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Community and Natural Resource Economic Issues and the Swine Industry

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"Growth for growth's sake is the ideology of a cancer cell." John Nichols

Introduction

Currently, a number of rural Colorado communities are deciding whether to allow and how to manage the opportunity for swine operations to locate in or near them. Common questions surrounding the potential of swine operations as an engine of economic development include: employment and income, infrastructure and public finance, real estate, and natural resource management. The introduction of new businesses has social, cultural, economic and natural resource impacts on communities. The issues are consistent across communities, but the answers are specific to a particular locale. Rural communities must determine the employment, services, and life style objectives of their communities in view of opportunities for economic development and resources at their disposal. Based on their objectives, opportunities and resources, communities can guide the evolving business, cultural, social, economic and natural environment using a creative mix of policy tools.

Employment and Income

Communities which have decided that job and income growth are among their objectives and are entertaining the possibility of having a swine operation enter their region, may ask how many jobs of what sort, and how much income in the short and long term will be directly or indirectly created by the introduction of this new enterprise. The answers to these questions depend upon the size and type of enterprise under consideration, the available human and natural resources, and the existing infrastructure, policy environment and agribusiness community. Table 1

"Rural communities must determine their employment, services, and life style objectives in view of their opportunities for economic development and resources at their disposal."

"All businesses have intended and unintended social, cultural, economic and natural resource impacts on communities."

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provides an overview of the wage rates found in the swine industry. In addition, a National Pork Producers Council publication finds that larger firms pay relatively higher wages due to greater skill required by newer technologies.

Table 1: Mean salaries in the hog industry (1995) (US\$)

Nationwide	24,721
West	26,932
Manager	27,729
Assistant Manager	21,298
Farrowing Manager	20,884
Herdsman	18,862

One indication of job quality is benefits (Table 2). From Table 2 it is possible to infer how job benefits are distributed across the size of swine industry operations. For example, it appears that 16% of producers are providing 66% of employees' life insurance. Larger producers relative to smaller producers more often provide life insurance. Paid vacations, holidays and major medical benefits appear to be more commonly provided across operations size.

Another indicator of job quality is the health impact on workers. Reports indicate that employees in the hog industry are more likely to complain about work related health problems. In particular, about 30% of hog industry employees complain of upper respiratory distress compared to about 20% across the agriculture sector.

Table 2: Percent of swine industry employees receiving benefits (1995)

	Reported by Producer	Reported by Employee
Paid vacation	62	79
Paid holiday	44	63
Paid sick leave	30	52
Major medical	45	80
Disability	15	55
Life insurance	16	66
Pension/retirement	11	36

Specifics: Short term

Short-term job creation tends to be in the construction sector. Estimates in the literature vary substantially and may depend upon qualified local labor availability. Estimates range from 7 to 25 jobs per 1,000 sows entering the community at about \$14,000/yr-job, and construction times are estimated between one and two years.

Specifics: Longer term

Longer-term jobs can be in traditional farrow-to-finish operations, or specialized farrowing/breeding, nursery, and finishing/growing operations in addition to packing plant job opportunities. Table 3 reviews the available job and income information for farrow-to-finish operations illustrating both economies of scale in labor and higher per job wages with size increases. In line with the Iowa results, a Virginia study found increases of 14-16 total jobs per 1,000 sows in the community.

Table 3: Employment and Income from Farrow-to-Finish Swine Operations, by size (Iowa)

Sows	300	1,200	3,400
Direct jobs	3	10	21
Salary/job (\$)	29,033	29,469	33,767
Indirect jobs	2.7	9	19
Salary/job (\$)	17,097	17,354	19,780

Indirect job and income effects are due to "multipliers". An employee at the hog operation may spend part of his salary on housing, food, services, and entertainment in the local community. The hog operation may purchase milling services and feed, trucking, and/or veterinary services and supplies locally. These expenditures create jobs and income in the community or multiply the effects of the original action. Actual local multipliers certainly depend upon the current stock and quality of labor, housing, retail and service sector and may depend upon the size and management structure of the CAFO. Multipliers will be higher for counties with corn surpluses and unemployed labor. Reported multipliers are commonly generalities based on the computer program used for estimations. Reported hog industry employment multipliers range from 1.28 to 2.22 and income multipliers range from 1.26 to 2.22. An employment multiplier of 2 means that for each job created in the hog industry another job is created in the community. An income multiplier of 2 means that for every \$17,000 job created in the hog industry an addition \$17,000 in income is generated in the community.

Farrowing operations are the most common new swine operation in Colorado. Farrowing operations seem to generate about 3-4 jobs per 1,000 sows at about \$14-\$18,000 starting annual salary. Mean reported salaries in farrowing operations are about \$20-\$22,000 per year. Managers earn around \$45,000 per year and tend to be recruited from outside of the community, at least initially. Another indicator of job quality, annual turn-over, reportedly ranges from about 17-30% in farrowing operations.

Reported wages in the packing industry range from about \$6-\$10.00 per hour largely depending upon how finely the plant cuts and packages pork products. Approximately, 10 jobs are created per 1,000 head per day packing operation. Higher end salaries are reserved for more specialized cuts. This part of the industry experiences greater turn-over rates (about 70% per year) and has a greater on the job accident risk. Due to the turn-over rate, the higher accident rate, and the common 6 month window on health insurance coverage, this portion of the industry may present pressure on indigent health care in rural communities. Reportedly, packing plant employees tend to be more culturally diverse relative to host communities than other sectors of the industry and tend to be recruited from outside of communities.

Specifics: Industry permanence

Communities may not only be concerned with the impact of the introduction of a new industry to the community, but also the likelihood and impact of a potential pullout. The closing of a business makes the multipliers work in reverse. Like a personal financial portfolio, when a community is highly dependent upon one industry, a closure can be devastating. Examples of mining communities in Colorado and "rust belt" cities of the Northeast provide an illustration.

While the future cannot be predicted with any precision on a case by case basis, there are a number of indicators that might act to influence the likelihood of a hog operation closing. Changes in the industry have led to far greater financial investment in buildings and machinery. Lagoons are constructed to last from 10-25 years. High fixed costs, greater size, integration and specialization of operations increase the likelihood that an operation will remain in place. Current estimates indicate the market for U.S. hog exports should increase by 20-50% over the next decade in part because the U.S. produces market hogs for the least cost on a worldwide basis. While domestic estimates are not optimistic, overall market improvements should increase permanence. Transportation prices continue to decrease encouraging specialization of the industry and farrowing operations in Colorado. Increased environmental regulations, if passed and enforced, in Colorado and the United States, increase the costs of production and tend to decrease the incentives for industry permanence in Colorado and the US. Depending upon other advantages of Colorado and the US and changes in environmental standards in other parts of the world the industry may or may not choose to move. Many US hog operations trace their roots to (currently more highly regulated) Northern Europe, before they moved to the Eastern US and eventually moved West.

Infrastructure and Public Finance

Among the issues of concern with any proposed private economic development is whether it will pay for itself in terms of increased demands on community resources and services. Increases in county tax base and decreases in tax burden should result from appropriate economic development initiatives. Impacts depend upon the local tax rate, the existing infrastructure, any concessions made to encourage the industry, and the type and size of the operation.

A Virginia study found that the tax burden decreased between \$15,700 and \$17,000 per 1,000 sows and the property tax base increased \$2,580 to \$2,860 per 1,000 sows introduced to the community. An Iowa study found the community tax burden decreased \$8,800 per 1,000 sows.

Research indicates there is one student enrolled in local schools and \$4,000 in tax revenues generated for every two jobs created. Whether this is a net benefit or cost to the community depends upon the current situation in the schools and whether the students have special needs including language that existing students do not have. Many communities in the Eastern Plains are aging and, thus, have excess capacity in the schools. Some school districts are facing consolidation. In this case, additional students in the public schools are likely to be viewed positively. Except in the packing industry, most research indicates that these students do not tend to be "special needs" students.

Additional issues to consider include increased health care demands (discussed above), dust, traffic, accidents and repairs. For example, one Iowa community estimates that its gravel costs increased by about 40% (about \$20,000) per year due to truck traffic to the 45,000 head finishing hog operations in the immediate area.

Real Estate Impacts

The introduction of a hog operation to a community is likely to have two impacts on the local real estate market: a positive price impact through an increased demand for housing and a negative price impact due to the odor generated by the operation. Although information on how CAFOs in Colorado affect real estate prices does not exist, studies have been prepared for North Carolina and Minnesota. Though these two states are different from Colorado in many respects, they have both experienced concentration in the pork industry, and their examples may provide insight into what could happen in Colorado.

In North Carolina results indicated that home values decreased \$0.43 for every additional hog in a five mile radius of the house. The study found a decrease of 4.75% (about \$3,000) of the value of residential property within 0.5 miles of a 2,400 head finishing operation where the mean home price was \$60,816. As homes were located farther from an operation, the decrease in total home value decreased to less than \$100 at 2 miles away.

However, in Minnesota a similar conclusion was not possible, as houses closer to feedlots sold (mean = \$26,500) for more than expected based on the characteristics of the house. Though this was not the expected result, the author considered the possibility that, due to limited available housing, the demand by hog farms for worker housing increased the value of the houses. In addition, a casino had recently moved in to the area, confounding the actual hog farm effect. Another possibility is the CAFO owners bought the homes to reduce the number of neighbors living nearby and in a position to complain about the odor. Finally, odor can be mitigated by a number of factors which have not been considered existing research.

An Iowa study found that agricultural land values increased due to an increased demand for "spreadable acreage." However, total assessed value, including residential, decreased in proximity to a hog operation. In Illinois and Iowa county assessors have, somewhat arbitrarily, discounted the assessed value of homes within a certain range of a hog operation. For example, one county in Iowa has decreased the assessed value of homes within 0.5 miles of a hog operation by 40%, within 1 mile by 30%, 1.5 miles by 20% and 2 miles by 10%, much greater discounting than the N.C. study would warrant.

Natural Resource Management

The introduction of any new business or industry to a community will increase the demands on the local natural resource base. Communities have broader constituencies and longer planning horizons than businesses and should, therefore, consider broad watershed impacts, alternative uses of water, the precautionary principle and safe minimum standards in their determinations. Communities must decide whether these demands are acceptable and what steps they should take to guide industries to minimize their impact on the local natural resource base. Agriculture poses particular demands on land and water supplies and quality. With the hog industry concerns surround the management of effluent to mitigate the risk and amount of air (odor and gasses) and water pollution (surface and ground).

The best solution for effluent management would be an odor free application to a crop that could utilize all of the nitrogen, phosphorous, and potassium in the effluent. This is not possible yet, but research and experiments are showing that effluent can be a cost-effective replacement for commercial fertilizer. The fertilizer replacement value of hog manure is about \$3 per hog. There is evidence that the amount of nitrogen in hog effluent is substantial enough to replace all commercial fertilizer purchases in a given year, especially in Colorado where center pivot irrigation is used. The gross nutrient value of swine effluent ranges from about \$11 to \$70 per 1,000 gallons (mean \$32.40) from concrete pits and from about \$5 to \$59 (mean \$17) from earthen lagoons. The cost of handling effluent is about \$10 per 1,000 gallons.

The inconsistent nature of manure as a fertilizer means that the most important step in using hog effluent may be the accurate testing of the contents. This is costly, and techniques vary across storage systems. Different types of application processes also call for more or less testing, agitation of the effluent, different loading rates and favorable weather conditions. Thus, farmers using effluent as fertilizer are not always using best management practices (BMPs) in applying effluent.

Two of the most common techniques for mitigating the odor emanating from swine operations are covering the lagoon or pit and incorporating the effluent into the soil rather than spraying it in application. Odor from effluent application can be reduced 50 to 80% by avoiding volatilization through soil incorporation. Soil incorporation/injection costs about \$1.39 per year-sow from a lagoon and \$0.49 from a bin. Incorporation costs about \$0.13 per gallon more than broadcasting from a lagoon and \$0.09 per gallon more from a bin. Table 4 reviews the costs of covering storage facilities for farrowing operations. Odor can be decreased as much as 80% by covering the storage facility. Here, the costs of covering a lined lagoon, the first stage of a two stage lined lagoon system, and an above ground bin are explored. The cost of plastic covering is assumed \$2.50 per ft². Straw should not be used in lagoon systems. Other odor mitigation techniques available include aeration (\$1.00 per finished hog) and experimental chemicals and feeds (\$0.30 to \$5.00 per finished hog).

Table 4: Per sow costs of covering effluent storage facilities (farrowing)

Category	Total Cost	Annual Cost
Lagoon w/plastic	74.25	11.07
Stage I w/plastic	46.75	6.97
Bin w/plastic	20.08	2.99
Bin w/straw	2.19	2.19

Assumes: 8% interest rate, 10 yr plastic life, 1 yr straw life

Concluding Remarks

Whenever a new business enters a community economic, social, cultural, and natural resource impacts result. Communities must determine whether and under what conditions they are interested in invited these impacts. These decisions are complex and specific to each community's situation. Here, we have reviewed many of the common questions regarding the community and natural resource economic issues surrounding the swine industry. Our knowledge is improving, but also shows many informational needs. For example, very little of our information was found in Colorado. Good information for Colorado communities will derive from a combination of strong local knowledge, good science, and the identified objectives of those communities.

Where You Can Go

- "Options for Managing Odor: a Report from the North Carolina Swine Odor Task Force." A recommendation paper based on extensive research by NC experts on the best ways to deal with the issues of odor in NC. The report is based on research into the specific problems that concentrated hog farming has created in NC. The broad based conclusions made can be applied to other states and their specific situations providing a basis of information for Colorado residents.
- "Importance of Being a Good Neighbor." By Paul Lasley of Iowa State. Simple, and sensible solutions that can be applied in conjunction with regulation to make a CAFO a valued member of the community, rather than an intrusive force.
- "Hog Operations, Environmental Effects, and Residential Property Values." By Raymond Palmquist, Fritz Roka and Tomislav Vukina in the Journal of Land Economics. Though the estimation procedure used in this article is very difficult to understand, the first page of the article summarizes the results of the research. Also of interest is Table Four that outlines the expected price declines according to proximity to a swine CAFO.
- "Measured Effects of Feedlots on Residential Property Values in Minnesota: A Report to the Legislature." By Steven Taff, Douglas Tiffany and Sanford Weisberg. This paper uses a different method of estimation than the NC paper, and thus the results are not comparable. However, these authors did find that prices increased the closer a home was located to a CAFO.
- "Structure of Wages and Benefits in the U.S. Pork Industry." By Terrance Hurley, James Kliebenstein and Peter Orazem. As detailed above this study explores national wages for workers in this industry, as well as touches on the issue of air quality for workers.
- "Managing Swine Effluent Applications Under Irrigated Conditions in Northeast Colorado." By Mahdi Al-Kaisi and Regan Waskom of CSU. A description of effluent management through a center pivot irrigation system in Yuma County. Describes the potential for replacing all commercial fertilizer use with swine effluent.
- "Most Commonly Asked Questions About Pork Production and the Environment." NPPC publication on topics that have been addressed in the popular press and by pending legislation. Pro Pork production.