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Are you planning to be the next generation farm operator? Whether you represent the transition of generations, or that of employee to owner or as a new entrant to the business, a fresh look at management will be necessary. Michigan State University Extension offers help to beginning farmers with this transition through the Beginning Farmers DEMaND series offering articles, workshops and additional resources.

Understanding Enterprise Budgets and Economic Profit

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When operating an agricultural business, you need to have a firm grasp on expected revenues, expenses and profitability. Knowing these numbers for each enterprise on the farm can help you, the operator, make informed decisions that affect your profitability and longevity. Every crop or livestock type produced within your operation is an enterprise. For example, sugar beets, beef cows, dairy cows, farrow-finish hogs, soybeans, asparagus and so forth are all individual enterprises – even commodity corn and organic corn would be two different enterprises. A useful way to organize expected revenues and expenses to calculate economic profitability is with an enterprise budget.

An enterprise budget uses historical information paired with future expectations to estimate revenues, expenses and ultimately, the economic profit of a single enterprise. Enterprise budgets serve as the building blocks for whole farm plans and provide information useful in partial budgeting exercises and decision-making.

Accounting vs. Economic Profit

When using an enterprise budget, you must first understand the profit being calculated, as different budgets include different costs. Enterprise budgets calculate economic profit rather than accounting profit.

Accounting profit, or financial profit, is the total cash earnings of your enterprise. It is calculated by subtracting all dollar costs from total revenue. This is the value your accountant helps you calculate.

Economic profit deducts both dollar costs and opportunity costs from total revenue. Opportunity costs are the benefits you and your operation miss out on when choosing an enterprise, such as corn, over an alternative, such

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as soybeans. Opportunity cost is related to the idea of tradeoffs – there is a cost when using a resource for this enterprise versus using the resource elsewhere. Opportunity costs should be considered to assure the current allocation of a resource is maximizing your profit. Common opportunity costs include the cost of labor, management, land and equity capital. For example, although you may not write yourself a paycheck every other week, your labor and management time has value – or an opportunity cost. These costs are easily overlooked and not considered because there is usually no actual cash changing hands. However, understanding your opportunity costs of choosing one investment over another allows for better decision-making.

$$\text{Accounting Profit} = \text{Total Revenue} - \text{Dollar Costs}$$

$$\text{Economic Profit} = \text{Total Revenue} - \text{Dollar Costs} - \text{Opportunity Costs}$$

Be careful when using enterprise budgeting tools from different sources as not all tools report the same bottom line. For example, some budgets calculate profitability as “returns to land and management.” This means that the opportunity cost of land and management are not directly addressed in the budget.

Because of the inclusion of opportunity costs, economic profit of your operation will be less than accounting profit. Furthermore, a projected economic profit of zero is not necessarily bad. It simply means all labor, capital and land are earning their opportunity costs (or true economic value), no more and no less.

Constructing an Enterprise Budget

When creating an enterprise budget, come prepared. There are typically many sections and records needed to be as accurate as possible in forecasting your economic profit. This can be exhausting and confusing if you are not familiar with the numbers associated with every aspect of your enterprise. However, being prepared can make the process less painful.

When deciding which enterprise budget tool to use, or creating your own, be specific about units and time. Some enterprise budgets will measure economic profitability for the whole enterprise, for a common enterprise type or on a per unit basis. For example, common units are one acre for field crops, one litter for swine, one cow unit or 100 birds for poultry. Be explicit about the time period used for budgeting. The time period you choose will be based on the enterprise you are evaluating. Many crop enterprises budgets project economic profit for the next year, but some livestock feeding and finishing enterprises require less than a year. For example, swine produce offspring more than once a year, so the budget timeframe might be 6 months since swine produce on average two litters annually. Regardless of the period chosen, you should only include costs and revenue in the budget for that period.

Figures 1 and 2, from a cow-calf enterprise budget <https://www.canr.msu.edu/resources/cow-calf-enterprise-budget-tool> created by the authors, are used to demonstrate different sections of enterprise budgets.

Revenue

Revenue	Quantity	Units	Price	Units	\$/Cow	\$/Herd
Heifer calves	600	lb.	\$ 1.23	\$/lb.	\$ 369.00	\$ 18,450.00
Steer calves	750	lb.	\$ 1.38	\$/lb.	\$ 414.00	\$ 20,700.00
Bull calves	0	lb.	\$ -	\$/lb.	\$ -	\$ -
Cull cow	1100	lb.	\$ 0.53	\$/lb.	\$105.34	\$ 5,266.80
Other revenue					\$ -	\$ -
Gross income					\$ 888.34	\$ 44,416.80

Figure 1. For a cow-calf enterprise, the revenue section includes heifer, steer and bull calves, along with cull cow sales and other revenues.

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The revenue section consists of all cash and noncash revenue from the crop or livestock (Figure 1). The accuracy of the projected economic profit for your enterprise may depend more on the estimates made in this section than in any other. Yield and price estimates need to be as accurate as possible. Historical yields, yield trends, and the type and amount of inputs to be used should be considered and utilized when forecasting yield. For expected prices, use either futures prices with historical basis or forward contract prices. Government program payments should also be included in this section.

Variable Expenses

Variable (sometimes called operating or direct) expenses are costs that are only incurred when production happens. If there are no livestock raised or crops grown, variable costs are \$0. Common examples include labor, machinery fuel, oil, lubricants and repairs. When thinking about these costs, keep in mind fuel and labor time required to get to the field, pasture or barn. Additionally, interest expenses for capital tied up in operating activities would also be considered variable. If you run into trouble estimating these costs, contact your input suppliers.

For crop enterprises, variable costs might include seed, fertilizer, lime, pesticides, drying and hauling grain, and crop insurance. For livestock enterprises, variable costs often include feed, vaccinations, minerals, veterinarian cost and pasture care such as fertilizer, spraying or mowing. Often times, livestock enterprises consume both purchased and raised feed. Purchased feed is valued at cost, while raised feed should be valued at its opportunity cost – for what price the feed could have been sold to someone else.

Labor		
Primary Operator Labor		
Hours per week on enterprise		hours per week
Work weeks per year		weeks
Value of operator labor		per hour
Family Labor		
Family member 1 name		
Hours per week		hours per week
Work weeks per year		weeks
Wage		per hour

Figure 2. The opportunity cost of management and family labor are commonly overlooked.

Opportunity cost for management and family labor is a variable expense that is commonly overlooked – labor is not free. When investing your time into the enterprise, remember to include the value of your time (Figure 2). To calculate the value of your management and labor, consider the wage or salary you could be earning working somewhere else. Additionally, include the value of unpaid family labor, the wage they could be earning working somewhere else.

Fixed Expenses

Fixed (sometimes called ownership or indirect) expenses are costs that exist even if no crops or livestock are produced. These are incurred due to ownership of machinery, equipment, buildings and facilities, and land used in production. Other fixed costs include depreciation, term interest, taxes, non-crop insurance and any other overhead expenses. Common interest expenses include interest on loans taken to build facilities or purchase equipment and livestock.

Depreciation for management purposes is a noncash expense that recognizes the value an asset loses over the production period due to use, age and wear. Depreciation is also needed for asset replacement planning. There are multiple ways to calculate equipment and facility depreciation, but straight-line depreciation is common and

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simple. Straight-line depreciation takes the depreciable asset's cost (purchase costs minus the estimated salvage value) divided by useful life. For example, a piece of equipment that costs \$15,000 can be sold in 10 years for \$5,000 has a yearly depreciation cost of \$1,000 $[(\$15,000 - \$5,000) / 10 \text{ years} = \$1,000/\text{year}]$. Some enterprise budget tools will help you calculate depreciation.

Fixed costs are not always directly tied to any single enterprise. For this reason, you should allocate fixed costs to each enterprise. For example, suppose you use the piece of machinery above 100 hours a year. Ten of those hours were for your wheat enterprise, while the remaining 90 hours were for your corn enterprise. To prorate these hours, you would allocate 10% of that machine's depreciation to your wheat enterprise (\$100 of \$1000) and 90% to your corn enterprise (\$900 of \$1000). The same allocation rule goes for facility depreciation, insurance and taxes.

How to Use Enterprise Budgets for Making Management Decisions

Although a large amount of data is required to construct an enterprise budget, once complete, it is a source of data for other types of budgeting and management decisions. You can use the information throughout the year to make marketing, operating and production input decisions. For example, enterprise budgets can be used to identify areas where cost savings could occur. Alternatively, enterprise budgets can be used to see if you have the best mix of enterprises on your operation. Are there other enterprises that might be more profitable? However, these management decisions should not be taken lightly, and sensitivity analyses should be conducted under different price and yield scenarios to see how these assumptions impact your economic profitability.

Key Economic Profitability Value

A key intermediate economic profitability value is income over variable costs, as it relates to the short-run shutdown decision.

Income over variable costs calculates the net income after subtracting all variable costs and is often referred to as "return to fixed costs" or "gross margin." If income over variable costs is negative, this indicates the enterprise cannot cover variable costs for the period. Thus, you should not produce that crop or livestock for the period (meaning you only lose fixed costs).

Income Over Variable Costs = Gross Income – Variable Costs

If income is greater than variable costs but still less than total costs (meaning economic profit is negative), you should still produce the enterprise. This is because it can pay for all variable costs and part of fixed costs, minimizing your losses.

Break-Even Analysis

Break-even analysis can be used to see how sensitive economic profitability is to the assumptions used in your budget – namely assumed output price and yield.

Break-even price is the output price required to cover all costs at a given output or yield level; thus, it is the same as cost of production. Break-even price can be calculated by dividing total cost per unit by expected yield. This value can be computed for a range of yields to see how sensitive it is to yield fluctuations. This concept is also useful in marketing – when a product is sold for more than its cost of production, a profit is made.

$$\text{Break-Even Price} = \frac{\text{Total Cost per Unit}}{\text{Expected Yield}}$$

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Break-even yield is total cost per unit divided by output price. Break-even yield is the yield required to cover all costs at a given output price. Keep in mind the output price is an estimate, so it is useful to compute break-even yields for a range of possible output prices. Computing multiple break-even yields can provide insight into how sensitive your break-even yield is to price fluctuations.

$$\text{Break-Even Yield} = \frac{\text{Total Cost per Unit}}{\text{Output Price per Unit}}$$

A Few Tips for Success:

- Ask for help. If you are a co-primary operator, have a hired manager (or someone else in your operation who is mainly in charge of handling the bills) ask these individuals to walk through the process with you. Combining operational knowledge will make the process much easier and faster.
- Call your supplier. If you cannot recall your application rates or the price of certain variable costs, call your supplier direct.
- Remember to take breaks. Thinking through every aspect of your operation and the numbers associated with each section can be overwhelming. Do not try to understand every aspect of the operation at one time.
- Connect with your local Michigan State University (MSU) Farm Management Extension educator. They can help you identify the right tools for you as well as answer any questions you have along the way.

Summary

Enterprise budgets are an extremely valuable management tool for forecasting economic profitability. Taking the time to estimate revenues and costs for the period provides you and your management team expectations and aids in the decision-making processes. Additionally, break-even analysis can be used to test how sensitive the forecasted profitability is to price and yield assumptions. Do not hesitate to contact your local MSU Farm Management Extension educator for help!

Resources

Ready-to-fill-in tools exist for many agricultural enterprises including those common in Michigan. If you are having trouble locating a tool for your operation, contact your MSU Extension educator for guidance.

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Resources

MSU Crop Budget Estimator Tool for Forages

<https://www.canr.msu.edu/resources/crop-budget-estimator-tool-for-forages-detailed>

The Crop Budget Estimator for Forages is a Microsoft Excel–based tool built around key areas that producers need to consider as they plan for and continually evaluate their growing season.

MSU Crop Budget Estimator Tool for Grains

<https://www.canr.msu.edu/resources/crop-budget-estimator-tool-detailed>

The Microsoft Excel–based tool is built for corn, soybean and wheat production.

MSU Feedlot Enterprise Economics

<https://www.canr.msu.edu/resources/feedlot-enterprise-economics>

MSU Extension provides a tool for users to use to add up their feedlot enterprise budget.

MSU Organic Grain Crop Enterprise Budgets

<https://www.canr.msu.edu/news/organic-grain-crop-enterprise-budgets-are-available>

The MSU Extension Organic Grain Crop Enterprise Budgets provide estimates of returns and selected costs for organic yellow corn, food-grade soybeans, oats, soft white winter wheat and barley.

Penn State Tree Fruit Production Guide

<https://extension.psu.edu/tree-fruit-budget-tools>

There are two apple tree planting budgets, one for High Density (908 trees per acre) and one for Medium Density (272 trees per acre). The tart cherry budget is created for processing production, and the peach and sweet cherry are for fresh-market sales.