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UTAH AGRICULTURAL OPERATORS' ATTITUDES TOWARD COMMONLY USED AGRICULTURAL LAND PRESERVATION INITIATIVES

By Brett Zollinger and Richard S. Krannich

ABSTRACT

Like many areas in the Intermountain West, Utah experienced rapid population growth in the 1990s, resulting in the conversion of agricultural lands to various types of urban uses. The work described here is an examination of Utah agricultural operators' attitudes toward the most commonly used land preservation initiatives, including agricultural zoning, right-to-farm legislation, purchase of development rights programs (PDR), Greenbelt tax relief, and inheritance tax relief, in the context of substantial levels of agricultural land conversion. Interview and survey findings indicated that the most acceptable type of land preservation tool is tax relief programs, although farmers realized that these programs have not prevented the conversion of a great deal of farmland in the state. PDR is the least acceptable land preservation tool. However, most farmers did not have knowledge of PDR prior to interviews and the survey, and those that did have knowledge of PDR tended to view this program more favorably than those without any knowledge of PDR. This suggests that a well-constructed information campaign on PDR could be efficacious in increasing its acceptability. The implications of this research for developers are considered, and directions for future research are offered.

INTRODUCTION

Like many areas of the Intermountain West, northern Utah experienced a rapid increase in population growth in the 1990s. A concomitant of this growth is increased conversion of agricultural land to urban uses. Though broad economic and demographic changes are a key factor in this trend, it is important to keep in mind that the decisions of individual agricultural operators account for the aggregate loss of agricultural land experienced by Utah over the past

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several years. Thus, it is important to understand agricultural operators' attitudes toward commonly used land preservation programs.

A good deal of work documents conversion of agricultural lands (see American Farmland Trust [1997] for the most recent efforts to measure and map conversion of agricultural land in the U.S. to urban uses; also Lockeretz, 1987); discusses the effects of increased non-agricultural land uses on agricultural operations (Berry, 1978; Berry & Plaut, 1978; Heimlich & Brooks, 1989; Hirschl & Long, 1993; Johnston & Bryant, 1987; Lisansky & Clark, 1987; Lockeretz, 1988, 1989; Zollinger & Krannich, forthcoming); and identifies potential programs for reducing farmland conversion or stopping it all together (Daniels, 1991; Daniels & Bowers, 1997). Less research has addressed the question of operators' attitudes toward the prevailing land preservation programs. This question is particularly interesting given the growing trend within states and local units of government toward implementing purchases of conservation easements, also known as purchase of development rights (PDR) programs (Daniels & Bowers, 1997). The present paper analyzes results from a survey of and interviews with Utah farm operators regarding attitudes toward commonly used land preservation programs.

Importance of Study

Utah has relatively little arable land suited for agricultural production, and the majority of Utah's agricultural land lies in the northern part of the state. Still, agriculture comprises an important portion of Utah's exports, as "raw and processed food exports account for $280 million, or roughly 7 percent of the state's total export sales" (Utah Agricultural Statistics Service and Utah Department of Agriculture and Food, 1997, p. 3).

Growth-related pressures on agricultural activity and concerns about the need to preserve agricultural land uses were among the focal areas of concern addressed during Utah's first-ever Growth Summit in December 6-8, 1995, which was promoted heavily by the governor's office. A number of both governmental and nongovernmental entities had expressed concerns about the loss of farmland in northern Utah. Utah's governor issued an executive order in May 1996 creating a Utah Open Lands committee charged with facilitating the effort to conserve open lands in areas of the state experiencing rapid urbanization (Leavitt, 1996). In addition, the first page appearing in the 1997 edition of *Utah Agricultural Statistics* contains a statement by Utah's governor praising one farmer with land located along the rapidly growing Wasatch Front for selling easement rights on his property (Utah Agriculture Statistics Service and Utah Department of Agriculture and Food, 1997). In combination, these responses are indicative of a growing tendency for stakeholders to view the loss of Utah farm lands as problematic.

Agricultural Land Conversion in Utah

The state of Utah experienced a substantial decline in cropland[1] and prime farmland between 1982 and 1992. After accounting for cropland enrolled in the Conservation Reserve Program between 1982 and 1997, Utah experienced a decline of 145,600 acres of cropland from a base of 2,038,400 acres in 1982 (National Resources Inventory, 2000: Table 2). Twenty-four thousand acres of Utah's prime farmland was converted to urban use between 1982 and 1992. Of the 108,000 acres of total land developed in Utah over that 10-year period, 22 percent was prime farmland (American Farmland Trust, 1997: Table 7). Most of the urban pressure on farmland in Utah is occurring in the northern part of the state near the major population centers. These areas contain much of the state's prime farmland as they are located in fertile valleys with adequate supplies of irrigation water.

Purchase offers for agricultural land for urban uses have been quite high in northern Utah. An investigative report aired during the Utah Growth Summit indicated that in Davis County, offers of $25,000 per acre for farmland were not unusual (Growth Summit, 1995). The Weber County environmental affairs coordinator indicated that a sum of $20,000 per acre is a fair estimate of the price developers in that area are willing to pay for urban fringe farmland (Sawyer, 1995).

Limited legislation has been passed in the state to protect farmers from urban pressure. First, the 1969 Farmland Assessment Act (commonly know as "Greenbelt") represents a special tax assessment program that protects agricultural land from being assessed at market value in areas where urban growth pressures might otherwise cause increased property taxes to effectively put farmers out of business (Godfrey, 1995; Wasatch Front Regional Council, 1979). Legislation similar to this exists in all 50 states of the United States today (Daniels & Bowers, 1997). Such a program does not require farmers to keep their land in agriculture, but if they do, their land can be taxed only at the estimated value of the land in agricultural use. A study by Hansen and Schwartz (1975) found that at most, such programs may be *helpful* in preventing farmland conversion, but they argue that tax incentive programs certainly are not *sufficient* to keep land in agriculture as they mainly function as a tax break for farmers.

Agricultural districting is the only other legislation that provides some protection to farms from urban pressure in Utah, and this legislation was passed in 1994. It includes certain right-to-farm provisions, and right-to-farm laws that attempt to reduce the potential for increased economic costs and conflicts associated with nuisance complaints against farmers for normal agricultural operation that may be deemed undesirable by neighbors, such as odors and machinery operation noise (Berry & Plaut, 1978; Lisansky & Clark, 1987). In 1994 the Utah legislature passed a bill allowing for the establishment of Agricultural Protection Areas (Carter, 1997). This makes it possible for a farmer

or several farmers with a contiguous block of land outside of incorporated areas to petition county boards for designation as an Agricultural Protection Area (Carter, 1997).

Utah zoning laws do allow for agricultural zoning in community and county zoning plans. However, agricultural zoning in Utah does not prohibit other types of non-agricultural land use as the zoning is easily and readily changed as cities grow. Zoning laws are on somewhat tenuous ground due to the constitutional protection of property rights. A zoning law cannot be so restrictive that it does not allow one to obtain "reasonable" return from his property (Wasatch Front Regional Council, 1979).

Eighteen states have programs aimed at the preservation of farmland through purchase of development rights (PDR), also sometimes referred to as purchase of conservation easements (Daniels, 1991; Daniels & Bowers, 1997). These states are primarily in the eastern United States, but California, Oregon, and Washington have programs as well. Some existing programs are funded at the state level and some at the county level. A PDR program involves farmers selling only the development rights of the property to a governmental entity or a trust that would compensate the farmer by paying him the difference in the market values of the land in urban and agricultural uses. Those development rights are held in perpetuity (or for some specified, relatively lengthy period of time [e.g. 25 years]) by the government or trust so that the land cannot be developed in the future. While there are variants to such programs, this is the basic thrust of a purchase of development rights program (Daniels, 1991; Daniels & Bowers, 1997). Such an option allows the farmer to continue normal agricultural practices on the land. If the land is sold in the future, development rights are not sold with it, which helps to ensure that prices for the land stay at a level that would allow it to be purchased for agricultural use.

Utah currently has no legislative provisions for the funding of a PDR program by the state or local government. Bills were introduced unsuccessfully in the 1997 and 1998 general sessions of the Utah legislature by a representative to the state legislature from Cache County that would have allowed counties to implement a supplemental sales tax, the proceeds of which would go toward a fund for the purchase of conservation easements on agricultural lands in the county. There is a private, nonprofit organization in the state that has purchased some farmland development rights. Utah Open Lands trust purchased one easement of 70 acres on an agricultural operation in Salt Lake County in early 1997 (Ure, 1997; Utah Agricultural Statistics Service and Utah Department of Agriculture and Food, 1997).

Conceptual Orientation

There has been only limited systematic research on the attitudes of farmers toward various agricultural land preservation approaches in areas of rapid urban

growth. However, this research, along with evidence acquired by professionals who have dealt with farmers on this issue, suggests certain perceptions toward particular preservation approaches are widespread among farmers. Approaches that involve a clear, direct benefit to farmers with no potential cost, not surprisingly tend to be favored over those perceived as currently or at some future time exacting a monetary cost.

Tax relief programs are agricultural land preservation tools that farmers perceive as a clear, direct benefit at no cost, while agricultural zoning is often perceived by farmers as an action that could limit the ability to experience profit in selling agricultural land for non-agricultural land use value (Bourke & Jacobs, 1994; Daniels & Bowers, 1997; Ilvento, Watson, & Thomas, 1997). Zoning limits the array of land use options, and thus, in the eyes of a farmer, effectively limits his right to use/dispose of the land as desired. Zoning is often perceived as impermanent as well, and thus an unknown variable that may affect the farming operation. In addition, zoning is often perceived as a "political" activity, with the potential to be exploited to the personal benefit of members of the zoning entity and/or their "co-conspirators" (Bourke & Jacobs, 1994). In other words, farmers often do not trust those who have the power to zone.

While the provisions of agricultural districts vary by jurisdictions, farmers seem to look upon them with much less uneasiness than they regard zoning. This is probably a function of the voluntary nature of such programs along with the right-to-farm legal protections that accompany such districting. Thus, farmers view this type of preservation tool as providing potential (protection against future nuisance complains) and/or realized (tax breaks are sometimes a part of such programs) benefits without incurring costs (Bourke & Jacobs, 1994; Daniels & Bowers, 1997). Of course, one would expect that agricultural districting which also employs zoning as a component would enjoy less support among farmers.

Purchase of development rights and transfer of development rights programs may not be well known among farmers in jursidictions that contain no such public or private programs (Ilvento et al., 1997). However, the concept of selling a "portion of rights" to the land is not foreign to most farmers who have had experience with or know of the practice of selling mineral rights. As with zoning though, farmers may view the sale of development rights with a great deal of reluctance, as the sale of these rights may be thought of as "giving up" future disposal or uses of the land that could be either quite profitable and/or more appropriate for the life-cycle stage of the farmer or a changing family situation involving possible heirs to the land (Daniels & Bowers, 1997).

The present study intends to further the knowledge of farmers' perceptions of often-used agricultural land preservation approaches. Such knowledge should be valuable to the planner contemplating commonly used land preservation approaches for the protection of agricultural land.

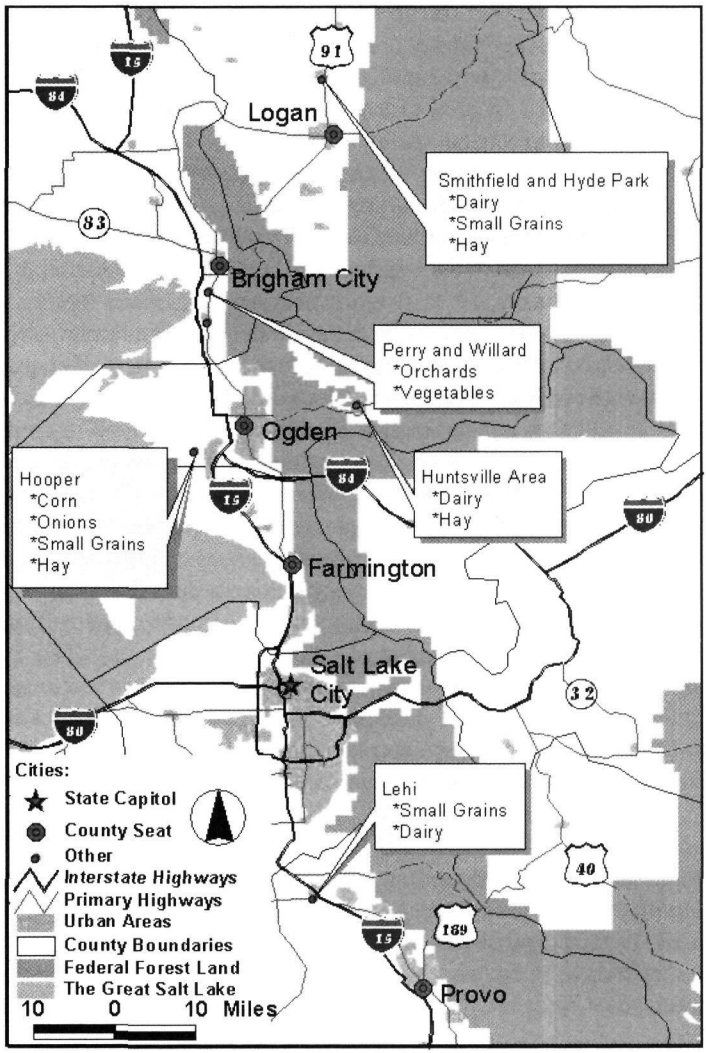

Figure 1. Northern Utah Study Areas

DESCRIPTION OF STUDY AREAS

County assessor's offices and Utah State University cooperative extension agricultural agents for four northern Utah counties were contacted in the summer and fall of 1996 and asked to identify agricultural areas of the county that had experienced relatively rapid growth within the past two to five years. An

important additional criterion for study area selection was that these agricultural areas surround small communities that had historically been distinct from nearby urban areas. The presence of a relatively distinct local community is important because it is assumed that area farmers consider themselves local community members, and that such ties may influence attitudes and actions regarding land use and land development.

Five study areas were selected from four counties in northern Utah (see Figure 1): Smithfield-Hyde Park area in Cache County; the Perry-Willard area in Box Elder County; the Huntsville-Eden-Liberty and Hooper areas in Weber County; and the Lehi area in Utah County. The Utah, Weber, and Box Elder County study areas are located along the fringes of the heavily urbanized Wasatch Front, while the fourth site is located in an area experiencing high levels of residential growth and some commercial/industrial growth in a valley 90 miles north of Salt Lake City, in the rapidly urbanizing Cache County.

Anglo settlement occurred in each area during the mid-1800s when members of the Church of Jesus Christ of Latter-day Saints settled in Utah (Daughters of the Pioneers, 1936; Gardner, 1913; Newey, 1977; Petersen, 1979). These areas were all originally based on agricultural economies, and their economies continue to be distinguished from the metropolitan areas of the Wasatch Front and the larger urban area of Logan in Cache County by the presence of agricultural production.

Population estimates for the study areas in 1997 showed growth in each study area between 1990 and 1997. With the exception of Lehi and Hooper, the study areas all represented multiple municipalities. Where possible, population for the combined municipalities was analyzed to measure population change for the study areas. However, Eden, Liberty, and Hooper are unincorporated areas in Weber County. Thus, the Huntsville (also in Weber County) population estimates were available from the Utah Governor's Office of Budget and Planning, making it possible to calculate population change for this municipality. This, along with the population change in the combined unincorporated areas of Weber County, is considered a good indicator of the population growth for the study areas (no other major unincorporated areas were growing rapidly in Weber County during the study period outside of Eden, Liberty, and Hooper) in Weber County. Population change for the study areas over the seven years varied from a low of 12 percent in Huntsville to a high of 75 percent in Lehi (Utah Governor's Office of Budget and Planning, 2000).

Interviews with Utah State University cooperative extension agricultural agents for each county, researcher observations, and U.S. Census of Agriculture data from 1992 were used to verify predominant types of farming activity in the five agricultural areas. The Smithfield/Hyde Park area is characterized primarily by dairy, small grains (wheat and barley), and hay production (Huber, 1996). Perry and Willard have high levels of fruit and vegetable production, including sweet and sour cherries, peaches, apples, plums, cantaloupe, watermelons,

Table 1. Percentage of Farms Within Each Study Area Involved in Each Type of Production Category*

Study Area	*Grains*	*Hay, Silage, Feed Seeds*	*Vegetables, Sweet Corn, Melons*	*Fruits, Nuts, Berries*	*Livestock, Poultry, and Their Products*
	---------- percent ----------				
Smithfield-Hyde Park	33.3	42.4	0.5	0.5	67.6
Perry-Willard	4.6	29.2	10.7	32.3	52.3
Huntsville-Eden-Liberty	20.1	45.5	0.0	0.0	61.9
Hooper	22.0	33.3	4.6	0.0	64.6
Lehi	9.7	30.0	1.9	0.4	68.4

* 2000 USDA (1997 Census of Agriculture data)

pumpkins, tomatoes, sweet corn, potatoes, squash, and cucumbers (Holmgren, 1996). A drive between mid-June and mid-September along approximately ten miles of U.S. Highway 89 that runs through Perry and Willard will find about ten roadside fruit/vegetable stands open daily. In addition, one may find several houses/garages along the highway from which farmers sell one or two orchard or vegetable crops as they are harvested at various times throughout those months. The Huntsville-Eden-Liberty area is characterized primarily by dairy and hay production, and the Hooper area is important for onion and corn production as well as some small grains in the state (Barnhill, 1996). The Lehi area has primarily small grain, hay, and dairy production (Miner, 1996). Dairy operations and hay production are two commonalities found in all of the study areas. U.S. Census of Agriculture data from 1997 shown in Table 1 affirms this description.

Table 2 provides zip code level data on number of farms, size of farms, and farm sales. Most of the farms in the study area were not large, as only a small percentage in each zip code are over 1,000 acres in size. Farms tended to be small in terms of sales of agricultural products as well—over half of the farms in each study area, with the exception of Smithfield-Hyde Park, reported annual sales of less than $10,000.

Observational data in each area between 1995 and December 1997 found some differences in types of non-agricultural land use across the study areas, but the most common and extensive type in all areas was residential growth. Lehi had more growth in high-tech manufacturing than the other study areas, while the Huntsville-Eden-Liberty was characterized by more condominium/second home growth than the other areas.

Table 2. Number of Farms in Each Area, Percentage of Farms in Each Area That Are Over 1,000 Acres in Size, and Percentage in Each Area With Market Value of Sales Below $10,000*

Study Area	*Number of Farms*	*Percent Over 1,000 Acres*	*Percent with Sales Below $10,000*
Smithfield-Hyde Park	198	2.0%	43.4%
Perry-Willard	65	1.5%	64.6%
Huntsville-Eden-Liberty	134	2.5%	73.1%
Hooper	150	0.0%	66.0%
Lehi	206	9.7%	67.9%

* 2000 USDA (1997 Census of Agriculture)

QUALITATIVE RESEARCH APPROACH

The qualitative data were collected via in-depth interviews conducted with 23 farmers in the five study areas between January and June 1997. Names of operators were obtained through the interviews with the agricultural extension agents in each county. The first author met with farmers for interviews ranging in length from 30 minutes to 2.5 hours. The average interview length was 1.5 hours.

Farm Operator and Operation Descriptives

All of the 23 farmers were men. While age was not asked directly, it was estimated, and many offered their actual age during the interviews. Based on the actual reported ages and interviewer's estimates of age, the following age groups were represented: one in his 30s, seven in their 40s, six in their 50s, five in their 60s, and four in their 70s. Twenty-two of the interviewees were married, and those same 22 had children. For those who had children, the number ranged from one to 11, and the average number of children was 4.4. In nine households wives were identified as providing labor for the operation primarily through bookkeeping. In those farm households with children, the children currently provided some labor for the farm operation, or had done so while they lived at home. All of the farmers reported relying primarily on family labor. For one of the grain and hay operations, a full-time, year-round hired hand was employed.

For most of the fruit operations, some seasonal migrant laborers were hired for harvests only, with the family providing labor for the remainder of the year.

All of the farming operations represented in the interviews relied primarily on the farming operation for their household income. Eight wives had off-farm work. The interviewee was asked whether his wife's off-farm income went toward financing the farming operation. In all cases, the farm was described as self-supporting. In 11 cases, the farmer and his spouse owned the operation. In 13 cases, the ownership structure was a partnership between siblings or between parents and sons.

Twenty-two of the interviewees were life-long farmers. They had started farming after high school, college, or service in the military and usually on operations owned by their parents. Seventeen were at least second-generation farmers in the areas where they were currently farming. Eleven farmers were at least third-generation farmers, many of whom had ancestors who homesteaded in the area in the mid- to late-1800s.

A very general indication of debt load was sought. Seventeen gave such an indication. One farmer described his operation's debt load as "average," while another described his as "medium." The remainder described their debt-loads as "low" or "still financing a little," but most owned their land and equipment outright.

A general indication of proportion of land owned versus rented was also sought. Some provided precise figures while others reported in percentages or proportions. Twelve owned half or more of the land in their farming operation. With the exception of three operators, for whom the proportion of owned to rented land was not obtained, the remainder rented more land than they owned.

SURVEY ADMINISTRATION PROCEDURES

Following the qualitative phase of the research, farmers with operations in the five study areas were selected to complete a self-administered mail survey. The Utah Agricultural Statistics Service (UASS) provided information necessary for a questionnaire to be mailed to all agricultural operators within the postal service zip codes that corresponded to the study areas.[3] Zip codes for each of the five study areas were used to assemble a mailing list of farmers. An initial mailing list totaling 520 farmers across all zip codes was compiled. Dillman's (1978) total design method was employed in administering the mail survey. Questionnaire collection was discontinued after March 1, 1998.

Forty-one surveys in the original mailing were dropped due to ineligible returns (e.g., returned questionnaires indicating that the intended respondent is no longer farming, is deceased, or has moved with no forwarding address provided). Consequently, 479 presumably eligible farmers were targeted across the five study areas. A total of 315 completed questionnaires was returned,

representing a response rate of 66 percent. The percent responding from each zip code deviated from the percent in the mailing no more than 1.0 percent for any zip code with the exception of the Lehi zip code, which comprised 23 percent of the returned questionnaires but only 19 percent of the mailings. Still, each zip code was well represented in the final population of returned questionnaires.

Context of Study Areas: High Levels of Perceived Negative Change

Before observing findings regarding support for certain land preservation options, it is important to establish the context of the study areas as having already experienced a substantial amount of urban pressure along with its accompanying effects on farmers and their operations. Both the qualitative and survey results regarding changes to study area operations due to increasing nonagricultural uses are discussed.

In the interviews, increased traffic was the most frequently mentioned problem for farmers in terms of negative changes for their operation. About two-thirds of the interviewees identified this as problematic already. Anxiety levels about moving farm equipment and livestock along roads had heightened for most farmers. One farmer commented, "I hold my breath every time we move to different fields." Another interviewee expressed frustration over an incident that had occurred while they were moving cattle along the road. As a car approached without diminishing its speed much, a calf darted into the road. The driver maneuvered to avoid it, and after stopping the car, rolled down the window yelling, "You just about killed a little kid in here!" Another related his attempt to move cattle down a road when two sheriff's vehicles approached at a fast speed with sirens going. The farmer tried to move the cattle off the road, and stopped the sheriff's vehicles, asking them to go slow. Instead, they sped off with sirens still blaring. A farmer who produced primarily grain stated that they recently began having their grain custom-hauled to the grain elevator to avoid legal liability as well as the "headache" of driving in the increased traffic. He said this traffic and the children on the roads from nearby subdivisions led to this decision. All of the interviewees mentioned these as new occurrences stemming from increased growth.

Vandalism and theft were the next most oft-mentioned problems on the rise with almost half identifying this as already problematic. Farmers in every study area reported increased vandalism from recreational use of motorcycles and other ATVs on fields and orchards. Nearly all farmers reported that they increasingly worry about theft, and no longer leave equipment in fields at night because items are stolen. The windows of one farmer's tractor were broken recently as it sat in a field overnight not far from the headquarters. A fruit and vegetable farmer maintained that people often help themselves to some of the crops. Nonfarmer residents of the area have told him that they sometimes pick

a little as they pass by the fields or orchards. The farmer believed that the intent is not malicious. However, he expressed concern when he stated, "A lot of people just picking a few pounds at 60 cents per pound adds up."

Of particular import for most agricultural areas in Utah is a predictable supply of ditch-delivered irrigation water. Five farmers maintained that debris in ditches has increased, including the dumping of grass clippings from new subdivision lawns into the canals. There is increased tampering with head gates; farmers attribute this to children from the new residential areas. Seven farmers noted that new residents complain about the hazards of open irrigation canals for their children. One farmer related the initially positive sentiments of a couple who recently moved to the area and considered the water running in the canal near their home to be charming. Later the couple expressed concern to the farmer because they worried their children might fall into the canal.

There is also concern about the availability of water due by local government actions. Four farmers maintained that local municipalities are increasingly tampering with irrigation infrastructure as the municipalities make changes to municipal infrastructure (e.g., sewer and water lines, new roads). One farmer expressed apprehension about the availability of irrigation water that would be needed because the ditch that delivered water to his fields had been torn up because a municipality was undertaking construction.

The uncertain future of rental land tenure and the inability to expand due to the lack and high price of rental land was identified as problematic by about one-half of the farmers interviewed. Nine had already lost rental land as landlords sold for development. One farmer who rented about half of his land said that "five of the places I now have leased have 'for sale' signs on them right now." In every study area, farmers reported that land prices had increased substantially, and that rental land was much harder to find and pay for as landlords escalated rents. The following two statements summarize a common sentiment regarding the negative influences on farming operations from the rental land situation in urban growth areas.

> This has caused problems for us because it affects our crop rotation, and you can't put money into the ground when you don't know how long you will have it. People have put 'for sale' signs or subdivision signs up in our rental fields, and they have gone on to the field to do percolation tests. This often destroys some of the crop. We found that under Utah law, our leases are not very binding. We get landlords telling us how beautiful the field is and what a great job we're doing. Then, a few weeks later we have gotten calls from them asking us to get off the land ASAP. . . . We feel that we're living on borrowed time.

> I lease 65 acres . . . and the owner told me three years ago that I could plan on having it for quite awhile; we could make long-term

> plans. Now he is selling it for between 20 and 30 thousand dollars per acre. We had made that a decent farm, and I plowed 20 acres of it just last fall that I wouldn't have done had I known it would be taken from us. I had a 10-year lease on the property, but there is always a clause in leases to allow for selling the land.

All of those interviewed saw the expansion of their operation in the area as unfeasible given high land prices and high developer demand.

Farmers in all areas had received nuisance complaints either directly from individuals or indirectly through law enforcement officials or conversation with others who had heard complaints voiced. Dairy operations in all areas had received complaints about their manure hauling and spreading. One dairy farmer related his dismay at being asked by the local city police to get some manure off the road after a nearby neighbor reported it: "It was no bigger than the size of a quarter, and we are in county jurisdiction anyway!" Farmers in three of the areas were approached by the sheriff about neighbor complaints about baling at night. Thus far, all three have continued their operations, but they, in addition to several of the other farmers, said they do try to limit baling near houses at night.

Survey findings also pointed to high levels of perceived negative impacts to farmers and their operations. Respondents were provided a list of items that represent common changes due to urban growth. Using a scale of 0 (decreased greatly) to 10 (increased greatly), farmers were asked to indicate how the item had changed "for your agricultural operation *as a result of* increased non-agricultural land use in your vicinity."[4] The midpoint on the 0 – 10 scale was "no change." The following items were used to measure perceived negative change to the operation: (1) vandalism to property and equipment; (2) tampering with irrigation equipment and facilities; (3) unauthorized use of irrigation water; (4) trespassing; (5) difficulty in moving equipment and livestock along roads; (6) complaints from neighbors about some aspect of the agricultural operation; and (7) being contacted by law enforcement who are following up on complaints from neighbors. The above eight items were combined into a summated index (Cronbach's alpha of 0.86) as a measure of overall perceived negative change to the operation from urban pressure. Inter-item correlations among the individual items ranged from a low of 0.29 to a high of 0.72. The index values ranged from 0 (decreased greatly) to 70 (increased greatly).

A score of 35 is the midpoint of the 0 – 70 scale, so anything higher than 35 represents a perception that negative change has increased. The aggregate mean score (47) indicates a tendency among respondents to perceive increases in negative change for the operation as a result of increased non-agricultural land use in the area. Mean scores on the scale range from a low of 43 in Perry/Willard to a high of 50 in Hooper.

Three items were used to measure anticipated difficulty in renting and purchasing land for agriculture in the area. Using a scale of 0 (will decrease greatly) to 10 (will increase greatly), farmers were asked to indicate how they

expected the conditions to change over the next ten years "for your agricultural operation *as a result of* increased non-agricultural land use in your vicinity." The midpoint on the 0 – 10 scale was given the referent "won't change." The following items were used to measure anticipated difficulty in renting and purchasing land: (1) difficulty in purchasing land for agricultural use because of escalating land prices; (2) difficulty in obtaining new rental land; and (3) difficulty in retaining existing rental land. The above three items were combined into a summated index as a measure of overall perceived negative change to the operation from urban pressure. The internal consistency of the index was high, with a Cronbach's alpha coefficient of 0.88. Inter-item correlations among the individual items ranged from a low of 0.64 to a high of 0.76. The index value ranged from 0 (will decrease greatly) to 30 (will increase greatly). Like perceived negative change to the operation as a result of increased non-agricultural land uses in the area, respondents anticipated high increases in difficulty in renting and purchasing agricultural land in their area over the next ten years. The mean scores range from 24.95 to 27.52, with an aggregate mean score of 26.40.

ATTITUDES TOWARD LAND PRESERVATION PROGRAMS

While knowledge of the concepts of agricultural zoning, preferred taxation (Utah Farmland Assessment Act, commonly known as Greenbelt), and relief of inheritance taxes was high, interviews suggested low knowledge levels of right-to-farm laws and PDR. That lack of knowledge suggested that providing a standard definition of certain land preservation options of interest would be necessary to provide a reasonable level of validity in measuring attitudes toward the preservation approaches, realizing that the definitions encountered in the questionnaire were the first exposure most respondents had to right-to-farm and PDR. Right-to-farm laws were defined in the questionnaire as: *Laws that protect farmers from nuisance suits filed against them by neighboring land owners and users. Nuisance complaints include complaints about noise, odor, traffic and other "normal" agricultural practices which exist at the time a right-to-farm law is passed.* Purchase of development rights was defined as follows: *Landowners voluntarily sell to a nonprofit trust or government entity the development rights portion of the bundle of rights that come with land ownership. The nonprofit trust or government ensures that development does not take place on the land thereafter. Land title remains with the owner so that the land may be sold to others. However, the sold land may only be used for agricultural uses.* See the Appendix for a list all preservation approaches mentioned in the survey and the definitions used.

On the topic of land preservation approaches, respondents were first asked to rate the potential of five approaches for preserving agricultural land from further development in their area: "Considering the *non*-agricultural uses **that**

Table 3. Mean Ratings (and Standard Deviations) by Study Area on the Potential for Land Preservation Approaches by Study Area in Respondents' Current Vicinity

	Smithfield-Hyde Park [a]	*Perry-Willard* [b]	*Hooper* [c]	*Huntsville Eden-Liberty* [d]	*Lehi* [e]	*Aggregate*
Agricultural Zoning	5.30 (3.04)	4.24 (2.93)	4.36 (2.91)	4.35 (3.03)	4.24 (3.12)	4.59 (3.03)
Right-to-Farm	6.42 (2.69) **d***	5.61 (3.18)	5.48 (2.85)	4.17 (2.92) **a***	5.43 (3.35)	5.56 (3.04)
PDR	6.10 (2.97) **b,e***	4.48 (3.23) **a***	4.86 (2.99)	5.00 (2.98)	4.55 (3.32) **a***	5.12 (3.14)
Greenbelt Tax Relief	7.44 (2.66)	6.70 (2.94)	6.45 (2.85)	6.63 (2.53)	7.12 (3.16)	6.93 (2.85)
Inheritance Tax Relief	6.97 (2.80)	6.33 (3.05)	5.84 (2.91)	5.87 (3.04)	6.42 (3.13)	6.36 (2.99)

* A letter appearing in a cell of a particular study area's column in the table denotes a statistically significant difference between the study area and the study area corresponding to the letter. For example, in the Smithfield-Hyde Park column, the letter "d" appears in the Right-to-Farm row. This denotes a statistically significant difference between the Smithfield-Hyde Park and the Huntsville-Eden-Liberty study areas. The difference is statistically significant at < .05 using a difference of means test in a oneway ANOVA that reports multiple comparisons based on Tukey's HSD.

have already developed in your vicinity, on a scale of 0 (no potential at all) to 10 (extremely high potential) how would you evaluate the potential of each of these programs or policies for preserving agricultural land from being further developed ***in your vicinity***?" Table 3 shows results of survey questions on attitudes toward the land preservation approaches. Findings indicated that tax relief programs, Greenbelt, and inheritance tax relief had the highest mean scores on potential to preserve agricultural land from further development in the vicinity among the aggregate data set. Agricultural zoning had the lowest mean score (4.59), and mean score on right-to-farm (5.56) was slightly higher than mean score on PDR (5.12). Observing the relative ranking on potential of each preservation approach within each study area revealed the pattern was the same as in the aggregate pattern, with the exception of the Huntsville-Eden-Liberty area where PDR had a higher mean score than right-to-farm.

Table 3 also shows that the differences in mean scores among study areas on perceived potential of land preservation approaches were low, with the exception of the Smithfield-Hyde Park area. This is not too surprising since the Smithfield-Hyde Park area, as a whole, has experienced less urban pressure than the other study areas, and it is more likely that respondents in the area have larger farms that include land not adjacent to (and in some cases far from) current urban development. The Smithfield-Hyde Park area had higher mean scores on right-to-farm than the Huntsville-Eden-Liberty area. The Smithfield-Hyde Park area also had a higher mean on PDR than both the Perry-Willard and the Lehi areas.

Farmers also were asked to rate the potential of each land preservation approach for a hypothetical area where development is not as prevalent, in order to further gauge the extent of the influence of current urban development on respondents' rating of such approaches. This was done to ascertain the difference in ratings for actual and potential usefulness of land preservation approaches. Using the same 0 – 10 scale, operators were presented with this item: "Thinking of areas outside your vicinity that ***have not experienced a serious shift*** from agricultural to non-agricultural land uses, how would you evaluate the potential of each of these programs or policies for preserving agricultural land?" Comparing the results of Tables 3 and 4, respondents rated the potential of each approach consistently higher for places that had not experienced a serious shift from agricultural to non-agricultural land uses. Observing the mean scores for the sample aggregate in Table 4, tax relief programs were rated as having the highest potential, as in Table 3. Tax relief was followed in descending order by right-to-farm, PDR, and agricultural zoning. In addition, relative ranking was generally consistent across all study areas, with the exceptions of the Perry-Willard area where PDR had the lowest mean score, and the Huntsville-Eden-Liberty area where PDR tied with agricultural zoning for the lowest mean score. Importantly, Table 4 shows no statistically significant differences among the study areas. Finding that farmers in these study areas tended to believe that land

Table 4. Mean Ratings (and Standard Deviation) by Study Area on the Potential for Approaches in Areas Not Experiencing Rapid Growth

	Smithfield-Hyde Park	*Perry-Willard*	*Hooper*	*Huntsville Eden-Liberty*	*Lehi*	*Aggregate*
Agricultural Zoning	5.95 (2.83)	5.55 (3.33)	5.55 (2.71)	5.47 (3.13)	5.29 (3.07)	5.59 (2.99)
Right-to-Farm	6.69 (2.50)	6.47 (2.95)	6.48 (2.75)	5.90 (2.98)	6.24 (2.87)	6.38 (2.79)
PDR	6.35 (2.82)	5.18 (3.25)	6.34 (2.72)	5.47 (3.00)	5.57 (3.18)	5.84 (3.01)
Greenbelt Tax Relief	7.54 (2.44)	6.98 (2.80)	7.14 (2.58)	7.02 (2.58)	7.04 (3.10)	7.17 (2.70)
Inheritance Tax Relief	7.15 (2.82)	6.63 (3.03)	7.00 (2.68)	6.84 (2.87)	6.51 (2.93)	6.84 (2.87)

preservation approaches had higher potential in areas not experiencing a serious shift from agricultural to non-agricultural uses is consistent with finding from interviews that numerous operators believe their own area had experienced increased nonagricultural land use to such an extent that preservation efforts would be fruitless. A farmer who planned to relocate his farming operation expressed an oft-made sentiment that "if this [agricultural zoning] is enforced where farming is not already ruined [by development] then it would be good, but it's bad if it's enforced in an area where farmers now need the option to sell [because of existing problems associated with present levels of urban use]." He wanted to see zoning enforced in the area to which he planned to relocate.

Agricultural zoning tended to be looked upon least favorably for at least two reasons: (1) too easily changed to accommodate development, and (2) "infringes" on landholders' property rights. This is consistent with the experience of development professionals involved with the issue of urban pressure on farmland (see Daniels & Bowers, 1997), and the limited research on farmers' attitudes toward common land preservation approaches (Bourke & Jacobs, 1994; Ilvento et al., 1997). Farmers have seen agricultural zoning changed time and again in their own areas to increase the land available for development, thereby reducing the amount of land zoned agricultural.

Right-to-farm programs were viewed more positively by operators, as this provided some protection for their agricultural operation from those who moved in and viewed many agricultural operations as a nuisance. However, several interviewees maintained that even if laws were in place to protect normal farming operations, "we still have to live with our neighbors." That is, even if legal protections were in place, social relations might be marked with acrimony as farmers must interact in social settings (e.g., church and school events) with those who find aspects of their operation undesirable. In addition, the logistical problems (e.g., increased traffic, vandalism, loss of rental land) for farmers that accompany increased urban development increase even if farmers are legally protected when engaging in normal farming practices.

Purchase of development rights was not well understood by most of the farmers interviewed. Many had never heard of such an approach. These individuals received an explanation of PDR from the first author (see Appendix). Some considered themselves too unknowledgeable about PDR to articulate an opinion. Of those who did have some knowledge and felt comfortable expressing an opinion, several reservations were apparent. The primary ones were (1) selling development rights too severely limited future options of the heirs—if heirs of the operation decided not to farm, these heirs could not sell for development prices; (2) farming might not always be profitable, and operators anticipated experiencing a windfall if they could sell at development prices; (3) there was uncertainty about whether neighboring operators would keep their lands in agriculture, thus contributing to the area's escalating development, and making it logistically more difficult to maintain a farming operation in the area; and (4)

it was highly unlikely that the public could come up with enough money to *fairly* compensate farmers for selling their development rights. One operator stated, "I wish this had been done twenty years ago. Now there is no way that enough money could be raised to pay a fair price for the development rights." With regard to limiting future potential to sell for development prices, "If my grandkids want to sell it, they can't sell it for anything above ag value. This is not something I want to do because it ties the hands of the next generation . . . Fifty years down the road we might realize that we've done something bad for our children." Another expressed the sentiment that "Farming is so volatile that one day we may have to sell the farm, and losing the opportunity for selling [at development prices] is too risky."

While tax relief programs showed highest potential in the survey, the information from the interviews suggested that this finding must be qualified. Most farmers stated that Greenbelt had helped immensely in preserving agricultural land. Without it, most believed their area would have no agricultural land today. However, they also expressed the belief that neither Greenbelt nor hypothetical inheritance tax relief was sufficient to offset the monetary gain from selling agricultural land for current development. Simply put, much of the land once in Greenbelt has already been sold for development, with sellers hardly concerned about paying the rollback taxes assessed for the previous five years when they could sell land for development prices. To contrast the perceived potential of tax relief with the perceived potential of PDR, interviewees saw PDR as offering a more permanent form of preservation. However, PDR was clearly more controversial among operators than tax relief for the reasons noted above.

The question of perceived *potential for* land preservation approaches differed from the question of *acceptability of* land preservation programs. An item was included on the survey to measure general level of acceptability of each land preservation approach. Using a 0 (very unacceptable) to 10 (very acceptable) scale, farmers were asked, "From your point of view, how acceptable are each of the programs or policies as a strategy to preserve agricultural land?" Table 5 shows that respondents found Greenbelt tax relief to be the most acceptable, as the average score for this approach (7.64) exceeded the mean score on all other approaches. The least acceptable, PDR, had a mean score of 5.15. This indicated moderate acceptability for PDR, but was still slightly lower than the acceptability of agricultural zoning. The relative ranking of the preservation approaches was the same across all study areas, and no statistically significant differences existed by study area. Overall, the ratings on acceptability of the various land preservation approaches were moderate to high.

This relatively low level of PDR acceptability was somewhat surprising given interview results. Interviewees who had a relatively good understanding of PDR, tended to support the program. They had heard or read about operators in other states participating in a PDR program, which seemed to reduce their

Table 5. Mean Ratings (and Standard Deviation) by Study Area on the Acceptability of Land Preservation Approaches

	Smithfield-Hyde Park	*Perry-Willard*	*Hooper*	*Huntsville Eden-Liberty*	*Lehi*	*Aggregate*
Agricultural Zoning	5.49 (3.02)	5.18 (3.14)	5.89 (2.58)	5.40 (3.27)	5.17 (3.33)	5.43 (3.06)
Right-to-Farm	6.57 (2.88)	6.46 (3.14)	6.55 (2.84)	6.76 (3.12)	6.47 (2.95)	6.54 (2.96)
PDR	5.38 (3.02)	4.42 (3.28)	5.41 (2.87)	5.39 (3.17)	5.06 (2.92)	5.15 (3.05)
Greenbelt Tax Relief	7.69 (2.55)	7.54 (2.64)	7.27 (2.53)	7.57 (2.68)	8.19 (2.30)	7.64 (2.54)
Inheritance Tax Relief	7.43 (2.88)	7.06 (3.07)	7.18 (2.52)	7.32 (3.04)	7.65 (2.82)	7.33 (2.86)

level of uncertainty about relinquishing certain property rights under a PDR program. Those who had a relatively good understanding of PDR also tended to express much more support for this approach over agricultural zoning. Interviewees typically viewed agricultural zoning as effectively taking property rights without just compensation. It was also evident that even those interviewees who did not support PDR thought it to be a more equitable approach, in the abstract, for a farmer than agricultural zoning for the same reason. However, the majority of the interviewees had not heard of PDR, and many, as previously noted, refused to evaluate it even after the author explained it in the abstract (this may also account for the consistently higher incidence of item non-response on questions regarding PDR compared to the other land preservation approaches). Many were cautious about commenting on its acceptability until they could learn more about it. It is likely that a lack of knowledge among survey respondents had some influence on its acceptability rating.

Table 6 shows that indeed, when operators were asked to rate their familiarity with each of the land preservation approaches, they are least familiar with PDR. Again on a 0 (not at all familiar) to 10 (extremely familiar) scale, farmers were asked, "How would you describe your familiarity with each program or policy before you read the brief description provided above?" The relative rankings of familiarity in each study area was generally consistent with the rankings among the aggregate sample. Among the aggregate sample familiarity with Greenbelt tax relief was highest with a mean of 7.79, followed by inheritance tax relief (6.12), agricultural zoning (5.55), right-to-farm (5.22), and lastly, PDR (4.50). The Perry-Willard area had the lowest familiarity with PDR of all study areas, and its mean score (3.42) on familiarity with PDR was significantly lower than the means of both the Hooper (5.11) and the Huntsville-Eden-Liberty (5.41) areas. It is interesting to note that the Perry-Willard area also showed the lowest level of PDR acceptability among all study areas (though the difference did not achieve statistical significance). The link between familiarity and acceptability is explored in more depth below.

The relatively low level of familiarity with right-to-farm is important in the context of Utah agriculture since interviewees saw right-to-farm in a very favorable light, and Utah established legislation in 1994 to allow formation of agricultural protection areas—carrying right-to-farm protections. However, only one of the 23 interviewees had a good understanding of this legislation, and he had begun the process of establishing his operation as an agricultural protection area.

Given findings from the interviews, it is reasonable to expect a positive association between level of familiarity with right-to-farm, PDR, Greenbelt tax relief, and inheritance tax relief, and levels of acceptance for each approach. There should be a negative association between familiarity with agricultural zoning and level of acceptance for agricultural zoning, given the objections raised to zoning during the interviews. Table 8 shows that familiarity with right-

Table 6. Mean Ratings (and Standard Deviation) by Study Area on the Levels of Familiarity with Land Preservation Approaches

	Smithfield-Hyde Park [a]	*Perry-Willard* [b]	*Hooper* [c]	*Huntsville Eden-Liberty* [d]	*Lehi* [e]	*Aggregate*
Agricultural Zoning	5.75 (2.98)	5.72 (3.46)	5.24 (2.83)	5.91 (3.02)	5.13 (2.97)	5.55 (3.04)
Right-to-Farm	5.38 (2.94)	4.78 (3.39)	5.39 (2.93)	5.73 (2.87)	4.85 (2.99)	5.22 (3.02)
PDR	4.78 (3.26)	3.42 (3.52) **c,d***	5.11 (2.89) **b***	5.41 (3.01) **b***	3.72 (2.83)	4.50 (3.19)
Greenbelt Tax Relief	7.70 (2.58)	7.26 (3.03)	7.83 (2.32)	8.30 (2.32)	8.11 (2.72)	7.79 (2.64)
Inheritance Tax Relief	6.09 (2.78)	5.86 (3.42)	6.54 (2.98)	6.18 (2.93)	6.08 (3.19)	6.12 (3.04)

* A letter appearing in a cell of a particular study area's column in the table denotes a statistically significant difference between the study area and the study area corresponding to the letter. For example, in the Perry-Willard column, the letter "c" appears in the PDR row. This denotes a statistically significant difference between the Perry-Willard and the Hooper study areas. The difference is statistically significant at $< .05$ using a difference of means test in a oneway ANOVA that reports multiple comparisons based on Tukey's HSD.

Table 7. Bivariate Correlations (Pearson r) Between Familiarity with and Acceptability of Commonly Used Agricultural Land Preservation Approaches

	Familiarity by Acceptability	*N*
Agricultural Zoning	0.094	289
Right-to-Farm	0.252*	286
PDR	0.302*	278
Greenbelt Tax Relief	0.433*	286
Inheritance Tax Relief	0.238*	286

* Correlation is significant at the 0.01 level (1-tailed).

to-farm, PDR, Greenbelt tax relief, and inheritance tax relief did have a positive influence on the acceptability of each respective approach. The correlation between familiarity with right-to-farm and acceptability of right-to-farm was statistically significant and positive as expected, with r = 0.252. The correlation between familiarity with PDR and acceptability of PDR also was significant and positive as expected, with r = 0.302. The correlation between familiarity with Greenbelt tax relief and acceptability of Greenbelt tax relief was significant and positive as expected, with r = 0.433. Finally, the correlation between familiarity with inheritance tax relief and acceptability of inheritance tax relief was significant and positive, with r = 0.238. Contrary to expectations, the association between familiarity with agricultural zoning and acceptability of agricultural zoning was positive. However, the association was not statistically significant, and the coefficient was negligible in magnitude, with r = 0.094.

DISCUSSION

Both qualitative and survey findings suggest that Utah operators in areas experiencing urban growth believe that the common agricultural land preservation approaches have higher potential in areas that have not experienced as much agricultural land conversion as their own. Several farmers felt that had these approaches been implemented and strictly followed (particularly agricultural zoning or PDR) 20 to 30 years ago, the potential to preserve agricultural land in their areas would have been quite favorable. The perceived potential of tax relief approaches to preserve farmland is highest of all approaches in survey results. However, interview findings suggest that operators believe that the prices

one can now command when selling agricultural land for development far outweigh the preferred taxation benefits from Greenbelt when keeping the land in agriculture. Thus, tax relief approaches are not perceived as very effective in areas of rapid urban growth. Survey results showed that perceived potential of the various approaches for areas that are not experiencing urban pressure closely mirrors acceptability of the approaches, and the tendency to rate preferred taxation highest and programs that infringe or restrict property rights lowest is similar to findings of other studies that compare operators' attitudes toward land preservation approaches (see Bourke & Jacobs, 1994; Ilvento, Watson, & Thomas, 1997).

Overall, acceptability of approaches was moderate to high. Those voluntary approaches with the most efficacy in establishing legal protection of farmland, right-to-farm, and PDR, as evidenced by the success of such programs in other states (Daniels & Bowers, 1997), were moderately supported by Utah farmers with operations in areas experiencing urban pressure. It is likely that knowledge of approaches has an important influence on program acceptance. During interviews, the authors found that those who know more about PDR tended to support PDR as an option they would be interested in should they sell their current operation and relocate to an area where urban development has not advanced as far as it has in their current area. The greater their knowledge of PDR, the more they supported PDR as an approach to preservation.

These findings suggest important policy implications for programs aimed at preserving agricultural land from urban growth. While the preservation of agricultural land may not be considered highest priority among developers who are dealing with many of the other issues that accompany rapid urban growth, it is important for developers to consider the perceived importance of preserving local agricultural land among the local public and local landowners. Should a developer endeavor to pursue agricultural preservation, Daniels and Bowers (1997) recommend a multifaceted approach in urban growth areas that are similar to the areas included in the present study—increasingly suburban communities that can be considered ex-urban bedroom communities within commuting distance of urban centers of employment. Their approach combines a solid comprehensive plan by the township or county, urban growth boundaries, agricultural zoning and protection districting, a PDR program, and right-to-farm laws (Daniels & Bowers, 1997, p. 241).

Of course, agricultural protection districting that involves voluntary enrollment and PDR programs presume that landowners are willing to enroll their land and sell development rights. Findings from the present study show that making farmers aware of the agricultural protection area (districting) legislation passed in 1994 has good potential to increase the number of farmers enrolling land in this program. Also, making operators aware of how PDR works in other states may increase operators' willingness to sell their development rights should funds become available for such a program in Utah, as evidenced by the higher levels of support among farmers familiar with PDR. However,

that said, it is important to target operators in areas expected to experience urban growth well in advance of substantial growth. If urban development reaches the point where farmers have already experienced substantial logistical, social, and political barriers to carrying out normal activities on their agricultural operations, they will be less willing to sell development rights as they anticipate the inevitable necessity of discontinuing the agricultural operation in the area altogether.

Targeting potential urban growth areas for agricultural land preservation would also need to take into account the necessity of preserving contiguous blocks of land. This includes a program that highlights absentee landowners who often rent to those actively engaged in an agricultural operation. Rental lands are often an important production component of the operation; therefore, the owners of these lands should also be targeted for agricultural districts and PDR programs. It is entirely possible that one would have to target the rentor, arming him/her with information about these voluntary land preservation programs, and rely heavily upon the renter (who has a large stake in access to rental lands) to present this information to the absentee landowner and convince him to participate.

Of course, educating farmers about the advantages and disadvantages of the agricultural protection districts and PDR programs is no easy task. Not unlike marketing approaches to conveying information, a "shotgun" approach involving multiple outlets for such information might be useful. Some of these might include direct mailings to targeted landowners (by zip code, for example) using state Agricultural Statistics Service lists and/or Farm Bureau lists; informational articles in trade magazines (often regional farm publications exist) with personal stories of farmers (preferably local farmers) who have enrolled their land agricultural protection districts and/or sold development rights; public meetings where experts on agricultural land preservation are present to answer questions and present options (the National Farmland Trust may be a good place to begin in locating such speakers); and the construction of a web site with comprehensive information and contact information for landowners with questions.

The potential for the active participation of Utah operators in land preservation programs is good, particularly if agricultural landowners are provided with thorough information (which should provide examples of farmers who are satisfied with their respective state preservation programs) about the programs. In addition, the potential for voluntary enrollment in preservation programs is likely to be higher if landowners are targeted for participation in the programs before extensive conversion of agricultural land to urban use takes place in the immediate vicinity of their agricultural operations. Community development entities are faced with the formidable task of identifying areas of potential urban development and convincing *landowners* of the potential for urban pressures to affect their operations in the future, while convincing the local *public* or the state to support expensive preservation approaches such as PDR programs where urban development is not yet rampant. Limited research

has shown lower public support for a PDR program in an urban area characterized by low urban pressure and economic stagnation than in an urban area with high urban pressure and a growing economy (Bourke & Jacobs, 1994). Thus, community development entities interested in preserving agricultural land will likely find higher public support in areas where growth has already begun to occur at a relatively rapid rate.

Future research should also focus on studies of farmers in areas not yet experiencing rapid urban growth, with an effort to compare their attitudes to those of farmers whose operations are located in areas currently experiencing substantial agricultural land conversion. A comparison of attitudes toward land preservation approaches between these two groups would be informative in discerning whether farmers in non-urban growth areas indeed see less need for the land preservation approaches as speculated. In terms of designing information campaigns and preservation programs, it would be informative to know whether those operators for which the urban pressure issue is not yet salient would anticipate the widespread logistical and social problems described by farmers in this study. From a development practitioner's standpoint, it may be necessary to engage first in an assessment of these operators' level of knowledge about the logistical and social problems accompanying development. If low levels of knowledge on these issues is apparent among farmers, it may be worthwhile to launch an information campaign that provides evidence of the logistical and social problems experienced by farmers in rapidly urbanizing areas elsewhere. This approach would show that not all farmers, perhaps not even most, in a particular area will desire to remain in farming. Of course, many will want to sell their operations depending upon many factors, not the least of which include level of indebtedness, level of profitability, lifecycle stage, and desires of heirs (Daniel & Bowers, 1997; Zollinger & Krannich, forthcoming). However, for those landowners who want to keep their land in farming but who also hold strong feelings about retaining property rights, their reluctance to "give up" development rights may lessen to the extent that they understand and anticipate the real difficulties in maintaining a viable operation in the presence of rapid urban growth.

Future research should also address the "critical levels" at which farmers perceive agricultural areas "tipping out of" agriculture.[5] It is likely that two very critical events shift the farmers' definition of his/her area as an "agricultural" one to a "urban" one: the widespread loss of rental land to urban development and the loss of agricultural support services. While the present research could not be definitive on such events, it was noted that the perceived potential for land preservation approaches was generally lower in areas that had experienced the highest levels of urban growth. This finding is likely due to farmers' perceptions that their area had effectively "tipped" out of agriculture.

Of course, future research should attempt to discern whether information about agricultural districts and PDR programs increases farmers' willingness to enroll their land in an agricultural protection district and sell development rights.

Such research should also examine the extent to which operators believe that adjacent and other nearby landowners will participate in agricultural land preservation programs (as the discussion of logistical problems of urban growth has shown that a single operation is not an island unaffected by the development of previously agricultural land around it) and how this influences the farmer's own willingness to enroll land in an agricultural protection district and sell development rights. Finally, a potentially important factor in influencing willingness to sell development rights, in particular, may involve the type of entity that will hold the conservation easement (state versus local versus non-profit), as limited research (Bourke & Jacobs, 1994; Ilvento et al., 1997) has shown that among those landowners familiar with the concept of PDR, the program's legitimacy may only be as firm as the trust in the easement holder.

NOTES

1. Cropland is subsumed under the category of "farmland." Cropland is "land used for the production of crops for harvest, alone or in rotation with grasses and legumes. Adapted crops include row crops, small grain, hay, nursery crops, orchard and vineyard crops, and other specialty crops" (American Farmland Trust, 1997: Glossary). Thus, it does not include rangeland, pastureland, or forestland, which together with cropland constitute the category of "farmland" (American Farmland Trust, 1997: Glossary).

2. The definition of prime farmland used by the U.S. Department of Agriculture's Natural Resource Conservation Service is as follows: "Land on which crops can be produced for the least cost and with the least damage to the resource base. Prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation and favorable temperature and growing season. The soils have acceptable acidity or alkalinity, acceptable salt and sodium content, and few rocks. They are not excessively eroded. They are flooded less often than once in two years during the growing season and are not saturated with water for a long period. The water table is maintained at a sufficient depth during the growing season to allow cultivated crops common to the area to be grown. The slope ranges mainly from 0% to 5%. To be classified as prime, land must meet these criteria and must be available for use in agriculture. Land committed to non-agricultural uses is not classified as prime farmland" (American Farmland Trust 1997: Glossary).

3. Using identification numbers, a procedure was established for identifying operators and keeping track of returned questionnaires without disclosing names and addresses of operators to the researchers. We asked UASS to eliminate from the list corporate farms that have absentee ownership (hired management). UASS eliminated four operations across all zip codes.

4. Some farmers may have land in the operation located far from the local area where urban growth is presently occurring. Farmers were asked for purposes

of this survey to consider only that portion of the agricultural operation in the vicinity, which was defined as "within approximately a 10-mile radius of your local agricultural operation."

5. The authors thank an anonymous reviewer for suggesting Thomas Schelling's concept of "tipping" in the context of changing neighborhood racial composition as a dynamic that is probably applicable to the conversion of agricultural areas to urban uses on the rural-urban fringe.

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APPENDIX

Below is a list of definitions of selected agricultural preservation strategies. Please read these definitions and keep them in mind when answering questions in this section.

Agricultural zoning:
Local governmental units are allowed to specify zones in which land uses other than agricultural and related uses are prohibited. Such zones are subject to change over time. Land owners are required by law to comply with the zoning.

Right-to-farm laws:
Laws that protect farmers from nuisance suits filed against them by neighboring land owners and users. Nuisance complaints include complaints about noise, odor, traffic and other "normal" agricultural practices which exist at the time a right-to-farm law is passed.

Purchase of development rights:
Landowners voluntarily sell to a nonprofit trust or government entity the development rights portion of the bundle of rights that come with land ownership. The nonprofit trust or government ensures that development does not take place on the land thereafter. Land title remains with the owner so that the land may be sold to others. However, the sold land may only be used for agricultural uses.

Utah Farmland Assessment Act (Greenbelt) tax relief:
This program allows property to be assessed and taxed based upon its productive capability in agricultural use instead of the prevailing market value. If the property is withdrawn from the program, roll-back taxes will be assessed for the number of years the property was in the program, up to a maximum of five years.

Inheritance tax relief:
This type of program would reduce the amount of estate taxes paid on the inheritance of an agricultural operation, reducing the financial burden on those who inherit an agricultural operation.