

Estimating Income and Costs: Calculating a Price

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Part I: What the Agent Needs to Know

At your first meeting, you discussed what, in general, your client needs to know. At this second meeting, you will cover what it will cost to produce a product. Farmers need to know not only the input costs—such as seed, land preparation and fertilizer—but also the cost of management time and labor. Once they know these costs, they can calculate their breakeven price—the price at which they cover all costs of production, assuming they can sell 100 percent of that production. They can use the breakeven price as the price for their products, or they can add an additional amount to the breakeven price. They can calculate either their mark-up price or their margin. More information on how to determine price is found in *Direct Answers for Direct Marketing* (available by e-mailing gary_bullen@ncsu.edu).

To understand pricing, you first need to know something about production costs. Before clients have actual costs, they need to develop budgets. Budgets are based on the actual average costs of producing a product. You can find budgets for many agricultural products on university Web sites. In North Carolina, for instance, go to http://www.ag-econ.ncsu.edu/extension/Ag_budgets.html and select the appropriate category and budget.

Budgets typically show income from the expected production and market price shown first, then costs broken down into variable costs and fixed costs. *Variable costs*

will change with how many acres a client produces and harvests. These costs are the ones your clients pay as they go along—such as seed, fertilizer, pesticides, labor. *Fixed costs* are long-term costs that your clients may not be able to easily attribute to a specific crop—such as land, equipment, advertising, telephone, electricity. Other fixed costs (like trellising, fruit trees, brambles, cows) are paid for over more than one production season. Once your clients have invested in these inputs, they have to pay for the inputs whether they produce or don't produce. The best example of both variable and fixed costs is machinery. The variable costs of machinery include fuel, repairs and maintenance. These vary based on how much the machinery is used. Fixed costs are insurance, taxes, depreciation and the interest on the loan a client might still be paying. Farmers have these costs whether they use the machinery or not. Depreciation is a "paper cost" to allocate the replacement cost over a period of time. Labor could be either variable or fixed depending on whether a client keeps the workers employed only when they are needed or year-round whether they need them or not. All of this information is necessary to calculate price.

Developing start-up budgets will help your clients determine how long it will be before they realize a profit from their investments. In other words, how much money do they need to have before they can sell their product, and how long before they will be able to repay that money? It makes no difference if the money is borrowed or their own. Start-up budgets may cover more than one year. If a client produces trellised apples, for example, it will be four years before they harvest. The first year is preparation, the second year is planting, the third year is training and maintenance and the fourth year is the beginning of harvest. The following sample budget is a start-up budget for honey.



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Example—Honey

Initial resource requirements (first-year establishment based on a 10-hive unit in a 50-hive production system).	
Apiary sites	\$
10 packages of bees (3 lb each) plus shipping	500.00
Capital investment	
Brood boxes, frames and foundation	467.00
Top, bottom and inner covers	250.00
Supers with frames and foundation	623.00
Protective clothing	40.00
Hive and smoker	35.00
Feeder	23.00
Queen excluders	57.00
Fume board	25.00
Extractor	950.00
Bottling tank (300 lb) with cover and strainer	715.00
Uncapping tank	195.00
Uncapping knife	67.00
<i>Total equipment investment</i>	3,442.00
Building	
Adapting and upgrading existing facility	1,500.00
Total start-up cost	5,442.00
Source: Frazier, M., G. L. Greaser, T. W. Kelsey, J. K. Harper. Beekeeping. <i>Agricultural Alternatives</i> publication series. Pennsylvania Cooperative Extension, College of Agriculture & Life Sciences. University Park: The Pennsylvania State University Online: http://agalternatives.aers.psu.edu/	

How long will it take to cover these start-up costs?

Whether your clients produce anything or not, these costs must be paid.

Calculating Price

Production budgets help your clients calculate their variable costs for the year. In production budgets, some amount of the fixed costs are allocated to each crop produced. Many farmers use a percentage of the total fixed costs based on a crop's acreage. Julie, for example, who has 1 acre of tomatoes, 2 acres of brambles and 7 acres of trellised apples, uses a simple method to allocate her fixed costs: 10 percent of her fixed costs go to tomatoes, 20 percent to brambles and 70 percent to apples. Your clients can use other methods.

A budget will help your clients know how much they need to charge to cover their variable, fixed and total costs, and what they will have left to help repay the startup costs. Note that no labor costs are included in the sample budgets. Your clients need to include labor unless they are donating their time to the operation. In the honey example, a typical production budget will look like the one below.

Example—Honey

Honey weighs, on average, 0.73 pounds per liquid ounce. From 10 hives that pollinate lavender, your client collects 600 pounds of honey, which will fill 820 8-ounce jars.					
Honey Production and Pollination Budget (established operation) Summary of estimated costs and returns for 10 mature hives.					
Item	Unit	Amount	Receipts or costs per unit \$	Total receipts or costs (for one crop) \$	Your estimate
Receipts					
Honey (extracted) ^a	pounds	600	2.00	1,200.00	
Pollination fee ^b					
Spring	hives	10	30.00	300.00	
Summer	hives	10	25.00	250.00	
Wax	pounds	5	2.00	10.00	
<i>Total receipts after establishment</i>				1,760.00	

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Variable costs					
Bees (replacement bees)					
Package (3 lb)	hive	2	45.00	90.00	
Queens (replacement)	queen	2	12.00	24.00	
Parasite and disease control					
Terramycin	6.4 oz pkg	2	4.75	9.50	
Varroa chemical control	pkg of 10	4	28.00	112.00	
Fumidil-B	2 gm bottle	1	27.00	27.00	
Menthol	10 1.8 oz packs	1	21.95	21.95	
Sugar	pounds	50	0.50	25.00	
Jars	cases of 24	21	510.10	212.10	
Labels (supplier & quality id)		500	0.10	50.00	
Chemical for fume boards	quart	1	16.50	16.50	
Paint	gallon	2	22.00	44.00	
Buckets	5 gallons	10	5.00	50.00	
Vehicle ^d	miles	150	0.45	67.50	
Marketing ^e	one year	1	100.00	100.00	
Registration fee (\$20) for two years	one year	0.5	20.00	10.00	
<i>Total variable costs</i>				860.55	
Fixed costs					
Brood boxes with frames and foundation					
				46.70	
Top, bottoms and inner covers					
				25.00	
Honey supers with frames and foundation					
				62.00	
Protective clothing					
				4.00	
Hive tool/smoker					
				3.50	
Feeder					
				2.30	
Queen excluder					
				5.70	
Fume boards					
				2.50	
Extracting equipment					
Extractor		for 50 hives			
				94.50	
Bottling tank (300 lb with covered strainer)					
				71.50	
Uncapping tank					
				19.50	
Uncapping knife					
				6.70	
Upgrading existing facilities					
		1,500 ^{g,h}		75.00	
<i>Total fixed costs</i>				418.90	
Total costs				1,278.45	
Returns					
Returns over variable costs					
				900.45	
Net returns					
				481.55	
<p>Source: Penn State University. Online: http://agalternatives.aers.psu.edu/Publications/bees.pdf</p> <p>a Retail price.</p> <p>b Rental fee may vary depending on the crop.</p> <p>c Estimated 20% loss each year.</p> <p>d Fuel, maintenance, depreciation (10 years)</p> <p>e Including advertising, production information and bee management</p> <p>f Depreciate over 10 years.</p> <p>g Depreciate over 20 years.</p> <p>h Building may not be necessary. Sideline beekeepers often convert a garage, basement or outbuilding into honey house.</p>					

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To calculate a break-even price, a beekeeper must know how many units they need to sell based on production of 60 pounds per hive and 10 hives. The producer uses 8-ounce jars, and the honey in them weighs about 11 ounces each. Based on these estimates, this client would estimate production of about 820 8-ounce jars from the 600 pounds. Assuming the variable honey cost is \$1.05 per 8-ounce jar, this formula would calculate a break-even price:

Break-even price = Per unit variable cost + (annual fixed costs ÷ projected units sold).

Break-even price = \$1.05 + (\$419 ÷ 820)

Break-even price = \$1.05 + \$0.51

Break-even price = \$1.56

Using these figures, your client concludes that at least \$1.56 per jar must be charged for the honey. This break-even price does not include any marketing costs. Marketing costs (such as rent at a farmers' market and labor to man the market) are not included in this example. Your clients must consider these costs as well when they prepare their budgets.

To determine what the price needs to be if more or less honey is sold, simply change the projected number of units and recalculate the price. The more the client thinks he or she can sell, the lower the price can be after variable costs are covered because the fixed costs are spread over more units.

Show your clients two other methods to calculate the price of their products: Mark-up and margin. Both of these methods require a client to choose a percent of increase in the total costs. These methods do not take into account the quantity available to sell.

Markup is the amount the cost is raised to achieve a desired selling price.

Example—Honey

Your client decides to consider using a markup. If a 30 percent markup is added, the calculation would be:

Markup amount	=	Total cost/unit × percent of markup
Markup	=	(\$1,278/820) × 0.3
Markup	=	\$1.56 × 0.3
Markup	=	\$0.47
Selling price	=	\$1.56 + \$0.47
Selling price	=	\$2.03 per 8-ounce jar

Margin is the percentage of the selling price above the cost of producing the product.

Example—Honey

Suppose your client decides she wants a margin of 30 percent. The calculation would be:

Selling price	=	Total cost /unit ÷ (1.00 - Margin percentage)
Selling price	=	(\$1,278/820) ÷ (1.00 - 0.30)
Selling price	=	\$1.56 ÷ 0.70
Selling price	=	\$2.23 per 8-ounce jar

Even though the client starts with the same costs, using a markup gives a lower price than using the margin method. Break-even pricing will result in the lowest price of all. This client needs to determine what specialty honeys are selling for elsewhere. It might be that an average of the two methods provides a better alternative to just selecting the higher price.

A study from the University of Chicago School of Business and the Sloan Institute found that prices ending in 9 sold more product than prices ending in any other number for the same product. Consumers think they are getting a bargain, even if they are not. If you want to sell something for \$8.00 a pound, price it at \$7.99 a pound. However, if everything you sell ends in a 9, it loses its effectiveness.

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Your clients need to consider three things when they are trying to price their products: what their cost of production is, how much consumers would buy and what their goals are for their operations. These three elements determine whether they price high, low or the same as everyone else.

Part II: Income and Costs Worksheet

Ask your clients to complete the worksheet at home. They may choose not to discuss the results with you because they consider production costs confidential information. Ask them if they compared their costs to any budgets produced by Extension from either their state or other states. Extension budgets often vary because costs of production vary by location.

Have your clients complete the following questions and, to the extent possible, the budgets. The items shown in each budget are to remind your clients to include them in addition to all other costs. These costs are often overlooked.

What are your pricing goals: make as much money as possible, only cover your total costs or keep your price the same as everyone else's?

Will you have product to sell in the first year?

If you have no product to sell in year one, in what year will your product be available?

How much are your startup costs? List the items needed, the number of units of each item, the cost per unit and calculate the total cost (number of units \times cost/unit)

Startup costs

Item	Units	Cost/unit (\$)	Total cost (\$)
Beginning Inventory			
Buildings			
Equipment			
Equipment			
Equipment			
Licences and permits			
Professional Fees			
Supplies			
Insurance			
Establishment Cost			
Other			
Total Cost			

How much are your variable costs? List the items needed, the number of units of each item, the cost per unit and calculate the total cost (number of units \times cost/unit)

Variable costs

Item	Units	Cost/unit (\$)	Total cost
Total Cost			

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How much are your fixed costs? List the items, the number of units, the cost/unit and calculate the total cost.

Fixed costs

Item	Units	Cost/unit (\$)	Total cost
Depreciation for equipment			
Depreciation for machinery			
Depreciation for buildings			
Land Charge			
Management			
Total Cost			

How much do you think you will be able to sell in the first year of production?

What will be your breakeven price?

Break-even price = Per unit variable cost + (annual fixed costs ÷ projected units sold)

What percent markup will you use?

Calculate your selling markup price

Markup selling price =
Total Cost × percent markup

What will be your price at that percent markup?

What percent margin will you use?

What will be your price at the percent margin?

Selling price =
Total Cost ÷ (1.00 - margin percentage)



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