



# AGRICULTURAL ALTERNATIVES

## Budgeting for Agricultural Decision Making

Farm managers must make decisions every day. Some have vital consequences for the farm business, while others are not as crucial. Some, such as purchasing capital equipment, occur infrequently. Others are made more often—choosing when to sell crops or livestock, for example. 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 such items as production, personnel, or financing.

Because many decisions have important financial impacts, farm managers need to analyze alternatives in a consistent fashion. Some alternatives are easily analyzed, and a decision can be made quickly. In other cases, more time is needed to recognize and evaluate all potential effects of that decision. To do this, a decision framework is needed to help analyze the relevant tradeoffs and determine the viability of enterprises. This publication discusses the use of enterprise and partial budgets, two tools that provide the basis for analyzing a wide range of farm management decisions.

### Enterprise Budgets

Enterprise budgets represent estimates of receipts (income), costs, and profits associated with the production of agricultural products. The information contained in enterprise budgets is used by agricultural producers,



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extension specialists, financial institutions, governmental agencies, and other advisers making decisions in the food and fiber industry.

Budgets are used to:

- Itemize the receipts (income) received for an enterprise
- List the inputs and production practices required by an enterprise
- Evaluate the efficiency of farm enterprises
- Estimate benefits and costs for major changes in production practices
- Provide the basis for a total farm plan
- Support applications for credit

An enterprise budget should be prepared with a specific objective in mind. The sample budgets in “Agricultural Alternatives” publications can be used as examples to help ensure that you include all costs and receipts in your own budgets. Receipts and costs are often difficult to estimate in budget preparation because they are numerous and variable. Therefore, you should think of

the sample budgets as a first approximation and then make appropriate adjustments using the “Your Estimate” column to add, delete, and adjust items that reflect your specific production situation. You may also use the PDF versions to adjust the values for your operation. The two example budget formats in this publication outline the types of costs and common units that are included in typical crop and livestock budgets (see Tables 1 and 2 at the end of this publication). These examples, unlike those for specific enterprises in this series, omit the estimated amounts for individual entries.

Enterprise budgets are usually developed based on a given type and size of unit. For example, the unit may be an acre for field crops or orchards or a given number of square feet for greenhouses or specialty crops. For animals, the unit chosen may be per head, per animal unit (e.g., a cow-calf unit), per flock, or on some other basis. The enterprise budget should contain receipts for every product and by-product of the enterprise. In the case of crops, this may also mean a breakdown of receipts by grades or market outlets. It may also mean listing two distinct products like grain and straw in the case of a small grain crop. For livestock, it often means breaking out the sale of different types of animals (e.g., sale of slaughter and breeding livestock and accounting for culled breeding livestock) or by grades of meat, hides, wool, eggs, or other products.

Enterprise budgets contain several cost components. Costs used should reflect market values and the productivity of enterprise resources (land, labor, capital, and management). Determining the costs of production practices can be difficult. Individuals often disagree over which costs to include and how they should be measured. Understandably, these differences arise because production costs are unique to each farming operation. An important financial distinction is the concept of variable and fixed costs.

- **Variable costs are those expenses that vary with output within a production period and result from the use of purchased inputs and owned assets.** Examples in crop budgets include expenses for seed or plants, fertilizer and lime, pesticides, fuel, machinery repairs and maintenance, crop insurance, hourly or seasonal labor, marketing, and interest on operating capital. In livestock budgets, they include expenses for feed, herd health, breeding, labor, marketing, and interest on operating capital. If land or buildings are rented, they should be included as a variable cost. Other terms used to describe variable costs include cash costs (or expenses), direct costs, and out-of-pocket costs..
- **Fixed costs are those that do not vary with the level of output and result from ownership of assets (and therefore will not change in the short run).** They include depreciation, taxes, interest on investment, land, repairs on fixed assets (like buildings and fencing), and insurance. Depreciation should be accounted for using the straight-line method based on actual

years of use and typical salvage values rather than accelerated methods allowed for income tax purposes. Sometimes a management fee or a pro-rated cost for salaried employees is also included as a fixed cost. Indirect, noncash, and overhead costs are other terms used to describe fixed costs.

- **Total costs are variable and fixed costs added together.** To be financially viable an enterprise must earn a profit above total costs in the long-run, but this is not always possible every year. When income received is less than total production costs should an enterprise be continued? The answer may be yes if (1) returns are above variable costs and (2) this is a short-term condition. It is economical to continue production in the short run if your income is higher than your variable costs of production. In other words, in the short run, you must receive a price that generates a return at least equal to variable costs (this is also referred to as having a positive gross margin or return over variable costs). In the long run, however, market price and yield need to be high enough to cover total costs of production, including fixed costs. Otherwise, replacing machinery and equipment will become increasingly difficult, and as a result the enterprise will not be financially sound after a period of several years.

The variable/fixed cost concept is critical to most short-run and annual farm decisions. Most or all the fixed costs associated with your farm will not be affected by annual production decisions. However, individual crop and livestock enterprises compete for limited farm resources. The most desirable options are those that pay the highest returns on these fixed resources and thus the greatest return above variable costs.

## Breakeven Analysis

Enterprise budgets are useful for performing breakeven analysis for prices and yields. The breakeven price is computed as follows:

$$\text{Breakeven price} = \text{projected total costs} \div \text{expected yield}$$

This is the minimum price per unit required to cover all projected costs at the expected yield. It provides you with a marketing price target that you must receive, on average, to cover all your costs in the current production year. The breakeven price will help you analyze alternative marketing options and decide if a given enterprise is a good choice in the markets you face. The breakeven yield is computed as follows:

$$\text{Breakeven yield} = \text{projected total costs} \div \text{expected price}$$

This is the minimum yield required to cover all projected costs at the expected price per unit. It provides you with a production target that you must meet to cover all your

costs in the current production year. Breakeven yield will help you analyze alternative production options and decide if a given enterprise is a good choice given the growing conditions on your operation.

Breakeven analysis is a useful farm management tool because it allows for the calculation of various combinations of price and yield (sensitivity analysis) that will cover projected costs. So long as the expected price received (or expected yield produced) is greater than the breakeven price (or breakeven yield), both variable and fixed costs are covered and a profit is being generated. Breakeven analysis can also be used to calculate the breakeven price or yield required to cover variable costs (short-term production decisions). In this situation, if the expected price received (or expected yield produced) is greater than the breakeven price (or breakeven yield), all variable costs and at least a portion of fixed costs are being covered. However, if the breakeven price (or breakeven yield) exceeds the expected price (or expected yield), then receipts would be less than variable costs and losses would be minimized by not continuing the enterprise. In this situation, losses would be limited to the amount of fixed costs that you would have to absorb.

## Enterprise Planning and Financial Management

Enterprise budgets are also very useful in helping you select the mix of enterprises that you produce on your farm. They can be used to develop whole-farm budgets that provide an estimate of the overall profitability and resource requirements (land, machinery, and labor) for a given farm plan. Enterprise budgets can also be used in projected cash flow budgets to estimate seasonal cash inflows and outflows and borrowing needs for your farming operation. When borrowing money to finance operations, you can show your lender that you have carefully evaluated potential earnings and credit needs with a good set of enterprise budgets.

Whole-farm budgets are used to estimate the profitability of your entire farm, and they are very useful when contemplating major changes in your operation. A whole-farm budget is used to estimate the expected income, expenses, and profit of a given farm plan, to compare the profitability of alternative farm plans, and often to evaluate the effect of a change in farm size and estimate the availability of farm resources (land, labor, capital, and management). A whole-farm budget is developed by first estimating total income and variable costs for all enterprises to be included in the plan. Then, any other farm income (e.g., custom work income, fuel tax refunds, and government payments) is added to this total. Finally, farm fixed costs (including depreciation, insurance, repairs, taxes, interest, utilities, and vehicle expenses) are subtracted.

Cash flow budgets are an important tool because of the seasonal nature of cash flows for most agricultural enterprises. A pro forma cash flow budget is a forward-planning tool and contains estimates of cash flows in future time periods. It is usually based on monthly cash flows, but it can also be used for annual planning. An annual cash flow budget is handled similarly to a general ledger or a farm business checking account. It helps you track important cash outflow demands (farm business expenses, debt payments, taxes, family living expenses, etc.) and match them with cash inflows in a given period (e.g., sales, loans, new investment, and government payments).

## Available Budgets

Penn State Extension, like many cooperative extension services, makes production cost and return estimates (in budget format) for many crop and livestock enterprises. In Pennsylvania, these budgets are available online, in individual enterprises covered in the “Agricultural Alternatives” series, and in the following production guides:

- *Mid-Atlantic Berry Guide for Commercial Growers*
- *Penn State Agronomy Guide*
- *Penn State Organic Agronomy Guide*
- *Penn State Tree Fruit Production Guide*

If you live outside Pennsylvania, check online or with your local extension office for enterprise budgets that will better reflect your local production practices and marketing conditions.

## Partial Budgeting

Partial budgeting is a planning and decision-making framework used to compare the costs and benefits of alternative management decisions faced by a farm business. It focuses only on the changes in income and expenses that would result from implementing a specific alternative. 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 your farm.

## When and How to Use Partial Budgets

Partial budgeting is simply the evaluation of the impact on farm profit resulting from a proposed management change. The partial budget framework can be used to analyze a number of important farm decisions, including:

- Adopting a new production technology
- Changing or adding enterprises
- Hiring custom work
- Leasing versus buying machinery
- Modifying production practices
- Making capital improvements

Four basic questions must be answered during the preparation of a partial budget:

- (1) What new or additional costs will be incurred?
- (2) How much current income will be lost or reduced?
- (3) What new or additional income will be received?
- (4) What current costs will be reduced or eliminated?

The scale used for your partial budget depends on the nature of the decision being analyzed. For a cropping alternative, a partial budget could be conducted on a per-acre basis or for all the affected acreage. For a livestock alternative, a partial budget could be conducted on a per-animal-unit basis or for a whole herd or flock. The partial budgeting framework is flexible enough to allow for these types of modifications.

## Ensuring an Accurate Partial Budget

The value of a partial budget analysis is highly dependent on the quality of the information used in the analysis. Having access to a good set of production and financial records and enterprise budgets is critical. There are several ways to ensure that you are using realistic and accurate figures for changes in cost and income in your analyses:

- Review your actual expenses from previous years
- Conduct research on the Internet to compare costs and estimate potential returns
- Get cost information from several suppliers
- Investigate prices for likely market outlets
- Talk with producers who have experience with the alternative you are considering
- Contact your local extension office

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

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 items that have cost or income values you can assign with a high degree of certainty. On the other hand, there may be “soft number” items about which you are less certain. In these situations, you should incorporate your best estimates in the partial budget analysis and then adjust them to see how much the estimate would need to change before you would change your mind about adopting the alternative.

It can also be beneficial to use “best case” and “worst case” numbers to establish a range for your partial budget analysis. The more soft numbers included in the analysis, the less trustworthy the results of the analysis will be. A good partial budget analysis has a solid foundation

of hard numbers provided by enterprise budgets and accurate production and financial records.

## Partial Budgeting Format

An example of a typical partial budgeting format that you can use to help organize the information for your own analysis can be found in Table 3 at the end of this publication. Partial budgeting is a simple yet powerful farm management tool. This format provides a systematic way to organize changes in cost and return information and compare alternatives.

There are seven steps to developing a partial budget. These steps involve answering the four basic partial budgeting questions and organizing the information in a format like Table 3 that facilitates analysis and comparison of alternatives

**Step 1: State the proposed change.** It is important to have a clear understanding of exactly what alternative is being considered, especially when sharing your results with other decision-makers or discussing your options with your banker or other adviser. You may be evaluating several alternatives, but the analysis of each should be carried out on a separate partial budget. Clarity at this stage will help you complete the other steps. Add a date to your analysis—even though you may decide not to make any changes now, this evaluation may provide a good starting point for a similar analysis in the future.

**Step 2: List the additional costs.** Start by identifying all the general areas in which costs will be increased if the change is adopted. Be careful to thoroughly analyze the alternative to get a handle on all sources of added costs. Additional costs may mean using more of some of the same inputs you currently use or including new ones. The quality of a given input (e.g., labor) may also need to increase. New equipment may be required. Enterprise budgets are very helpful in completing this step.

**Step 3: List the reduced income.** Certain types of income may be reduced or eliminated when choosing a given alternative. Even if you are producing the same product, there may be decreases in the quantity or quality of a portion of your output because of the change. If you are changing enterprises, then you need to account for the elimination of the products you are currently producing.

**Step 4: List the additional income.** Similar to step 3, certain types of income may be increased or introduced as a result of choosing a particular alternative. Even if you are producing the same product, there may be increases in the quantity or quality of a portion of your output because of the change. If you are changing enterprises, then you need to account for the products you will produce if you adopt the change.

**Step 5: List the reduced costs.** Similar to step 2, begin by identifying general areas where the change might lower costs. Carefully analyze the alternative to identify all sources of reduced costs. Reduced costs may mean using smaller quantities of some of the same inputs you currently use or eliminating some items altogether. The alternative may require less labor than you currently use. Some equipment may be no longer required. Again, enterprise budgets are very helpful in completing this step.

**Step 6: Calculate the change in profit.** Once you have completed steps 2–5, you can calculate the estimated change in profit from adopting the alternative. Steps 2 and 3 summarize those items that have a negative impact on profit, while steps 4 and 5 summarize those items that have a positive impact on profit. The change in profit is found by subtracting total additional costs and reduced income from total additional income and reduced costs. If the calculated change in profit is positive, then you must still weigh whether you believe this improvement to be worth any disruptions in your business required to implement it. In some cases, a negative change in profit may still warrant making the change if it has a relatively minor impact on overall farm profitability and frees up resources for other uses.

**Step 7: Consider intangible aspects.** Noneconomic impacts and other factors should also be considered

when evaluating an alternative. Intangible items can be positive or negative and, in some cases, may be more important than economic considerations. Examples of intangible items may include changes in the amount of family or leisure time, changes in stress or other health considerations in managing enterprises, the need for increased or specialized knowledge, and safety and/or ease of use of equipment. Note that intangibles generally focus on quality-of-life measures, which are frequently difficult or impossible to quantify economically.

## Capital Budgeting

Partial budgeting does not account for changes in the value of money over time. If your analysis focuses on effects that occur more than a year or two in the future, then you should use a capital budgeting approach, where future cash flows are discounted to account for their lower value compared to current-year dollars. This process involves the use of net present value analysis to evaluate the allocation of capital resources between competing projects and investments. Capital budgeting can be used to generate internal rates of return and pay-back periods that are commonly used to rank investment options. The process of capital budgeting is beyond the scope of this publication, but it should be considered for any large capital investments involving benefits and costs that occur over a long period of time.

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**Table 1. Format of a Typical Crop Enterprise Budget**

Summary of estimated costs and returns per acre.

Item	Quantity	Unit	Price	Total	Your Estimate
<b>Receipts</b>					
Product 1		bushel			
Product 2		pound			
Other					
<i>Total receipts</i>					
<b>Variable Costs</b>					
Soil test					
Custom lime application		ton			
Fertilizer					
Nitrogen		pound			
Phosphorus		pound			
Potassium		pound			
Seeds/plants		acre			
Herbicides					
Product 1		gallon			
Product 2		quart			
Product 3		pint			
Insecticides					
Product 1		quart			
Product 2		pint			
Product 3		ounce			
Harvest		bushel, pound, or acre			
Other		ton			
Fuel					
Tractors		gallon			
Self-propelled equipment		gallon			
Other		gallon			
Labor					
Tractors		hour			
Self-propelled equipment		hour			
Other		hour			
Repairs and maintenance					
Tractors		acre			
Self-propelled equipment		acre			
Implements		acre			
Interest on operating capital					
<i>Total variable costs</i>					
<b>Fixed Costs</b>					
Tractors		acre			
Self-propelled equipment		acre			
Implements		acre			
Land charge		acre			
Management		acre			
<i>Total fixed costs</i>					
<b>Total Costs</b>					
Returns					
Gross margin (returns over variable costs)					
Net returns					

## Table 2. Format of a Typical Livestock Enterprise Budget

Summary of estimated costs and returns per acre.

Item	Quantity	Unit	Price	Total	Your Estimate
<b>Receipts</b>					
Livestock type 1		head			
Livestock type 2		cwt			
Other					
<i>Total receipts</i>					
<b>Variable Costs</b>					
Cost of livestock		head			
Feed		ton			
Grain		pound			
Pasture		AUM			
Hay		ton			
Silage		ton			
Other		pound			
Other variable costs					
Veterinarian and medicine		head			
Breeding		head			
Utilities		head			
Bedding		ton			
Misc. expenses and supplies		head			
Interest on operating capital					
<i>Total variable costs</i>					
<b>Fixed Costs</b>					
Salaried labor		hour			
Equipment		head			
Building		head			
Management		head			
<i>Total fixed costs</i>					
<b>Total Costs</b>					
Returns					
Gross margin (returns over variable costs)					
Net returns					

### Table 3. Partial Budgeting Format

Proposed change: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

<b>Additional costs:</b>	<b>Additional income:</b>
<b>Total additional costs:</b> _____	<b>Total additional income:</b> _____
<b>Reduced income:</b>	<b>Reduced costs:</b>
<b>Total reduced income:</b> _____	<b>Total reduced costs:</b> _____
<b>Total additional costs and reduced income:</b> _____	<b>Total additional income and reduced costs:</b> _____
	_____ minus _____ <b>Change in profit:</b> _____

Intangibles (list): \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_