



# Break-Even Costs Program for Virginia Grain, Soybean, Cotton and Peanut Producers\*

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## Introduction

This program has been developed to serve as an aid to Virginia grain, soybean, cotton and peanut producers in making well informed marketing decisions. The program allows a producer to quickly examine how total farm revenue and profits are affected by different possible price and yield outcomes. The user can project costs and revenues across a range of acreage allocations, yields, and market prices. Analyzing a variety of situations should facilitate the development of a marketing strategy by illustrating best case, worst case and most likely scenarios and how the bottom line (profit/loss) for the whole farm is affected in each case.

The program is designed around costs of production. An accurate estimate of the total cost of production for the whole farm and each crop is needed to provide a benchmark so that an appropriate marketing plan can be developed. Costs are limited to cash operating expenses (both variable and fixed). Costs for depreciation expenses on equipment, buildings, etc., or the opportunity costs of equity capital or labor are not included. Knowledge of the total cost of production for each crop is an essential benchmark value in a marketing plan because in the long run, average market price must cover the average cost of production to remain in business.

The variable costs of production are generally very well known for the various crops. There are fixed costs associated with owning and operating a farm that are not easily attributed to any specific crop. A percentage of the fixed costs must be assigned to each crop. How this percentage is determined is discussed in a later section. The sum of the fixed and variable costs is the total cost of production for that crop. The total cost of

production divided by the acreage and yield determines the price necessary to cover variable costs, fixed costs, debt and family living expenses.

## Main Menu

The worksheet entitled "Main Menu" is the primary page for analyzing scenarios. The gray cells may be changed by the user but the rest of the cells are protected to prevent formulas used in various computations from being changed. The scenario is created in the top box by entering acreage, yield, and price for some combination of enterprises. This program includes most of the major grain and oilseed crops that are produced in Eastern and Southeastern Virginia; corn, soybeans (full season and double-cropped), wheat, barley, sorghum, cotton and peanuts. The program does not include any livestock enterprises. The program computes the costs, revenue, breakeven price and profit for the entire farm and by individual enterprise. The 'acres in production' column can be used to explore farm profit from various acreage allocations. The 'acres in production' column can also be used to help identify those crops which are more profitable at current market prices.

Varying the yield in the second column helps to determine the financial impact of yield risk. Producers should initially enter average yields by crop for the whole farm. The impact of lower or higher yields on production costs, breakeven prices, and total farm profits can be quickly determined by changing the expected yield. This feature should be useful in helping analyze the potential costs and benefits associated with various crop insurance programs.

The third column 'expected net price' allows the examination of price risk. The value entered in this

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column should reflect the current expected net price after adjusting for local basis and grade premiums and discounts. The program assumes all production is sold at this price. Another EXCEL file called 'Historical Futures Price Distributions' contains futures price data for corn, wheat, soybeans, and cotton since 1980. The historical price distribution indicates the probabilities that futures prices will be within certain price ranges.

## Enterprise Budgets

There are eight different crop enterprises included in this program. Each enterprise has its own worksheet. The enterprise budgets were developed by Extension and Farm Management Agents in conjunction with the Virginia Cooperative Extension Service. The budgets represent a "typical" or "average" production operation in 1997. Producers are strongly encouraged to modify these budgets to give a more accurate representation of their particular operation. Clicking the tab "corn" at the bottom of the screen accesses the corn cost of production worksheet. Each budget has two columns entitled "price" and "quantity" that are colored gray. These gray cells are initially set for the "typical" farm but may be changed to reflect the actual costs incurred by a particular operation. The price and quantity values that go into the gray cells determine the per-acre cost for the expense represented by that row. For example, the first expense listed is generally seed. One bag of seed corn may seed four acres and cost \$80.00 per bag. This needs to be converted to a per-acre basis. The conversion is made by entering \$80 in the price column and 0.25 in the quantity column. The third column of numbers is the cost/acre for that item. The last column represents the total cost for that item (seed) for the entire acreage planted in that crop. All the variable production costs are listed in the first column and any cost not explicitly stated should be entered as "other costs." The break-even price is computed in dollars per bushel or cents per pound depending on the crop. It is computed by calculating the total cost per acre and dividing by the expected yield per acre.

Each budget has a couple of rows for pre-harvest and harvest labor expenses. These expenses refer to hired labor and not owner labor. If no outside labor is hired, then there should be no entry in these rows. Owner labor is accounted for in the fixed expense section under 'Family Living' expenses. The enterprise budgets only take into account cash operating expenses. Interest expense assumes a loan term of 6 months since the operating loan is drawn upon in varying amounts throughout the production year.

## Fixed Expenses

The fixed expense worksheet describes those expenses of owning a farm operation that are not related

to the level of production in the short run. The fixed expenses are sunk regardless of the choice of enterprise or the level of production. These expenses are again cash operating expenses. Depreciation expense and opportunity costs of equity and labor are not included. If payments are made on a debt financed piece of land or machinery, then the amount of the annual payment should be entered in the appropriate row. If all land and equipment is owned and paid for, then a zero may be entered in that row.

Frequently, the fixed expenses such as machinery, buildings, family living, etc., cannot be matched to any specific crop. Each crop must carry some percentage of the total fixed expenses. The percentage of fixed expense that each crop must carry is determined by taking the total variable costs of each crop and dividing by the sum of the variable expenses across all crops. For example, if the variable costs of corn are \$100,000 and the total variable costs for the farm (all crops) is \$500,000 then corn is responsible for 20% of the fixed costs. This method of allocating the fixed costs was selected because the prices of the inputs tend to remain stable across time and crop revenues must cover these valuable and fixed costs over time.

Alternative methods of allocating the fixed costs were considered. One alternative is to allocate the fixed expense to a crop based on its contribution to gross revenue, but this method is very sensitive to changes in crop prices. The price level of the output varies a great deal within a production year and even more across years. The ideal way to allocate the fixed costs is to record the hourly usage of machinery, labor, buildings, etc., for each crop. This method requires a large amount of record keeping and not many farmers have this data.

Cotton and peanuts each require specialized machinery that is specific to those crops. This specialized equipment expense is carried by the specific crop and not spread across the entire farm enterprise.

The 'Family Living Expense' row represents the farm's contribution to the household budget. If the yearly household expenses are \$45,000 a year and off farm income is \$20,000 a year, then the farm is expected to account for the remaining \$25,000 a year.

## Charts

Each crop enterprise has a chart that shows breakeven prices necessary to cover various levels of expense. The charts are accessed by clicking on the tabs along the bottom of the screen. It may be necessary to click on the arrow pointing right in the lower left corner of the screen to see the chart tabs. The first column in the chart shows the price necessary to cover the pre-harvest and harvest variable costs only. The second column shows the price necessary to cover the total variable costs as well as the fixed expenses for land,

machinery, and building repairs. Column three includes the expenses from the first two columns plus taxes, marketing and insurance. Columns four and five include family living and return to management expenses respectively.

## Getting Started

The attached flow chart is designed to help the user understand how to use this program. The user should follow the steps indicated in the chart. The type of information needed and the computations conducted on each worksheet are summarized. The shaded area in each box contains the name of the tab across the bottom

of the EXCEL spreadsheet. A click on the tab will bring up the desired worksheet. Any change made on one worksheet will automatically be transferred to all other worksheets. Once a change is made, the impact made on each crop and the whole farm can be determined by clicking on 'Farm Total.'

Always start with the 'main menu.' The acres, yields, and prices used impacts all the other cost of production budgets, fixed costs, and farm totals. Do not make acreage and yield changes on the crop budget pages. These changes will need to be made on the 'main menu' page and will then be automatically transferred to the budget pages.

STEP	SHEET	COMMENTS
<b>Main Menu</b>		
1	<ul style="list-style-type: none"> <li>• Enter acres</li> <li>• Enter yield</li> <li>• Enter net price</li> </ul>	Enter acres planted Enter zero for crops not planted Enter average yield per acre Enter net farm price
<b>Fixed Expenses</b>		
2	<ul style="list-style-type: none"> <li>• Enter rent payments</li> <li>• Enter mortgage payments</li> <li>• Enter equipment payments</li> <li>• Enter other fixed payments</li> </ul>	Enter annual amounts for rent, land payments, buildings, and equipment
<b>Farm Total</b>		
3	<ul style="list-style-type: none"> <li>• Revenue per crop</li> <li>• Pre-harvest expenses</li> <li>• Harvest expenses</li> <li>• Allocate fixed</li> <li>• Profit by crop costs &amp; farm</li> </ul>	Displays revenue and expenses by cost category by crop and total farm. Fixed costs allocated according to variable production costs. See 'Calculations worksheet' for details of fixed allocation procedure.
<b>Corn (Crop Budget)</b>		
4	<ul style="list-style-type: none"> <li>• VCE estimates</li> <li>• Change prices &amp; costs</li> <li>• Add other costs</li> </ul>	Virginia Cooperative Extension (VCE) cost estimates are used. Change prices and quantities for your farm. Add other costs. All farm variable and fixed cost recomputed.
<b>Corn Chart</b>		
5	Shows breakeven prices by category based on acres & yield <ul style="list-style-type: none"> <li>• Variable costs</li> <li>• Land, machinery, equip.</li> <li>• Taxes, marketing, ins.</li> <li>• Family living</li> <li>• Return to mgt.</li> </ul>	Based on your costs and yields, shows prices necessary to cover various cost levels - If change yield level in main menu, or costs in crop budget all breakeven prices are recomputed.
<b>Corn Distribution</b>		
6	<ul style="list-style-type: none"> <li>• Historical distribution December corn futures</li> <li>• Probability prices trading in given price ranges.</li> </ul>	Shows historical distribution December corn futures prices based on daily prices from 1980-1996. Only December futures. Must be adjusted for local basis to determine net farm price.
<b>Calculations Worksheet</b>		
7	<ul style="list-style-type: none"> <li>• Shows how fixed costs allocated to each crop based on acres, yield, and share production expenses.</li> </ul>	Computation worksheet for allocating fixed costs. Shows variable and fixed costs by category for each crop produced.

## Summary

This program is meant to serve as a tool for Virginia producers for the development of an overall marketing plan. There are a number of steps involved in developing a marketing plan. Several of these steps are incorporated into the program but there are several that are not and require additional analysis. The first step is to decide on some pricing objectives for your particular farm. Examples of objectives may include pricing in the top third of historical prices, pricing when the market is covering costs, or perhaps marketing so the odds of getting a good price are on your side. A clearly defined pricing objective is important because the subsequent steps in developing the marketing plan are concentrated on reaching that objective. The next step in the development of a marketing plan is identifying the costs of production. This program breaks down the cash operating expenses into individual components. The individual components may then be adjusted from

the 'typical farm' default settings to the actual expenses incurred on a particular farm. Once the user has adjusted the costs to represent his particular farm, then he may project those costs and returns across a range of acreage allocations, yields, and market prices. The probabilities of realizing a particular yield or market price can be assessed by examining some historical data in accompanying files. Assessing those probabilities represents another step in developing a marketing plan. The next step is to examine the market outlook from both a fundamental and technical perspective. The fundamentals should indicate a price range where the market should trade. The fundamental analysis along with your pricing objectives in mind should help to identify a target forward price level. Technical analysis may be used to help time the execution of the pricing plan. The last step is to have the discipline and resolve to stick with the plan in a volatile market.

This computer program requires a PC computer running EXCEL 7.0 (office 97 version). Copies of this publication and a computer disk are available from:

Extension Division Distribution Center  
112 Landsdowne Street (0512)  
Virginia Tech,  
Blacksburg, VA 24061

Publication 448-035 is electronically accessible via the Virginia Cooperative Extension World Wide Web site at:  
<http://www.ext.vt.edu/>

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