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## Living with Hogs in Rural Iowa

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## Living with Hogs in Rural Iowa

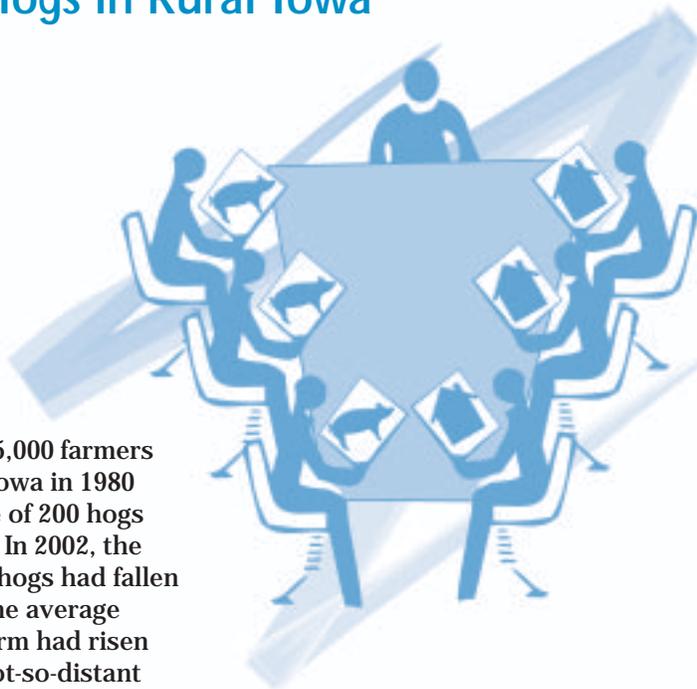
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Approximately 65,000 farmers raised hogs in Iowa in 1980 with an average of 200 hogs residing on each farm. In 2002, the number of farms with hogs had fallen to about 10,000, and the average number of hogs per farm had risen to over 1,400. In the not-so-distant past, the presence of livestock on farms was the social norm. When living or traveling in rural areas, you would expect to smell the smells, hear the noises, and see the sights that accompany such operations. Rural neighbors registered few complaints when nearly everyone had livestock. But the dramatic increase in the concentration of ownership now means that far fewer rural residents have a large financial interest in livestock. What once was the smell of money is now the smell of somebody else's money.

Complaints and lawsuits about livestock operations are now much more common. The best known case involves the four farm couples—two of which had raised livestock—who sued Iowa Select Farms in 2002 for the production of offensive odors, noxious gasses, and excessive flies on the company's 30,000 head hog facility in Sac County, Iowa. The plaintiffs were awarded \$1.06 million in actual damages plus \$32 million in punitive damages.



Lawsuits are a costly means of settling disputes. But many residents feel that they have no alternative because state law largely controls the siting of livestock operations. Currently, livestock producers have the right to construct facilities that meet state environmental standards. Supporters of state control argue that making Iowa a location that consistently applies standards for siting livestock facilities makes economic sense because livestock production is one of the industries for which Iowa has a competitive advantage.

Opponents of state control argue that increased local control of livestock operations makes sense because local governments are in a better position to gauge the local costs and benefits of local economic activities. Many feel, however, that, at least for hogs, modern feedlots in Iowa offer few local benefits. Sow facilities generate far more economic activity than do finishing operations. Increasingly, Iowa is becoming home to finishing operations, while the

large sow facilities are locating in North Carolina, Missouri, and Canada. And concentrated ownership of finishing operations means more central purchasing of feed, veterinary services, and other supplies. Central purchasing helps larger commercial centers but not necessarily smaller communities.

Thus, the benefits associated with increased economic activity from livestock production flow to larger commercial areas, and to the state as a whole, whereas the costs from odor, flies, and the risk of water contamination are borne locally. Clearly, under these circumstances, more local control would mean more restrictions. The difficult question that Iowa must address is, How can a competitive livestock industry be supported while accounting for local costs?

### REGULATION THROUGH ASSIGNED PROPERTY RIGHTS

Suppose that a hog farmer wants to build three new finishing houses on a site. The farmer knows that the hogs will generate a significant amount of odor intermittently throughout the year. This odor will affect the residents of four nearby families. Under current law, as long as all state environmental requirements are met, the farmer can build the facility. To some this means that current state law assigns this hog farmer the right to generate odor. But suppose state law gave the four families the right to be free of odor?

Initially you might think that such a proposal would bring a halt to any expansion in the hog industry, as residents would veto any new construction. But is this necessarily the case? A right to be free of odor can be considered a property right, in which the property is odor-free air rather than real estate. Just as real estate can be traded, so too



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## IN THIS ISSUE

Living with Hogs in Rural Iowa .... 1

Antibiotics Restrictions:  
Taking Stock of Denmark's  
Experience ..... 4

Iowa's Agricultural Situation ..... 6

Integration in the North  
American Livestock and  
Meat Industries ..... 8

U.S. Agriculture and the  
Value of the Dollar ..... 10

And the Survey Said. . . . . 11

Recent CARD Publications ..... 12

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could the right to odor-free air. Is it possible that private negotiations between the hog farmer and rural residents could result in a solution where everybody is better off?

Suppose that at this location, the hog farmer expects to generate profits equal to \$10,000 per year from the operation, after accounting for all costs of building and operating the facility. A payment to the residents of anything less than \$10,000 per year would leave this farmer better off than if the project were blocked. Economists call this \$10,000 the farmer's maximum willingness to pay to be able to build this facility. Further, suppose that each of the four families would accept nothing less than \$1,000 each per year as compensation for having to breathe hog odors. Economists call this \$1,000 payment the minimum willingness to accept the odor.

There is room for mutually beneficial trade when the willingness to pay exceeds the willingness to accept, as is the case in the example. Suppose the hog farmer offered each family \$1,500 per year as compensation for the odor. The farmer's profit would decrease by \$6,000 but would still be positive. Each family would have \$500 per year over and above the actual amount of harm caused by the odor.

Note also that giving families the right to be odor free encourages the farmer to invest in cost-effective practices that eliminate odor. Suppose that an investment of \$3,000 per year would eliminate odor. The farmer would have an incentive to make this investment because it would be less than the \$6,000 paid to the families as compensation for the odor.

This beneficial solution follows from the assignment of a property right to the rural residents. But the property right also could be assigned to the hog farmer. Suppose the hog farmer has the right to generate odor. The farmer would have no immediate incentive to compensate the odor-affected families, but the families would have an incentive to induce

the farmer to adopt odor-reducing technologies. If the odor generates \$4,000 in damages and costs \$3,000 to eliminate, then there is room for mutually beneficial trade to take place. In this case the payments would go to the farmer from the residents. Again, the assignment of property rights is the key to reaching an agreement.

### THE MAGNITUDE OF DAMAGES

Is there room for beneficial trades that could help solve the problem of locating livestock facilities in Iowa? There is unless the damages caused by proximity to livestock operations are much greater than the profits generated by such activity. How can we measure such damages? There is no market price for hog odor, so we cannot look at market reports. Surveys that ask residents how much they would be willing to pay to be free of hog odor would be a poor basis on which to base damage estimates. What is needed is a measure that is based on actual transactions between individuals—such as residential real estate transactions.

If odor causes damage, then one would expect that, all other things being equal, a house that is exposed to odor would sell for less than a house that is not. Therefore, measuring the impact of odor on property values should yield the needed damage estimates. We do not have a measure of odor at each property. Instead, we created a proxy measure of odor exposure by calculating the number, distance, and direction of feedlots relative to residential properties that have sold.

We obtained data for every rural residential house sold in Webster, Humboldt, Hamilton, Franklin, and Hardin counties from the mid-1990s until the summer of 2002. Along with the actual sale price for each home, we collected information on those attributes that typically affect a home's value, such as the square feet of living space, number of bedrooms, and proximity to schools and commercial centers. Finally, we used Department of Natural Resources data

on the location and size of livestock operations requiring either an operating permit or a manure management plan to determine how close each home was to each of these livestock facilities. For each house, we identified the nearest livestock operation, recording the operation's distance from the house, its size (live weight), and whether it was upwind of the home during the winter (that is, northwest) or summer (that is, south) seasons. We also computed the number of operations within a three- and ten-mile radius. We then determined (using regression techniques) if there is a statistically significant effect of proximity of livestock operations on property values, and if so, the magnitude of the effect. Only owner-occupied, single-family detached residences were included in the study. Details of the analysis are contained in CARD Working Paper 03-WP 342 (available at <<http://www.card.iastate.edu>>).

There is an important qualification to report about the results of this study. The statistical techniques used to estimate these results give insights into the average effects, not the effects on any particular residence. The actual affects will be higher or lower, depending on the type of facility, the type of livestock located in the facility, how well the facility is managed, topographical features of the site, and other factors that are not explicitly included in our statistical analysis.

#### RESULTS OF CARD'S ANALYSIS

Reasonable results emerge from our analysis. Overall, the data suggest that livestock facilities can affect property values. The closer the facility is to a residence, the greater the effect. And the effect is zero unless the residence is downwind of the closest facility.

We can best illustrate the magnitude of the effects by posing the following scenario. Suppose a residence has a three-mile buffer zone with no livestock facilities. Our results indicate that if one facility with 450,000 lbs live weight of livestock moved to within one-half mile, the value of the residence would decline by an average of 8 percent if the facility were located to the

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*Our results suggest that there may be significant room for beneficial trade between livestock farmers and homeowners.*

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northwest and by 5 percent if the facility were located to the south. These declines in average property values increase to 11 percent and 7 percent if the facility were located within one-quarter mile. At a distance of 1.5 miles, the declines fall to 3 percent and 2 percent.

The large amount of variation in the data hampers our ability to measure precisely the effects of livestock facilities on property values. However, it is somewhat reassuring that our average results are about the same as those of a previous study conducted in North Carolina by Palmquist, Roka, and Vukina ("Hog Operations, Environmental Effects, and Residential Property Values," *Land Economics*, vol. 73, February 1997, pp. 114-124). In this earlier study, the results indicated that rural residential property values declined by as much as 9 percent because of the siting of hog facilities within one-half mile of a residence.

#### A POSSIBLE TRADE-OFF?

With these potential property damages in mind, would a policy that gives existing homeowners the right to be free of damage from livestock operations put a stop to all facility construction? Our results suggest that there may be significant room for beneficial trade between livestock farmers and homeowners.

Suppose that a farmer wants to locate a site a half mile upwind from two residences valued at \$100,000 each and that there are no other facilities located in the area. The farmer is a good neighbor and promises to manage the operation to minimize odor, flies, and the risk of a manure spill. But the realities of livestock production in this case impinge on the owners of the residences. Given the right to be free of any effect from livestock operations, the homeowners would be able to block construction of the facility. But suppose the farmer offers each homeowner a one-time payment of \$10,000 (10 percent of the value of the home) as compensation for any potential damages. The homeowners might well choose to take the money and live with the livestock. The farmer would then be able to construct the facility at the chosen site, at a modest increase in construction costs. And the state of Iowa would get the benefits of attracting a competitive industry.

Exact rules and legal obligations would have to be worked out before any compensation program could be implemented. However, given the current stalemate, whereby homeowners feel powerless to affect land use decisions and livestock producers feel that their investments are not welcome in the state, the payoff from such voluntary agreements could be large. ♦