

AN ECONOMIC SPREADSHEET TEMPLATE TO ESTIMATE THE BENEFITS AND COSTS OF GRASS FILTER STRIPS

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Notes on Spreadsheet Template:

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Software: Microsoft Excel version 7.0

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Introduction

This paper provides directions for using a spreadsheet template that assesses the impact vegetative filter strips have on the finances of a farm operation. A *grass option* is explored here, where the land along a stream or ditch is taken completely out of conventional agricultural production and converted to a mixture of grass and legume. Grass filter strips do not provide future profits to landowners, although they may provide other environmental benefits on or off the farm. These benefits are not included in this template showing financial costs or benefits, although they may be important in many situations.

For general background information on vegetative filter strips, please see AEX-467, "Vegetative Filter Strips: Application, Installation and Maintenance." For general background on the environmental, economic, and financial decisions related to vegetative filter strips, please see AE-6-98, "The Economics of Vegetative Filter Strips." That Fact Sheet focuses on the most important economic considerations associated with the decision to install a filter strip. It provides estimates of the economics of four different types of vegetative filter strips, using the typical costs and benefits one might expect in the state of Ohio.

While the estimates in the Fact Sheets above are useful for many purposes, they may not always fit a particular situation. Because land values, the size of the application, the cost share payment, and the project duration differ from place to place, the financial impacts may vary from landowner to landowner. This template provides a tool for farmers to determine the benefits and costs for their own situation. Additional templates that explore hay, low and high timber management, as well as the Fact Sheets described above, are available through the Department of Agricultural, Environmental, and Development Economics at The Ohio State University at

<http://www-agecon.ag.ohio-state.edu/Faculty/bsohngen/bmp/bmpinfo.htm>.

Discounting and Present Value

Because the costs and benefits of vegetative filter strips occur at different times, financial considerations must use the net present value approach. While discounting can be a complicated subject to learn, the spreadsheet template does these calculations automatically. All necessary components to correctly account for interest rates are included. All that is needed is the user's preferred project duration and interest rate.

The spreadsheet template is set up to calculate the net benefits of the project, accounting for benefits and costs that occur today and in the future. This is the relevant decision variable that will allow landowners to determine how much of an impact the proposed project will have on their bottom line over the life of the project. The final net benefit or cost estimate is the net present value of the gain or loss in profits that the farmer may expect over the life of the project. In addition, the annual values are presented to show the average effect on profits from year-to-year.

Template Instructions

These instructions are organized to help individual input eleven necessary values in the spreadsheet, and to understand the results. The worksheet is set up so that the user inputs the necessary pieces of information first. Once this information is entered, the calculations occur automatically and the results can be viewed at the bottom of the page.

Each step in the calculations is explained below. The initial numbers used in this worksheet represent typical values for the state of Ohio. Users have the ability to alter most of these numbers according to their own situation.

The rows in the worksheet represent particular cost or benefit items that occur with the establishment of the filter strip. They are numbered from row 1.1 to row 2.4. Although there may be additional benefits and costs, depending on the landowner's particular situation, these represent the most common to most applications in Ohio.

The first column in the spreadsheet template lists the names of the benefits or costs. Column A lists the number of years over which these costs and benefits occur. Column B is the dollar value of the benefit or cost for each acre in each year the benefit or cost is presented, and Column C is the present value of Column B over the correct number of years. Values in Column D are the present value of the costs or benefits for the number of acres specific for the filter strip application. Negative numbers indicate costs inside brackets (in red) and positive numbers indicate benefits (in black).

Required Inputs

There are eleven necessary inputs for this spreadsheet template. The necessary inputs are shown at the top of the spreadsheet and they are numbered from (1) to (11). These numbers can be changed to values reflecting your particular situation.

(1) Interest rate: The interest rate chosen should be the same as the interest rate a bank has charged you for a recent loan.

(2) Time period: The user must input the length of time they plan to maintain the filter strip.

(3) Number of acres: Input the size of the planned filter strip in acres.

- (4) Cost-share contract length:** Input the length of time the cost-share contract will run. This typically must be determined in advance by consulting a local NRCS or FSA office.
- (5) Cost-Share Signup Bonus:** Some cost share programs have sign-up bonuses. These bonuses can be factored in directly by providing the dollars per acre provided by the program. \$150 per acre per year is the default value for the input.
- (6) Cost share for initial establishment costs:** Cost share programs like CRP often pay half the cost of establishing a filter strip. Individual contracts may vary, however, so landowners should input the expected amount of cost share paid by the program they choose. The default value is \$50 per acre in the spreadsheet.
- (7) Cost share for rental payments:** Cost share programs like CRP often pay half of the annual value of land rent for the life of the contract, usually 10-15 years. The default value is \$60 per acre per year for the years the contract is in force.
- (8) Annual rental rate:** Input the value of the land you are using for the filter strip in crops, \$120 is used initially to represent a typical land rental rate for corn-soybean rotations in Ohio.
- (9) Cost of seed:** Costs of seed will vary with the choice of vegetation. The average costs of several mixtures of seeds, recommended by Ohio Agronomy Guide (1995), were calculated. Additional values are shown in the table at the right of the template.
- (10) Mowing costs:** Annual mowing costs can be varied by landowners, although landowners are expected to mow grass filter strips each year. Typical costs are \$25 per acre. The default value is \$50 per acre because we assume that there are two mowings per year. *If landowners expect to mow more than twice, they can multiply the cost*

per acre for each mowing by the number of times they expect to mow each year, and insert this value into the space for input 10.

(11) Conventional tillage: Seeding and applying fertilizer with a conventional tillage system typically costs \$32.50 per acre for labor and equipment, and with a no-tillage system, labor and equipment costs are \$21.50 per acre. The template user needs to choose which system they will be using. Inserting a "1" into input (11) indicates a conventional tillage system, and a "0" indicates a no-tillage system.

Information on Calculations

The calculations in this spreadsheet are given for each row. The rows in the spreadsheet are identified by numbers corresponding to the text below. Some values for the worksheet are provided for the users, based on typical usage.

Costs

ROW 1.1 Seedling Purchase Costs

Seedling purchase only occurs at the very beginning of the project. The value in column D equals the value in column C times the number of acres.

ROW 1.2 Fertilizer Costs

The fertilizer costs are assumed to be \$37/acre. Fertilizer applications are assumed only to occur at the beginning of the project, so the present value of this cost is \$37 per acre.

ROW 1.3 Labor and Equipment Costs

The costs depend on the type of tillage system chosen by the landowner. If conventional tillage system is used, it takes \$32.50/acre of labor and equipment costs. For no-tillage system, it costs \$21.5/acre. The operation occurs in the first year of the project, and is net discounted.

ROW 1.4 Mowing Cost

Mowing is assumed to occur twice per year over the whole length of the project. The annual mowing costs are according to the input by users, meanwhile, the spreadsheet provides a suggested cost of \$25/acre per mowing, that is, \$50/acre per year for two mowings. The present value of these costs is calculated in column C. All mowing costs are assumed to occur at the beginning of the year.

ROW 1.5 Land Rent

The present value of land rent is calculated in this row. Land rent occurs for the entire life of the project. Land rent is the opportunity cost of taking land out of some other productive use.

ROW 1.6 Total Costs

This row sums the values in Columns C and D from row 1.1 to 1.5. It is the total cost of installing and maintaining the filter strip.

Benefits

ROW 2.1 Initial Cost Share Payment

This row accounts for the signup bonus and the establishment cost share payments. They are assumed to occur at the beginning of the first year.

ROW 2.2 Rental Cost-Share Payment

Landowners may also receive land rental payments as cost-share. These will occur for the number of years in the contract. These payments are assumed to occur at the end of each year.

The amount of total land rent that is cost-shared is entered above.

ROW 2.3 Returns

There is no harvest return available for grass filter strips.

ROW 2.4 Total Benefits

Total benefits represent the sum of rows 2.1 to 2.3.

Net Benefits (Costs) with Cost Share

ROW 3.1 Present Value of Net Benefits (Costs)

This row represents the impact of the filter strip on farm profits over the life of the project with a cost share program. Positive numbers (in black) indicate that the filter strip adds to profits while negative numbers inside brackets (in red) indicate the filter strip reduces profits.

ROW 3.2 Annual Net Benefits (Costs)

This row shows the average annual benefits or costs of the filter strip.

Net Benefits (Costs) without Cost Share

ROW 4.1 Present Value of Net Benefits (Costs)

This row calculates the net benefits or costs without the cost share program in rows 2.1 and 2.2. These values can be compared to 3.1 and 3.2 to determine the benefit of the cost share program.

ROW 4.2 Annual Net Benefits (Costs)

This row shows the average annual benefits or costs of the filter strip without the cost share program.