatly affected while those in another, similar area are not affected at all. Further, the heavier gasses in hog manure tend to follow the terrain during times of cooling (i.e., in the evening) when no inspectors will either be present or on call.

For all of these reasons, there is no record in the US of a complaint-driven system doing anything to prevent air pollution. And the visits of the (single) inspector proposed by the Report will be too infrequent to be able to monitor either air pollution problems or water pollution. As established, this part of the Report gives hog ILOs carte blanche to do anything they want in terms of air pollution. The likelihood they will be either detected or stopped is so small that it will be of no concern.

Proper monitoring of hog ILOs is prohibitively expensive. And that raises a very important point: why allow facilities to open in the first place when they present a region with only two options—(a)air and water pollution that follows the inability to properly monitor operations or (b)heavy expenses from monitoring, the costs of which must be assumed by the taxpayers? As the following sections will demonstrate, there is no economic justification for allowing either condition to exist.

SECTION II
Property Values and Tax Revenues—The Evidence

A number of separate lines of inquiry have investigated the unfavorable trends in property values and tax revenues that develop where hog ILOs are common (Abeles-Allison, 1990; Abeles-Allison and Connor, 1990, Palmquist, R. B. et al., 1995, Kilpatrick, 2001). Hog ILOs are a point source of both water and air pollution that falls unevenly across the area surrounding the ILO. Of the two, air pollution has generally imposed the most immediate and significant costs on surrounding rural residents and those closest to the hog ILO bear most of these costs.

The economic loss suffered by the neighbors of a hog ILO can be significant. Costs shifted to the residents of the region by a hog ILO 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 ILOs 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 ILO does have an impact on property values. Based on the averages of collected data, loss of land values within 3 miles of a hog ILO 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. 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 hog ILOs. 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 hog [ILOs],.....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 hog ILOs. On September 14, 2001, Clark County, Illinois established an assessment abatement for fifty residential homes around the Welsh Farm (a hog ILO) 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).

Hog ILOs and the desire for isolation

Hog ILOs 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. They use/hire very few people and often import those employees who run their facilities. These people usually live far from the hog ILO site. To further reduce costs, the hog ILO 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 hog ILO an incentive to leave an area before the tax base deteriorates and before tax rates increase.

Because they are intent on finding isolated locations, hog ILOs 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 hog ILO specified as part of its site requirements. The transportation links the hog ILO 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 hog ILO, and who are likely to complain are nuisances to be avoided and their influence is must be reduced as expeditiously as possible.

For obvious reasons, these activities are not accompanied by published statements of intent, but they can often be implied. For example, in 1997 the Canadian Pork Council asked Agriculture and

Agri-Food Canada to develop a coordinated vision and approach to the environmental challenges faced by the Canadian hog industry. The vision statement forecasts that:

> [e]nvironmental constraints to hog production in Canada will be significantly reduced within the next three years through the joint efforts of government, industry and other interest groups (AAFC Hog Management Strategy Development, 1997).

This statement effectively removed residents of rural areas from any role in determining the impact of hog ILOs on their area and, at the same time, stressed the one factor—reduced environmental constraints—that would make rural agricultural areas undesirable for those residents.

Attempts to control the regulatory environment

The fastest way to reduce demands for new regulation is to simply buy out the nearest residents who are most likely to complain. However, buyouts are expensive and hog ILO owners usually prefer a cheaper option: acting through existing legislation such as Right-To-Farm laws, hog ILOs claim to be agricultural operations who are protected from nuisance lawsuits concerning water and air pollution. While these arguments are received favorably at state and provincial levels, their reception by local residents who must actually bear the costs of the pollution has been very different. Local control of conditional use permits by counties in most states and Canadian provinces has been reimposed in an attempt to halt hog ILO expansion in their region. And when these efforts have failed, some counties such as Worth County, Iowa have resorted to the use of county health regulations to keep hog ILOs out.(Marbery, 2001)

There is an important difference between water and air pollution where regulation is concerned. Water pollution often takes a significant amount of time to register in wells and other monitoring locations (for example, in eastern Colorado and in the Texas Panhandle it takes about 20 years for surface pollution to reach the aquifer.) Air pollution, on the other hand, is seldom regulated and has an immediate effect. Those county-level regulations that have caused hog ILOs to locate elsewhere directly address the short term pollution concerns that local residents feel would destroy property values and result in depopulation—and those concerns usually involve air pollution.

In the last five years, hog ILO owners have responded to the growth of county-level regulation by attempting to remove any 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 by hog ILO owners. In the state of Texas and in the province of Alberta, Canada, this has created a regulatory structure that relaxed laws for permitting facilities, established lax oversight of existing regulations, and reduced public participation "loopholes." Indeed, in the Texas case not only were the counties rendered powerless, but citizens have effectively lost almost any right of legal redress: Texas laws required a person suing another for a nuisance to pay all court cost for both sides—whether or not they win.

Hog ILOs 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 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 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).

Just as the cost of airborne pollution falls unevenly on the neighbors of the hog ILO, so does the loss of the right to exclusive use. This, in turn, means that the rural residents around the hog ILO 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 hog ILO owners desire because it leads to the creation of more hog ILO sites. Unfortunately, the side effect of these actions is to hasten the depopulation of rural agricultural areas where hog ILOs are located as more and more land is rendered uninhabitable due to air pollution.

This explanation provides the rationale for certain hog ILO actions that seem to make little economic sense. For example, why would a hog ILO, whose main concern is driving down the cost of production, engage in a lengthy and costly legal fight to force itself on a rural area when it would be simpler to just move the site to a more hospitable location? One answer lies in the realization that the legal fight, if successful, will break open the area not only for the hog ILO owner who is suing, but also for additional hog ILOs that are likely to follow.

This also provides one plausible explanation for the rapid growth in contract hog operations. On their face, contract hog finishing operations would appear to be at variance with the desire of modern hog ILOs to be completely vertically integrated (Morgan Stanley Investors Conference, 2002, p. 8) However, the use of contract finishers allows major, vertically integrated hog ILO owners like Smithfield, Maple Leaf, or Premium Standard to gain entrance to a rural area through a local resident. Once this entrance has been gained, the loss of the right to exclusivity will commence and entrance will be much easier for additional operations.

One could claim that the setback provisions of any hog ILO 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 hog ILO 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.

The role of rural areas in hog ILO location

Creation of a moral hazard

A proposed hog ILO will hide most important information about its planned activities from the rural residents of the region it is entering. When a hog ILO 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 hog ILO promises these things in return for land, water, access, power and the other factors that are required for the hog ILO 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 hog ILO.

The hog ILO 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 hog ILO's explicit contract with its organization. As a result, there is an incentive on the part of the hog ILO 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 hog ILO facilities (Hennessy and Lawrence, 1999, p. 53). When a hog ILO 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 hog ILO.

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 hog ILO by shifting the operating costs of the hog ILO to the residents around its operation. The certainty of this outcome follows directly from existence of asymmetrical information about the operation of the hog ILO and from the motivation of the hog ILO owners.

These factors create an agreement (contract) between a hog ILO 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 hog ILO on the physical, social and economic environment is withheld from the public and is available only to the owners/operators of the hog ILO. 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 hog ILO).

As the previous paragraphs in this paper have shown, the moral hazard associated with hog ILOs is not uniformly spread across the region. Instead, it is concentrated on those rural agricultural landowners who are closest to the hog ILO—and who have less political power in the permitting

process. This moral hazard manifests 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 hog ILO 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 hog ILO 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 hog ILO. Unfortunately, hog ILOs use laws based on loose, conventional agricultural standards to avoid pollution controls that would more fully assign the costs of waste to the hog ILOs. In addition, the factors that make it difficult to get information on proposed hog ILO operations during the permitting process also complicate attempts to monitor hog ILOs. 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 hog ILO 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 hog ILO is through economic incentives. But a powerful economic incentive structure has already been formalized in the explicit contract between the hog ILO, its own organization, and its investors. This contract directs the hog ILO 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.

Motivation for allowing hog ILOs in rural areas

Supporters of hog ILOs often justify the entry of an ILO into a rural area on economic grounds. However, the economic characteristics that generally define a hog ILO 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. Hog ILOs 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 hog ILO is designed to minimize the number of workers it hires 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 hog ILO 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 creates up to one other job in the local region and another in the state outside the region. Theoretically, each $1,000 of farm income also adds approximately $1,000 to the local region and another $1,000 to the state outside the region (Sporleder, 1997, p. 9). Either of these figures probably overstate the real 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 hog ILO 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 region. If the region has to export even one bushel of grain, all the grain in the region will have to be priced at a lower level that enables the grain to compete in the export market (Hayes, 1998).

(2) Constraints on Regional Economic Development Due To Taxes

Numerous tax write-offs and abatements are possible because hog ILOs 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 hog ILO create social, health and traffic costs that the local government must finance. The local government, in turn, must rely on increased taxes to pay the hog ILO-induced costs--and this can decrease other economic activity in the region.

For example, additional costs associated with hosting a hog ILO 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 ILOs 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 hog ILOs may undermine a community’s opportunities to expand its economic base. They also found that the vertical coordination structure used by large hog ILOs can cause a loss of resources from farms and rural communities because hog ILO

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 hog ILOs 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 in the United States--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 no 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 hog ILOs increase in size and number... Studies in Michigan, North Carolina, and Missouri found that the value of real estate close to hog ILOs tended to fall. These and other data show that hog ILOs are defined by present and potential neighbors as at least a nuisance" (Iowa Concentrated Animal Feeding Operations Air Quality Study, 2002, pp 5-15).

Conclusion: Countering the incentive to pollute

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 hog ILOs create—particularly when this pollution affects the locale where a service-based economy is developing.

There is only one way out of a dilemma where one partner in a contract is likely to cheat and where failure to curtail that activity will result in other potential cheaters locating in the area: full and complete enforcement of regulations. Therefore, before any county approves a hog ILO it should be able to promise the region where the pollution impact of the hog ILO is felt that there will be immediate and full enforcement of all regulations—and that detection of polluting activities is not the responsibility of the local residents, but that it will be a daily emphasis of county employees. Further, the county should provide evidence to the area of impact that it is properly staffed to accomplish these tasks.

If this does not occur, the problems experienced by neighbors of the hog ILO can be so severe they can cause diminished enjoyment of the neighbors' private property and, in some cases, so degrade the neighbors' ability to enjoy their private property that they are unable to utilize the property for any of the purposes a normal property owner would be expected to pursue. The pollution problems that accompany a hog ILO are, at their core, centered around the issue of economic costs that are transferred from the hog ILO to the residents without compensation—and this is the specific problem enforcement of environmental regulations is supposed to prevent.

For these reasons, enforcement of pollution regulations should reflect the economic impact on neighbors of hog ILOs and assure these neighbors will receive some meaningful protection from the adverse impacts of these facilities. In addition, there should be an incentive for the reviewing or permitting authority to protect the property rights of the neighbors to the facility and to protect the region from the loss in property tax revenue that can accompany the operation of a hog ILO.

To satisfy both requirements, any proposed application or technology permitted for use by a hog ILO should be able to function without causing economic loss to neighbors of the hog ILO where the technology or application is used. If, instead, the operation of the hog ILO causes costs to the neighbors of the facility in the form of odour, water pollution, or other factors, and if these costs reduce the asset value of the private property of these neighbors, each neighbor should be reimbursed on an annual basis for monetary losses to property value and enjoyment caused by the operation of the hog ILO during that year.

References

Abeles-Allison, Mark. 1990. *An Analysis of Local Benefits and Costs Associated with Hog Operations in Michigan*. Unpublished Thesis. Department of Agricultural Economics. Michigan State University.

Abeles-Allison, Mark and Larry J. Connor. 1990. *An Analysis of Local Benefits And Costs of Michigan Hog Operations Experiencing Environmental Conflicts,* Agricultural Economics Report #536. Department of Agricultural Economics. Michigan State University.

Beasley, Lee, 2001. *Cumberland hog facility may affect Clark County homeowners property values*. Guardian Publishing.

Bill 81, "An Act to provide standards with respect to the management of materials containing nutrients used on lands….", Legislative Assembly, 2001.

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

Chism, J. and R. Levins. 1994. *Farms spending and local selling: How much do they match up?* Minn Agric Econ 676:1–4

Duncan, M.R., Taylor, R.D., Saxowsky, D.M., and W.W. Koo. 1997. *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.

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.

Gale, Fred. 2000. *Farming's Role in the Rural Economy*. Agricultural Outlook, Economic Research Service, USDA.

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.

Gómez, Miguel I. 2002. Scale of Hog Farms and Economic Growth in Rural Areas: Evidence from the State of Illinois, Food Industry Management Program. Department of Applied Economics & Management. Cornell University.

Gómez, Miguel I. and Liying Zhang. 2000. Impacts of Concentration in Hog Production on Economic Growth in Rural Illinois: An Econometric Analysis, Presented at the American Agricultural Economics Association annual meeting in Tampa, Florida.

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

Henderson, D., L. Tweeten, and D. Schreiner. 1989. *Community ties to the farm.* Rural Dev Perspect 5(3):31–35.

Henderson, Jason R. 2002.*Will the Rural Economy Rebound with the Rest of the Nation?* Economic Review. Federal Reserve Bank of Kansas City, Q1.

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.

Ikerd, John E. 1998. *Sustainable Agriculture: An Alternative Model for Future Pork Producers*. The Industrialization of Agriculture. Jeffrey S. Royer and Richard T. Rogers, eds. Ashgate Press. Brookfield, VT.

Iowa Concentrated Animal Feeding Operations Air Quality Study. 2002. Final Report. Iowa State University and The University of Iowa Study Group.

Johnson, Kenneth M. and Calvin L.Beale. 1998. *The Rural Rebound*. The Wilson Quarterly, Spring.

Kilpatrick, John A. 2001. *Concentrated Animal Feeding Operations and Proximate Property Values*. The Appraisal Journal.

Launch of the AAFC Hog Management Strategy Development Approach. 1997. Agriculture and Agri-Foods Canada. Document received through Freedom Of Information Act, 2001.

Lawrence, John D., et al. 1994. *A Profile of the Iowa Pork Industry, Its Producers, and Implications for the Future*. Staff Paper No. 253. Department Of Economics. Iowa State University.

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.

Marbery, Steve, 2001. *Health rules published*. Feedstuffs Magazine. June 11.

Metcalf, Mark. 2001. *US Hog Production and the Influence of State Water Quality Regulation*. Canadian Journal of Agricultural Economics. vol. 49.

Milgrom, P. and J. Roberts. 1992. Economics, Organization, and Management. Prentice Hall. Englewood Cliffs, NJ.

Mubarak, Hamed, Thomas G.Johnson and Kathleen K.Miller. 1999. The Impacts of Animal Feeding Operations on Rural Land Values. Report R-99-02. College of Agriculture, Food and Natural Resources. Social Sciences Unit, University of Missouri – Columbia.

Morgan Stanley Investors Conference February 11, 2002.

Palmquist, R. B. et al. 1995. The Effects of Environmental Impacts from Swine Operations on Surrounding Residential Property Values. Department of Economics. North Carolina State University. Raleigh, North Carolina.

Palmquist, R.B., F.M Roka, and T. Vukina. 1997. *Hog operations, environmental effects, and residential property values*. Land Economics, 73: 114-124.

Park, Dooho, Kyu-Hee Lee and Andrew Seidl. 1998. Rural Communities and Animal Feeding Operations, Department of Agricultural and Resource Economics, Colorado State University, Ft. Collins, CO.

Report to Joint Agricultural and Rural Affairs Committee and Planning and Development Committee and Council, 25 June 2002.

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.

Snare, Frank. 1992. *The Concept of Property*, American Phhog ILOsophical Quarterly 9.

Sporleder, T. 1997. Ohio Food Income enhancement program. Agricultural, Environmental, and Development Economics Department. Ohio State University.

Stigler, George, 1992. *Law or Economics?* Journal of Law and Economics 35: 455-469.

Sullivan, John, Utpal Vasavada and Mark Smith. 2000. *Environmental Regulation & Location of Hog Production*, Agricultural Outlook. Economic Research Service, USDA.

Tweeten, Luther G. and Cornelia B. Flora. 2001. Vertical Coordination of Agriculture in Farming-Dependent Areas. Council for Agricultural Science and Technology. Task Force Report No. 137. Department of Agricultural, Environmental, and Development Economics. The Ohio State University and North Central Regional Center for Rural Development. Iowa State University.

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.

Appendix I

PROPOSED EPA REVISIONS TO CAFO REGULATIONS
(January 12, 2001; 66 FR 2960)

II. Existing Regulations

• ***When were the existing NPDES CAFO regulations promulgated?*** The existing NPDES CAFO regulations were published on March 18, 1976 (41 FR 11458). The existing effluent limitations guidelines for feedlots were published on February 14, 1974 (39 FR 5704).

• ***What is an AFO under the existing regulation?*** Under the existing regulations, an AFO is a lot or facility (other than an aquatic animal production facility) where: 1) animals have been, are, or will be stabled or confined and fed or maintained for a total of 45 days or more in any 12-month period, and 2) crops, vegetation, forage growth, or post-harvest residues are not sustained in the normal growing season over any portion of the lot or facility.

• ***What operations are defined as CAFOs under the existing regulation?*** Under the existing NPDES regulations, an AFO is defined as a CAFO if meets the criteria in 40 CFR Part 122, Appendix B (relating to the size of the operation or size and manner of discharge), or it is designated as a CAFO on case-by-case basis by the Permit Authority.

III. Proposed Changes to the CAFO Definition A. AFO • *What changes are proposed to be made to the definition of an AFO and why?*

EPA proposed to amend the AFO definition to clarify how feedlots are distinguished from pasture and grazing lands. EPA proposed this change to clarify that situations where the existence of a small amount of vegetation (i.e., incidental growth) in what is clearly an area that concentrates animals (as well as feed, manure, etc.) for feeding meets the definition of an AFO. The definition is intended to exclude pastures and rangeland that are largely covered with vegetation that can absorb nutrients in the manure. Areas within the pasture land where animals tend to congregate to feed or drink are not considered AFOs.

The following are examples of facilities that meet the definition of an AFO under both the current and the proposed regulations:
– animals are maintained in a confined area with a dirt or constructed floor
– animals are maintained in a confined area with a dirt floor that has a small portion of vegetative growth during all or part of the year.

Under the proposal, the boundaries of the AFO would include both the production area and the land application area. [See, *Why do the definitions of AFO and CAFO include the land areas under the control of the operator?*].

B. CAFO Thresholds/Criteria

• ***What are the proposed changes to the definition of a CAFO?*** EPA proposed two alternative structures for defining a CAFO (i.e., a three-tier structure and a two-tier structure). EPA also proposed eliminating the term "animal unit," eliminating the mixed animal type calculation, eliminating the 25-year, 24-hour storm exemption in the CAFO definition, and including new animal types (these proposed changes are addressed individually under separate questions, below).

The proposed three tier structure provides that an AFO is a CAFO

– if it has more than 1,000 AU;

– if it has 300 to 1,000 AU and it meets any of the following conditions: -there is direct contact of animals with waters of the U.S., -there is insufficient storage and containment at the production area in the last five years, -there is evidence of a discharge from the production area in the last five years, -the production area is located within 100 feet of waters of the U.S., -the operator does not have, or is not implementing a *permit nutrient plan,* -more than twelve tons of manure is transported off-site to a single recipient annually, unless the recipient has complied with the requirements for off site shipment of manure; or – if the permit authority designates the facility a CAFO. [See, III.C., Designation].

The proposed two-tier structure provides that an AFO is a CAFO

– if it has more than a set number of animals for any animal sector (the proposed threshold was based on 500 AU and would include: 500 cattle and heifers; 500 veal; 350 mature dairy cattle; 1,250 swine each weighing over 25 kilograms (approx. 55 pounds); 5000 immature swine weighing less than 25 kilograms; 50,000 chickens; 27,500 turkeys; 2,500 ducks; 250 horses; or 5,000 sheep or lambs. EPA also is soliciting comment on other alternative thresholds, including the equivalent of 300 AU, 750 AU, and 1,000 AU.

– if the permit authority designates the facility as a CAFO based on the fact that the facility is a significant contributor of pollutants to waters of the U.S. [See, III.C., Designation]

7

• ***Why do the proposed revisions to the definitions of AFO and CAFO include the land areas under the control of the operator?*** EPA believes this aspect of the regulations should be clarified, and has proposed to do so by including the land areas under the control of the operator directly in the

definition of an AFO. EPA interprets the current regulations to include discharges of CAFO-generated manure and wastewaters from improper land application to areas under the operational control of the CAFO as discharges from the CAFO itself. Otherwise a CAFO could simply move its wastes outside the area of confinement and over-apply or improperly apply those wastes, which would render the CWA prohibition on unpermitted discharges of pollutants from CAFOs meaningless. The preamble further explains our rationale on this issue. Land application areas are integral parts of many CAFO operations and land application is typically the end point in the cycle of manure management. Significant discharges to the waters in the past have been attributed to overapplication of CAFO-generated manure and wastewater. EPA does not believe that Congress intended to exclude the discharges from a CAFO's land application areas from coverage as discharges from the CAFO point source. Moreover, defining CAFOs in this way is consistent with EPA's effluent limitations guidelines for other industries, which consider on-site waste treatment systems to be part of the production facilities in that the regulations restrict discharges from the total operation.