

Knowing Your Product Costs: A Primer for Farmers and Food Entrepreneurs¹

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Introduction

Knowing your product costs is essential for effectively managing any business. Product cost calculations can assist with management decisions on product mix, pricing, and changing the quantity or method of production. Accurate estimation of product costs helps the manager understand how these decisions will affect the business's profits.

This primer provides a basic introduction to product costing for farm businesses and food processing enterprises. As a farmer, do you know which of your crops is contributing the most to the farm's profits, or whether one of your crops is losing money? As a food entrepreneur, would it be more profitable to make fruit jams or fruit pies? What minimum selling price will fully cover your product costs or provide an adequate profit margin? Is it less expensive to purchase ingredients or grow the ingredients used in your food products? How much would you need to expand production and sales to cover the cost of purchasing new equipment or to achieve a certain profit goal? Accurate calculation of product costs can help answer those questions. This publication is intended to help farmers and food entrepreneurs understand product costing concepts and do their own cost calculations to assist with business decisions.

The remainder of this publication describes cost concepts, provides product costing examples, and briefly discusses software tools that can assist with cost analysis. A practice

activity that accompanies this publication is available from the authors upon request. Whereas this publication covers basic cost concepts, other publications in this series describe specific types of cost analysis in more detail.

Cost Concepts and Terms

In cost accounting, we distinguish between production and nonproduction costs. **Production costs** are incurred in the process of growing crops, raising livestock, or making value-added products. Production costs are attached to your products, can be counted for valuing your inventory of unsold products, and may be expensed as "cost of goods sold" (COGS) on an income statement. **Nonproduction costs** (or period expenses) are selling, general, and administrative (SG&A) expenses incurred as part of running a business, but not linked to the production process. These may include the cost of advertising, farmers' market fees, office supplies, insurance, or accounting services. **Gross margin**, also called gross profit or production margin, is sales revenue minus cost of goods sold (production costs). It is the money left to pay for SG&A (nonproduction) costs and profit (Jackson et al. 2009; FFSC 2016; Bragg 2019).

Product costs normally include all production costs associated with making a product. However, for purposes of analysis and decision making, the manager can choose which costs are relevant to the decision and may want to include some nonproduction costs closely linked to

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an individual product. For example, the cost of storing a product, the cost of transporting a product to market, and sales commission or broker fees are not considered production costs but are costs linked to the sale of a product.

The Farm Financial Standards Council (FFSC) states that “Total Product Costs” refer to “not only production costs but other period expenses that can be reasonably allocated to products for analysis purposes” (FFSC 2016, p.11). The term “Cost of Revenue” is similar. It includes the cost of the goods sold (production costs), as well as selling and marketing activities tied to the sale of a specific product (Bragg 2020). The manager can decide which costs to include as product costs relevant for a particular decision.

When costs are recorded, they may be assigned either to a product (directly) or to an indirect cost category. **Direct costs** are assigned directly to individual product categories. For example, the cost of purchasing tomato seeds or seedlings would likely be assigned directly to a tomato cost category. Direct costs are typically materials that go into making a product, but in some cases labor and other costs may be charged directly. **Indirect costs**, also called overhead, are shared by multiple products. For example, the costs of owning and operating a greenhouse, tractor, or food processing equipment, or of leasing kitchen space are production costs that may be shared by multiple products. Indirect costs are first assigned to an indirect cost category (also called overhead cost pool). Then the total cost in each indirect category is allocated or prorated to specific products. A logical metric (called a cost driver or allocation base) must be chosen to allocate those costs. Ideally the metric should assign a greater portion of the indirect costs to products responsible for more of the overhead costs. For example, greenhouse costs could be allocated to crops in proportion to the area (square footage) occupied by each crop. Tractor and implement costs could be allocated to crops based on the number of tractor hours used on each crop. Processing equipment or kitchen costs could be allocated in proportion to the number of hours used to make each product. Production costs will typically include both direct and indirect costs. Nonproduction costs are usually treated as indirect costs (Jackson et al. 2009, FFSC 2016, Bragg 2019).

Ideally, a farm or food business will have different indirect cost categories for costs shared by different groups of products or that have different cost drivers. For example, a farm might have one indirect cost category for tractor and field implement costs and one for greenhouse costs. A food entrepreneur may have one indirect cost category for baking equipment and one for canning equipment.

Categorizing and allocating indirect costs appropriately are important for fully and accurately estimating product costs.

The scale and timing of product cost accumulation must also be considered. In farming, costs may be accumulated for one year or one season for a 40-acre crop parcel or a 100-foot crop row. For food processing, costs may be accumulated by processing stage or one batch at a time. All relevant costs associated with the chosen production scale-time-frame must be assigned to the harvest or output from that scale-time-frame.

Cash costs refer to expenditures or money leaving the business’s bank account during the time frame of the cost analysis. Some **noncash costs** may also be relevant for product cost estimates. For example, equipment used for this season’s crop or processing activities may have been purchased in a previous period, but some cost for use of the equipment should be charged to products made in the current period. Depreciation expense is a prorated share of the original cost of fixed assets, like production equipment, assigned to the current year’s crop or an individual batch of food produced. Accounts payable is another type of noncash cost. These are bills received or liabilities incurred for current production that have not yet been paid. A third type of noncash cost is opportunity cost, which is a value forgone by using land, capital, labor, or other resources for a production choice instead of the next best alternative. Sometimes in evaluating management decisions, it is helpful to consider opportunity costs. For example, opportunity cost is relevant for a decision about whether to use the farm’s own-grown berries to make jam. If the farm’s harvested berries would go unsold if not made into jam, the opportunity cost of using the berries in jam would be zero. But if the berries could be sold for \$5 per pound if not made into jam, the opportunity cost of the berries for jam would be \$5 per pound.

Lastly, for management purposes, we often want to consider cost behavior in response to production changes. **Variable costs** vary in proportion to the amount of production. **Fixed costs** do not change over a certain range of production and within a certain time frame. Direct production costs are typically variable, and indirect costs often have fixed components. But all costs described above can be either variable or fixed, depending on the production change considered and the time frame of the analysis. Distinguishing variable and fixed costs aids in estimating changes in total costs and profits as production expands or contracts. **Contribution margin** is sales revenue minus variable costs. It is the money left to pay for fixed costs and profit (Jackson et al. 2009, FFSC 2016, Bragg 2019).

Product Costing Examples

We suggest the following steps for product costing.

1. Identify the product or products and the scale and time frame for the analysis.
2. Assign direct costs “directly” to each product.
3. Identify indirect production cost groups and allocate to products based on cost drivers.
4. Calculate cost per unit for each product.
5. Separate costs into variable and fixed to evaluate production or marketing changes.

Example 1: Farm crop costing

Let’s consider a first example of a small farm growing tomatoes and other crops. For **Step 1**, we want to know how much it costs to grow a pound of tomatoes. We will accumulate costs and do our calculations based on one acre of production (the scale) during the spring growing season, March planting for May and June harvest (the time frame).

For **Step 2**, we list and sum costs that can be assigned directly to the spring tomato crop. These might include seeds or seedlings, mulch, fertilizers, pesticides, stakes and string, and tomato boxes. For materials purchased that will last more than one season, estimate the portion that will be used for the current season. For example, if the stakes will last for two seasons before being replaced, only assign half the cost of the stakes to the spring tomato crop. An example cost estimate for these items is shown on the direct production cost line in Table 1.

For **Step 3**, we identify the following indirect production cost groups: (1) hired labor, (2) machinery and equipment, and (3) land, buildings, and irrigation. Hired labor costs include salary and wages, payroll taxes, workers’ compensation insurance, and other employee benefits. The cost driver is labor hours, which means we must track the labor time spent on each crop and allocate a portion of total hired labor costs to tomatoes based on the portion of total crop labor hours spent on tomatoes. (Because some labor hours will be general farm work or idle time not specific to an individual crop, we divide tomato hours by total crop hours, not total hours, to get an allocation percentage. For example, 40 hours on tomatoes, 40 hours on other crops, and 20 hours general farm work result in a 40/80 (50%) allocation to tomatoes.)

Machinery and equipment costs include depreciation, tax and insurance, repairs, fuel, and lubricants. An interest charge may also be included if the machinery is financed. If the machinery is leased, the cost of the lease may replace some of these costs. The cost driver is machine hours, so we allocate a portion of total machine costs to tomatoes based on the portion of machine time used on tomatoes. The time frame used to count total machine time should match the time frame of these costs (e.g., per year or per season).

Land, buildings, and irrigation costs might be allocated separately or together in one indirect cost pool. Costs might include property tax or land lease charge; depreciation and interest on buildings, well and pump; irrigation supplies; and electricity or propane. We use area occupied by each crop as the cost driver. If the time frame for these costs is annual and it is possible to have more than one crop in one year, the total crop-acres may exceed the acres in production on the farm. For example, in north Florida it is common to have a spring vegetable crop and a fall vegetable crop. In that double-cropping case, one acre of spring tomatoes on a five-acre farm might be allocated one-tenth of the total land, building, and irrigation costs. Alternatively, an area-time cost driver could be used, such as acre-months or square-foot-weeks.

Table 1 shows example amounts allocated to tomatoes from the three indirect production cost groups, which, summed with the direct production costs, equal total production costs. Below total production costs in Table 1 is a line for sales, marketing, and delivery expenses that are linked directly to tomato sales and included in total product costs.

Step 4 is to convert total product costs to a cost per unit. We compiled costs based on an acre of production for one growing season. To calculate cost per unit, we also need to know the marketable yield or quantity sold from that acre-season. Dividing the total product costs by the marketable yield gives us the total product cost per unit. The example figures in Table 1 show total product costs of \$18,000, which, when divided by a marketable yield of 30,000 pounds, equals a cost per pound of \$0.60.

In this example, tomato sales revenue greater than \$18,000 must be earned to cover product costs and have money left to go toward general and administrative costs and profit. Selling tomatoes at prices above \$0.60 per pound will provide a return toward general and administrative costs and profit. The return per unit or per acre can be compared to other crops to assist with decisions on product mix or pricing and marketing.

Step 5 is to separate costs into variable and fixed categories to analyze specific changes in production and marketing. If the only change in production is a higher yield on the same acreage, the only costs that would be variable are the harvesting labor, tomato boxes, and possibly marketing costs. All other costs would be considered fixed in evaluating that scenario. However, if the farmer is considering expanding her tomato acreage, all the direct production costs (e.g., seeds or seedlings, mulch, fertilizers, pesticides, stakes and string, tomato boxes) may be variable. Labor and fuel for farm machinery will likely be variable, too, even though they are in indirect cost categories. If the expansion is onto land that otherwise would not be farmed, there may be additional land lease or irrigation system costs, in which case, those costs would be considered variable, too. If the expansion is replacing a different crop, the total land-building-irrigation costs may stay the same (fixed), but the reduced variable costs of the crop being replaced would need to be considered in the analysis.

Table 2 shows an example breaking down the costs from Table 1 into variable and fixed cost categories for a decision about changing tomato acreage. The example variable costs are per-acre of spring tomato production. Based on the figures in the table, expanding tomato production from one to two acres would increase costs by \$11,000 (the variable costs). Total tomato costs would then be $\$7,000 + (\$11,000 \times 2 \text{ acres}) = \$29,000$.

Example 2: Food product costing

Let's consider a food entrepreneur making salsa, which must be produced in a permitted, inspected facility. **Step 1** is to identify the product unit and the scale and time frame for accumulating costs. We want to know the cost of producing a 16-ounce jar of salsa, and we decide to estimate costs for a single batch, which produces 100 jars.

In **Step 2**, we list and sum costs that are assigned directly to our salsa product. These include ingredients, jars, and labels. For some ingredients it may be easy to know the cost per batch. For example, we buy tomatoes by the 25-lb box for \$20 each and need three boxes of tomatoes to make a 100-jar batch. So, it costs \$60 per batch for the tomatoes. Other ingredients may be less straight forward. For example, we buy salt and spices in quantities that last for more than one batch. We can divide the amount purchased by the batch recipe amount to get the amount per batch. When the purchase units are weight-based (e.g., pounds) and the recipe units are volume-based (e.g., cups), or vice versa, the weight-volume conversion depends on the type of ingredient. Aqua-Calc (2021a, 2021b) provides websites where

you can convert volumes to weights or weights to volumes for specific food products. In any case, we need to divide the purchase price by the estimated number of batches that ingredient quantity will last to get the cost per batch.

If hiring labor, we will need to decide whether to assign labor costs directly to individual food products or to collect all labor costs in an indirect cost category, which later will be allocated to individual products. If one or more employees are dedicated to a single product, it may make sense to assign their labor costs directly to the product. If employees work on multiple products, it likely makes more sense to put all labor costs in an indirect cost group, which then can be allocated to individual products by tracking person-hours worked on each product.

For **Step 3**, identify indirect production cost groups. We may choose to put all processing-facility-related costs into one indirect cost group. If we own the processing facility, costs may include depreciation and interest on the building and equipment, property taxes, insurance, permitting and inspection fees, food manager certification, maintenance and repairs, and utility expenses. If we rent or lease kitchen space, the rental fee will replace several of the costs associated with owning a facility. Food processing labor may be a separate indirect cost group. Processing facility and equipment costs, as well as payroll costs, could be allocated to products in proportion to the amount of food preparation and processing time needed for each product.

Table 3 shows example amounts for direct costs (ingredients, jars, and labels) and indirect allocations of labor and production overhead. Those sum to \$400, representing total production cost per batch. Any food business likely has significant costs associated with storing, selling, marketing, and delivery of products. These may be considered "selling, general, and administrative" (SG&A) costs, not included in product costs. Or if some of those costs are specific to one product, we may wish to include the product-specific SG&A costs in our total product cost calculation. In our example, we assign \$50 per batch as product-specific SG&A cost.

Step 4 is to convert total product costs to a cost per unit. We divide the total product cost per batch (\$450) by the number of jars per batch (100) to calculate \$4.50 as our total product cost per jar.

In this example, salsa sales revenue greater than \$450 per batch must be earned to cover product costs and have money left to go toward general and administrative costs and profit. Selling salsa at prices above \$4.50 per jar

will provide a return toward general and administrative costs and profit. The return per jar and per batch can be compared to other products to determine which products are most profitable or guide decisions on product mix and pricing.

For **Step 5** we might want to estimate how changing price will affect sales quantity, as well as production and marketing costs. By separating costs into variable and fixed categories, we can more easily calculate the change in product costs associated with a change in production levels. For example, we may estimate that \$350 per batch is variable and \$100 per batch is fixed. In that case, increasing our production by ten batches will increase our costs by \$3,500.

Software Tools

Several software tools are available to help organize financial information and support product cost analysis. Examples of financial accounting software include QuickBooks, FreshBooks, and Wave. These software tools are designed to handle many bookkeeping and accounting functions, but charts of accounts must be set up in a way that will support product cost analysis. Spreadsheet software products, such as Microsoft Excel, Google Sheets, and Calc, provide a lot of flexibility for the user to set up any type of analysis and automate calculations. An entrepreneur can enter and organize data in a spreadsheet for any product costing scenario.

Summary

Estimating product costs involves a process of defining cost categories, identifying relevant costs, collecting cost information, and allocating costs appropriately. Various types of costs and cost behavior must be considered for product costing. With an understanding of these concepts, farmers and food entrepreneurs can perform their own product cost calculations to inform business decisions. This publication covers basic cost concepts. Other publications in this series describe in more detail how cost analysis can be used for specific farm and food enterprises to inform specific decisions.

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Table 1. Example Product Costs for Spring Tomatoes on One Acre*

Direct Production Cost	\$4,000
Labor Allocation	\$6,000
Machinery and Equipment Allocation	\$4,000
Land, Buildings, Irrigation Allocation	\$3,000
Total Production Costs	\$17,000
Crop-Specific Sales, Marketing, Delivery Costs	\$1,000
Total Product Costs	\$18,000
Marketable Yield (pounds)	30,000
Total Product Cost per Pound	\$0.60
*Example costs are hypothetical, not intended to represent any particular tomato farm.	

Table 2. Example Fixed Costs and Variable Costs per Acre of Spring Tomato Production*

Variable Direct Production Cost	\$4,000
Variable Labor	\$5,000
Variable Machinery and Equipment	\$500
Variable Land, Buildings, Irrigation	\$500
Variable Crop-Specific Sales, Marketing, Delivery Cost	\$1,000
Total Variable Costs	\$11,000
Fixed Labor	\$1,000
Fixed Machinery and Equipment	\$3,500
Fixed Land, Buildings, Irrigation Allocation	\$2,500
Total Fixed Costs	\$7,000
* Example costs are hypothetical, not intended to represent any particular tomato farm.	

Table 3. Example Costs per Batch of Salsa*

Direct Production Costs (ingredients, jars, labels)	\$200
Labor Allocation	\$50
Processing Facility, Equipment and Permitting Allocation	\$150
Total Production Costs	\$400
Product-Specific Sales, Marketing, Delivery Costs	\$50
Total Product Costs	\$450
Quantity Produced (number of jars)	100
Total Product Cost per Jar	\$4.50
*Example costs are hypothetical, not intended to represent any particular salsa producer.	