Maximizing Profitability on Highly Erodible Land in Iowa

SUMMARY

Options in grass may be the most profitable for CRP land when the long-term cost of erosion is considered.

Introduction

Thousands of acres of Iowa's highly erodible cropland (HEL) have been enrolled in the Conservation Reserve program (CRP) for the last 20 years. This government program provided a reasonable and relatively risk-free income to HEL while preserving the soil from erosion. CRP rules changed somewhat from sign-up period to sign-up period, but the requirement that the land be seeded to grass or trees didn't change. The land in CRP provided steady income to owners and the program preserved soil on much of the poorer cropland in southern Iowa.

However, times and the economics of crop production have changed since the inception of CRP in 1985. Then, many farmers and landowners needed a steady and secure income to recover from the poor farm economy of the mid-1980s. Crop and livestock prices were deflated and farmer bankruptcies were at an all-time high. The Conservation Reserve Program provided relatively high income on the farm's poorer cropland. It took the marginal land out of corn and soybean production and reduced the market supply of those commodities. Thousands of acres entered this program between 1985 and 1990, stabilizing farm income streams in the depressed farm economy. Many of those 10-year CRP contracts were renewed for another 10 or 15 years in the 1990s.

As those contracts began to expire in 2009, farming conditions were vastly different than in the 1980s or 1990s. Among the differences were: 1) a demand for ethanol and biofuels leading to increased corn and soybean demand; 2) much higher land and cash rents, creating the need for greater return from each acre on a farm; 3) crop genetics that allow easier and better weed and insect control for no-till row crops such as corn and soybeans; 4) higher grain prices for both corn and soybeans; 5) better machinery for farming marginal cropland; and 6) political pressure to reduce government support for farmers. This publication discusses and compares profit potential for six farming options on highly erodible marginal cropland. Each option uses 2009 crop and livestock production prices. The cattle options are based on actual production data gathered at the Adams County CRP Research and Demonstration Farm near Corning, Iowa. The authors believe similar comparisons and reasoning would be applicable on other soils and in other parts of the United States.

Methods

Highly erodible land is defined by the Natural Resources and Conservation Service (NRCS) as land that is susceptible to excessive amounts of soil loss per year as calculated by the universal soil loss equation. This equation includes rainfall data, individual soil erodibility characteristics, length of slope, and percent of slope. Sidehill soils such as Shelby clay loam and Adair clay loam fit this definition and are common in southern Iowa. These soils often are marginal, glacial till side hills with greater than 9 percent slope and are prone to sheet, ephemeral, and gully erosion.

Many of these soils can be productive when treated with conservation measures. If they are left untreated and continuously row-crop farmed, topsoil will erode leaving the less productive subsoil and the gullies. With the loss of topsoil, continued row-crop farming is nearly impossible and likely to be very unprofitable.

What are the best crop options to make farming of these highly-erodible, marginal soils profitable and prevent further deterioration of the land? This is the question the Southern Iowa Forage and Livestock Committee, with support from the Leopold Center for Sustainable Agriculture, addresses in this publication.

To answer this question, the authors compare six options: 1) Leaving the land in grass and re-enrolling it in the CRP if available; 2) Leaving the land in grass and rotationally grazing steers on the pasture; 3) Leaving the land in grass and rotationally grazing cows and calves on the pasture; 4) Raising no-till corn in a corn/soybean rotation on the land; 5) Raising herbicide tolerant soybeans in a corn/soybean rotation on the land; and 6) Raising alfalfa/orchard grass hay on the land.

Table Explanation

The income number in the CRP column in Table 1 is the Iowa average continuous sign-up CRP payment amount for 2009. Expenses in the CRP option include weed control chemicals, weed and tree control labor, property taxes, and the miscellaneous costs associated with property liability, fence maintenance, etc.

Column 2 is based on production data from rotational grazing of stocker steers for eight consecutive years (1997-2004) at the Adams County CRP Farm 1½ miles northeast of Corning. During that demonstration period with rotational grazing of 34 paddocks, stocker steers between the weights of 500-850 pounds produced an average of 257 pounds of gain per acre in an average of 131 days on an average of 69.1 acres. December 2009 stocker prices of $1.00 per pound for 619.3 pound steers on the average

Table 1. A Comparison per Acre of Six Income Options on Highly Erodible, Marginal Land Currently in CRP.

OPTIONS	1.CRP	2.STOCKER GRAZING	3.COW/ CALF GRAZING	4.C/SB ROTATIONAL CORN	5.C/SB ROTATIONAL SOYBEANS	6.ALF/ OG HAY
INCOME						
Government payment				$20.00	$16.00	
CRP payment	$99.94					
Cattle income		$899.36	$298.25			
Crop sales				$490.00	$400.00	$400.00
TOTAL INCOME	**$99.94**	**$899.36**	**$298.25**	**$510.00**	**$416.00**	**$400.00**
EXPENSES						
Animal costs		$774.13	$67.67			
Till/plant		$5.03		$22.60	$19.40	$44.78
Seed/feed		$14.48	$89.92	$81.38	$63.00	
Fertilizer			$20.00	$169.00	$97.00	$197.60
Chemicals	$.50	$.50		$36.46	$30.63	
Harvest/dry				$76.96	$29.50	$76.00
Insurance	$1.00	$1.00	$1.00	$20.00	$12.50	$1.00
Labor	$1.30	$33.42	$44.80	$25.30	$19.25	$44.00
Land cost	$100.00	$100.00	$100.00	$100.00	$100.00	$100.00
Interest		$19.45	$10.01	$14.35	$9.19	
R.E. taxes	$9.00	$9.00	$9.00	$9.00	$9.00	$9.00
Miscellaneous		$23.00	$3.52	$9.00	$9.00	
TOTAL EXPENSES	**$111.80**	**$980.01**	**$345.92**	**$564.05**	**$398.47**	**$472.38**
NET INCOME	-$11.86	-$80.65	-$47.67	-$54.05	$17.53	-$72.38
ESTIMATED SOIL LOSS*(tons/acre)	.03	.03	.03	2.4	4.6	.03
Farmer erosion cost	$.30	$.30	$.30	$24.00	$46.00	$.30
Total erosion cost	$.60	$.60	$.60	$48.00	$92.00	$.60
LONG TERM NET INCOME	**-$12.46**	**-$81.25**	**-$48.27**	**-$102.05****	**-S74.47****	**-$72.98**

* Soil loss calculations were completed by NRCS personnel using RUSLE2. Soil map unit 24D2 (Shelby soil on a 12% slope) was used for these calculations.

**A typical corn/soybean rotation average net income would be -$88.26 with all erosion costs included.

The financial information in option 1 uses the actual Iowa 2009 average continuous CRP payment information published by the Iowa Farm Service Agency along with information from ISU publication FM 1698, 2009 Iowa Farm Custom Rate Survey, prepared by Iowa State University Extension economists William Edwards, Darnell Smith, and Ann Johanns. Information for options 2 and 3 comes from rotational-grazing demonstration production information collected at the Adams County CRP Research and Demonstration project near Corning, Iowa, in the years 1991-2007 as well as information from Iowa State University Extension publication FM 1815, Livestock Enterprise Budgets for Iowa – 2009, prepared by ISU Extension staff Shane Ellis, William Edwards, John Lawrence, and Ann Johanns. Income and expense information in options 4, 5, and 6 comes from Iowa State University Extension publication FM 1712, Estimated Costs of Crop Production – 2009, prepared by Iowa State University economists Michael Duffy and Darnell Smith.

start date of April 25 and $.87 per pound for an average end weight of 827 pounds on September 3 were used in the calculations. In this demonstration, each acre provided grazing for 1.25 steers. Expenses included interseeding a mix of red clover, birdsfoot trefoil, and alsike clover every third year. Cattle were rotated between the 34 paddocks on a daily basis and the labor expense reflects the time necessary for that management as well as weed control and fence and water system maintenance. Interest was calculated on the purchase cost of the steers at 7 percent APR. Miscellaneous expenses included veterinary, marketing and transportation costs, and death loss. Amounts for these costs were taken from ISU publication FM 1815 – Revised 2009.

The numbers in column 3 are based on 13 years (1991-2003) of production data from a four-paddock rotation grazing system at the Adams County CRP Farm near Corning, Iowa. The data show that 1 acre of land in the demonstration area can support .59 cow/calf units for an average of 144 days per summer. Stated another way, in those 13 years with a 4-paddock rotation, it took 1.69 acres of land for each cow/calf pair for the 144-day average length grazing season. The authors used this pasture production information and the 2009 beef cow-calf enterprise budget information in Iowa State University publication FM 1815 to arrive at a per acre income and expense budget in the table. The production data in the Adams County four-paddock system did not include creep feed for the calves, so the corn amount in the enterprise budget was not included in the budget in Table 1.

The numbers in columns 4 and 5 are from Iowa State University publication FM 1712. The authors used corn yield and price assumptions of 140 bushels per acre sold at $3.50 per bushel and soybean yield and price assumptions of 40 bushels per acre sold at $10 per bushel. These yields were chosen as representative of marginal sidehill no-till yields on Shelby and Adair soils found in Adams County in a good crop year. Common practice in Adams County and the surrounding area is to use a corn/soybean rotation pattern. Extension publication FM 1712 lists each of these crops separately in their estimate of expenses. To get a corn/soybean rotation long term net return number, the reader should use an average of columns 4 and 5. The average yearly net income for a corn/soybean rotation would be -$18.26 before any costs of erosion are considered. Adding the costs of erosion to this choice brings the average net income per acre to a -$88.26.

The income from hay in column 6 assumes a 4 ton per acre yield at a price of $100 per ton. An example of a perennial hay stand that would produce 4 tons per acre on Shelby and Adair soils would be an alfalfa and orchardgrass mix. Expenses are from publication FM 1712.

Discussion

It is easy to generalize about highly erodible land, but the reality is that every field and every farm are different. Some HEL fields are severely eroded from past cropping practices. Other fields still have good topsoil. Some fields have erosion control structures in place, others do not. The lands most susceptible to increased erosion with continuous row crop production are the hillsides with greater than 5 percent slope. These include all the C, D, and E slope soils. With the tremendous variability in soils on these slopes, it is difficult to know what yield amounts to use for the corn, soybean, and hay crops in the income comparisons made here. Yields or costs may be higher or lower depending upon the individual circumstances and the weather in a given year. If average yields or costs on a particular field are expected to be much different than these publication estimates, then the actual yields and costs should be the ones used in a comparison of profit potential. For example, if the average corn yield in a year was 120 or 100 or even 80 bushels to the acre, the net losses likely would be much greater than the loss shown in Table 1.

The land cost number in the table was a source of much discussion. The 2009 Iowa State University cash rental rate survey shows the average cash rental rate for low-quality cropland in southwest Iowa is $138 dollars per acre. It also shows the average improved pasture rent is $56 per acre and alfalfa hay ground cash rent is $91 per acre. In the Iowa State University Estimated Costs of Crop Production publication, the cost of land numbers varied with the crop. The variation was from a low of $55 per acre for grass pastures to a high of $205 per acre cash rent equivalent for 160-bushel corn. Because the same acre is being compared in Table 1, the authors chose to leave land costs consistent at $100 per acre across all options.

The bottom four lines in Table 1 introduce the hidden cost of soil erosion to this discussion. Soil erosion losses can be divided into two cost components. One is the immediate cost to the farmer in lost yields or time to make the field ready to plant in the spring. The other is the cost to society when soil leaves the field. These costs include clogging roadway ditches, increasing the speed that reservoirs fill and lose their effectiveness, decreased fish populations, and increased costs for water filtration needed for safe consumption. These are costs that the farmer doesn't have to pay directly, but eventually, someone will have to assume these costs. Estimates for soil loss costs vary, but the cost used by the Iowa State University Iowa Learning Farm project is $10 per ton of soil. This cost is similar to other estimates of the cost of erosion. The costs that are not borne by the farmer are of a similar magnitude. This means that the actual costs of erosion are approximately $20 per ton.

In order to make a true comparison of the systems in Table 1, the expected erosion should be included. The Estimated Soil loss line calculates expected soil loss for each option in Table 1 using the NRCS revised soil loss calculation known as RUSLE2 on 24 D2 soil or Shelby clay loam, 9-14 percent slope, moderately eroded soil. The next lines convert the tons per acre soil loss to dollar losses by multiplying each soil loss amount by $10 and $20 per ton, respectively. For the complete income picture on the impact of farming highly erodible steeply sloping soils, individuals should look at the new net income number on the bottom line of Table 1.

The net income analysis by the authors before considering the soil loss factor has shown that under current income and expense assumptions, the soybean crop enterprise is the most profitable use for highly erodible land. However, soybeans usually are grown in a rotation with corn every other year. Combining these two years gives an average net income of -$18.26 per acre. Upon examination of soil loss per acre for the various options, it is clear that the soybean option allows for the greatest erosion at 4.6 tons per acre per year. The authors combined the soil loss costs with the more immediate cash income or loss values to give a true picture of the impact of each crop option. Table 1 shows that the option with the highest net return then becomes the CRP option in column 1, followed by cow/calf grazing option in column 3. When erosion is not considered in decision making, the no-till corn/soybean option appears to be the second best option at -$36.52 net income (average of -$54.05 and $17.53).

Summary

The Conservation Reserve Program (CRP) started at a time when farm incomes were very low and the farm economy was in the midst of a financial crisis. The 1985 Farm Bill was passed because a coalition was formed between farmers and environmental groups. Environmental groups lobbied for the CRP because it meant reduced erosion and improved environmental quality. Farmers lobbied for the program because it meant higher incomes and a stable source of revenue on the marginal crop acres of a farm.

Times change and situations change. CRP contracts expire in 2009-2010. No-till farming techniques have improved. Land prices and cash rents are much higher. Corn and soybean yields and prices have increased greatly. Landowners are deciding how best to use their CRP land within this new set of parameters. What are the best crop options on the marginal sidehill soils with greater than 9 percent slope?

On highly erodible marginal cropland, the authors believe crop net returns and the cost of erosion both should be high on the list of considerations when making land-use choices. On Shelby and Adair clay loam, 9-14 percent slope soils, using current income and expense scenarios, a continuous no-till row crop plan of corn and soybeans appears to be a good option. However, when the long-term effects of soil erosion also are considered, the options in grass appear to be the best choices for these steeply sloping, marginal, sidehill soils.

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This bulletin is part of a series to help CRP contract holders assess the land-use options available to them when the contracts expire. The series is funded in part by the Leopold Center for Sustainable Agriculture. Other bulletins in the series and additional information are available at county ISU Extension offices.