

**Assessing the Economic Benefits of Implementing Conservation Practices  
Presentation to Soils and Crops Workshop, Agricultural Economics Section  
Saskatoon, Saskatchewan, February 26, 1993, 1:30 pm**

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**1.0 Introduction**

An important consideration in farm management is inclusion of soil conservation practices into the farm operation. Research has shown the deleterious effects resulting from traditional tillage based farming practices. These facts have been presented to producers and have for the most part been accepted by them. Producers are generally aware of their need to manage soils properly, and at the same time are very concerned with their financial viability. They are telling agrologists they know that there is a problem out there, so what should they be doing about it and above all, what will be the costs? These financial concerns arise due to the perception that soil conservation means increased cash costs and capital expenditures.

Producers need more information on the economic benefits of implementing conservation practices. So much diversity exists between soil zones, and even from farm to farm that it is impossible to develop an economics fact sheet for a broad based audience specific enough to be very useful. As a result, agrologists and conservationists have been "selling" soil conservation programs on the basis of agronomic advantages not their economic benefits. It is difficult to suggest to producers the economic benefits of soil conservation without becoming very specific.

The decision to adopt soil conservation practices should involve the careful evaluation of costs and returns of the existing practice and the proposed change. This is the principle of partial budgeting. The producer can then make an informed decision on whether or not to adopt a particular soil conservation practice. Showing that implementing a conservation practice will result in a net benefit in time or money will assist the producer in decision making. Yield increases under conservation practices must be compared to conventional practices. Cash costs must be assessed along with fixed costs. Producers must be able to compare their existing system with a new conservation based system and find out if there is a saving in time or money.

With this challenge in mind, Agriculture Canada Prairie Farm Rehabilitation Administration (PFRA) proceeded in the spring of 1992 to develop materials to evaluate the economic benefits of soil conservation practices. Doug McKell of Branik Resources, entered into a contract with PFRA to complete the task. The challenge was to develop a series of publications which would assist the producer to compare the costs and returns of existing practices to those of a proposed system using soil conservation practices.

## 2.0 Partial budgeting as a tool

The partial budget is a planning tool used in decision making by farm managers. It allows playing out a planned scenario before committing resources, and examines only those costs, returns and resource needs that change with a single proposed adjustment to the business operation. If a proposed change to the farm operation is being considered, the partial budget will look at the advantages that occur and compare those with the resulting disadvantages.

On the advantages side there are two things to consider. First of all, are revenues or income going to increase as a result of the change? Secondly, will there be any reduced costs, either fixed or variable, due to the proposed change?

On the disadvantages side the opposite will be considered. What are the fixed and variable costs that increase due to the change? What annual revenues will be reduced or forgone in making the change?

The next step is to compare the total advantages to the total disadvantages. This net change gives the producer an indication if the proposed change will result in an increase or decrease in annual farm profits. This exercise will not guarantee the result of the decision, either positive or negative, but it increases the probability that the farm managers decision will turn out as planned.

The final step in the partial budget exercise is to look at non-cash benefits associated with the proposed change, which may include improved lifestyle, reduced risk, or an enhanced environment. Even if there is a negative cash benefit, the proposed change may still be undertaken due to non-cash benefits.

Partial Budget: Conservation Fallow vs Current Fallow

Advantages			Disadvantages		
<b>Added Revenue</b>			<b>Added Costs</b>		
			Conservation Fallow operation costs from Worksheet 2	Line 6	\$144
			Conservation Fallow labour costs from Worksheet 2	Line 7	\$150
			Conservation Fallow herbicide costs: Worksheet 3	Line 8	\$2,160
Total added revenue from Worksheet 1	Line 1	\$21,120	Total Added Costs Line 6 + Line 7 + Line 8	Line 9	\$2,454
<b>Reduced costs</b>			<b>Reduced Revenues</b>		
Current Fallow operating costs from Worksheet 2	Line 2	\$1,296			
Current Fallow labour costs from Worksheet 2	Line 3	\$600			
Total Reduced Costs Line 2 + Line 3	Line 4	\$1,896	Total Reduced Revenue from Worksheet 1	Line 10	\$19,200
<b>Total Advantages</b> Line 1 + Line 4	Line 5	\$23,016	<b>Total Disadvantages</b> Line 9 + Line 10	Line 11	\$21,654

### Summary

Net Change: Line 5 - Line 11	Line 12	\$1,362
Total Acres (from Worksheet 1)	Line 13	160
Net Change per acre = Line 12 Line 13		\$8.51

Source: *Economics of Conservation Fallow*, PFRA, 02/93

### **3.0 Economic worksheets for assessing soil conservation practices**

Through a contract with Branik Resources, PFRA proceeded in the spring of 1992 to develop economic worksheets for the three most popular soil conservation practices; zero tillage, conservation fallow and field shelterbelts. Using the principle of partial budgeting, the worksheets were designed to enable the producer to go through various steps to ultimately compare the costs and returns from implementing the conservation practice. Several drafts were prepared and were sent out for review by producers, university agriculture economists, farm organizations, and federal and provincial specialists.

For the producer to feel comfortable with any figures used or generated, the worksheets were designed so that producers could supply their own estimated costs and returns from implementing the proposed conservation practise. As an option, tables were provided in the worksheets so that producers could choose applicable numbers from research results, field demonstrations, custom rate guides or experienced producers.

In developing the worksheets for zero tillage and conservation fallow, advice was sought from experienced producers who had implemented these practices. They indicated the biggest savings in implementing soil conservation practices have been in time (labour) and reduced cash costs. Thus in developing the worksheets it was important to account for changes in labour requirements and cash costs. This was accomplished by a step where the field operations between systems are compared. In the worksheet, the producer lists the operations performed, the time spent on each operation and the cash costs (fuel, lubrication and repairs) associated with these practices. Figures from the Saskatchewan Custom Rate Guide were included to assist producers in estimating their operational costs.

Producers set their own value for labour. Producers who are adamant that their labour is worthless are encouraged to look at the hour requirements for the conventional and conservation systems, and consider the difference (and usually there are significant labour savings in favour of the conservation system) in labour requirements. The extra time might be put to use earning extra revenue for the farm, taking on more acres or enjoying recreation activities.

A process for comparing fixed costs (depreciation, investment cost, insurance and housing) was included in the worksheets. As machinery lifespan is characteristically extended and machinery inventories and repairs are reduced when practising zero tillage and conservation fallow, these factors needed to be accounted for in the worksheets.

Fixed costs are compared in the worksheets by using a rate based on factors developed in the Saskatchewan Rental Rate Guide, and multiplying these times the original cash cost of the machine. In this way producers compare their existing system to a conservation based system with a different machinery combination. The main factor to consider is the difference in tractor hours. As tractor hours increase, a different rate is used to reflect a lower salvage value or lower lifespan.

Even though original cash costs are used in the worksheet tables, a producer can still calculate fixed costs using the standard formulas for annual depreciation, investment costs and insurance/housing.

The field shelterbelt worksheet took a different format, and is based on the computer program designed by John Kort of the PFRA Shelterbelt Centre, Indian Head, Saskatchewan. This program looks at the establishment of shelterbelts, and through discounting and present values calculates the cash benefits to producers. The "Economics of Shelterbelts" worksheet was designed to assess the net benefit to producers as if there were mature shelterbelts on their farm at the time of the calculations. Yield benefits are calculated due to an improved growing environment for the crop in the zone affected by the shelterbelt. Factors adjust for variables in shelterbelt type, moisture stress, crop response and competition loss. Whereas this worksheet provides a simplified analysis of shelterbelt economics, a more detailed analysis can be accomplished by going through the PFRA Shelterbelt Economics computer program, which is available at most Saskatchewan Rural Service Centres.

All three worksheets take the evaluation to a net change where a net benefit or deficit may be experienced. If the worksheet shows a positive net cash benefit through the adoption of the proposed conservation system, then a producer quite likely would favour the adoption. If the worksheet proves a net cash deficit then a further look at the non-cash benefits could be explored, such as soil structure improvement, wildlife habitat enhancement and erosion protection. A producer may be in favour of adopting a particular soil conservation practice even if a small financial loss is incurred (ie. for twelve dollars per hectare erosion protection could be purchased).

The economic worksheets were printed in the fall of 1992 by PFRA and Saskatchewan Agriculture and Food, through the Canada-Saskatchewan Soil Conservation Agreement. Since November 1992, PFRA and other provincial field staff have been introducing the worksheets to producers in workshop settings, where the principles of partial budgeting and the steps in filling out the worksheets are explained. The worksheets are currently in their second printing, and have been generally well received.

#### **4.0 Conclusions and recommendations**

Extending soil conservation technology using partial budgeting is a new approach for many extension workers. Economic worksheets, developed by PFRA, explore the economic implications of conservation practices, and allow producers to compare costs and returns using figures applicable to their farming situation. The worksheets, entitled "Economics of Zero Tillage", "Economics of Conservation Fallow" and "Economics of Shelterbelts"; are mainly being made available to producers through workshops, where the various steps involved in filling them out are explained in detail.

Similar worksheets could be developed for producers to weigh the costs and returns of other soil conservation practices (ie. gully restoration, forage production). The principle of partial budgeting can work well is designing future worksheets.

More research information is required to provide a clearer picture to producers. Research work presently underway will in the future enable producers to include a value on such factors as depth of topsoil, soil quality and water quality. The current economic worksheets could be modified to incorporate these values. If these non-cash benefits of practising soil conservation can be valued on a cash basis, the budgeting exercise could show an enormous advantage in favour of soil conservation practices.

In addition, more research results are required that address such matters as:

- yield implications for oilseed or pulse crops in the brown and dark brown soil zones by adopting a soil conservation program
- repair rates for machinery used in soil conservation practices
- compounding yield benefits in using soil conservation practices in combination
- differences in fixed costs associated with machinery used under soil conservation programs rather than conventional programs

As well, more information is required on custom rates for equipment and practices used in soil conservation.

Economic worksheets are proving to be a valuable tool in assessing the costs and returns in implementing conservation practices. Copies of the worksheets can be obtained by writing to:

Agriculture Canada, PFRA  
Land Ecology Section  
1800 Hamilton Street  
Regina, Saskatchewan  
S4P 4L2  
Fax: 306-780-8229