**Abstract**

This paper estimates the average return to Iowa farmland is approximately 3.9 percent. For the farmer with owned land, the returns are approximately five percent using an average price scenario. Government programs are estimated to have significant impacts on Iowa farmland values.

## Estimated Returns to Iowa Farmland

By Dr. Michael Duffy and Ann Holste

### Introduction

The value of Iowa farmland has increased dramatically over the past few years. The estimated value based on the 2003 Iowa State University Extension (ISUE) annual land value survey was $2,275 per acre, the highest average value ever recorded in Iowa (ISUE, Publication FM 1825). Other surveys show land values have continued to rise since the November 2003 survey.

Dr. Duffy received a B.S. in Natural Resources and an M.S. in Agricultural Economics from the University of Nebraska and a Ph.D. from the Pennsylvania State University. Dr. Duffy is an Iowa State University Extension farm management specialist. He also serves as the Associate Director for the Leopold Center for Sustainable Agriculture and the Professor-in-Charge of the Beginning Farmer Center.

Ann Holste received a B.S. in Agricultural Business from the Iowa State University. She is an Iowa State University Extension program specialist.

The profiles of Iowa land purchasers and owners continue to change. The 2003 land value survey asked who had purchased land over the past year and 37 percent of the purchasers were identified as investors. This was the highest percentage ever recorded in this category.

A recent survey of Iowa farmland ownership shows that from 1982 to 2002 the percentage of land in possession of sole owners decreased from 41 to 28 percent (ISUE, Publication PM 1983). Over the same time period, the amount of land held in trusts increased from 1 to 8 percent and the amount of land held as joint tenants increased from 7 to 12 percent.

When the acres in Conservation Reserve Program (CRP) and other conservation programs are excluded, the amount of land that was owner-operated decreased from 55 to 41 percent in the two decades between 1982 and 2002. The amount of land held under a cash rent arrangement increased from 21 to 40 percent over the same time period.

Another significant change in Iowa land ownership from 1982 to 2002 occurred in the percent of land held within various age categories. In 1982, 12 percent of the land was owned by people over the age of 74, and by 2002 that percentage had increased to 24 percent. Nearly half, 48 percent, of Iowa's farmland is now owned by people over the age of 65.

The record high level of land values, changing purchaser characteristics, and alterations in age and ownership structure all suggest that Iowa is likely to see considerable investor interest in farmland for the foreseeable future. What does this suggest for the returns to land as an investment? How does it impact farmers wishing to purchase land or secure use of this asset? The answers to these and other questions are of considerable importance to all Iowans, not just farmers. Farmland is the largest asset in farming. Using the average land value, Iowa's farmland is worth more than $72 billion dollars.

This paper examines the rate of return to Iowa farmland. First is an examination of the returns from an investor's point of view, and second, the estimated rate of return will be viewed from the perspective of the farmer.

## County Rent Return

Several steps, assumptions, and data sets were used to complete this analysis. The first step was to estimate the use of Iowa farmland by county, relying on data from the 2002 USDA Census of Agriculture.

The majority of Iowa's farmland (74%) is planted to either corn or soybeans. The county range for corn and soybean plantings is from 22 to 95 percent of all farmland. Four counties have 95 percent of their farmland in corn or soybeans. Maps showing the distribution of land uses are presented in Appendix A.

The second step was to estimate the weighted average cash rent per county. The average rent for the various land uses (crops, hay, and pasture) came from the ISU Extension 2004 Annual Cash Rent survey (ISUE, Publication FM 1851). The weighted average rent is simply the percent of farmland classed by land use times the dollar rent obtained in the rent survey. Wasteland, timberland, and land in roads, homes, and buildings were not included in calculating the weighted average rent.

The value of any asset held in perpetuity is determined by:

$$V = \text{income/capitalization rate.}$$

The capitalization rate in this formula also can be thought of as the rate of return to the asset.

The third step was to estimate the county level capitalization rate that would be associated with the rental income. The average 2002 real estate taxes per acre and a $10 per acre management fee were subtracted from the weighted average cash rent. This result was divided by the average land value as reported in the ISU Extension land value survey (ISUE, Publication FM 1825).

The 2003 weighted average capitalization rates, per county, are shown in Figure 1. The average of the county capitalization rates is 3.9 percent with county ranges from a low of 2.9 percent to a high of 5.4 percent.

## Return to Owner/Operators

Estimating the returns to farmers who farm their own land is more complicated. The first step in estimating income is to

determine the average yields per county using data from the USDA/Agricultural Statistics Service. Average corn and soybean yields for 1998 to 2002 were used, while (due to data availability) oat and hay figures used were the average county yields only for the past two years.

Prices received varied by county. The first step in estimating the county prices was to determine the price in each county relative to the statewide price. Data for this step also came from the USDA/Agricultural Statistics Service for the 2002 marketing year. The reported county prices were then compared to the state price. County prices for corn ranged from 5.1 percent above the state average to 6.4 percent below. The range for soybeans was from 2.3 percent above to 2.6 percent below. Oats ranged from 10.1 percent above to 10.2 percent below the state average price. Hay price variation was not available.

Revenue equals the price times the quantity. The statewide price adjusted for county variations is used here. The quantity is the county average yield. The average pasture rent for all types of pasture is used as a proxy for revenue from pasture in the district.

Government payments are another source of income. The average government payment per acre was obtained from the Environmental Working Group web site at www.ewg.org. The payments consisted of the total county payment divided over all acres for the years 1995 through 2002. The impact of government programs will be discussed in greater detail below.

One of the issues to be addressed was estimating the average costs of production. Costs of production will vary by farmer, yield, and many other factors. For this study, the cost of land was not considered to simplify the equation.

To estimate the costs of production, we used cost estimates from the Iowa State Extension Service (ISUE, Publication FM 1712). The Extension publication provides cost estimates for three yields of corn and soybeans and two yield levels for oats and hay. These yield levels attempt to capture the cost variability due to yields.

In this study we used average county yields from 1998 to 2002. These yields were used to determine which cost category from the ISU Extension cost estimates should be used. This approach allows us to capture some of the cost differences associated with yields.

Average pasture rents were used for the revenue from pasture land. No costs, except land taxes, were assumed for pasture. The oat crop also included a straw harvest. Straw was harvested as small square bales and hay was harvested as large round bales.

The income per acre in each county was calculated as 1) the weighted average crop income, 2) plus the government payment, 3) minus non-land costs of production and real estate taxes. The weights for the percent of land in the various land use categories were the same as those used in the rental income calculations.

Three different price scenarios were used to estimate the rate of return to farmland. High-, medium- and low-price scenarios were used to reflect possible prices for the coming year.

Figure 2 shows the estimated income per acre using the mid-price scenario (corn $2.45, soybeans $5.75, oats $1.50, hay $95, and straw $35). The income pattern displayed in Figure 2 is repeated regardless of the price scenario used.

Figure 3 shows the relationship between the estimated capitalization rate shown in Figure 1 and the net income estimates shown in Figure 2. Figure 3 shows almost no correlation between the estimated capitalization rate and the net income.

This would seem to indicate a normally functioning market. If land was over or under-priced relative to its income then one would expect to see a pattern. When interpreting the relationship shown in Figure 3, it is important to remember that this is for a single year. If you used an average over several years a pattern might emerge. For one thing, you might assume that higher income could be associated with better soils that would be associated with more stable yields. The capitalization rate should reflect the risk involved with the income as well as the level of the income. Additionally, there are location factors that can influence the value of the land in addition to the net income. Urban expansion, non-farm demand for farmland, and so forth would constitute such factors.

In this study, several possible relationships were examined. We used the implied capitalization rate from the income (shown in Figure 4), examined the average government payment, shown in Figure 7, and also examined whether the level of land value had an impact on the estimated capitalization rate. None of these produced results different from Figure 3.

The prices used for corn, soybeans, oats, and hay crops have significant influence on the rate of return for farmed land. Using a low-price scenario (corn $2.30, soybeans $5.30, and oats $1.10 per bushel; and hay and straw at $85 and $35 per ton, respectively), the average county capitalization rate is 5 percent, with a range from 3.8 to 7.8 percent (Figure 4).

Figure 5 presents the capitalization rates using a middle-range price scenario (corn $2.45, soybeans $5.75, oats $1.50, hay $95, and straw $35). The average capitalization rate increases to 5.9 percent, with a span from 4.6 to 9.1 percent.

Finally, with a high-price scenario (corn $3.80, soybeans $9.10, oats $2.00, hay $110, and straw $35) as shown in Figure 6, the average of the county capitalization rates increases to 12.4 percent, ranging from 10.1 to 16.2 percent.

This calculation does not take into consideration the cost the farmer pays to acquire the land. Depending on the farm financial situation, the returns for the farmer will have to cover the purchase cost of the land until payment has been completed. Individual farmers will face different situations. Some farmers will have the land paid for and thus only need to cover their desired rate of return whereas other farmers may have to borrow. For farmers with debt against the land, the returns have to be enough to cover the debt or there must be additional income to cover the cost of financing.

When considering these estimated returns to the farmer, it is important to remember several factors that have not been included. As noted, the cost of the land has been omitted. For some, especially beginning farmers, this cost can be considerable. Cost of ownership should include an opportunity cost that has not been considered here.

Another consideration is that these calculations do not include any return for the individual farmer's management or marketing

skills. The costs covered end at the farm gate. There also will be delivery costs, but more importantly the farmers should expect some return for their management and marketing efforts. It is not possible to determine these figures in an aggregate sense but they need to be considered when evaluating the estimated returns.

A final consideration not estimated here is a return to risk. Farmers have insurance available but there are production risks that still need to be considered. All of these factors need to be considered when evaluating returns to farmland for the farmer.

### Government Programs

U.S. government programs have provided significant support for farm income in Iowa. As such, they directly influence the rate of return to the land through expected income.

Figure 7 shows the average direct government payment per acre by county in Iowa. This data for the years 1995 through 2002 comes from the Environmental Working Group. Figure 7 shows the total payments divided by the county's total farmland acres to reflect what the average per acre payment.

The best approach or way to handle government payments for our purpose is problematic. The payments are made for the major program crops while hay and other acres do not receive government payments. It was decided to divide the government payments over all acres because the land values that are used are reflective of all farmland acres, not just the cropland. Trying to allocate the total payment just to the crop acres would have added an unnecessary degree of complication and it was not possible to totally allocate the payments in a satisfactory manner.

A frequently asked question is how the government payments have affected land values. If we assume that the average payments from 1995 to 2002 were factored into the bid for land, we can estimate the potential impact by taking the average government payments per county and capitalizing them at the rates estimated in Figure 1. Dividing the resulting value by the average land value produces the estimated portion of the land value coming from the government (Figure 8). For example, the statewide estimate of the government payments per acre is $40.08. Capitalizing that amount by the average capitalization

rate of 3.93 percent gives an estimated value of $1,020/acre in government payments. This is 45 percent of the reported average land value from the ISU land value survey.

This does not mean that if the government programs were ended land values would drop by 45 percent. There are too many other adjustment factors that would continue to influence the percentage change if the federal aid programs were discontinued. The level of government payments varies by year depending on the commodity prices. Higher prices mean lower government payments and vice versa. The government payments do, however, provide a floor for the income per acre and that will be factored into the land values.

While land values would not decline by 45 percent if government payments were taken away, there would be adjustments that would decrease land values. How much lower they would go cannot be estimated with certainty. The 45 percent estimate is a reasonable proxy and does show the extent to which government payments influence land values. In 2000, the U.S. Department of Agriculture reported, "Farm commodity program payments have the highest proportional effects in the Heartland, accounting for 24 percent of the market value of farmland" (Barnard).

## Discussion

One of the major concerns with ever-higher land values and rent increases is the impact on beginning farmers. Higher prices can force them to borrow more to maintain their position or even eliminate their chances of entering agriculture.

Higher land values increase the net worth of those owning land, but the higher land values also lead to rising rents that increase the costs of production. Based on the 2002 Census of Agriculture, 55 percent of Iowa farmers farm only land they own. In total just over half (51%) of all Iowa farmland is rented.

There is no certainty in the future of farming. However, the recent upsurge in land values does not show signs of abating at any time soon. The estimated returns presented here provide some understanding of what is happening. The returns to farmland look attractive relative to other investments.

Stock market performance, government programs, and interest rates will exert considerable influence on Iowa land values over the next year or so. How long values will continue to increase and whether or not land values will drop will be determined in large part by these factors.

In spite of the uncertainty, Iowa land ownership and rental arrangements will be changing in the near future. Almost half (48%) of Iowa's land is owned by people over the age of 65, and almost a quarter (24%) is owned by people over the age of 75. This means there will be a significant amount of farmland changing hands over the next few years. It remains to be seen whether or not this land comes on the open market for sale. Regardless of how or to whom the land is transferred, there will be an impact on land values. Iowa land values and the returns to Iowa farmland will remain as a topic of keen interest for many years to come.

## References

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Duffy, Michael, et al. "Farmland Ownership and Tenure in Iowa 1982-2002: A Twenty-Year Perspective." ISU Cooperative Extension Service, PM 1983. 2004

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Farm Subsidy Database. Environmental Working Group. 2003. <http://www.ewg.org/farm/>

2002 Census of Agriculture. USDA National Agricultural Statistics Services. 2002. <http://www.nass.usda.gov/census/>

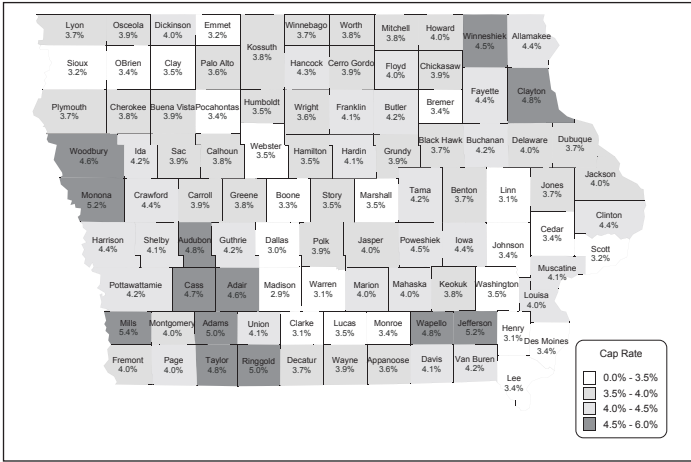*Figure 1.  2003 Weighted Rental Capitalization Rates*


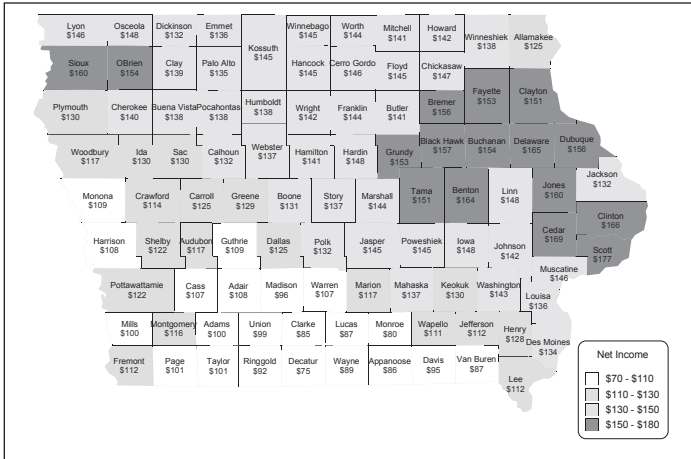
*Figure 2.  Average Net Income per Acre at Mid Prices*



*Figure 3.  Net Income and Rental Capitalization Rate*



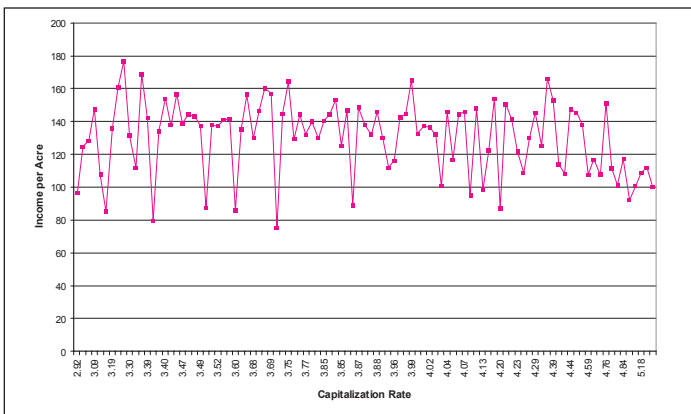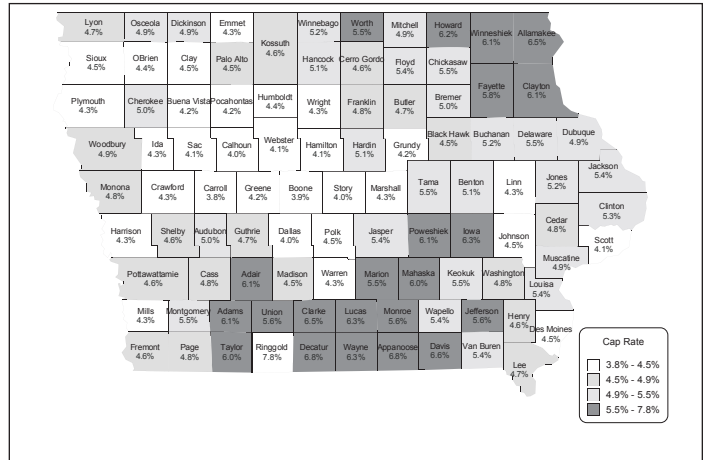*Figure 4.  Income Capitalization Rate with $2.30 Corn and $5.30 Soybeans*



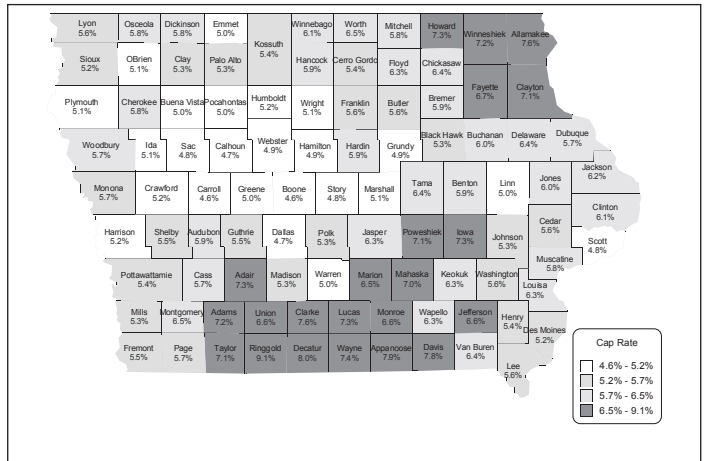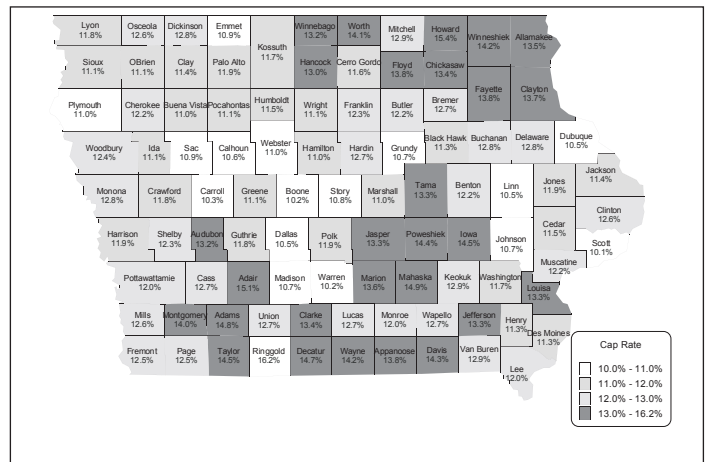*Figure 5.  Income Capitalization Rate with $2.45 Corn and $5.75 Soybeans*



*Figure 6.  Income Capitalization Rate with $3.80 Corn and $9.10 Soybeans*

*Figure 7. Average Government Payment, 1995-2002*



*Appendix A cont'd. Percent of Farmland\* Idled, in Cover Crops, Unharvested, Failed, or Abandoned*



*\* Does not include land in building sites or woodlands*

*Figure 8. Capitalized Value of Government Payments as a Percentage of the Land Value*



*Appendix A cont'd. Percent of Farmland\* in Hay and Oats*



*\* Does not include land in building sites or woodlands*

*Appendix A. Percent of Farmland\* in Corn and Soybeans*



*\* Does not include land in building sites or woodlands*

*Appendix A cont'd. Percent of Farmland\* in Pasture\*\**



*\* Does not include land in building sites or woodlands*
*\*\* Includes both woodland and rangeland pasture*

*Appendix A cont'd. Percent of Farmland in Woodlands, Houses, Ponds, Roads, and Wasteland*