



# Partial Budgeting for Agricultural Businesses



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## Introduction

Farm managers make choices every day. Some decisions have vital consequences for the farm business, while others are not as crucial. Some, such as purchasing milking equipment, occur infrequently. Others are made more often—choosing when to cull cows, for instance. The choices made today may have an immediate impact on the business, or they may take much longer to have an effect. These decisions may involve any facet of the farm business, including—but not limited to—production, personnel, or financing. The bottom line is that no matter the size or scope of any single decision, nearly all decisions can have important implications for the immediate and future success of the farm business.

Because many decisions have such important impacts, farm managers need to analyze alternatives in a methodical fashion. Some alternatives are easily analyzed, and a decision can be made quickly. In other cases, farm managers must take more time to recognize and evaluate all potential effects of that decision. To do this, farm managers need a framework for analyzing the relevant trade-offs. This publication discusses partial budgeting, a useful and easily implemented framework for such analysis.

## What Is Partial Budgeting?

Partial budgeting is a planning and decision-making framework used to compare the costs and benefits of alternatives faced by a farm business. It focuses only on the changes in income and expenses that would result from implementing a specific alternative. Thus, all aspects of farm profits that are unchanged by the decision can be safely ignored. In a nutshell, partial budgeting allows you to get a better handle on how a decision will affect the profitability of the enterprise, and ultimately the profitability of the farm itself.<sup>1</sup> However, the value of a partial budget analysis is highly dependent upon the quality of the information used in the analysis.

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<sup>1</sup> This framework does not account for changes in the value of money over time. If analysis is required to focus on effects that occur more than a year or two in the future, then you should use a net present value approach, which discounts the dollar amounts in future years to account for their lower value compared to current-year dollars.

## When and How to Use Partial Budgets

The partial budget framework can be used to analyze a number of important farm decisions, including:

- adopting a new technology
- changing enterprises
- choosing to specialize
- hiring custom work
- leasing instead of buying machinery
- modifying production practices
- making capital improvements

The structure of the analysis depends upon the nature of the decision being analyzed. For example, suppose you want to analyze the installation of a new milking parlor. It would be wise to perform a partial budget analysis on the milking enterprise by analyzing costs and returns on either a per-cow or per-hundredweight basis. On the other hand, a farmer choosing to purchase feed rather than grow it might want to see the effects on the whole farm, in terms of total income and costs. The partial budgeting framework is flexible enough to allow for these modifications.

Keep in mind that partial budgeting analyzes the impacts of some change on profit. Prior analysis should be performed to assure that the enterprise or farm, whichever is being analyzed, is profitable. If it is not profitable, you may have much more important decisions to face.

There are seven steps to the successful use of partial budget analysis as a decision-making tool.<sup>2</sup> Each step serves a specific, unique purpose and is vital to an accurate, meaningful analysis.

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<sup>2</sup> *Partial Budgets*, Newfoundland and Labrador Department of Forest Resources and Agrifoods, [www.gov.nf.ca/agric/pubfact/agribus/partial.htm](http://www.gov.nf.ca/agric/pubfact/agribus/partial.htm)

### 1. State the proposed change.

It is important to have a clear understanding of exactly what alternative is being analyzed. If possible, you should analyze several alternatives; however, the analysis of each is carried out on an individual basis. Clarity at this stage will help you to easily complete the other steps.

### 2. List the added returns.

Identify any possible means of generating new revenue streams or increasing existing streams. Suppose the alternative is purchasing a mixer. Will that lead to increased milk production? If so, then the added revenue resulting from growth in milk sales should be determined.

### 3. List the reduced costs.

In this step, begin by identifying general areas where the choice might lower expenses. Once all general areas are identified for the specific alternative, you can work to plug numbers into the partial budget. Take, for example, the choice to hire custom crop harvesting. One of the most obvious savings associated with this decision is a decreased need for labor. You can identify how many hours of labor will be saved, and then multiply that figure by the hourly wage rate to obtain a value for the partial budget. Keep in mind that this is one reduced cost. It is important to identify all possible costs that the choice will reduce.

### 4. List the added costs.

Once again, start by identifying all of the general areas in which costs will be increased. The choice to have crops custom-harvested has one obvious new cost: the payment for the service. Suppose instead the choice was to purchase a new piece of machinery for \$50,000 with a useful life of 10 years, a salvage value of \$5,000, a financing interest rate of 7 percent, and repair

and insurance rates of 2 percent and 3 percent of the average value, respectively. In the situation of capital purchases, a depreciated cost must be claimed annually, not the total purchase cost. The average value (\$27,500) should be used to compute annual interest, repair, and insurance expenses. To summarize, the added annual costs for the purchase of this piece of machinery are:

Depreciation: \$4,500

Interest: \$1,925

Repairs: \$550

Insurance: \$825

Be careful to thoroughly analyze the alternative to get a handle on all sources of added costs.

### 5. List the reduced returns.

Will revenues be decreased or eliminated as a result of choosing a particular alternative? For instance, suppose you are deciding whether or not to adopt a no-till system of crop production. Will this decrease yield? If so, then you must estimate the amount of the reduction and multiply that by an expected price to approximate the reduced revenues resulting from the adoption of no-till.

### 6. Summarize the net effects.

Once you have identified the individual positive (steps 2 and 3) and negative (steps 4 and 5) aspects of the alternative, these should be aggregated to determine a total cost and total benefit of the alternative. The net benefit of the alternative is found by subtracting total costs from total benefits. If the net benefit is positive, then that alternative may have some economic advantages. However, if the net benefit is negative, the business would be better off staying with the current situation or analyzing a different alternative.

### 7. Consider non-economic and other factors.

Non-economic considerations must be taken into account when considering an alternative. Such considerations may include the social aspects of having less labor on the farm, increased/decreased leisure time, the need for increased or specialized knowledge, and safety and/or ease of use of equipment. Note that these are generally focused on quality of life measures, which are frequently difficult to quantify.

As you work through the partial budget analysis, it is important to identify those numbers in the analysis that can be considered “hard numbers.” Hard numbers are those that have values we can assign with a high degree of certainty. For example, if you are considering having your crops custom-harvested, you probably know with a high degree of certainty how much you will have to pay for that service.

Suppose, on the other hand, you are concerned that the harvester may not be available at an optimal time. This may lead to decreased output. However, it is unclear exactly how much production might be lost. Thus, lost production can be considered a “soft number.” In this situation, you should incorporate your best estimate in the partial budget analysis, then use different yield loss numbers to see how much the soft number estimate should change before the decision switches.

It can be beneficial to use “best-case” and “worst-case” numbers to establish a range for the partial budget analysis. Obviously, the fewer the soft numbers you use, the better. The more soft numbers included in the analysis, the less trustworthy the results of the analysis will be. This is why a good

partial budget analysis must be founded upon good records, which provide many hard numbers.

### Ensuring Realistic Estimates

A decision based on partial budget analysis is only as good as the information used in the analysis will allow. There are several ways to ensure that you are using realistic and accurate figures for price savings and expenses in your analyses:

- review previous years' actual expenses
- use the Internet to research fees associated with services
- contact your Penn State Cooperative Extension agent
- get prices from several suppliers
- talk with other producers who use the alternative you are considering

By speaking with farm managers or producers who already made a change similar to what you are considering, you can also learn about things they wish they had done differently, problems they encountered, or successes they achieved.

### Example

The following example demonstrates the usefulness of partial budgeting in the decision-making process.

Farmer Red Valentin is considering having his dairy heifers custom-raised. Red is nearing retirement age, and none of his children have an interest in dairying. The farm is of moderate size (100 cows, 50 heifers, and 400 crop acres) and has been well managed and profitable. Currently, there are two full-time employees besides Red (one of whom would like to buy the farm in the future), and two or three local teenagers who work part-time during crop season. Red would like to increase farm profits and maybe free up some of his time to spend with his wife and family.

A dairy farmer in a nearby town recently sold his milk cows and has started a custom heifer-growing business. Red has heard much discussion about specialization at extension meetings, and he has decided to analyze the option of having his heifers raised off-farm with the goal of increasing total farm profits. Red met with the custom grower to learn what services are provided and at what fee. The grower told Red that the fee is \$1.30/head/day, not including the cost of transportation to and from the custom facility. The grower would raise the heifers from just after birth to three weeks prior to freshening. All veterinary and breeding costs are included in the daily fee.

Before making a decision, Red wants to analyze the situation to make sure it is the right thing to do for himself, his family, and the business. He should work through the partial budgeting process before making his decision. A table like Table 1 on the next page will help provide some structure for the analysis.

Table 1. Partial Budget Format

**POSITIVE IMPACTS**

	unit of analysis
<b>Added Returns</b>	
Item 1	\$xxxx
Item 2	\$xxxx
Item 3	\$xxxx
Item 4	\$xxxx
<b>Total Added Returns:</b>	<b>\$xxxx</b>
<b>Reduced Costs</b>	
Item 1	\$xxxx
Item 2	\$xxxx
Item 3	\$xxxx
Item 4	\$xxxx
<b>Total Reduced Costs:</b>	<b>\$xxxx</b>
<b>TOTAL POSITIVE IMPACTS</b>	<b>\$xxxxx</b>

**NEGATIVE IMPACTS**

	unit of analysis
<b>Added Costs</b>	
Item 1	\$xxxx
Item 2	\$xxxx
Item 3	\$xxxx
Item 4	\$xxxx
<b>Total Added Costs:</b>	<b>\$xxxx</b>
<b>Reduced Returns</b>	
Item 1	\$xxxx
Item 2	\$xxxx
Item 3	\$xxxx
Item 4	\$xxxx
<b>Total Reduced Returns:</b>	<b>\$xxxx</b>
<b>TOTAL NEGATIVE IMPACTS</b>	<b>\$xxxxx</b>

**1. State the proposed change.**

All heifers would be raised by a custom heifer grower, instead of being raised on the farm.

**2. List the added returns.**

Here, we assume there are no added returns from having the heifers custom-raised, since Red expects to receive the same quality heifer as he is currently raising. Anything less is unacceptable. However, in some situations, if the custom-raised heifers are of higher quality and are to be sold on the market, a higher price may be received as a result. Also, a heifer might be in better condition when she returns and enters the milking string. While there is some possibility that there may be added returns, this is a very soft number.

Added returns: \$0

**3. List the reduced costs.**

The operating costs that will be reduced if Red has heifers custom-raised are feed, labor, breeding, bedding, and veterinary/medicine expenses. Capital ownership costs that Red will reduce are those associated with buildings and equipment. Note that these are repair and maintenance expenses associated with the buildings and equipment used in the heifer operation, not the cost of the buildings and equipment themselves. Finally, animal ownership costs that Red will reduce are those associated with the interest on the money used for operating and capital ownership costs, as well as any miscellaneous costs that may come up while raising the heifers. The value for each of these expenses is given in the next column.

**Reduced costs per heifer:**

- Feed: \$701.18
- Labor: \$182.37
- Breeding: \$21.60
- Bedding: \$12.33
- Buildings: \$60.02
- Equipment: \$17.55
- Interest: \$71.54
- Miscellaneous: \$40.00

**Total reduced costs are \$1,127.94 per heifer.**

#### 4. List the added costs.

The primary added expense that Red would incur by having his heifers custom-raised is the fee charged by the grower, which is \$1.30/head/day. Since the heifers will be there for 24 months (730 days), the total cost per heifer is \$949.00. However, there is also the added cost of transportation to and from the grower, and the interest on these expenses. For each heifer that goes to the custom grower, Red will pay \$10, and for each transported back to the farm, he will pay \$20.

##### **Added costs per heifer:**

Grower fees: \$949.00

Transportation to grower: \$10.00

Transportation to dairy: \$20.00

Interest: \$68.49

**Total added costs are \$1,047.49 per heifer.**

#### 5. Lists the reduced returns.

As in Step 2, there are no reduced returns in this example. This is because heifers coming back from the grower are assumed to be of the same quality as those Red has raised for many years.

Reduced returns: \$0

#### 6. Summarize the net effect.

Now we need to sum the added returns and reduced costs—the “positive impacts”—on the left-hand side of Table 2 (page 7). These amount to \$1,127.94 per heifer. Next we must sum the added costs and reduced returns—the “negative impacts”—on the right-hand side of Table 2. These values amount to \$1,047.49 per heifer. Finally, we subtract the “negative impacts” from the “positive impacts” to determine the net benefit per heifer.

$$\$1,127.94 - \$1,047.49 = \$80.45$$

The net benefit of \$80.45 represents the increase in profit that results from having one heifer custom-raised for two years by the custom grower. This means that Red would save \$40.23/heifer/year. Thus, he would save \$2,011.25/year if he sends all 50 of his heifers to the custom grower. Based on this alone, and assuming that price estimates are correct, Red would want to go ahead with the decision to have his heifers custom-raised.

#### 7. Consider non-economic and other factors.

There are also non-economic factors that Red must take into account when deciding whether or not to send his heifers to a custom grower. If he sends the heifers to the custom grower and spends less time working on the farm, will there be enough or too much work for his employees? Can the labor be used more productively in another enterprise? How will the employee who intends to buy the farm feel about this change? What are Red's wife's thoughts and feelings about the change? Does she want to see the heifers leave the farm and have Red around the house more? Red must make his own decisions about these questions.

Finally, a farm manager must look at the risk factors and other issues involved in a change. Are the expected savings and expenses realistic and accurate? Are there better alternatives that may pose less financial risk? Will managerial and/or labor requirements change? In this example, there is some risk that the custom grower may go out of business after Red makes the decision and alters his enterprises. It is up to Red to evaluate this risk and decide if it is acceptable or not.

## Conclusions

What did Red gain from going through the partial budgeting process?

First and foremost, he got a better understanding of the potential value of having his heifers custom-raised. He also has a structured analysis that allows him to see what factors are most important in determining how beneficial the choice may be.

Second, by going through the partial budgeting steps, he was able to systematically identify and quantify all potential areas that might be affected by the choice. If there were one or more soft numbers, he could have used a best-case and worst-case approach to determine how the results would change in each case.

Third, he may have learned a lesson on how important keeping good records is in the decision-making process.

Finally, the seventh step gave Red an opportunity to identify impacts of the alternative that are not directly related to the farm business. This step also opened up the lines of communication between Red and his employees and family.

What should Red do? The numbers indicate that he should consider having his heifers raised by a custom grower. The partial budget framework allows Red to better understand the potential outcomes, but ultimately he must make the decision.

In general, partial budget analysis provides a useful structure for analyzing potentially complex decisions. A computer spreadsheet package provides a simple method for performing this type of analysis. This is especially helpful in situations where many soft numbers might be used, because the computer can easily recalculate numbers when others change. Regardless of whether the analysis is done on paper or on the computer, progressive producers should use partial budget analysis to examine alternative choices and make better decisions.

Note: Some data for this example were gathered from *Heifer Economics*, DAS 99-14 by Tozer, et al., The Pennsylvania State University.

Table 2. Partial Budget For Custom Raising of Heifers

### POSITIVE IMPACTS

	\$ per head
<b>Added Returns</b>	
None	\$
<b>Reduced Costs</b>	
Operating Costs:	
Feed	\$701.18
Labor	\$182.37
Breeding	\$21.60
Bedding	\$21.35
Veterinary/Medicines	\$12.33
Capital Ownership Costs:	
Buildings	\$60.02
Equipment	\$17.55
Animal Ownership Costs:	
Interest	\$71.54
Miscellaneous	\$40.00
<b>Total Reduced Costs:</b>	<b>\$1,127.94</b>
<b>TOTAL POSITIVE IMPACTS</b>	<b>1,127.94</b>

### NEGATIVE IMPACTS

	\$ per head
<b>Added Costs</b>	
Grower Fees:	
Daily fee ( \$1.30 x 730 days)	\$949.00
Transportation	
To grower	\$10.00
To dairy	\$20.00
Interest on above (7%)	\$68.49
<b>Total Added Costs:</b>	<b>\$1,047.49</b>
<b>Reduced Returns</b>	
None	\$
<b>TOTAL NEGATIVE IMPACTS</b>	<b>\$1,047.49</b>

### SUMMARY OF ANALYSIS

1. Change in income per heifer over 24 months from custom-raising: \$ 1,127.94 - \$ 1,047.49 **\$80.45**
2. Change in income for farm over 1 year from custom-raising: \$80.45 x (12 mo/24 mo) x 50 heifers **\$2,011.25**

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