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## **PORCINE, POULTRY, AND PROPERTY VALUES**

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## Porcine, Poultry & Property Values

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### *Introduction*

In autumn 1994, a \$45,000 judgement against a Buena Vista Country swine producer for “environmental nuisance and diminution of value” sparked controversy locally and around the state. The state legislature, the following year, passed H.R. 519, commonly called “The Hog Lot Bill”, as well as other related legislation pertaining to confinement livestock feeding, its alleged spillovers, and defense to nuisance actions for feedlot operators. This paper attempts to analyze rural residential property value as determined through market transactions, and the effect of concentrated livestock feeding operations on rural residential property values.

### *Review of Literature*

The controversy surrounding the environmental effects from confinement livestock feeding operations and their effect on adjacent property values is ongoing with scant but increasing scientific evidence. Odor externalities were estimated to reduce rural Michigan home values by \$0.43 per hog within five (5) miles of studied properties (Abelers-Allison and Connor). Van Kleeck and Bulley studied swine, beef and poultry farms as probable environmental offenders in the eyes of their neighbors. And Rubinfeld looked at urban property values in clean air and dirt(ier) air regions in estimating homeowner’s demand for cleaner air. Palmquist, most recently, examined property values in rural North Carolina’s most swine intense counties – Duplin and Sampson – concluding that rural house values fall as much as 7% when new swine finishing

facilities are located nearby.

### *Methodology and Hypotheses*

Rural residences are highly differentiated products, with location, condition, size, structural integrity and surrounding neighborhood of likely import. But due to their specific locational attribute and fixity, environmental conditions and environmental quality are tangible “goods” included in a real estate transaction. Local spillovers or externalities should effect the value(s) of affected homes without impacting the entire market’s equilibrium. A multi variable regression technique will be used to test the assertion that proximity to concentrated livestock feeding facilities or other point-source polluters lowers rural residence values.

The area considered for the study is Buena Vista County (Iowa) and surrounding portions of Sac, Cherokee, and Pocahontas county. The county is 576 square miles and has a population of 21,500 with 60% concentrated in the Storm Lake-Alta vicinity. Data were collected on 55 home sales that occurred between January 1996 and July 1997. Sales did not include familial transactions or transfers (with subsequent valuations) the result of marital dissolutions. All homes outside a municipalities’ “sphere of influence” were considered in the data. Each houses’ characteristics, sales prices, condition, square footage, number of bathrooms, number of bedrooms, commute-to work times, outbuildings (acreage), and distance from surrounding livestock facility were noted.

Condition, square footage, number of bathrooms, number of bedrooms, outbuildings, and distance from livestock facilities are expected to positively influence house values. Commute times and nearness of the homes to livestock facilities are expected to decrease average home

values.

The location of animal feeding operations, their capacity, and manure storage structures is identified. Thirty seven (37) feeding operations are found to have weight capacities requiring licensure and/or separation distances outlined in Iowa Code Chapter 455B.162. In addition, the Storm Lake Municipal Water Treatment facility (and adjacent industrial evaporation pond) is considered a potential contributor to environmental degradation (consistent with the County Assessors' judgement). Homes, livestock feedlots, county's most major highways, and perimeter are identified on figure 1.

Table 1 lists the variable, their descriptions and descriptive statistics. Ten of the 55 rural residence have sizable livestock operations with ½ mile.

**Table 1. Model Variables and Descriptive Statistics.**

<b>Variable</b>	<b>Description</b>	<b>Units</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
PRICE	Market price	\$	54,296	26,148	7,600	128,500
BDR	Bedrooms	#	3.055	0.78	1	4
SQFT	Heated area	Sq. ft.	1,333	312	528	2,100
BTR	Bathrooms	#	1.43	0.48	1	2.75
DIST	Commute time	Min.	22.8	9	2	40
BLDGS	Number of outbuildings	#	0.67	0.95	0	3
COND	Condition of home	1,2,3	1.47	0.3	1	3
NEAR	Within ½ mi. of feedlot	1=yes 2=no	0.18			

### *Estimation Results*

Multivariate regression techniques were utilized in assessing the role of each variable in effecting market prices. School districts, as first suggested for inclusion by several realtors, were omitted from the estimation. It is presumed that commute time likely serves as a proxy for school districts hastening the latter's exclusion. Similarly, collinearity problems in using both bedrooms and square footage were lessened by using only square footage. The chosen regression equation

in analyzing the effect of each variable, nearness to livestock operation inclusive, is:

$$\text{PRICE} = 28746 + 18.8 \text{ SQFT} + 25316 \text{ BTR} - 1253 \text{ DIST} + 7834 \text{ BLDGS} \\ - 8177 \text{ COND} + 516 \text{ NEAR}$$

$$S = 15998 \quad R\text{-sq} = 80.9\% \quad F = 34.51$$

As is seen by the  $F = 34.51$ , the null of  $b_1 = b_2 = b_3 = b_4 = b_5 = 0$  is rejected. The global test attest to the models' validity. Evaluation of individual regression coefficients are summarized below:

<u>Variable</u>	<u>Coefficient</u>	<u>t-value</u>	<u>p-value</u>
SQFT	18.8	2.8	0.007
BTR	25316	5.31	0.000
DIST	- 1253	- 4.88	0.000
BLDGS	7834	3.04	0.004
COND	- 8177	- 2.14	0.037
NEAR	516	0.08	0.934

The structural variables of square footage, bathrooms, outbuildings and condition were each of predicted signage, the first three (3) significant at the 99% level, the last at 95%. The coefficients, likewise, are reasonable, with a square foot of heated living space adding \$19 to the average house's value and bathrooms adding over \$25,000 (twice the estimate used in local in-town appraisals). The stylized outbuilding variable, representing an "acre-equivalent" in structure or acreage amendment, adds \$7834 to the average home's value, slightly above local appraiser \$6000 correction for usable structures or acreage. The DIST variable is negative, as expected, and significant at the 99% level. Each one (1) minute the home is from its respective county seat (or employment center), about \$1250 is pared from an average home's value. And lastly, being within ½ mile of animal feeding operations (or municipal sewage facility) does not significantly

effect rural residence's estimated market values.

### *Conclusions*

The minimum separation distance established by the Iowa Legislature in 1995, according to the analysis of one county's rural residential home markets, appears to be adequate in curbing value diminution of adjacent homeowners. As expected, the structural attributes of individual houses (square footage, bathrooms, outbuilding and/or acreage) and location relative to employment centers account for three fourths (3/4) of the variability in home prices. The results are consistent with anecdotal and local practitioners' evidence when appraising and/or assessing rural residences. No adjustments have yet been made by the county's assessor to adjust for changed use of rural land, which might influence neighbor's property values. Likewise, local appraisers have not altered or accounted for the existence of animal feeding operations in appraising rural residences. A possible counter is that the entire county's rural residential market is diminished due to the growing number of confinement animal feeding operations as well as other socio-economic factors. Thus, even the "higher quality" residences far(ther) removed from animal agriculture, are "depressed", and don't reflect the value differences likely between dissimilar properties. Both the county assessor, realtors and appraisers refute that assertion.

Odor, auditory and vehicular externalities will likely persist and lead to conflicts between neighboring rural landowners or residents. Several Iowa counties (i.e., Humboldt, Adams, Montgomery) have tightened the regulatory hold on animal feeders beyond the standards prescribed statewide. Ongoing odor control experiments and manure handling/applying research are being done in Buena Vista County. Continued study of farm practices and market revelations

may provide valuable guidance in designing regulatory and market proposals regarding land use, environmental preservation and favored management practices.

### References

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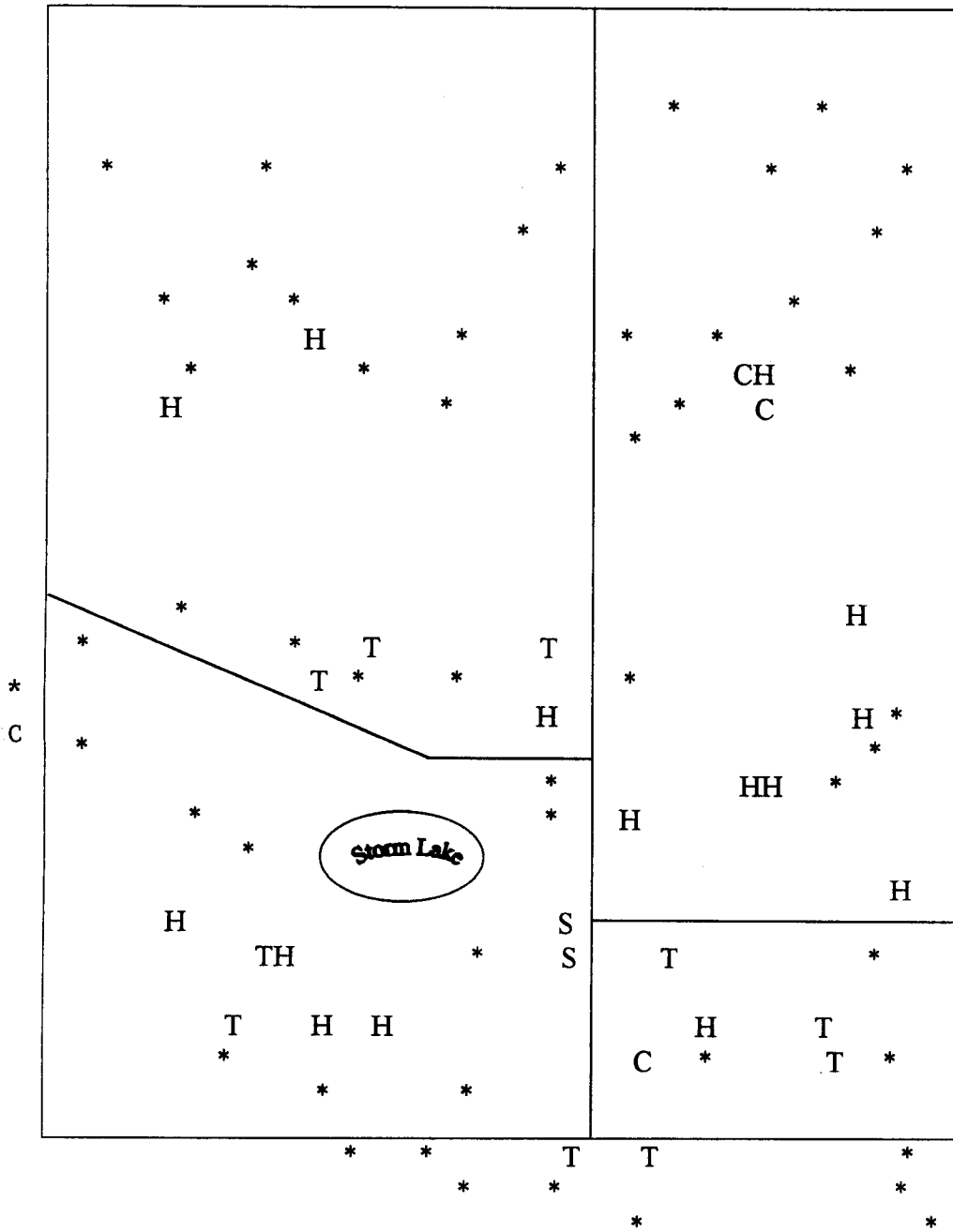
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**Figure 1 Rural Residences Sold, Confinement Livestock Feedlots, and Studied Area**



- T = Confinement Turkey Finishing Facility
- H = Confinement Hog Gestation, Nursing or Finishing Facility
- C = Confinement Cattle Feeding Facility
- S = Municipal Sewage Treatment Facility and Adjacent Evaporation Pond
- \* = Rural Residence Included in Study