

## **The CAFO and Depopulation of Rural Agricultural Areas: Implications for Rural Economies in Canada and the US**

*For presentation at the International Conference on The Chicken—Its Biological, Social, Cultural  
and Industrial History, May 17-19, 2002, Yale University*

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May 18, 2002

### **Introduction**

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

In addition, a number of separate lines of inquiry attempted to explain the unfavorable trends in property values and tax revenues that developed across the agricultural regions of the US and Canada where CAFOs were common (Abeles-Allison, 1990; Abeles-Allison and Connor, 1990, Palmquist, R. B. et al., 1995).

These inquiries all concerned social and economic conditions in "rural areas." However, time has changed the composition of rural areas considerably. Recent effects of these changes occurred in two phases: In the first phase the financial conditions of the 1960s and early 1970s ruined a large number of farmers whose high debt load and high fixed costs precluded their survival during a period of prolonged weakness in crop prices. The secondary result of these failures was the loss of a number of weaker rural communities whose base of support was directly linked to the failed farms that had surrounded them. This loss of rural communities was an on-going process that weeded out weaker communities while leaving those with alternative bases of support. This, in turn, established the economic environment in which the second phase of change—the CAFO expansion period of the late 1980s and 1990s--occurred.

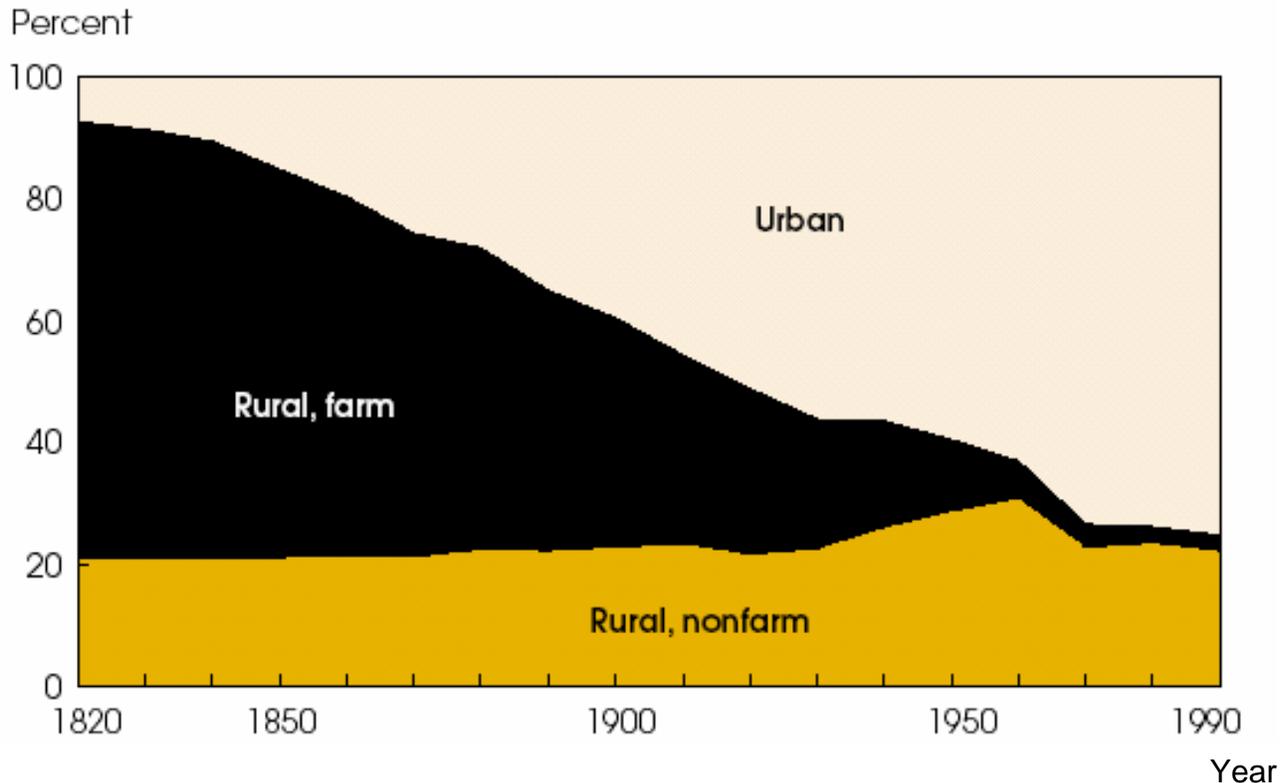
During the second phase of change, rural agricultural communities were able to survive by becoming increasingly separated from the farming and ranching areas that surround them. As Gale has noted, "[w]hile many view 'rural' and 'agriculture' as virtually synonymous, the ability of the rural economy to shake off severe problems in the agricultural sector is a reminder that agriculture

is no longer the primary economic engine of rural America" (Gale, 2000, pp. 21,22).

For this reason, the inquiry proposed by this paper requires a modification of the definition of rural agricultural areas. In the past, rural agricultural areas where actual farming/ranching occurred were viewed in the same way as the rural communities they surrounded. Because this has changed in many rural locations, this paper differentiates between areas of rural residential concentration (RRC)—which include rural communities--and areas of rural agricultural activity (RAA).

## Population Trends in Rural Areas

As Figure 1 shows, there was a continual shift of population from agricultural to urban areas for the 150 years prior to 1970. Within this phenomenon, the percentage of rural nonfarm residents increased steadily from 1930 to 1960 and then fell as rural communities died during the financial crisis I have called Phase 1. However, since the 1970s rural depopulation has slowly occurred in areas of rural agricultural activity—not in areas of rural residential concentration. Areas of rural residential concentration remained stable and actually grew in the 1980s.



Source: Census of Population data compiled by Woods and Poole Economics, Economic Research Service, USDA, 2000.

Figure 1  
Rural Non-farm Population Stability Since 1970

Depopulation in rural agricultural areas is difficult to study because the numbers of people involved are small even though the land areas involved are large. This depopulation has been aided by an aging rural population which, if it is without heirs, or interested heirs, is motivated to sell and move into rural communities where services are better. This factor can not explain why depopulation would occur in rural agricultural regions unless no one else was willing to purchase the land—a condition that would be reflected in lower rural land prices. However, land values have continued to rise in rural areas as recent reductions in borrowing costs, when added to existing tax incentives, have increased prices of rural land (Henderson, 2002, pp. 65-83). Further, demand for rural residences has been high. Recent studies show that people in urban areas want to move to

rural communities because of the environment and because they can live in a community where they are known and where they can make a difference. A 1995 Roper survey found that 41 percent of people polled (up from 35 percent in 1989) said they would like to live in a small rural town within 10 years (Johnson and Beale, 1998, p. 23).

The hypothesis of this paper is that while depopulation in areas of rural agricultural activity did not initially occur by design, rural depopulation is now significantly motivated by legal and economic factors that are designed to stifle rural opposition to CAFOs. These factors render agricultural land attractive only to owners who do not live on the land because they degrade the lifestyle of rural residents. This, in turn, creates a rationale for rural agricultural depopulation that can no longer be regarded as occurring entirely by chance.

### **The Mechanisms of Depopulation**

Large CAFOs are usually located in areas of rural agricultural activity, not rural residential concentration. While these operations are a point source of both water and air pollution that falls unevenly across the area surrounding the CAFO, air pollution has generally imposed the most significant costs on surrounding residents. Those rural farmers and ranchers closest to the CAFO bear most of these costs.

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

A 1996 study by Padgett and Johnson found much larger decreases in home value than those forecast by Palmquist. In Iowa, hog CAFOs decreased the value of homes in a half-mile radius of the facilities by 40%, within 1 mile by 30%, 1.5 miles by 20% and 2 miles by 10%. In addition, an Iowa study found that while some agricultural land values increased due to an increased demand for "spreadable acreage," total assessed property value, including residential, fell in proximity to hog operations (Park, Lee and Seidl, 1998).

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

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

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

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

### **Resistance and Responses to CAFO Losses**

As the losses of lifestyle and property value that accompany air pollution have been recognized by rural residents, resistance to CAFOs has grown in rural agricultural areas. The CAFO's response to this resistance is fundamentally determined by the fact that a CAFO is structured to view local residents as nuisances instead of assets. CAFOs crave isolation, and they are carefully designed to facilitate an isolated existence. They select areas close to good roads and railroads so they can import those things they need to build their facilities. They use/hire very few people and often import those employees who run their facilities. These people usually live far from the CAFO site.

To reduce costs, the CAFO makes every effort to pay as few taxes as possible. This mandates locating in areas with existing infrastructure or infrastructure the public will finance. This also gives the CAFO an incentive to leave an area before the tax base deteriorates and before tax rates increase. The growing separation between rural agricultural areas and rural residential areas can be helpful in this respect. As recent actions in places as diverse as Russell, Manitoba and Dumas, Texas show, a rural community can establish zoning laws or it can use agreements associated with CAFO subsidies to keep CAFOs well away from its own residences while still providing tax support for CAFO location in rural agricultural areas well removed from the community. CAFOs, in turn, are increasingly careful to locate far enough away from the community so it does not feel the effects of the CAFO's pollution. If the community believes that the CAFO will improve its economy, it is likely to support such activities to the detriment of the residents in the agricultural areas around it.

For example, when the Dumas, Texas City Council voted 5-0 to sell all but 30 years of Dumas' water supply to a Seaboard hog slaughtering facility, they carefully arranged to pipe the

water to a site 15 miles away from Dumas along the southern border of the county.(Storm, 2002) This allowed Moore County, where Dumas is located, to collect taxes on the slaughtering plant while shifting the negative social costs of the plant (housing, educating and meeting the medical needs of the large Hispanic workforce) south to Amarillo, Texas, where most workers are expected to live. This same agreement will require a large number of hog production facilities to supply the slaughter facility. These appear to be slated for Sherman County, again protecting the area around Dumas.

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

For obvious reasons, activities that lead to depopulation 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).

It effectively removed residents of rural areas from any role in determining the effect of CAFOs 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.

### **Overt and Covert Depopulation**

The fastest way to remove rural residents and thus depopulate an area is overtly--simply buy out the nearest residents who are most likely to complain. For example, when the Milford Facility (70,000 sows farrow to finish) started in Utah, residents within a five mile radius of the facility were bought out. Smaller facilities have employed smaller buyouts. Buyouts are expensive and CAFO owners should prefer a cheaper option, but the extensive use of buyouts demonstrates that CAFO owners do recognize that the pollution they create is not compatible with residences in the areas in which they locate.

For obvious reasons, activities that cause or promote depopulation of rural areas are unpopular with local residents. For this reason, the initial method used by CAFOs to accomplish rural depopulation has been do it covertly through existing legislation such as Right-To-Farm laws. CAFOs claimed to be agricultural operations who were protected from nuisance lawsuits concerning water and air pollution. Further, 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).

However, local control of conditional use permits by counties in most states and Canadian provinces reimposed other regulations that threatened to halt CAFO expansion in many regions. In fact, Worth County, Iowa resorted to the use of county health regulations to keep CAFOs out.(Marbery, 2001)

Metcalf has shown that while increased environmental compliance costs for water quality has no significant influence on large hog operations, it has significant negative effects on smaller operations (Metcalf, 2001, p. 37-52). This agrees with the assessment of Premium Standard Farms which stated during an investors conference that "[s]tricter environmental and regulatory requirements increase barriers to entry" in the hog sector (Morgan Stanley Investors Conference, 2002, p. 8).

However, when depopulation is considered, it must be recognized that there is an important difference between water and air pollution. 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 CAFOs 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, CAFO 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 CAFO 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.

### **CAFOs and the Right of Exclusive Use**

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

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

violation of the right of exclusive use typically carries either payment of compensation to the rightful owner or assessment of a penalty. For example, if "A" trespasses on land owned by "B," then "A" will be guilty of a crime and a possible criminal penalty may be in order, as well as civil damages. Physical impairment, such as 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).

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

This explanation provides the rationale for certain CAFO actions that seem to make little economic sense. For example, why would a CAFO, 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 CAFO owner who is suing, but also for additional CAFOs 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 CAFOs to be completely vertically integrated (Morgan Stanley Investors Conference, 2002, p. 8) However, the use of contract finishers allows major, vertically integrated CAFO 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 CAFO permitting regulation, whether they be county or state/province based, will prevent the loss of exclusive use that has been described in the previous paragraphs. This is unlikely for a number of reasons. First, setback requirements usually stipulate distances that are considerably less than those that have already been shown to be associated with losses in property and tax values. But even if one could assume that a setback requirement had been properly sized to reduce to zero all problems with airborne pollution, the setback itself establishes an area around a CAFO where normal development and normal residences are not permitted unless the owners are willing to waive all rights to exclusive use. In other words, potential residents within a setback radius could only build if they acknowledged that they were subject to air pollution and thus waived their rights to exclusive use. This means that every setback radius becomes a center of zero population growth.

## **The Role of Rural Residential Areas in CAFO Location**

### Creation of a moral hazard

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

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

Local, county, state, provincial and national laws and policies on the environment and on zoning are important determinants of the location of CAFO facilities (Hennessy and Lawrence, 1999, p. 53). When a CAFO enters a region it encounters a set of rules that have generally been structured to control a kind of agricultural production whose inputs and waste byproducts are not representative--either in quantity or chemical composition--of the Confined Animal Feeding Industry. Thus, in addition to this contract being physically defined around incorrect assumptions, it will also be based on asymmetrical information that heavily favors the CAFO.

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

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

transaction. By definition, a moral hazard leads to lower efficiency and to higher costs to the party that is least informed (in this case, a higher cost to the region that hosts the CAFO).

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

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

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

So far, the history of CAFO operations shows that cheating is likely. And it is made even more likely by the separation between the rural community where it is approved and the rural agricultural area where it is located. If monitoring fails or is not effectively implemented, the only other option for controlling the behavior of the CAFO is through economic incentives. But a powerful economic incentive structure has already been formalized in the explicit contract between the CAFO, its own organization, and its investors. This contract directs the CAFO to operate in such a way as to maximize profit, and if it can do this by shifting the costs of its waste to its neighbors in the region, that is how it will operate.

### **Rural Residential Motivation for Approving CAFOs**

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

#### **(1) Constraints on Regional Economic Development Due To Employment**

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

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

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

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

## (2) Constraints on Regional Economic Development Due To Taxes

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

For example, additional costs associated with hosting a CAFO include increased health costs, traffic, accidents, road repairs, and environmental monitoring. One Iowa community estimated that its gravel costs alone increased by about 40% (about \$20,000 per year) due to truck traffic to hog CAFOs with 45,000 finishing hogs. Annual estimated costs of a 20,000 head feedlot on local roadways were \$6447 per mile due to truck traffic (Duncan, Taylor, Saxowsky and Koo, 1997). Colorado counties that have experienced increases in livestock operations have also

reported increases in the costs of roads, but specific dollar values are not available. In addition, an Iowa study found that while some agricultural land values increased due to an increased demand for “spreadable acreage,” total assessed property value, including residential, fell in proximity to hog operations (Park et al., 1998).

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

In a 2001 study of farming dependent areas, Tweeten and Flora found that if they create environmental problems, newly developed or arrived CAFOs may undermine a community’s opportunities to expand its economic base. They also found that the vertical coordination structure used by large CAFOs can cause a loss of resources from farms and rural communities because CAFO facilities tend to be so large and because ownership and control may reside in distant metropolitan centers. All else being equal, they found the productivity gains attributed to large CAFOs decrease aggregate employment and other economic activities in rural communities (Tweeten and Flora, 2001, p. 32).

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

A study of 1,106 rural communities by Gómez and Zhang of Illinois State University found that large hog farms tend to hinder rural economic growth at the local level.. All models in this study indicated an inverse relationship between hog production concentration and retail spending in local communities. Economic growth rates were 55% higher in areas with conventional hog farms as opposed to those with larger hog operations in spite of the fact that economic growth rates had been almost identical in all the studied communities before the advent of larger hog operations in the 1990s. Data in the study also showed that communities with heavy hog concentration suffered larger population losses than those with conventional hog operations. According to the authors, the results of this study suggest that without public policy to protect rural communities, the most probable outcome is the continuing decline of rural communities in the future as the size of agriculture and livestock production units continue to increase (Gómez and Zhang, 2000).

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

In February, 2002, the Iowa Concentrated Animal Feeding Operations Air Quality Study found important emerging issues surrounding "the intensification of livestock production that

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

### **Conclusion: CAFOs, Rural Depopulation and Economic Development**

There are a number of economic reasons why the presence of CAFOs is likely to contribute to the depopulation rural agricultural areas. Further, depopulation is desirable from the CAFO's point of view and the growing separation between rural communities and the agricultural areas that surround them has decreased the likelihood that these communities will protect their sparsely populated agricultural areas.

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

Rural communities are becoming aware of this and are increasingly zoning CAFOs out of their immediate locale—and into rural agricultural areas whose residents are less capable of defending themselves. Attempts to have rural communities take more responsibility for the future of their surrounding agricultural areas have been complicated by the realization that as rural residential areas become increasingly tied to service-related activities, the survival of the community has less and less to do with the health of the surrounding agricultural activities. This means, among other things, that recipes for the economic survival of a rural residential area are unlikely to have any positive effect on the depopulation of areas surrounding the community.

The solution to this problem requires a two-pronged approach—the removal of the subsidies and the antidemocratic laws that have led to the expansion of CAFOs and the pursuit of long-run immigration and economic growth policies that insure the health of the rural communities. Such policies will only succeed if all residents of the rural area realize that their fates are inextricably linked in the long run. Short-run policies on the part of either party are likely to create long-run pollution and tax costs that could destroy an entire region.

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