



From Cash Records to Cost of Production

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What's the best way to summarize financial information about a farm/ranch enterprise? Taking a look at cost of production per unit—animal, acre, bushel—is a good way to get a measure of profitability. This provides a benchmark to be used in comparisons over time and comparisons among enterprises. For instance, measuring the total cost of production for the hay enterprise suggests whether an operation should be raising or purchasing hay. By analyzing production costs, a better understanding of the relative importance of different expenses and ideas about how to better control costs will be gained. Making the calculation requires some effort (and a few records)!

Calculating the cost of production requires identifying all cash and noncash costs, then allocating them to the appropriate farm or ranch enterprise. Here are suggested steps:

1. Identify the enterprises (for example, stockers, cow-calf, wheat, native pasture).
2. Allocate cash expenses to the different enterprises.
3. Identify all non-cash expenses, including depreciation and changes in beginning and ending balances of assets (what you own) and liabilities (what you owe).
4. Allocate non-cash expenses to different enterprises.
5. Total the expenses (cash, depreciation, changes in inventory, and other accrual adjustments) by enterprise.
6. Divide the total expense figure by the number of head, acres or other units to get a per unit cost.

Use the enclosed worksheet to break out your income and expenses, starting with cash income and expenses from your tax forms. Supplement cash transaction data with information from the balance sheet, tax schedules, and other farm records. Calculate the total cost of production by adding cash costs and noncash expenses (depreciation and accrual adjustments).

Identify Enterprises

Think about the different activities in your operation. They might include wheat, cow/calf, stocker, bluestem pasture, bluestem hay, native range, custom work, sale bulls, and bred heifers. Think about activities that result in a product for sale, for instance, beef production by the cow/calf herd, as well as those activities that contribute indirectly to production, for instance, different pasture enterprises. List calves retained beyond weaning as stockers, which is a separate enterprise. Ideally, anything that should be self-supporting or has an alternative use (owned pasture could be rented out

rather than used in the operation) should be identified as an enterprise. Owned cropland and rented cropland are typically identified as separate enterprises because they have different costs (rent, for instance, or shared expenses or management) and perhaps different yields.

Allocate Cash Expenses

Tax records typically summarize all cash expenses (fertilizer, fuel, custom hauling) and also list depreciation expenses. However, an additional step is needed to allocate expenses such as repairs, fuel, or overhead costs among enterprises. Estimate the portion of the total that should be charged to the enterprise, and allocate expenses among enterprises using any method that seems reasonable. For instance:

- Use the number of acres of each crop with the application rate to allocate fertilizer.
- Use the number of bales produced for each crop to allocate baler expenses.
- Use the number of times over fields with the number of acres of each crop to allocate tractor expenses like fuel and repairs.
- Determine the proportion of the total cash expenses each enterprise uses and allocate operating interest in the same proportion.

Use whatever approach seems most accurate to allocate the costs.

Identify Non-cash Expenses

Accrual Adjustments. Accrual adjustments are necessary to account for changes in beginning and ending inventories that reflect a business expense for the time period being studied. For instance, in calculating the cost of production for a cow/calf enterprise, a decrease in the hay inventory from the beginning to the end of the year indicates hay was sold or fed to cattle. If it was fed to cows, it should be charged as an expense to that enterprise.

Accrual adjustments are based on differences between beginning and ending values of assets (for example, prepaid expenses) and liabilities (accounts payable, ad valorem taxes, etc.). It is important to have a balance sheet (or at least a list of items owned and owed) for the beginning and end of the accounting period. If a balance sheet for the farm business is needed, call the local Extension office to get a fact sheet containing a worksheet and instructions on how to develop one (OSU Extension Fact Sheet F-752).

Enterprise Cost Allocation Worksheet

List your operation's enterprises (wheat, cow-calf, custom work) as column headings. Then using your historical farm income statements or Schedule F of the 1040 Tax Forms (line number references are provided), estimate the income and expenses associated with each enterprise. Use a column labeled "Overhead" for any expenses that are impossible to allocate.

Schedule F: Farm Expenses:	Total	Enterprise				
Car and truck expenses (line 12)	\$ _____	_____	_____	_____	_____	_____
Chemicals (line 13)	\$ _____	_____	_____	_____	_____	_____
Conservation expenses (line 14)	\$ _____	_____	_____	_____	_____	_____
Custom hire (machine work) (line 15)	\$ _____	_____	_____	_____	_____	_____
Depreciation (line 16)*	\$ _____	_____	_____	_____	_____	_____
Employee benefit programs (line 17)	\$ _____	_____	_____	_____	_____	_____
Feed purchased (line 18)	\$ _____	_____	_____	_____	_____	_____
Fertilizers and lime (line 19)	\$ _____	_____	_____	_____	_____	_____
Freight and trucking (line 20)	\$ _____	_____	_____	_____	_____	_____
Gasoline, fuel and oil (line 21)	\$ _____	_____	_____	_____	_____	_____
Insurance (other than health) (line 22)	\$ _____	_____	_____	_____	_____	_____
Interest - mortgage (line 23a)	\$ _____	_____	_____	_____	_____	_____
Interest - other (line 23b)	\$ _____	_____	_____	_____	_____	_____
Labor hired (line 24)	\$ _____	_____	_____	_____	_____	_____
Rent or lease - Vehicles, machinery, equipment (line 26a)	\$ _____	_____	_____	_____	_____	_____
Rent or lease - other (land, animals, etc.) (line 26b)	\$ _____	_____	_____	_____	_____	_____
Repairs and maintenance (line 27)	\$ _____	_____	_____	_____	_____	_____
Seeds and plants purchased (line 28)	\$ _____	_____	_____	_____	_____	_____
Storage and warehousing (line 29)	\$ _____	_____	_____	_____	_____	_____
Supplies purchased (line 30)	\$ _____	_____	_____	_____	_____	_____

* or, your estimate of economic depreciation.

Enterprise Cost Allocation Worksheet

Schedule F - Farm Expenses (continued):

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	Total				
Taxes (line 31)	\$ _____	_____	_____	_____	_____
Utilities (farm share only) (line 32)	\$ _____	_____	_____	_____	_____
Veterinary, breeding and medicine (line 33)	\$ _____	_____	_____	_____	_____
Other farm expenses (line 34a)	\$ _____	_____	_____	_____	_____
Other farm expenses (line 34b)	\$ _____	_____	_____	_____	_____
Other farm expenses (line 34c)	\$ _____	_____	_____	_____	_____
Other farm expenses (line 34d)	\$ _____	_____	_____	_____	_____
Other farm expenses (line 34e)	\$ _____	_____	_____	_____	_____
Other farm expenses (line 34f)	\$ _____	_____	_____	_____	_____
TOTAL EXPENSES (line 35)	\$ _____	_____	_____	_____	_____
Accrued Expenses _____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
Total cash and accrued expenses (line 35 + accrued expenses)	_____	_____	_____	_____	_____
Number of units (acres, head, etc.)	_____	_____	_____	_____	_____
Estimate of cost of production per unit = $\frac{\text{Total Cash and Accrued Expenses}^*}{\text{number of units}}$	_____	_____	_____	_____	_____

*Note that this is not truly cost of production unless accrual adjustments are made and tax depreciation is comparable to economic depreciation.

Accrual adjustments that might be needed in our bluestem hay example include changes in prepaid expenses, supplies, accounts payable, ad valorem taxes, employee payroll withholding taxes if labor is hired to work in the enterprise, other accrued expenses, accrued interest, and loan balances.

Depreciation. Depreciation is a way of prorating the cost of an asset over its useful life. An economic depreciation value for an enterprise should be estimated. For instance, a baler might be used in both custom work and bluestem hay enterprises. The baler may be used for 10 years. To get an annualized portion of the economic depreciation expense by enterprise, determine

- 1) the total annual depreciation expense for each of the individual assets used in the operation, and
- 2) the portion of the total that should be assigned to each enterprise.

Ideally, an economic depreciation expense would be calculated for each of the assets used in the enterprise. However, it may be easier to value and allocate depreciation for groups of equipment or machinery.

The simplest method of calculating annual economic depreciation is the **straight-line method**. This method allocates an equal amount of depreciation expense to each year of useful life:

$$\frac{(\text{cost} - \text{salvage value})}{\text{years of useful life}}$$

Cost is the original purchase price plus any additional expenses incurred to make the asset operational, e.g. freight, inspection, repairs, modifications. **Salvage value** is a reasonable estimate of the market value of the asset at the end of its useful life. The asset's **useful life** is used to divide the expense of the asset over the time period in which it is used to generate revenue. For a round baler which cost \$17,000, has an expected salvage value of \$2,000 and will be used for 10 years, the annual depreciation expense is $(\$17,000 - \$2,000)/10 = \$1,500$.

Rather than calculating economic depreciation for an asset, you may want to use tax depreciation as a proxy. Be aware that the IRS depreciation schedule may or may not approximate economic depreciation. For instance, if machinery and equipment are several years old, depreciation for tax purposes might be zero (the assets have been "expensed" or "depreciated out"). Tax rules often allow the cost to be "expensed" or written off before the asset is obsolete or worn

out. Thus, using tax depreciation expenses overstates economic depreciation in the early years and understates it in later years of an asset's useful life. Whichever method used, make notes on what is done to ensure that calculations are consistent across enterprises and from year to year.

Allocate Non-Cash Expenses

As with cash expenses, non-cash expenses may be allocated any number of ways. If a piece of machinery or equipment is used almost solely with one enterprise, for instance, wheat, charge the maintenance and repair costs as well as depreciation and taxes for it to that enterprise. If a baler is used both in custom work and individual hay operation, but twice as many bales are for customers, allocate 2/3 of the total baler depreciation, taxes, and insurance costs to custom work, 1/3 to the bluestem hay enterprise. Use an approach that seems logical.

Since perennial crops are multi-year in nature, establishment expenses are prorated as a fixed cost in calculating profitability. Ideally, cost determination is based on the cost recovery method where annual costs are accrued to a future value at the end of the preproductive period.¹ The total establishment cost is then amortized over the specified stand life of the enterprise. For instance, if bluestem establishment costs are \$33.50 per acre, the stand is expected to last ten years with no salvage value, and a 3 percent interest factor is used, the annual expense associated with establishment for cost of production purposes would be \$4.30 per year.

Enterprise Analysis

With income and expenses sorted by enterprise, profit and loss centers are highlighted. An informed decision about whether it is cost effective to produce hay, for instance, can be made. It requires some pencil pushing, but estimating unit cost of production helps producers take a hard-nosed look at whether enterprises are profitable. A worksheet like the one attached can be used to start allocating cash costs to farm or ranch enterprises. For more information on record-keeping alternatives, contact the local Extension office, area agricultural economics specialist or the OSU agricultural economics department.

¹ AAEA Task Force Commodity Cost and Returns Estimation Handbook. February 2000.