

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

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May 1999

Notes on Spreadsheet Template:

Release 2.0/ May, 1999

Software: Microsoft Excel version 7.0

Notes and Acknowledgments:

We would like to thank the following individuals for their assistance in developing this Fact Sheet: Larry Brown (Assistant Professor, Department of Food, Agricultural and Biological Engineering, The Ohio State University); Randy Heiligmann (Associate Professor, School of Natural Resources, The Ohio State University); D. Lynn Forster (Professor, Agricultural, Environmental, and Development Economics, The Ohio State University); Rob Leeds (Extension Associate, Indian Lake HUA); Kathy Smith (Ohio Department of Natural Resources, Division of Forestry); Bruce Atherton (Department of Food, Agricultural and Biological Engineering, The Ohio State University); Wes Beery (USDA, Natural Resource Conservation Service).

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 *hay option* is explored here, where the land along a stream or ditch is taken out of conventional agricultural production, and converted to hay. Hay harvests occur to provide future benefits for landowners.

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 grass, 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/bsohnngen/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 eight necessary values in the spreadsheet, and to understand the results. The worksheet is set up so that the user first inputs the eight necessary pieces of information. This data is to be input at the top of the spreadsheet. 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 calculation is explained below. The initial numbers used in this worksheet represent typical values for the state of Ohio. Users have the ability to alter certain 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 2.2. 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 eight necessary inputs for this spreadsheet template to work:

- (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 hay filter strip.
- (3) **Number of acres:** Input the size of the planned vegetative filter strip in acres.
- (4) **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.
- (5) **Cost of seed:** Costs of seed will vary with the choice of vegetation. Users should check local agricultural service for current seed price estimates.

(6) 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 (6) indicates a conventional tillage system, and a "0" indicates a no-tillage system.

(7) Average annual hay production: The average annual hay production over the project years is likely to vary from stand to stand. In Ohio, the average production can be as much as 4.5 tons/acre per year. Fill the column with your expected average annual yield. Note, however, that we assume there are no harvests the first year.

(8) Price of hay per ton: Different hay species have different prices. An average price for hay is \$75/ton in Ohio. Users need to check local dealers for current hay price estimates to fill the column, or use the default average price provided in the template.

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 present values of costs in column D equals the present value per acre 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.

ROW 1.3 Labor and Equipment Costs

The costs depend on the type of tillage system chosen by the landowner. If a conventional tillage system is used, it takes \$32.50/acre of labor and equipment costs. For a no-tillage system, it costs \$21.50/acre. The operation is assumed to occur only in the first year of the project.

ROW 1.4 Harvest Cost

The costs for harvesting hay are assumed to be \$35 per ton. The costs per acre therefore will depend on the production obtained for the filter strip. This value is automatically calculated when the user inputs production per acre above. For the default case where 4.5 tons are produced per acre, harvest costs are \$157.50 per acre. Note that no harvests are assumed to occur in year 1.

ROW 1.5 Land Rent

The present value of land rent is calculated in this row. Land rent is the opportunity cost of forgoing traditional crop harvests on the land. Land rent is assumed to occur for the entire life of the project, and it is assumed to occur at the end of each year.

ROW 1.6 Total Costs

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

Benefits

ROW 2.1 Hay Returns

In 1996, the Ohio average price for Alfafa and other hay were \$134.58 per ton and \$75.42 per ton respectively. We use a conservative estimate of \$75 per ton to begin with, although users can input their own price in (8) above. Since average hay production in Ohio for 5-year system is 4.5 tons per acre annually, the estimated harvest returns are approximately \$337.50/acre per year, provided in the template. Note that we assume there are no harvests in the first year in order to allow the stand to be established. Column C shows the present value of the total returns per acre over the project period, and column D shows returns for all acres.

ROW 2.2 Total Benefits

The benefits only come from the harvest returns of hay, so that the total benefits are the same as the value of returns.

Total Benefits (Costs)

ROW 3.1 Present Value of Benefits (Costs)

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

ROW 3.2 Annual Benefits (Costs)

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