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BUDGETS FOR TEXAS CROPS

FOREWORD

Enterprise budgets were developed by the Extension economist-management. Twenty-two production regions were defined by major soil resource areas. The regions have been identified as:

- 1. HP I (High Plains I)
- 2. HP II (High Plains II)
- 3. HP III (High Plains III)
- 4. HP IV (High Plains IV)
- 5. RP I (Rolling Plains I)
- 6. RP II (Rolling Plains II)
- 7. HP V (High Plains V)
- 8. TP (Trans-Pecos)
- 9. EP I (Western Edwards Plateau)
- 10. EP II (Eastern Edwards Plateau)
- 11. NET (North East Texas)

- 12. WG (Winter Garden)
- 13. CT (Cross Timbers)
- 14. GP (Grand Prairie)
- 15. BP (Blackland Prairie)
- 16. EA (Edwards Aguifer)
- 17. ST (South Texas)
- 18. CB (Coastal Bend)
- 19. RGV (Rio Grande Valley)
- 20. ET (East Texas)
- 21. UC (Upper Coast)
- 22. MC (Middle Coast)



An Introduction to the TEXAS CROP AND LIVESTOCK BUDGETS*

Estimating the production costs and returns of farm enterprises for planning purposes is a difficult, but important, task. Timely and accurate cost of production estimates are necessary: (a) to make input use decisions, and to arrange for operating capital requirements, (b) for enterprise selection, (c) to estimate the potential profitability of capital investment decisions, and (d) to develop marketing strategies and assess their impact on costs and returns.

Budgeting is a deceivingly simple tool which can be used for analysis of problems ranging from day-to-day detailed choices to major questions about the size and type of farm business. Budgeting, as a management tool, is the testing and estimation of likely outcomes from decisions before they are implemented. Enterprise budgets are both a product of and the basic building block for the planning process.

The Texas Crop and Livestock Budgets are projected enterprise budgets jointly prepared by the Texas Agricultural Extension Service (TAEX) and the Texas Agricultural Experiment Station (TAES) to assist farmers and ranchers in estimating "real" economic costs and returns of production, in current dollars.¹ The information presented in the budgets is prepared as a management planning guideline and therefore is not intended to recognize or predict the costs and returns from any particular f or ranch operation. It is suggested that users modify the budgets to fit their individual situations by making changes in yields, input levels, prices and other factors. A column

¹ Alternative procedures are mixed in their method of handling the impact of inflation on costs, or attempt to estimate nominal cash costs of production either before or after relevant taxes. In fact, most budgets are a mixed bag of nominal, real, beforetax, after-tax, cash and non-cash concepts and procedures.



^{*} Prepared by Steven C. Griffin, Assistant Professor, and James M. McGrann, Associate Professor, Dept. of Agricultural Economics, Texas A&M University, College Station, February, 1982, and revised annually by Robert H. Jenson, Assistant for Management Analysis, Texas Agricultural Extension Service. This paper is designed to accompany the distribution of the Texas Crop and Livestock Budgets (TAEX).

titled "Your Estimate" is provided on each budget to make modifications convenient. Furthermore, the expiration date on each budget indicates updating is necessary.

The 1984 crop budgets include the anticipated government deficiency payments for cotton, corn, sorghum, and wheat. To qualify for these payments producers must be in compliance with the government program for the respective crops. In evaluating the whole farm situation proper acreage adjustments and fallow acreage costs must be included when determining costs and returns per acre.

Procedure

One of the major problems involved in enterprise budgeting is the lack of information concerning the amount of production which will result from a particular combination of inputs. Information for the Texas Crop and Livestock budgets is assembled from published and unpublished sources. The data are obtained and continually revised with the cooperation of farmers, ranchers, and agribusiness firms through informal surveys and personal contacts. Data supplied by these sources are confidential and provide average values which are used in developing and revising budgets. Scientific sampling techniques required to produce statistically reliable estimates, however, are not used due to time and cost limitations. When possible, published information from the Texas Statistical Reporting Service and published research from the Texas Agricultural Experiment Station (TAES) are used in preparation of the budgets. Regionally based agricultural economists provide leadership in assembling the data and constructing the budgets.

The input levels used, the combination of inputs and machinery operations, and the type and length of ownership of machinery and equipment are *not* necessarily profit-maximizing. They are only believed to be representative or typical for the specified geographic area.

Budget preparation is a time consuming task involving numerous data and mathematical calculations. A computer program has been developed to aid in budget preparation. The TAEX budgets are prepared using a modified version of the Oklahoma State University Enterprise Budget Generator.² This computerized tool stores and retrieves base data, prices, and other factors; calculates machinery, capital, and labor costs; organizes the costs and returns in a variety of formats; and performs a number of budgeting analyses.

Terminology Used in Budgets

An <u>enterprise budget</u> is an economic recipe for the production of a commodity usually expressed in terms of the production unit (e.g., per bushel, per head, etc.) or by a common resource (e.g., per acre of cropland). It is a statement of all expe revenues and expenses, both actual and imputed.

There are three general types of costs that make up the total economic cost of producing any farm commodity. These are variable costs, fixed costs, and overhead costs.

<u>Variable costs</u> (sometimes referred to as operating costs) are those short-run costs that may change with changes in level of production and/or are controlled by the manager. They are generally the cost of items that will be used up during one production cycle. If the manager decided to cease the production activity, these costs are avoidable. Examples are such operating inputs as fuel, fertilizer, chemicals and some hired labor costs. In the long run, all production costs are variable.

In the TAEX published budgets, variable costs are further divided into <u>pre-harvest</u> and <u>harvest</u> costs. This separation is particularly useful for decisionmaking in which crop abandonment or graze-out are common practices. Once variable costs are incurred (e.g., seed after planting), they have the characteristics of fixed costs and are referred to as "sunk" costs.

² Kletke, Darrel D., "Operation of the Enterprise Budget Generator." Research Report, P.-790, Okla. Ag. Exper. Station, Stillwater, August, 1979. (Source code dated October, 1979 and since revised.)

<u>Income above variable costs</u> serves to guide most farm management decisions, particularly in the short run. If income over variable costs is negative, and since variable costs are by definition avoidable, a producer will minimize his losses by ceasing production. Selecting enterprises which maximize income over variable costs will lead to greater short-run profit.

<u>Fixed costs</u> may be defined as those costs that either do not change with the level of production or cannot be controlled or avoided. Examples are items such as property taxes, insurance, depreciation, and interest on investment. Cash or fixed dollar land rents and owner-operator labor may also be considered fixed costs.

Fixed and variable cost analysis is a useful tool in determining profitability of an investment (e.g., machinery) based on its life or ownership period. It can aid in determining the best replacement policies, whether to own or custom-hire services, and a host of other decisions. However, fixed and variable cost analysis does not adequately explain the cash flow and income tax effects of an investment. Cash flow analysis is directed more to the question of fiscal feasibility, or the ability to meet the financial obligations of the investment, than to the question of profitability. Consequently, the two types of analysis must be used together in order to present a clear and total picture of investment alternatives.

<u>Overhead costs</u> are costs of machinery, equipment, buildings, and management that cannot be directly identified with an individual enterprise. Since these items are involved in the overall farm operation, it is sometimes difficult to reasonably include them in enterprise budgets. Examples of overhead costs might be telephone service, office supplies, general utilities, legal, and secretarial expenses.

The allocation of fixed and overhead costs is not generally required for most farm management decisionmaking. At best, it is an arbitrary procedure for shared resources (e.g., the fixed costs are allocated by percentage of total annual use in the Texas budgets). However, estimates of the fixed resource requirements and the relative efficiency at which alternative enterprises use fixed and limiting resources is important to enterprise selection.

The concept of <u>opportunity cost</u>, rather than incidence of cost, is used in estimating a number of production cost items. The opportunity cost of a production resource is its current value in its next best alternative use. The opportunity cost concept is useful in estimating the appropriate costs of inputs that are either not purchased or do not have a clear market value, such as equity capital, land rents, returns to operator labor, and farm-produced feedstuffs. Cost incidence versus opportunity cost is the primary difference between economic cost of production and cost estimates derived from cost accounting records when all inputs to the production process are included.

The projected <u>net return</u> in the budgets (the "bottom line") is the residual returns remaining after accounting for accrued and imputed costs to other factors of production. (The variable and fixed costs discussed above.) In most cases, the net return is a projected return to certain overhead, management, and profit (risk) for the enterprise, the only remaining factors of production for which returns have not been imputed.

Inflation's Effect on the Budgets

Inflation has become a pervasive part of the economic setting facing agricultural producers. Inflation is defined as a rising general level of prices. And, as a result, dollar values from different time periods (past, current, future) are not comparable in their "real" or "equivalent purchasing power" value. One method of accounting for inflation's effects is to express all economic values in "real" terms based on the current year's purchasing power of the dollar as the standard (constant-value) monetary unit.

Most of the gross returns and variable costs in the enterprise budgets relate to only the current production period. These returns and costs are expressed in current dollars and, by our standard, they are the real returns and real costs for the enterprise. The interest rate used to calculate capital costs and the calculation of machinery and equipment ownership costs involve considerations over several production periods.

The current or nominal interest rate that is charged by financial institutions contains an inflation premium. The relevant "real" interest rate may be substantially less than the nominal rate, depending on the rate of inflation.

The real interest rate may be calculated as: 1 + nominal rate - 11 + inflation rate

Thus, an 18 percent interest rate charged by financial institutions during a period of 12 percent inflation translates into a $\frac{1+.18}{1+.12}$ - 1

or a 5.36 percent real rate of interest. In this manner, the cost of owning machinery, for example, where nominal value may be actually appreciating over time even though it is depreciating relative to the cost of its replacement, will be more accurately represented.

While the real interest rate provides a look at the cost of production apart from inflation's effect, it is equally important to remember that the cash required to pay the interest charge on borrowed capital is based on the nominal rate. With inflation, some economic returns may be in the form of increased values (e.g., land and used machinery). These returns are in the form of capital gain (in nominal terms) and may, therefore, not be available to meet current cash requirements except through liquidation.

Price and Yield Effects

A projected enterprise budget is generally calculated on the basis of one price and yield combination for each product of the enterprise being analyzed. In reality, producers face substantial risk and uncertainty about the amount of the commodity they will produce or the price they will receive for the commodity. Printed on the back of each crop budget is an analysis that shows the impact that several levels of price and

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yield for the primary product have on net return.³ In addition to the "price times quantity" impact, the net return figures are adjusted for designated quantity-related costs (e.g., per bushel drying costs and share-rents) and total revenue related costs (e.g., percentage commission fees).

Calculating Annual Capital Requirements

Annual operating capital is the average annual short-term capital needed to cover variable operating costs from the beginning of the annual production cycle to the end, (the annual capital month). Internally generated funds (e.g., from the sale of products of the enterprise) offset the operating input (cash) expenses with any cash surplus carried forward and any deficit constituting an operating capital requirement. An annual capital requirement averages the surplusses and deficits. Therefore, it is important *not* to interpret the average annual operating capital requirement as the maximum or minimum level of short-term financing required by the enterprise. Furthermore, annual average capital requirements may even be negative, if accumulated monthly receipts are greater than accumulated operating expenses, by month, over the production cycle, and the enterprise credited for the value of operating capital.

Calculating Machinery and Equipment Ownership Costs

One of the more difficult tasks in estimating costs of production is estimating the cost of owning and operating farm machinery. Coupled with this difficulty is the associated problem of how to allocate the cost of items (e.g., tractors) shared by a number of enterprises on a farm.

Current replacement values and capital budgeting techniques are used as the basis for calculating machinery and equipment projected ownership costs (depreciation, interest, taxes and insurance) in the TAEX budgets. This projected (economic) cost may

3 Each step represents a 10 percent deviation from the base budget in either price yield, or both, of the primary product of the enterprise budget.

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be more or less than the estimated cost based on the book values and IRS-approved depreciation schedules of machinery and equipment (rather than current market value) for established farms or ranches that have a combination of used and new machinery. This method, however, more closely reflects the "real" earnings required to cover the "real" cost of recapturing machinery investment during high rates of inflation. The depreciation method based on book value and used for income tax purposes underestimates the total amount of capital needed for replacement of machinery and equipment under inflation. Accelerated depreciation schedules, combined with short accounting lives, may overestimate the real economic depreciation needed for long run production. Users of the budgets should review their fixed costs closely and be conscious of the differences in ownership cost based on current replacement values versus those developed from historical or accounting costs and used for income tax purposes.

Since detailed information on machinery fuel, lubrication, repair and labor requirements are not generally available, the budget generator uses a series of functional relationships and parameter settings for each machinery and equipment item to estimate ownership and operating costs. (See machinery and equipment data and parameters at the end of each budget set and formula section that follows). The cost calculated for each monthly machinery operation, including associated labor and materials costs, is printed on the back of each published crop budget.

Other Information Available

Other budget analyses available from the budget generator are monthly summaries of variable costs and returns, monthly fuel requirements by fuel type, cost break-downs on individual machines and equipment, and costs of machinery and irrigation use by operation or application. Also available is a program which will generate whole farm cash flow summaries on the basis of enterprise budgets and the number of units of each in the farm organization. Details concerning this information may be obtained from the economist-management serving the particular geographic region (soil resource area).

Limitations

Careful evaluation of the resource situations must precede the drawing of inferences from an enterprise budget. Farms having resource situations (available land, machinery, capital, and management, for example) that differ from the situation assumed by the budgets can come to considerably different conclusions. Differences in assumed annual hours of use of machinery and equipment because of farm size or other uses, or size of the machinery used, can make significant differences in per un costs and net returns. These differences in resources and organization must be evaluated and accounted for adequately if reliable conclusions are to be drawn.

The Texas Crop and Livestock Budgets are projected budgets, not historical or actual. It is difficult to make accurate estimates of future prices, yields, or other production uncertainties. Most of the budgets are prepared 12 to 18 months in advance of the crop harvest or the end of the livestock production cycle. Therefore, the user should evaluate current production outlook information and use his expectations to update the budgets in preparing to use them. In addition, year-to-year comparisons of the published budgets are not advisable due to changes in farm size, technology, and farming patterns.

Availability

The Texas Crop and Livestock Budgets are published annually and distributed in loose-leaf form on a subscription basis. To subscribe send \$100 to: Extension Farm Management, Dept. of Agricultural Economics, Texas A&M University, College Station, Texas, 77843.

Individual copies of budgets for major enterprises in a particular region of Texas may be obtained at no cost through local county Extension offices. 🚧 a dalaki senga dépuntan dépuntan dépuntan kang patéh kata sa kang ana kang patéh kang sa kang kang kang kang

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Appendix I. Formulae for Estimating Machinery Cost⁴

Fixed Costs per Hour

Depreciation cost per hour (DEP)

$$DEP = (Purchase Price - Salvage Value) HUA*Y$$

where: HUA = hours used annually

Salvage Value = $RFV1 * (Current List Price) * RFV2^{Y}$

RFV1 and RFV2 are parameters specific to the machine type.

Y = years of ownership

both purchase price and salvage are current values

Interest cost per hour (INT)

INT = Adj. Avg. Investment * I

where: Adj. Avg. Investment = (Purchase Price + Salvage) + $\frac{D}{2}$

I = (1 + nominal rate) - 1 = real interest rate(1 + inflation rate)

and
$$D = (Purchase Price - Salvage Value)$$

Y

Insurance cost per hour (INS)

Tax cost per hour (TAX)

TAX = (<u>Purchase Price</u>) * (Tax Rate) HUA

Total fixed cost per hour (TFC)

$$TFC = DEP + INT + TAX$$

4 An '*' implies the multiplication operator (e.g., "times" or "x")

Appendix I. Formulae for Estimating Machinery Cost (cont.)

Operating Costs Per Hour

Repair cost per hour (REP)

$$REP = \frac{TAR_{2} - TAR_{1}}{HUA * Y}$$

where: TAR = (Current List Price) * RC1 * 100^{-RC3} * (%Age/life)^{RC3}

RC1 and RC3 are parameters specific to the machine type.

HUA = hours used annually.

Age = hours of previous use.

Fuel Cost per hour (FUEL)

FUEL = QFC (load, fuel type) * fuel cost/gallon

where: QFC is a fuel consumption curve based on varying load

and fuel type.

Lubrication cost per hour (LUBE)

LUBE = FUEL * P(22)

where: P(22) is a multiplier (e.g., 0.10)

Total operating cost per hour (OPER)

OPER = REP + FUEL + LUBE

Machinery Capacity Per Hour

Acres per hour = <u>Speed (mph) * width (ft) * field eff. (decimal)</u> 8.25

Labor Costs Per Acre (LABOR)

LABOR = <u>(Tractor multiplier)</u> * (Labor multiplier) Acres Per Hour