

# Direct Answers for Direct Marketing

Business Tools—2

May 2008

## Estimating Income and Cost for Your Enterprise

Karen Mundy, Department of Agricultural and Applied Economics, Virginia Tech  
S. Gary Bullen, Department of Agriculture and Resource Economics, NCSU

### Part I: For the Extension Agent

At your previous meeting, you discussed what, in general, your clients need to know. At this second meeting, you will cover what it will cost your clients to produce their products. They need to know not only the input costs of seed, land preparation, fertilizer, etc, but also the cost of management time and labor. Once they know these costs, they can calculate their break-even 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*.

To understand pricing, you first need to know something about cost of production. Until clients have actual costs, they first need to develop budgets. Budgets are based on actual *average* costs of producing the product. You can find budgets for many agricultural products on university websites. In North Carolina, for instance, go to [http://www.ag-econ.ncsu.edu/extension/Ag\\_budgets.html](http://www.ag-econ.ncsu.edu/extension/Ag_budgets.html) and select the appropriate category and budget.

In budgets, you will generally find 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 your clients produce and harvest. These costs are the ones your clients pay as they go along—seed, fertilizer, pesticides, labor, etc. Fixed costs are long term costs that your clients may not be able to easily attribute to a specific crop—land, equipment, advertising, telephone, electricity, etc. Other fixed costs like trellising, fruit trees, brambles, cows, etc. 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, maintenance. These vary based on how much the machinery is used. Fixed costs are insurance, taxes, depreciation, and the interest on the loan your clients might still be paying. They 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 your clients keep the workers employed only when they are needed or year round whether they need them or not. All of this information is necessary to have to calculate price.

Developing start-up budgets will help your clients determine how long it will be before they realize a profit from their investment. 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 theirs. Start-up budgets may cover more than one year. If your clients produce trellised apples, for example, it will be four years before they harvest: the first year is preparation, 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.

**Initial resource requirements (first-year establishment based on a 10-hive unit in a 50-hive production system).**

	\$
Apiary sites	
10 Package 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 tool/smoker	35.00
Feeder	23.00
Queen excluders	57.00
Fume board	25.00
Extractor	950.00
Bottling tank (300 lb) with cover & 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
<b>Total start-up cost</b>	<b>5,442.00</b>

Source: Frazier, M., G. L. Greaser, T. W. Kelsey, J. K. Harper.  
 “Beekeeping,” *Agricultural Alternatives*.. Found at  
<http://agalternatives.cas.psu.edu>

How long will it take to cover these start-up costs? Whether your clients produce anything or not, these costs expenses 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 producers use a percentage of the total fixed costs based on the acreage of the crop. Julie, for example, who has one acre of tomatoes, two acres of brambles, and seven 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.

In the bee example, a typical production budget will look like the one below. For example, honey weighs, on average, 0.73 pounds per liquid ounce and from 10 hives that pollinate lavender, your clients get 600 pounds of honey, which will fill 820 8-ounce jars. The 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: no labor costs are included in the sample budgets. Your clients need to include labor unless they are donating their time to the operation.

**Sample 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
<b>Receipts</b>					
Honey (extracted) <sup>a</sup>	pounds	600	2.00	1,200.00	
Pollination fee <sup>b</sup>					
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	
<b>Variable costs</b>					
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 <sup>d</sup>	miles	150	0.45	67.50	
Marketing <sup>e</sup>	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>				<b>860.55</b>	
<b>Fixed costs</b>					
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	for 50 hives				
Extractor	945 <sup>f</sup>			94.50	
Bottling tank (300 lb with covered strainer)	715 <sup>f</sup>			71.50	
Uncapping tank	195 <sup>f</sup>			19.50	
Uncapping knife	67 <sup>f</sup>			6.70	
Upgrading existing facilities	1,500 <sup>g,h</sup>			75.00	
<i>Total fixed costs</i>				418.90	
<b>Total costs</b>				<b>1,278.45</b>	
<b>Returns</b>					
Returns over variable costs				900.45	
Net returns				481.55	

Source: Penn State University, found at [agalternatives.aers.psu.edu/other/bees/Bees1.xls](http://agalternatives.aers.psu.edu/other/bees/Bees1.xls)<sup>a</sup> Retail price.<sup>b</sup> Rental fee may vary depending on the crop.<sup>c</sup> Estimated 20% loss each year. '<sup>d</sup> fuel, maintenance, depreciation (10 years)<sup>e</sup> including advertising, production information, and bee management<sup>f</sup> Depreciate over 10 years. '<sup>g</sup> Depreciate over 20 years. '<sup>h</sup> Building may not be necessary. Sideline beekeepers often convert a garage, basement, or outbuilding into honey house.

To calculate a break-even price, your clients know how many units they need sell based on 60 pounds per hive production and 10 hives. Your clients use 8-ounce jars and the honey in them weighs about 11 ounces each. Based on these estimates your clients calculate that they will get about 820 8-ounce jars from the 600 pounds. They assume their variable honey cost is \$1.05 per 8-ounce jar. The formula to calculate a break-even price is

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 clients conclude they must get at least \$1.56 per jar for their 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 need to consider these costs as well as 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 they think they can sell, the lower their price can be after they cover variable costs because they are spreading the fixed costs 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 clients choose a percent that they want to increase their total costs by. These methods do not take into account the quantity available to sell.

**Markup** is the amount the cost is raised to achieve the desired selling price. Using the same example as above your clients decide to consider using a markup. They decide they want to add a 30 percent markup to that their calculation would be

Markup amount = Total cost/unit X Percent markup

Markup = (\$1,278/820) X 0.3

Markup = \$1.56 X 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. Suppose your client decides he/she wants a margin of 30 percent. The calculation would be

Selling price = Total cost /unit ÷ (1.00 - Margin percent)

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 they are starting with the same costs, using a markup gives your clients a lower price than using the margin method. Breakeven pricing will result in the lowest price of all. Your clients need to check to see 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 nine 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 your clients sell ends in nine, they lose the effectiveness of it.

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: Worksheet**

Part II is for your clients to complete 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 you 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 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 X cost/unit)

**Startup costs**

---

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

---

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 X cost/unit)

**Variable costs**

---

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

---

Marketing

---

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

<b>Fixed costs</b>			
Item	Units	Cost/unit (\$)	Total cost
Depreciation			
Interest on debt			
Loan principal payments			
Management			

---

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 mark-up will you use?

Calculate your selling markup price

Markup selling price = Total Cost X 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?

$$\text{Selling price} = \text{Total Cost} \div (1.00 - \text{Margin percent})$$

## References

Ag Econ Extension at OSU. Enterprise Budgets. Found at <http://www.agecon.okstate.edu/budget>.

Arsham, Hossein. Break-Even Analysis and Forecasting. Found at <http://home.ubalt.edu/ntsbarsh/Business-stat/otherapplets/BreakEven.htm>.

ehow\_business\_writer. How to Calculate a Price Markup. [http://www.ehow.com/how\\_2027243\\_calculate-price-markup.html](http://www.ehow.com/how_2027243_calculate-price-markup.html).

Frazier, M., G. Greaser, T. Kelsey, J. Harper. "Alternative Agriculture: Beekeeping." Penn State University 2001. Found at <http://agalternatives.aers.psu.edu/default.asp>.

Hofstrand, Don Breakeven Selling Price *Ag Marketing Resource Center*. Found at <http://www.agmrc.org/agmrc/business/gettingstarted/brkvnsellingprice.htm>.

Marketing and Food Systems initiative. Found at <http://www.leopold.iastate.edu/research/marketing.htm>.

The manual was developed and funded as part of a Southern SARE Grant 2006.

For more details on *Direct Answers for Direct Marketing*:

Email: Gary\_Bullen@ncsu.edu

Phone: (919) 515-6096

Address: ARE, Box 8109, NCSU Campus, Raleigh NC 27695

