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Measured Effects of Feedlots on Residential Property Values in Minnesota: A Report to the Legislature

by

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UNIVERSITY OF MINNESOTA

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BRIEF

We were asked by the Legislature to conduct "research into the effects feedlots have on the value of nearby property." To do so, we carried out a statistical examination of the interrelationships among residential property sales prices and nearby feedlots in a southwestern Minnesota study area. Structure and location data for 292 residential property sales in Redwood and Renville Counties, excluding the cities of Olivia and Redwood Falls, were linked to the location and physical characteristics of every larger feedlot within three miles of each sale.

The basic approach was to ask, "Does the addition of information about feedlot proximity help us explain observed house prices beyond the explanatory power of statistical models that use only the house's structure and other location characteristics?" We examined this overall question with respect to a series of constructed proximity indicators that capture the effects of feedlot size, direction, distance, and types of animals, among others.

We found statistically significant evidence of a link between feedlot location and house prices in the study area. That relationship was positive in sign, not negative as initially expected. Houses closer to feedlots appear to have sold for more than expected from knowledge of the characteristics of the houses alone. The effect was most pronounced for houses that are older, relatively lower in price, or located in small towns.

Are these results generalizable to elsewhere in Minnesota? Not necessarily. Negative links between house prices and feedlots might well actually exist, but statistical "noise" could have masked them. Or it is possible that our sample data is not representative of the total housing market in the area, in which case our findings are not representative. Or there might be a negative relationship, but it won't show up in observed property sales prices for a number of years yet. But it just might be the case that feedlots do indeed positively influence nearby property values.

Introduction

Feedlot location has become one of the more contentious issues facing Minnesota's local governments. While the state's Pollution Control Agency has broad permitting authority over most new facilities, this authority extends only to questions of design and operation -- not of location. Whether or not new facilities can be built at a particular site is a decision usually left to county or to city or township officials.

In the public hearings that precede location decisions in those jurisdictions that choose to exercise oversight, many opinions for and against the proposed facility -- or feedlots in general -- are proffered. Among these are assertions that the new facility will result in lower nearby property values. The evidence that can be brought to bear on this assertion is the subject of the present study. We do not address the policy implications of a positive or negative finding; we simply address the basic question of fact.

Nearby feedlots might affect property values in two broad ways: they might increase or diminish the current owner's willingness to sell, or they might increase or diminish potential buyers' willingness to purchase. The actual price at which a property sells, the only property value we can actually observe, necessarily lies somewhere between the seller's lowest acceptable price and the buyer's highest potential offer. The observed sales price is the net outcome of all the conflicting influences on buyers' and sellers' preferences.

For example, a seller might be willing to settle for less, just to get away from perceived negative effects from the feedlot. Or a buyer might be willing to pay less, to compensate for anticipated negative effects. Either or both would lead to a pattern of observed sales prices that are lower for houses near feedlots. Conversely, feedlots might provide sufficient positive benefits to nearby residents that sellers can hold out for a higher price. Or buyers might be willing to pay more, for the same reason. If this is the case, we would expect to observe sales prices that, on average, exceed those of houses that lie farther away.

Whichever the situation, if we observe different average prices when feedlots are nearby, then we have evidence linking feedlots to property values -- all other property characteristics held constant. We cannot, however, use this evidence to decide which combination of buyer and seller influences was the root cause of the observed prices.

Evidence of a link

Three major sources of evidence might be brought to bear on the proximity question. The first is anecdote -- the accumulation of personal observation, news accounts, public hearing statements, or appraisal reports. These "stories" have the advantage of being personalized and particular, because they can capture the subtleties and nuances of individual situations. They have the decided disadvantage of not being "scientific," in the legal or academic sense, because it is very difficult to generalize from a few instances to new occurrences.

A second data source is the collective judgments of local property tax assessors. These officials are charged with annually assigning a market value, defined as an expected sales price, to every property in their jurisdictions. Assessors' value estimates have proved fairly reliable on average, although their estimates on individual properties of course are more prone to deviation. The disadvantage of using assessor values is that any observed differences in value associated with feedlots is by definition simply a discovery of the assessors' own judgments on the question.

The final source for data bearing on the question is the set of residential properties that actually sold in the study area during the study period. This approach limits the number of properties subject to analysis, but it has several advantages that recommend it. The principal reason economists prefer actual sales prices, rather than assessed values, is that sales prices capture more information from the market; after all, the final price tells us that both buyer and seller agreed that that was a "fair" price for the property. For this reason, we have chosen to examine only actual property sales in this study.

Previous studies

Abeles-Allison and Connor (1990), in a broader study of the local costs and benefits of the hog industry in Michigan, examined housing sales prices in the context of property, neighborhood, and environmental characteristics. Eight feedlots were selected from a list of those receiving numerous odor complaints. Each house in the data set was associated with one and only one of the study feedlots. The authors reported a negative relationship between housing values and nearby feedlots.

Palmquist et al. (1997) is the only other published study that directly examines the feedlot proximity question. They linked sales data from 237 rural residential properties in nine North Carolina counties to swine feedlots within two miles of each sale. Because feedlot data is considered confidential in North Carolina, the researchers did not have direct access to location or size attributes. They were able to arrange with the State Veterinarian's Office, that state's feedlot data repository, to report the aggregate number and size of swine feedlots within 1/2, 1, and 2 miles of each sale. From this sorting, the authors constructed a manure index which weighted the aggregate number of hogs by distance.

After substantial data manipulation, the researchers calculated a range of effects for different sizes of feedlots locating at various distances from a mid-range priced house. They found a small but statistically significant negative effect on house values. For example, if a new 2,400 head finishing floor were to be built within 0.5 miles of a house that already had some feedlots nearby, the authors calculate that the average house value would drop by 4.75% ($2,889 from $60,816), If the same feedlot were instead to be built two miles away, the value of that house would drop only 0.56%.

The present study

The present study builds from these findings, expanding particularly upon the North Carolina study. Our approach, sometimes termed "hedonic price analysis," links observed property sales prices to those properties' structure, location, and feedlot characteristics. The underlying data are 292 rural residential property sales in 1993-94 for two Minnesota counties for which complete data is available, plus all larger nearby feedlots. Because we know the geographic location of each property and of each feedlot, we are able to measure the direction and distance of each feedlot from each house. This permits us to explore aspects of the proximity question that were not possible in the other studies.

We examine the data in two steps. First, ignoring any feedlot characteristics, we model sale price solely as a function of characteristics of the house such as its size and its location. Assessors call this method "mass appraisal," whereby housing characteristics are used to "explain the variability" in sale prices. If we could explain 100% of the variability, then we could insert the housing characteristics into an equation and calculate a predicted price. That predicted price would exactly equal the eventual observed sales price. Of course such a 100% accurate prediction is not possible: two houses with identical characteristics, according to the information from the assessors records, might sell for very different prices due to the condition of the property, to the proximity of feedlots, or to other unmeasured factors unrelated to feedlots.

As a second step in the analysis, we compute the prediction errors, which are the differences between the observed sale price and the sale price predicted from this basic property model. Some of the prediction errors are positive, and some are negative. If proximity to feedlots is an important determinant of sales price, then we would expect that the prediction errors would be "explained by" proximity to feedlots. If the addition of the feedlot data does not improve the basic model by decreasing prediction errors, these variables can be classified non-important.

We ask a series of interrelated questions about property values and feedlot proximity: Does distance matter? Does direction matter? Does type of animal matter? Does manure handling method matter? Does the size of the operation matter? Each of these can be addressed in our framework.

We choose to report our results essentially as “yes/no” answers to these broad questions of fact, rather than as what we would consider to be overly precise estimates of feedlot effects on property values. The method of analysis we used is outlined in Cook and Weisberg (1994). The software included with this book, called the R-code, was used for the bulk of the data analysis.

Study Area

Economic theory requires that all examined properties lie within the same "housing market," a geographic area in which it is plausible that potential buyers might choose from among all properties. On that count, we could not lump all Minnesota sales or even all sales in southern Minnesota. We required a more compact, more homogeneous market area.

The present study examines the rural residential property market in Redwood and Renville Counties, Minnesota. The two counties lie approximately 100 miles west of the Twin Cities and jointly cover 1,868 square miles. Each contains about 17,000 people, down slightly from a peak just after World War II. . The major city in the area is Redwood Falls, with a population of just over 5,000. Residents in each county have similar off-farm employment opportunities and average income levels.

The study area is almost entirely agricultural and largely flat with few wooded areas, except along the Minnesota River. Principal crops are corn, soybeans, and sugar beets. The area is known for extensive swine and poultry operations which have grown substantially within the past decade. The two counties have shown somewhat different approaches to regulating feedlots. Renville County has generally approved only lagoons for manure storage, while Redwood County has only approved pits and above ground tanks for this function.

Proximity

Given the large number of both property sales and livestock facilities, we need to measure the distances among a complex of feedlots and residential properties. Unlike those in the Michigan study noted above, houses in our study area might have several feedlots "nearby." Unlike that used in the North Carolina study, our data set tells us a great deal more about which feedlots lie in what direction and distances from each house. What we require is a set of measures that captures and notions such as "many," "near," "large," etc.

Two approaches suggest themselves. The first would be to draw circles of stated radius around each feedlot and examine the relative prices of houses inside and outside each circle. This approach would help us answer such questions as "Do houses nearer to feedlots have lower values on average?" Unfortunately, however, it can't help us with other questions that we have, such as "Does the total number of nearby feedlots reduce values?"

The second approach preferred by economists for both practical and theoretical reasons is to draw a circle around each property and count all feedlots within the circle as "nearby." This is the approach adopted for this study. We classify all feedlots within three miles of each property as "nearby" and, hence, subject to further analysis. For each property in our data set, we have, in addition to its structure and location features, a list of all nearby feedlots, including their direction and distance. For each feedlot, we know the animal type, its size, and its manure handling facilities. From these data we are able to create the several feedlot proximity indicators that become the principal variables of interest.

Feedlot Data

In Minnesota, all new and upgraded feedlots over 50 animal units (AU) in size require a state permit, issued by the Minnesota Pollution Control Agency. An animal unit is a standardized measure of feedlot size: the necessary conversions are shown in Table 1.

Table 1: Conversion to standardized animal units

animal	animal units
Horse	1.0
Dairy Cow	1.4
Dairy Youngstock	0.5
Finishing Pigs (>55 lb.)	.40
Breeder Swine	.40
Boars	.40
Farrowing Sows	.40
Gestating Sows	.40
Feeder Pigs (<55 lb.)	.05
Turkeys	.018
Chicken Layers	.01
Chicken Broilers	.01
Chicken Pullets	.005
Beef Feeders	1.0
Beef Cow w/Calf	1.0

We chose to consider only those feedlots with more than 500 AU. This had the effect of excluding many traditional dairy farms and a few older swine facilities; consequently, it more closely approximates, in our judgment, the image that most people form in their minds when they hear the word "feedlot." Virtually all new facilities built in the study area in recent years exceed 500 AU in size..

There has been a flurry of feedlot permit issuance in recent years in Minnesota, partly linked to a 1995 relaxation of the state's corporate farming laws. Many new operations have been set up, and scores of new MPCA permits have been issued -- but in some cases no physical facility is yet on-line. It seems unlikely that the prospective issuance of a permit, not to mention actual construction, would greatly influence those sales. For our analysis, therefore, we excluded from our nearby-feedlot count any permit that was dated after the sale. Feedlot permits contain the following data, of which we use the first six items in this study:

1) date of the application
2) number and type of animals to be housed in the facility
3) location of the proposed facility, usually to the quarter-quarter section
4) the name and address of the applicant
5) the type of animal confinement
6) the manure storage structure
7) the soil type around the facility
8) the land application method for the manure as well as acres available
9) the usage of the well on the property (humans, livestock, or irrigation)
10) data on the existence of special conditions

For each feedlot, we identified the dominant animal type (swine, bovine, poultry) and associated major manure process (solid-pack, liquid-lagoon, liquid-tank, liquid-pit). The number of animal units for the entire facility was that number attached to the dominant animal type. This assignment was rarely a problem, because nearly all the permits were for a single animal type or for a type that accounted for over 90% of the total facility's manure production.

Housing Data

The housing data in this study came from county assessor records and state Department of Revenue sales reports. Periodically each parcel is classified according to use, inspected, and measured. The number of bedrooms and bathrooms are noted, as well as the year a property was built, recent improvements, and additions. Assessors make a plat drawing, describe the lot size, and separately value the land and building components. The assessors in the study area rely on "multipliers" to be applied against foundation area for homes of known condition and construction style. For example, assessors assign particular classes to homes depending upon whether or not they are two-story, ramblers, split levels, Cape Cods, domes, and so forth.

Sales data came from official Certificates of Real Estate Value filed with the Minnesota Department of Revenue and from each county assessor's field cards, which detail the attributes of each property. Sales were included if the property is located in any city or township with population 2,500 or less. This restriction excluded from our analysis the City of Redwood Falls in Redwood County and the City of Olivia in Renville County. We counted a property as "residential" if the sale was so classified by the Department of Revenue: farmsteads are generally <u>not</u> included in this category.

Our final data set of 292 sales consists of all reported 1993-94 sales for which complete data was available. Most of the sales used in this study were for less than $50,000, and over a third were for less than $20,000 (Figure 1). Table 2 lists various descriptive statistics for the housing data.

Somewhat less than half of the sales were for properties that had no feedlot of size over 500 AU within three miles, including feedlots located in adjoining counties. The majority of sales were associated with two or fewer nearby feedlots, although one cluster of sales, all in a single community, was surrounded by eleven feedlots within three miles.

Figure 1: Distribution of sales prices (n=292)

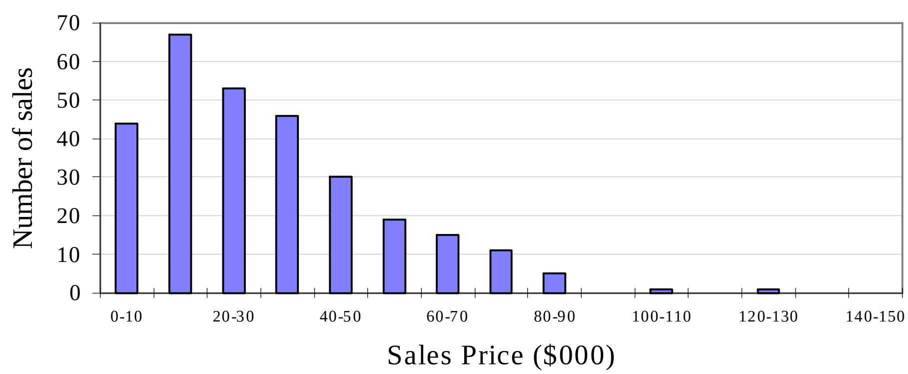

Table 2: House structure variables

variable	description	min.	mean	median	max.	std. dev.
FOOTPRINT	Number of square feet in foundation	320	979	927	2,096	284.2
BUILT	Year of initial construction	1885	1936	1936	1988	28.2
BEDROOMS	Number	1	2.9	3	6	0.8
BATHROOMS	Number	1	1.4	1	3.5	0.5
RATIO	Ratio of assessor's estimates of house value to total property value	0.36	0.84	.88	0.99	0.2
PRICE	Reported sales price adjusted for time and terms	5,000	31,434	26,500	120,500	21,213

Basic property model

The first task is to explain as much of the observed variation in house prices as we can, using only available structural and location characteristics. As is common in this type of study, we used multiple regression analysis to obtain an equation relating price to several characteristics at once. Following Cook and Weisberg (1994) we first transformed the independent variables (also called the predictors) so that they are as linearly related as possible. Special software included in the R-code makes finding the needed transformations straightforward. We used this method and then rounded the selected transformations to the nearest whole number or simple root:

variable	transformation
BATHROOMS	inverse
FOOTPRINT	cube root
RATIO	arcsine square root
BUILT	logarithm

The arcsine square root transformation is often used to make more nearly symmetrical the distribution of a quantity bounded between zero and one. Similarly, we transformed the scale of the dependent (or "response") variable to improve the applicability of a model: we used the Box-Cox method to transform PRICE to the cube root scale.

Table 3 gives the full basic property model and estimated coefficients. The COUNTY variable is 0 if the property is in Redwood County and 1 if in Renville County. TOWNSHIP is 0 if the property is in a city and 1 if in a township. The joint distribution of these two variables is shown in Table 4.

Statisticians generally agree that a t-value of 2.0 or more in absolute value, which corresponds to a significance level of about one in twenty, means that the associated coefficient estimate can be considered "important" or "statistically significant." These higher values make us pretty confident that the "true" values of the coefficients (which we can never observe) are not really zero. The 2.0 threshold for t-values was our criterion of statistical significance in this study.

Table 3: Basic property model (cube root of price)

variable name	estimated coefficient	standard error	t-value
CONSTANT	-1156	152	-7.6
COUNTY (0/1)	2.2	0.5	4.4
TOWNSHIP (0/1)	7.5	0.9	8.7
BEDROOMS	0.8	0.3	2.5
RATIO (arcsine square root)	9.4	2.2	4.3
BATHROOMS (inverse)	-4.4	1.1	-3.9
FOOTPRINT (cube root)	2.3	0.3	7.0
BUILT (log)	133.1	20.1	6.6
N= 292			
R2 = .66			
sigma-hat = 4.0			
F = 78.9			

Table 4: Distribution of 0/1 variables in basic property model

COUNTY / TOWNSHIP	(0) Redwood County	(1) Renville County	total
city (0)	117	142	259
township (1)	10	23	33
total	127	165	292

Adding in the feedlot variables

We can now assess the implications of adding various feedlot variables to this basic property model. If the model is "improved" by an addition, then that variable accounts for a part of the price that is not attributable to house characteristics alone. We demonstrate the effects of adding feedlot variables to the basic model through use of *proximity indicators*, each of which encapsulates one of the basic research questions. These indicators, described in Table 5, are categorical, not continuous variables. Their interpretation will become apparent as we discuss each in the results section. Briefly, a statistically significant coefficient estimate (t-value greater than 2.0) on a proximity indicator suggests that the feedlot characteristic underlying that indicator does indeed "matter."

In each case, the parameters of the basic property model portion of the new model shift, but only slightly. We therefore report the statistical properties of only the independently added proximity indicators.

Table 5: Definition and distribution of feedlot proximity indicators

indicator	category levels	associated value	number of sales	meaning
NEARBY	0	no	138	Is there any feedlot within three miles?
	1	yes	154	
SWINE	0	no	160	Are there any swine feedlots within three miles?
	1	yes	132	
LAGOON	0	no	194	Are there any feedlots that use lagoons within three miles?
	1	yes	98	
DISTANCE	0	0 - 1	7	Miles to nearest feedlot of any type or size.
	1	1 - 2	97	
	2	2 - 3	50	
	3	3 +	138	
SIZE	0	0	138	Total number of animal units on all feedlots within three miles combined.
	1	1 - 1,000	34	
	2	1,000 - 10,000	102	
	3	10,000 +	18	
NUMBER	0	0	138	Total number of feedlots of any type or size within three miles.
	1	1 - 10	147	
	2	10 +	7	
NORTHWEST	0	no	250	Are there any feedlots of any type or size located northwest of the property within three miles?
	1	yes	42	

Results

Table 6 summarizes the results from adding each of the proximity indicators independently to the basic model. All proximity indicators "mattered," in that their associated t-value was greater than the critical value. The conclusion is striking: for this study area, nearby feedlots do influence property values -- positively. On average, nearby feedlots are associated with higher property values. This is true over the whole range of indicators, not just in isolated instances.

Table 6: Estimated coefficients for proximity indicators, added individually

indicator	estimated coefficient	standard error	t-value
NEARBY	1.9	0.5	3.8
SWINE	1.9	0.5	3.6
LAGOON	1.8	0.5	3.3
DISTANCE	-1.3	0.3	-4.8
SIZE	0.9	0.2	3.4
NUMBER	1.7	0.5	3.7
NORTHWEST	2.2	0.7	3.2

Discussion

Table 7 lists the parameter estimates that permit a judgment about whether the statistically significant estimates listed in Table 6 are economically significant. This we accomplish by comparing the estimate with its proportional (and marginal) effect on property values. For example, the estimate for the NEARBY indicator's coefficient is 1.9. This can be interpreted as the amount the estimated (transformed) price would change if a particular house that has no nearby feedlots were to instead have a feedlot (of any sort, of any size, in any direction, etc.) within three miles. At the mean transformed value for PRICE (29.0), the proportional price effect of the new feedlot would therefore be 1.9 divided by 29.0, or 6.6%. This is equivalent to a $1,750 change in the $26,500 median house price.

The table lists the proportional effects for each indicator. Because the response variable price has been transformed, the calculated effect will vary with the price of the house. To suggest the range of such effects, we report value-effects estimates for houses at the 25% and 75% quartiles of the distribution of the untransformed price variable, equivalent to $14,000 and $44,000 houses.

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Table 7: Change in property prices due to incremental change in proximity indicator

indicator	categories	estimated coefficient	percent change (at 25% / 75%)	price change (at 25% / 75%)
NEARBY	no, yes	1.9	8.2 / 5.6	1,150 / 2,450
SWINE	no, yes	1.9	8.2 / 5.6	1,150 / 2,450
LAGOON	no, yes	1.8	7.7 / 5.3	1,100 / 2,300
DISTANCE	0-1, 1-2, 2-3, 3+	-1.3	-5.6 / -3.8	-800 / -1,650
SIZE	0, 1-1000, 1000-10000, 10000+	0.9	3.9 / 2.6	550 / 1,150
NUMBER	0, 0-10, 10+	1.7	7.3 / 5.0	1,000 / 2,200
NORTHWEST	no, yes	2.2	9.4 / 6.5	1,300 / 2,850

The estimated coefficients for the proximity indicators that have other than 0/1 values are interpreted like continuous variables in regression models. For example, the -1.3 estimated coefficient for the DISTANCE indicator is the decrement to the transformed price variable associated with a change in the property's status from having the closest feedlot located within a mile to having it located between one and two miles, or from 1-2 to 2-3 mile status. Similarly, the coefficients for the SIZE and NUMBER indicators are interpreted as the change in property value associated with a change to the next higher category for that indicator. Downward movement among categories calls for use of the opposite sign, of course.

In our judgment, these property value effects are not "small." Simply adding a feedlot to the northwest of a house, for example, adds 9.4 % on average to a lower-price house's value. Or adding a feedlot a mile closer than an existing feedlot results in a $1,650 increase for a higher-price house. We cannot dismiss these influences as insubstantial. Their sources must be examined further.

The NEARBY indicator, which reflects whether or not there is any feedlot of any type or size within three miles of the house, itself captures all of our findings, so we use it next to identify those properties that most strongly influence the revealed feedlot-value relationship. We do this by fitting models separately for each value of three 0/1 indicators: age of the house, price of the property, and location of the property. Specifically, we create two new variables and re-use one from before:

OLDER:	1, if built before 1945
	0, if built after 1945
LOWPRICE:	1, if under $26,500 (the median of the sample price distribution)
	0, if over $26,500
TOWNSHIP:	1, if located in township
	0, if located in city

We refit the basic property model plus the NEARBY indicator using in sequence, only the older houses, only the newer houses, only the lower priced houses, and so forth. The estimated coefficient on the NEARBY indicator plus its standard error then help us isolate any notable drivers of our results. Table 8 shows the results of these "segmented" models. They are separated into two groups: those models that show a strong relationship between the NEARBY variable and the sales price, and those that do not.

Table 8: Estimated coefficients for NEARBY indicator in segmented models

model using only houses that are:	number of sales	estimated coefficient	standard error	t-value
older	173	2.9	0.7	4.4
lower priced	147	1.8	0.5	3.6
city	259	1.9	0.5	3.6
lower/older	115	1.5	0.6	2.5
lower/older/city	112	1.4	0.6	2.4
newer	119	0.4	0.7	0.5
higher priced	145	0.5	0.5	0.9
township	33	2.2	1.7	1.3
newer/higher	87	-.8	0.6	-1.3
newer/higher/township	16	-2.0	3.4	-0.6

The residential properties that most clearly are affected by nearby feedlots (indicated by t-values greater than 2.0 or so) tend to be older, lower priced, or located in the small cities that account for most of the sales in the study area. Focusing on the variables jointly reaffirms that older, lower priced houses tend to be the ones that are most affected by feedlot proximity. (Almost without exception, these houses are located in the small cities, as examination of the tabulation in Table 9 indicates. Half of the township houses in the data set are newer and higher priced.) Newer, non-city, or higher priced houses do not appear to be affected by feedlot proximity in the two-level housing market that characterizes the study area. The sign on the "newer/higher" combination is suggestive of a negative effect of feedlot proximity on this type of house, but the t-value is too small for us to classify this effect as "significant" under the criterion used in this study.

Table 9: Cross tabulation of segmentation variables (number of houses)

	older/lower price	**newer/higher price**	**other**	**total**
city	131	94	34	259
township	6	17	10	33
total	137	111	44	292

Is the relationship real?

While many causal factors could plausibly be put forward to explain the positive proximity effect, our simply observing that effect can't tell us which factor or factors actually did cause it. Why might houses nearer feedlots sell for more, on average? It might be that feedlot owners are buying nearby residences, either to provide housing for their own workers or to remove from use those properties whose new owners might complain about the feedlot's operations. Or it might be that feedlot workers are buying nearby houses in order to live nearer to their jobs. In either case, if these purchases tend to be at higher than typical prices, and if there are a substantial number of them, then the observed pattern of prices might result.

It could be, however, that there really is a negative (or neutral) effect, but our analysis caused us to miss it. In particular, suppose that houses near feedlots are more difficult to sell because of odors or some other negative effect. Had these houses sold, the price would have been less than the owners desired, so they might be withdrawn from the housing market more often than houses farther away from feedlots. Under these conditions, the set of observed sales would incorrectly give the appearance that proximity to a feedlot increases sales price.

Conclusion

Even with our "simpler" presentation of the statistical results, we have clearly answered the central question posed at the outset. The results do surprise us. Most anecdotal evidence and some appraisal studies seemed to point in the opposite direction. So did the two other property sales studies discussed earlier. We'd expected to find either negative or at least non-positive influences in the present study as well. It is of some interest, in light of these findings, that the Michigan study noted a similar result in passing, but quickly explained it away as an artifact of the analysis procedure. We cannot so casually put this evidence aside. Additional investigations may prove instructive. For that purpose, the authors have assembled similar data sets for Blue Earth County. These could be used for a second phase of this study, should additional funding permit.

Until or unless other geographic areas are examined, we are left with the fairly strong suggestion that nearby feedlots positively influence property values in Minnesota.

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