Comments on the Permit Materials submitted by DGH and the Taiwan Sugar Corporation Concerning Economic Development and a Farrow-to-Finish Hog Operation In the County of Flagstaff, Alberta, Canada

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Introduction

The permit application submitted by DGH on behalf of the TSC concentrates almost totally on the various engineering aspects of the hog ILO proposed by TSC. However, the only rationale for allowing such an operation in Flagstaff County is the potential that it will increase the economic stability and well-being of the residents of the county. Thus, at the most fundamental level, the central issue in this debate should be economic affect of the proposed operation on the residents of the County of Flagstaff.

On August 17, 2000, DGH wrote to Mr. Andy Cumming of Alberta Agriculture Food and Rural Development concerning Alberta Agriculture's comments on the use of phytase.[1] In their letter, DGH expressed the concern that Alberta Agriculture is spreading misconceptions about "well established science that is very important in the future sustainability of animal agriculture." Given these remarks, one would expect DGH to adhere rigorously to the science of economics in its statements about the economic effects of its proposed operations in the County of Flagstaff. Instead, DGH has provided a collection of statements and contentions, the majority of which are supported neither by credible data nor by peer reviewed scientific research.

The following sections provide hard evidence based on peer-reviewed economic research that hog ILOs:

(a) decrease local economic growth.
(b) devalue local property.
(c) create a moral hazard for the county that leads to higher costs to the residents of the county.
(d) operate in such a way as to maximize their profits by shifting the costs of their waste to other residents of the region.
(e) overcome the twin costs of diminishing returns to scale in diseconomies of scale by taking advantage of tax and subsidy policies that allow important costs of ILO operations to be either omitted or understated.
(f) are structured so that they cannot aid or enhance regional economic development.

This information concerning the impact of large hog Intensive Livestock Operations (ILOs) comes from peer-reviewed economic studies or government collections of economic data. I respectfully request the appeal board to hold DGH Engineering to the same standard concerning their statements regarding the economic impact of their operations.

1. What economic research tells us about hog ILOs and local economic growth:

A growing amount of credible research in this area all reaches the same conclusion--hog ILOs of the type specified in the DGH proposal interfere unduly with the existing amenities of the region in which they are located and materially interfere with the use, enjoyment and value of neighbouring properties. For example:

In 1999 Chapin and Boulind found that the effects of large hog farms are far reaching. Besides the odor and gases, nearby residents must cope with an increasing number of flies, rats, and other scavenging animals. Improperly managed manure wastes and pre-slaughterhouse carcasses threaten water quality. The close proximity of humans to these facilities raises concerns that infectious diseases may cross over from hogs to humans. In addition, new evidence indicates that the use of antibiotics in industrial swine production can contribute to the increase of antibiotic resistance in human pathogens. [2]

A new 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 the 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 agriculture and livestock production units continue to increase.

A recent study by Palmiquist, Roka and Vulkina (1998) shows that large hog operations tend to depress the sales value of nearby homes and real estate.[3] An eighteen month study of 75 rural land transactions near Premium Standard's hog operations in Putnam County, Missouri that was 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. This study primarily evaluated farmland without dwellings. These findings were confirmed by a second study at the University of Missouri-Columbia by Hamed, 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.[4]

These findings were further substantiated by a Sierra Club study that found that tax adjustments by county assessors in at least eight states lowered property taxes for neighbors of factory farms. As Table 1 shows, local property tax assessments were lowered in Alabama, Illinois, Iowa, Kentucky, Maryland, Michigan, Minnesota and Grundy County, Missouri. Grundy County has lowered some residents' taxes by up to 30% due to their close proximity to the corporate hog operations of Continental Grain.

Table 1--Property Tax Reductions In Areas Around ILOs

Area	Amount of Reduction	Reduction In Value Of:
Grundy Co, MO	30%	
Mecosta Co, MI	35%	dwellings only
Changed to	20%	total property (land and structures)

Midland Co, MI	20%	
DeWitt Co, IL	30%	rescinded
McLean Co, IL	35%	
DeKalb Co, AL	base reassessment, variable rates	
Renville Co, MN	base reassessment, variable rates	dwellings only
Humbolt Co, IA	20-40%	dwellings only--now rescinded
Frederick Co, MD	10%	now reduced to 5%
Muhlenberg Co, KY	18%	dwellings only

Radius of reduction varied, up to 2 miles. All were for hogs except Muhlenberg, for chickens.
Source: Property Tax Reductions, scott.dye@sfsierra.sierraclub.org, March 13, 2000

2. What economic research tells us about the relationship between hog ILOs and the area in which they are located:

The markets in which ILOs are employed are very different from the old commodity-based models of agricultural production, and the effects of these markets on the life and economies of local communities have changed significantly. When a ILO enters a region it creates two contracts of interest to the citizens of the region:

1. the contract with the ILO's organization where information is equally shared and where the motives of all players are a consistent and singular search for profit, and
2. the contract between the community and the ILO where asymmetrical information exists.

The ILO's bargain with the rural community is an implicit contract that is usually formed around stated, not written, promises of jobs and economic growth for the region that the ILO will provide in return for land, water, access, power and the other factors that are required for the ILO to operate. This implicit 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 ILO.

The ILO organization is typically well informed about the implied contract with the region because it extended the verbal offers on which the contract is based, but the citizens of the region are privy to very little information about the ILO's explicit contract with its organization. As a result, there is an incentive on the part of the 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.

County and national laws and policies on the environment and on zoning are important determinants of the location of ILO facilities.[5] Further, these laws and policies affect the ability of ILOs to control information about their operations and they are major determinants of the role the ILO will play in the physical, social and economic environment of a region. Thus, the physical relationship between the ILO and the region is essentially predetermined by the rules and policies that are already in place in the region--and this set of rules and policies is based on the pivotal assumptions that

1. All agricultural operations are similar to the conventional, closed systems that previously dominated agriculture.
2. Animal waste, as a natural product, while annoying, is essentially harmless, and not as toxic as human waste.

3. Most animal-raising operations can be treated as if the waste that will result is from ruminate animals.

As a result of these assumptions, when a 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 Concentrated Animal Feeding Industry.

The question here is not whether the ILO can make an implied contract with the region. Instead, the issue is that in addition to this contract being physically defined around incorrect assumptions, it will also be based on asymmetrical information that heavily favors the ILO. Such a contract is likely to work in only one direction--it is likely to increase the profits of the ILO by shifting the operating costs of the ILO either to the region in which it is situated or, through some mechanism of pollution migration, to another region further removed from the ILO. The certainty of this outcome follows directly from existence of asymmetrical information about the operation of the ILO and from the motivation of the operators of the ILO.

The term 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. [Footnote: Remember that capitalism is based on the concept of full and free information about all aspects of the market--something that was easy to achieve under the traditional agricultural model where no single player was big enough to affect the market or, by implication, to operate in such a manner that it could hide information on which the market price was based and thus, shift its costs.]

In theory, the permitting process used to evaluate ILO applications should insure that the citizens of a region are fully informed about all aspects of the ILO's proposed operation. If this was indeed the case, there would be no asymmetrical information. However, the structural nature of the permitting process--which is usually based on incorrect assumptions that all agricultural projects are conventional in nature--allows the ILO operator to acquire an operating permit while withholding significant amounts of information from the residents of the region. This can occur in the following ways:

1. The ILO uses claims that its methods of handling waste are technologically advanced and thus, proprietary, to block release of information about the specifications and performance of its waste handling systems.
2. The ILO's requirements for sterile operating facilities limit public inspection of and knowledge about the ILO and even limit the overall organizational knowledge of many ILO employees.
3. The usual position of the ILO as a contract operator for a larger, out-of-area corporate interest may limit even the ILO operator's knowledge of the source of inputs (feeds, antibiotics, etc.), the rationale behind the amounts and types of inputs selected, and the actual value of the product (the pork, chicken, etc.) to the owner.
4. Out-of-area ownership and the use of Limited Liability Partnerships (LLPs) severely limits the ability of regional residents to determine the motivation, trustworthiness, and credibility of those who own and operate the ILO.
5. The short life span of ILOs and the normal practice of building ILOs as turn-key operations limits the ability of regions to establish any reliable record of ILO performance before committing to a fully-constructed operation.

6. The legal protection extended to the ILO by permitting authorities often insulates the ILO from disclosures that may provide the only source of information about out-of-state operations.
7. And finally, the ILO permit approval process is often so rushed that residents of the region have insufficient time to learn enough about the proposal to ask intelligent questions or to do relevant research on the proposal.

A combination of all these factors creates an agreement (contract) between a ILO and a region that is based on verbal promises of jobs and economic development, but for which the actual information needed to validly assess the impact of the ILO on the physical, social and economic environment is withheld from the public and is available only to the owners/operators of the ILO. The result is that the county or other permitting agency has inadvertently created what economists call a moral hazard, a process that occurs when 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 ILO.)

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. Thus, additional ILOs are likely to be attracted to the region. As Milgrom and Roberts note, adverse selection is “a kind of pre-contractual opportunism that arises when one party to a bargain has private information about something that affects the other’s net benefit from the contract and when those whose private information implies that the contract will be especially disadvantageous for the other party to agree to a contract.”[6]

Casson has laid out the general outlines of the relationship that develops between the region and the ILO as a result of these factors by noting that:

> the crucial question... is whether the other party to the transaction can be trusted. There are two fundamental approaches to engineering or creating trust. The one most commonly used in much of the Western world is to monitor performance through the institutional and legal system and penalize those parties that do not fulfill their negotiated commitments. The alternative approach to engineering trust is to manipulate the incentive structure so that individuals fulfill their commitments based on rewards they receive rather than penalties they incur.[7]

For ILOs, the issue of trust is directly tied to out-of-area ownership and the asymmetrical information in the agreement between the ILO and the community. Since the motivation of the ILO is to create profit, not to control pollution or engage in any of the other social benefits the region may desire, the ILO can only be trusted to act in its own self interest. The interests of the region could initially be protected by disclosure of full information concerning the operations of the ILO during permitting. However, due to the factors already discussed, the ILO usually controls the information in this part of the process. The only recourse for the region is monitoring by knowledgeable regulators.

Unfortunately, monitoring measures compliance with laws that are often crippled by the same underlying assumptions about the nature of agriculture listed earlier in this section. ILOs are often able to use laws based on loose, conventional agricultural standards to avoid pollution controls that would more fully assign the costs of waste to the ILOs. In addition, most of the factors that made it difficult to get information on proposed ILO operations during the permitting process also complicate attempts to monitor ILO operation. This leads to a condition called low separability. Separability is “...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."[8]

So far, the history of ILO operations shows that cheating is likely. And it is made even more likely by the decision on the part of many regulating agencies to rely on citizen complaints instead of more costly professional monitoring. If monitoring fails or is not effectively implemented, the only other option for controlling the behavior of the ILO is through economic incentives. But, as previously noted, a powerful economic incentive structure is already in place and this incentive structure has been formalized in the explicit contract between the ILO, its own organization, and its investors. This contract directs the 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.

In fact, simply accounting for these conditions and for the factors that would reward a ILO for shifting its costs allow one to develop a simple ILO location model. For example, a hog ILO would look for an area where:

1. Roads for importing feed inputs and exporting pork are near and already constructed.
2. Water is readily available and cheap.
3. Local croplands require a high nitrogen input, thereby allowing more waste to be spread closer to the ILO.
4. Waste application is not limited by phosphorus content.
5. Land is cheap, due to either soil conditions or a depressed economy.
6. And most important, environmental standards are low and enforcement is lax.

3. What economic research tells us about the impact of efforts to achieve ILO efficiency on the area in which the ILO is located:

The economic issue of efficiency in production is central to the rationale for Concentrated Animal Feeding Operations. However, the use of an ILO only confines the animals in less space, it does nothing to reduce the amount of land needed to raise feed for the animals and it does nothing to reduce the amount of land that ultimately is needed to recycle the animal waste. For this reason, the switch back to conventional farming simply places the animals on the land that is also used to grow their feed and uses the animal manure responsibly to fertilize that land so that feed can continue to be grown in a more-or-less closed system. In addition, spreading the animals out in this manner reduces the need for antibiotics.

If all the economic costs of ILO operation are considered, two economic concepts--diseconomies of scale and diminishing marginal returns--both mandate that the efficient size of most animal feeding operations should be relatively small. To understand why smaller and medium sized hog operations have lost market share to the ILO giants it is necessary to investigate how the expected effect of these two economic concepts has been altered by the actions of the ILO industry.

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

site before health factors become so overwhelming that they can no longer be controlled with certainty and the hog operation must abandon the site.

The second, more powerful economic concept called diminishing returns also ought to act to limit the size of efficient ILO operations. Under this concept, when units of a variable resource (such as hogs) are added to a fixed resource (such as land) one reaches a point where the marginal product (the revenue gained from the last hog added to the operation less the cost of the last hog added to the operation) of the variable resource begins to decline. Because of the costs of handling animal waste responsibly, the point at which this decline occurs is closely related to the ability of the land on which the ILO is located, and the land over which the ILO will apply its waste effluent, to absorb and recycle the manure. If diminishing returns to a ILO did not exist, all the hogs in the world could be raised on a single, small plot of land and this is clearly the philosophy of some in the hog industry who recognize no limits to hog farm growth. For example, Freese has stated that while "[c]ompletely comparable costs are not publicly available to distinguish between a declining or flat average cost curve in the long run, but what is clear is that diseconomies of size are not limiting the growth of firms with 95,000 sows."[9] Such a statement, which completely disregards the diminishing returns from hog waste and confinement, is complete nonsense.

To overcome these costs, ILOs have also been designed to take full, economic advantage of the assumptions listed in the previous section—assumptions that not only form the basis for ILO permitting and regulating but also establish the tax and subsidy policies that create the economic environment in which ILOs operate. These assumptions allow important costs of ILO operations to be either omitted or understated in the profit and loss calculations of the ILO. They also allow the ILO to take advantage of important tax and investment opportunities that, in effect, subsidize its operation. These factors artificially inflate the amount of profit available from ILO operations and generate short term gains for developers and investors.. While this would be significant in itself, artificially inflated profits also act to draw more investment into ILO operations, contribute to the proliferation of ILOs, and provide an economic incentive for an organizational model that gives rise to the four common attributes of every ILO:

(1) The use of capital intensive production methods. ILOs 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.

4. What economic research tells us about the relationship between hog ILOs and the local economy:

The four economic characteristics of a ILO that were listed in the previous section are fundamentally incompatible with regional economic development. Regional economic development proceeds on the premise that the wages paid and purchases made by a company are transferred to other

individuals or companies in the region. The multiplier effect of these payments further assumes that they are again spent within the confines of the region and that they do not "leak" into other areas of the state or nation. However ILOs 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 ILO 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 ILO sow farrowing operation.[10] Ikerd calculated that a farrow-to-finish contact hog operation would employ about 4.25 people in to generating 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.[11]

Depending on the state, the employment multiplier for agriculture is varies from 1.8 to 2.2 for every direct employee (thus, indirect and induced impacts on related economic sectors of the economy would create 1.8 to 2.2 total jobs for each person employed in hog production.) However, if one treats ILOs as industrial operations, the multiplier would be much lower--about 1.35.[12] It is likely that even this figure overstates the economic impact on rural counties. For the employment multiplier to operate at the levels specified above, 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 ILO 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.[13] 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.[14]

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.[15]

(2) Constraints on Regional Economic Development Due To Taxes

Taxes are levied on taxable amounts calculated on national returns. The numerous tax write-offs that are possible because ILOs 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 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 these ILO-induced costs--and this can decrease other economic activity in the region.

For example, additional costs associated with hosting a ILO 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 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.[16] 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. [17] 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. [18]

(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 ILOs 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. [19]

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

The previous three sections have described the reasons inherent in the structure of ILOs that most of the money from a ILO will either be directly spent outside the region or it will quickly migrate there. However, through cost shifting the ILO 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 ILO is operating. In addition, ILOs 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. [20] 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 by 40%, within 1 mile by 30%, 1.5 miles by 20% and 2 miles by 10%.[21]

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[14] 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.
[15] Hayes, Dermot, Iowa's Pork Industry--Dollars and Scents, Iowa State University, January, 1998.
[16] 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.
[17] Park et al., op. cit.
[18] Ibid.
[19] Lawrence et al., op. cit.
[20] 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.
[21] Park et al., op. cit.