**Dairy Enterprise Budget**

May 2019

by

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**Introduction**

Enterprise budgets are a forward-looking planning tool with the outcome being an estimate of costs of production and profitability for a specific enterprise (dairy, feeding steers, growing corn, growing hay, etc.). Like most tools, if used appropriately, then they can be an asset to management decision-making. However, they can also be used in ways that could lead managers on a path to a wrong decision.

The first key is to remember that they are a “planning” tool. One of the best values of an enterprise budget is that it forces the manager to think through expected productivity, cull rates, rations, operating costs, machinery costs, etc. A second major value of the enterprise budget is analyzing where money is being made or lost in the farm business. A manager may find out that they are making a good return in their dairy, but not so much with growing corn and soybeans. If so, that may inform better decision-making in either changing practices to improve profitability in growing corn or soybeans or maybe even eliminating those enterprises.

One of the dangers of enterprise budgets, or any planning tool, is the accuracy of the initial estimates. If overly optimistic estimates of prices, production and costs are used then not surprisingly, an overly inflated profit will result and visa-versa. A related danger is using “generic” enterprise budget created by some other entity. There is likely nothing wrong with the generic budget in and by itself other than it was not created for your farm! Thus, it may or may not reflect your situation.

A final challenge with enterprise budgets is how in-depth to go. Budgets can be very simplified with many default estimates, or they can be sophisticated with herculean efforts at getting the estimates just right. There is a balance between user friendliness and usefulness.

The Dairy Enterprise Budget by Bernhardt attempts to incorporate some specificity such that a budget unique to a particular farm business can be created. The payment for the specificity is more work in deriving the initial inputs. The budget also includes sensitivity, that is, comparison of results under different production, prices, and costs.

**Methods**

The spreadsheet includes several tabs or worksheets. The primary tab is “Enterprise Budget,” which is ultimately the final product. It has three columns for assessing three production per cow levels. Supporting tabs include:

* Mach & Bldg FC Calculator (for calculating fixed costs for machinery and buildings)
* DM Feed Costs (for calculating feed ration costs on a dry matter basis)
* As Fed Feed Costs (for calculating feed ration costs on an as fed basis)
* Sensitivity Analysis (for comparing how sensitive profits are to changes in prices, costs, and production)

In addition, there are information tabs

* Note on Feed Costs (explanation of how feed costs are calculated)
* Title Page

On a separate Excel file are benchmark enterprise budgets derived from the Agricultural Financial Analysis (AgFA) database maintained by the Center for Dairy Profitability. One is a set of three budgets based on 2015-2017 averages by herd size. A second is based on three different production levels for those farms that are 200-500 range herd size, average of approximately 330 cows.

Throughout all tabs, yellow-shaded cells are for user input. Because it is yellow-shaded does not mean there has to be a value entered in the cell, but it is a place for users to enter their information if it is appropriate to do so.

Green-shaded cells are information for the user, but they are not a part of the budget calculations. For example, if the feed cost tab is used to estimate feed costs then the results of that worksheet will be transferred to the budget, but only as information in a green-shaded cell. The user must still ultimately enter a feed costs in a yellow-shade cell, but they have information in the green cells to help guide that decision. The same is true for fixed costs.

Any cell that is not shaded yellow or green is either text, not used, or contains a formula. Cells with formulas are protected from accidentally over-writing them and losing the formula.

The budget is based on a per cow basis. A cow unit is based on 85% of the year in lactation (310 days) and dry for 15% of the year (55 days). Cost of production and profitability results are given per cow, per cwt, per cwteq, and whole herd.

**Tab: Enterprise Budget**

The top of the enterprise budget begins with a few characteristics of the dairy that could affect revenues or costs. It allows the user some customization to their farm:

* Herd size (lactating + dry)
	+ The budget is per cow, but herd size is used later in the budget to reflect whole herd costs and profits
* Mailbox Milk Price
	+ Impacts milk sales. Each situation could be different depending on typical basis for that farm and of course, this will change by year.
* Bull and Heifer Calf Prices, Calving Interval and calf death loss
	+ Impacts revenue from bull and heifer calf sales.
	+ Calving interval adjusts the number of bull and heifer calves produced, the longer the interval, the less a cow unit will produce.
	+ Note that the budget assumes that heifer calves are sold, with replacements purchased back as springing heifers. While the reality may be different, the selling and purchasing back is a proxy for the labor, feed, and other costs in raising them. A user could use other rows to accommodate raising replacements.
* Cull Cow Price, Cull Rate and Replacement Heifers Price
	+ Impacts revenue from cull cow sales, costs for replacements and is used in calculating some fixed costs for insurance and interest.
	+ Cow death rates are assumed to be incorporated in cull rates.
* Wage Rate and Labor hours
	+ Impacts labor costs

Revenues

With exception to the yellow-shaded “Other” line items, revenues are automatically calculated based on the production and price characteristics entered. The “Other” rows can be used to enter dairy income other than milk such as bull and heifer calves and cull cows.

Revenues from other enterprises, such as crop sales, could also be entered, but then it is not truly an enterprise budget. Income credit is being given to cows that they don’t deserve and likewise the cows are being charged for costs that they did not create. This could also happen if using aggregated data that does not have income and costs separated by enterprise.

Having non-enterprise income and/or expenses creates a distorted result and may lead one on the wrong decision path with respect to the profitability of a single enterprise. There are some ways to counter this challenge that will be discussed later under the heading of “Non-Enterprise Income and Expenses.”

Variable Costs

The biggest challenge with herd size is feed costs, partly because it is such a significant amount of total costs and because the mix of purchased versus raised feed makes estimating feed costs challenging.

Two worksheets (tabs) are provided to calculate feed costs based on a ration, one based on dry matter basis and the other on as-fed basis. The enterprise budget assumes that all feeds are purchased. Thus, one must be careful not to use the full ration cost, but also include costs for seed, fertilizer, etc. in growing feed. The price of feedstuffs that are grown can be changed to reflect the costs in raising them more accurately. If the costs of seed, fertilizer, etc. are used then the price in the ration worksheet for the raised feed can be entered as zero to avoid double counting.

The Enterprise Budget includes two lines shaded green that show the results from the dry matter based ration worksheet and the as-fed worksheet respectively. However, these are only provided as information and are NOT part of the variable cost calculation. The actual feed costs must still be entered in the “Feed” line to be counted.

Marketing and hauling costs must be entered by the user. However, there is a small calculator next to the marketing and hauling cost line that can be used to calculate $/cwt costs for marketing and hauling. Again, the $/cwt calculator is not included in the variable cost calculation, only for information.

Operating interest is based on the interest rate entered by the user and half of all variable costs except marketing and hauling. Marketing and hauling are assumed to be a deduction on the milk check and thus not a part of any operating line of credit.

Fixed Costs

The breakdown of fixed and variable costs is not always obvious, nor is it always terribly relevant if your goal is understanding total costs of production. A handy acronym for fixed costs is DITI -

 Depreciation,

 Interest,

 Taxes,

 Insurance.

However, other costs can be considered fixed costs including utilities, management salaries and housing for machinery. Several “Other” lines are included so that the user can tailor fixed costs to their liking.

Another line that is in the Fixed Cost area is “Management Charge.” The percentage entered on the “Management Charge” line will be multiplied by total revenues to derive a charge for management. If zero is entered then the Enterprise Budget is considered a return to management and profits. Or, one could include the value of unpaid labor and management elsewhere in the budget, for example in the number of labor hours or in an “other” line item. In this latter case then the percent entered on the “Management Charge” line should be zero.

Results

Costs of production and profitability results are provided in a number of ways. The first section gives the total costs of production followed by three ways to view profits – net return per cow, net return per cwt, and net return for the whole enterprise. The next three sections breakdown costs on a per cow, per cwt, and per cwteq basis respectively. The “cwteq” is discussed in the next section.

Non-Enterprise Income and Expenses

Enterprise budgets often include income and expenses that are not from the enterprise in question. For example, crop sales and their associated expenses may be included in a dairy enterprise budget. Using whole-farm databases or aggregated farm records to develop an enterprise budget are especially susceptible to this challenge. The problem is that the costs of production and profitability measures will be inaccurate and therefore could lead to a wrong decision about the enterprise.

For example, Figure 1 shows a dairy enterprise situation. The “true” dairy total cost of production per hundredweight is found by taking just “Milk COP” divided by hundredweight of milk sold:

$$\frac{\$558,026}{34,768 cwt}=\$16.05/cwt$$

However, assume that all we had was “Total COP” and did not have information on just “Milk COP.” If we do the same math, but with total costs instead of just milk costs the result is quite different:

$$\frac{\$662,214}{\$34,768 cwt}=\$19.05/cwt$$

This is a sizeable $3/cwt difference. By far, the best way to counter this challenge is to clean the data of any non-enterprise income and expenses. If that is not possible, then another method that may yield better results is hundredweight equivalent. Hundredweight equivalent (CWTEQ) adjusts the denominator (hundredweight of milk sales) by taking total income and dividing it by milk price. The result is a hundredweight value that when used as a denominator will give a value that adjusts for the non-enterprise income and expenses.

Let’s assume that milk costs and other non-enterprise costs are aggregated together and all that is available is “Total COP”. The CWTEQ adjustment starts with dividing total income by milk price:

$$\frac{\$674,744}{\$16.29/cwt}=41,421 cwteq$$

The 41,421 cwteq represents milk sales that achieve the same income. The second step is to take whatever cost you are interested in (variable costs, cash costs, feed costs, or total costs) and divide it by the CWTEQ. To find an adjusted total milk cost of production:

$$Total Cost of Production=\frac{\$662,214}{41,421 cwteq}=\$15.99/cwteq$$

It is not exact in this example, but it is close - $15.99 versus true cost of production of $16.05.

Another method for adjusting for non-enterprise income and expenses is residual claimant. Residual claimant assumes that non-enterprise income and expenses are close to being the same, that is, a breakeven situation. Sources of income are often a lot easier to disaggregate than costs, so the residual method subtracts non-enterprise income from total expenses and uses the difference as an estimate of enterprise costs.

For example, Figure 1 shows that other income is $108,373. Let’s assume that we did not know the amount of non-enterprise costs and all that was available was total cost of production including non-enterprise costs. Using the Residual Claimant method, the first step is to subtract “Other Income” from “Total COP:”

$662,214 - $108,373 = $553,841

The second step is use the new value as an estimate of enterprise only costs and divide it by hundredweight sales:

$$\frac{\$553,841}{34,768 cwt}=\$15.93/cwt$$

Again, it is not exact, but it is close. This method works well if the non-enterprise costs and non-enterprise income is close to being the same.



**Tab: Mach and Bldg FC Calculator**

A worksheet is provided to assist in determining machinery and building fixed costs, titled “Mach and Bldg FC calculator.” Two methods are available to develop estimates for fixed costs.

The first method is the easiest. It provides a ballpark estimate based on beginning of the year asset values for machinery and buildings plus any purchases minus any sales during the year. The adjusted value for assets is multiplied by 5% to estimate depreciation for buildings and 10% for machinery and equipment. Interest taxes, insurance and housing are based on a percentage of beginning value (percentages entered by the user). All fixed costs are adjusted to the percentage attributable to the dairy enterprise (percentage that is dairy is entered by the user).

The second method is similar in its math, but much more involved. This method allows the user to list each asset that is used for the dairy enterprise including its original purchase price, expected salvage value, expected useful life, and percent of the cost that should be attributed to the dairy.

**Tab: Feed Cost Calculators (Dry Matter (DM) and As-Fed)**

The Enterprise Budget spreadsheet provides two worksheets for deriving the cost of feed. One worksheet is for calculating feed costs based on a dry matter basis ration and the other is based on as-fed. The user must enter the lbs/day of each feedstuff in the ration. Note that different rations can be entered for each of the three levels of production and a separate ration for dry cows. The user must also enter the dry matter percent, units upon which the feedstuff is priced, price per unit, and expected feed waste.

Once the ration is entered, along with other information, then the spreadsheet will calculate the total feed costs and transfer the number to a green-shaded cell on “Enterprise Budget.” Recall, that values in the green-shaded cells are for information only. The user can used that information, but must enter a value for feed costs on “Enterprise Budget.”

**Tab: Sensitivity Analysis**

The “Sensitivity Analysis” tab may be the most useful of all. The “Sensitivity Analysis” tab evaluates what will happen to net returns if the actual costs, revenues, production per cow, or milk price is different from the estimate in the Enterprise Budget.

The Sensitivity Analysis only pertains to the middle column of results in the Enterprise Budget, column F. Again, the yellow-shaded cells are for user input and are located in columns A-F and rows 5-11 and in rows 26-32.

The top half, rows 2-20, are for evaluating the change in net returns per cow, per cwt and in total dollars based on percent changes in overall revenues and costs. The user can enter percent changes in revenues and costs in the yellow-shaded cells in rows 5-11, columns A-F. Once done net returns per cow, cwt, and total dollars will automatically be calculated.

The green-shaded cells are the results from the Enterprise Budget. Rows 13-20 show the change in returns from the original situation.

The bottom half, rows 23-41, are for evaluating the change in net returns per cow, per cwt and in total dollars based on changes in production per cow and milk price. Again, the comparison it to the middle column, column F, of the Enterprise Budget and the green-shaded cell is the original value.

**Concluding Remarks**

The purpose of this enterprise budget and accompanying worksheets is to assist producers, lenders, and others in evaluating their dairy enterprise. The desired outcome is that results will inform improved decision-making and ultimately better, more consistent, profitability.

However, the tool is only as good as the user’s ability and desire to use it. Any feedback on format, calculations, etc. is very helpful in improving future versions. In addition, spreadsheets that depend on several formulas, transfers from other worksheets, etc. can have errors. If you question a formula, please feel free to let me know so that it can be reviewed and fixed.

**References**

Barry Ward, Dianne Shoemaker, Maurice Eastridge. ', Extension Dairy Specialist, Department of Animal Sciences. "2018 Dairy Cow Budget - Large Breed," The Ohio State University Extension, 5/25/2018. ( https://brown.osu.edu/program-areas/agriculture-and-natural-resources/enterprise-budgets)

Bolton, Ken and Gary Frank (2009) “Cost of Production versus Cost of Production and there is, Cost of Production!” *Center for Dairy Profitability*, University of Wisconsin, Madison.

Cabrera, V.E., P. Hoffman, and R. Shaver. "FeedVal v6.o predicted dairy feed prices and ranking for May 2018" (<http://dairymgt.info/tools/feedval_12/index.php>)

Kay, Ronald D., William M. Edwards, and Patricia A. Duffy. Farm Management, 8th ed., McGraw Hill, 2016.

Tranel, Larry (2018) “Iowa Dairy Enterprise Budgets, 2018,” *Animal Industry Report*: AS 664, ASL R3247. ([www.extension.iastate.edu/dairyteam](http://www.extension.iastate.edu/dairyteam))