BUDGETS FOR TEXAS CROPS AND LIVESTOCK

INTRODUCTION

Enterprise budgets were developed by the Extension economist-management for each of the fourteen Extension Districts.
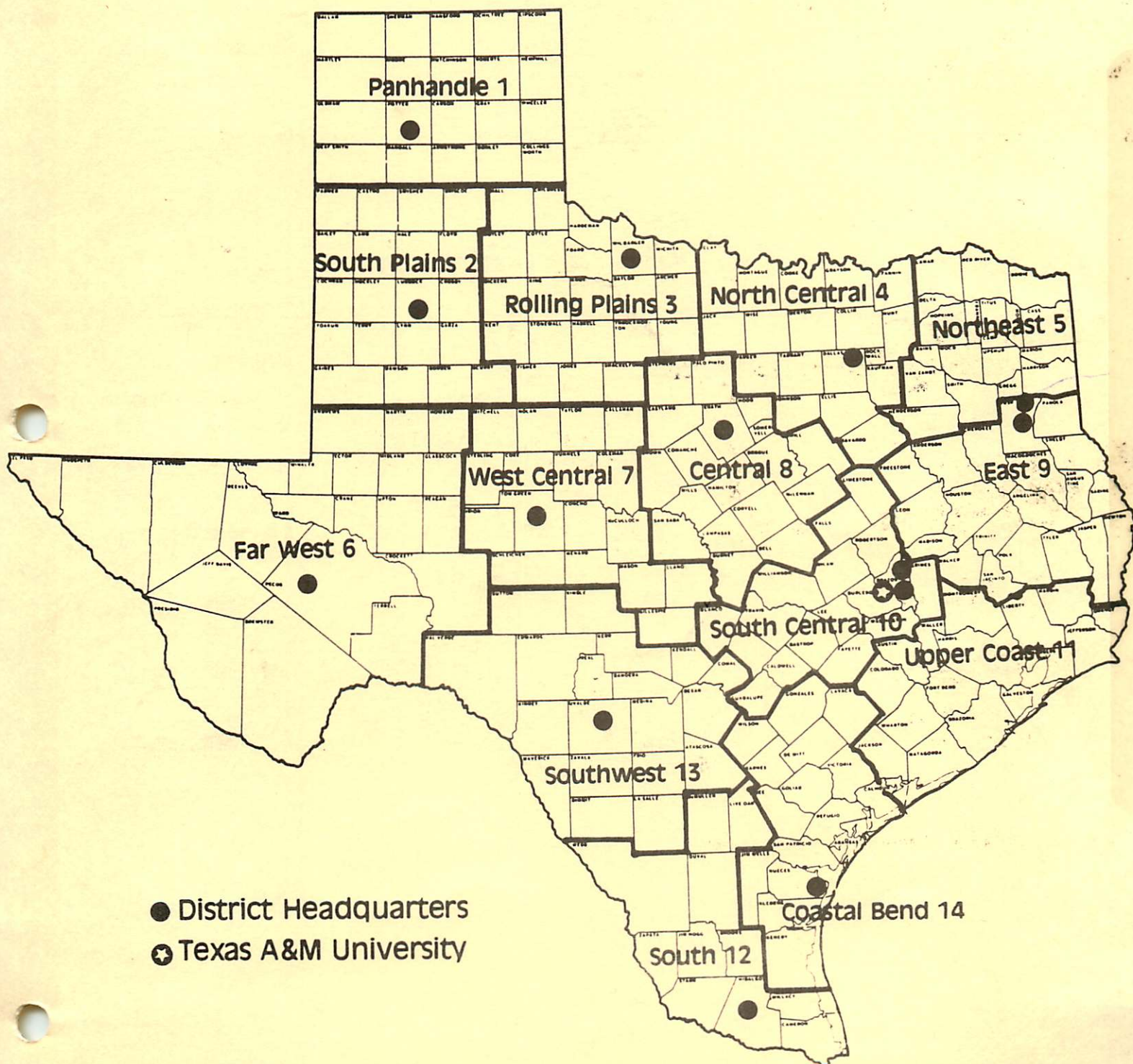

● District Headquarters
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An Introduction to the Texas Crop and Livestock Budgets[*]

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

The 1994 crop budgets include the anticipated government deficiency payments for cotton, corn, sorghum, barley, oats 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. Budgets for *set aside* land are included in several of the districts. Some of the crop budgets include the cost from the *set aside* budgets. In using budgets for crops that are in the government program, care must be taken to correctly account for *set aside* land.

The budgets also include several enterprises that require an establishment that may include one or more years of providing inputs before realizing any income. Enterprises that require this type of establishment include pasture and hay enterprises and orchards or groves. Budgets for these enterprises generally include a *Perennial Crop* line listed in the fixed cost section and are usually preceded by an establishment budget. The cost of establishment is amortized at an interest rate and number of years defined in the *Perennial Crop*. This works well for enterprises like hay and pastures where a single year of establishment is required. Enterprises with several years preceding production followed by some years of increasing production before reaching a mature production level require budgeting techniques beyond the capabilities of most enterprise budgeting analyses. *Perennial crop* values may provide an estimate of amortized costs, but capital budgeting analysis using net present value or internal rate of return as well as cash flow analysis would be required to adequately determine the profitability of these types of enterprises.

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

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[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, before-tax, after-tax, cash and non-cash concepts and procedures.

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 the Microcomputer Budget Management System (MBMS).[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 *enterprise budget* 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 expected 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.

Variable costs (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 *pre-harvest* and *harvest* costs where applicable. This separation is particularly useful for decision making 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.

Income above variable costs 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.

Fixed costs 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

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[2]McGrann, James, M., Kent D. Olson, Timothy A. Powell and Ted R. Nelson, *Microcomputer Budget Management System User Manual*. Dept. of Agricultural Economics, Texas A&M University, College Station, February 11, 1986.

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.

Overhead costs 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, and legal and secretarial expenses.

The allocation of fixed and overhead costs is not generally required for most farm management decision making. 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 are important to enterprise selection.

The concept of *opportunity cost,* 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 *net return* 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.

Calculating Annual Capital Requirements

Annual operating capital is the short term capital required to finance cash variable and fixed costs during the enterprise production cycle. The MBMS program allows for the internally generated cash (e.g., from the sales of products of the enterprise) to offset the operating input expenses. Any cash surplus is carried forward as savings and any deficit constitutes an operating capital requirement. The annual capital requirement is the weighted average net capital requirement (weighted by days outstanding). The annual operating capital is not the minimum or maximum of short-term financing required by the enterprise. Annual capital requirements may even be negative if accumulated monthly receipts are greater than expenses over the production cycle.

The interest charge on borrowed capital and the interest savings on surplus cash are listed separately on the budgets to allow for different interest rates. In most cases, the TAEX budgets assume that 100% of the required capital is borrowed (0% equity capital is used to meet operating requirements).

Calculating Machinery, Equipment and Livestock 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. The MBMS program divides equipment and livestock into seven categories: tractors, self-propelled machinery, implements, equipment, auto and trucks, breeding, milking and working livestock, and buildings and other improvements.

Current replacement values and capital budgeting techniques are used as the basis for calculating projected ownership costs (depreciation, interest, taxes and insurance) in the TAEX budgets. This projected (economic) cost may be more or less than the estimated cost based on the book values and IRS-approved depreciation schedules of the various classes of equipment and livestock (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 equipment investment, especially 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 or accounting costs and used for income tax purposes.

Since detailed information on equipment fuel, lubrication, repair and labor requirements is not generally available, MBMS 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 hourly cost calculated for each piece of machinery or equipment and the per acre or per mile cost of each farming operation, including associated labor and materials costs, is also printed at the end of each set of crop budgets.

Other Information Available

Budget analyses available from the budget generator are detailed line item reports, summary reports and reports by stage, operation, resource, residual returns and expense type. The crop budgets are printed using the report by stage. The livestock budgets use the residual returns and operations reports. Also available is the ability to 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 Extension district.

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 unit 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. Various budgets are published for each of the twelve Extension Districts in the state. To subscribe send $100 to: Extension Farm Management, Department of Agricultural Economics, Texas A&M University, College Station, Texas, 77843-2124.

Individual copies of budgets for major enterprises in a particular Extension District may be obtained at no cost through local county Extension offices.

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Appendix I.
Formulae for Estimating Machinery Cost[3]

TRACTOR MACHINERY AND IMPLEMENT COST CALCULATION[4]

The tractor, self-propelled machinery, and implement calculation section is the major computational part of MBMS. Several options are available to users to calculate both hourly and per acre costs. The two major options are for calculation of repair, maintenance and depreciation costs. Option one is based on user defined costs associated with an hourly use base while option two duplicates the procedure and formulas in the 1983 ASAE Yearbook to calculate repair, maintenance and depreciation costs. Nearly all of the published budgets are calculated using option two, so that is what will be explained here.

Field Capacity Calculation

The field capacity of different implements and self-propelled equipment must be calculated to determine tractor hours or self-propelled hours per acre.

Calculated capacity for tractors and self-propelled machinery is similar except that self-propelled machinery has its own capacity estimate. A wheel tractor or a track layer relies on the implements to determine capacity and power requirements.

Since multiple implements are allowed on one tractor the slowest implement should determine the overall capacity. A tractor multiplier is used to convert the implement hours per acre into tractor hours per acre.

The implement hours per acre is calculated from the implement information.

The capacity of self-propelled machinery, such as a combine, is calculated from the speed, width and field efficiency information. The following equation is used to calculate capacity.

$$C = \frac{S \times W \times FE}{8.25}$$

where
C = acres per hour calculated capacity
S = implement speed in miles per hour
W = swath width of the implement in feet
FE = field efficiency is the ratio of accomplishment in acres per hour compared to theoretical maximum efficiency

Speed is expressed in miles per hour, width in feet, and field efficiency as the ratio of actual capacity to theoretical capacity. The constant, 8.25, is used to convert the units to acres per hour.

The tractor and machine hours per acre are used to calculate operator hours per acre and fuel per acre. They are also used to allocate the fixed costs of interest, depreciation and the annual lease payment.

The required operator's hours are a multiple of the tractor or machinery hours per acre. We expect the operator to work longer than the machine due to pre-operation checkouts, waiting, etc. This additional time is expressed as a percentage of the tractor or the machine hours. The following equations are used to calculate operator's hours per acre for tractors or self-propelled machinery.

Operator's hours per acre = Tractor hours per acre × labor multiplier

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[3]For a complete listing of formulas used by MBMS see the *Microcomputer Budget Management System User Manual*, Chapter 9 (See footnote 2).

[4]Irrigation equipment calculations are nearly identical except calculated on an acre-inch basis.

Operator's hours per acre = Machine hours per acre × self-propelled labor multiplier

The operator wage is multiplied by the operator's hours per acre to calculate the cost of operator labor per acre.

Operator cost per acre = Operator's hours per acre × wage rate

Fuel Requirement and Cost Calculations

Fuel cost is calculated using equivalent PTO horsepower of the implement(s) and the required fuel use multiplier of the fuel type. Equivalent PTO horsepower required varies directly with implement width, tillage depth, soil texture, and speed of operation. All these factors determine draft of an implement. For tractors pulling two or more implements. the required horsepower for that tractor is the sum of the required horsepower for each implement. The formulas for calculating fuel cost are shown below.

$$CFC = F \times HPR \times FM$$

where

CFC = calculated fuel cost per hour
HPR = equivalent PTO horsepower required
FM = fuel use multiplier for each fuel type

$FM_{gasoline} = .54X + .62 - .04 \times (697X)^{0.5}$
$FM_{diesel} = .52X + .77 - .04 \times (738X + 173)^{0.5}$
$FM_{LPG} = .53X + .62 - .04 \times (646X)^{0.5}$

X = HPR divided by the maximum PTO horsepower available

Lube Cost Calculation

Lube cost per hour is calculated as a percent of the fuel cost. The multiplier is stored in the parameter file.

$$LC = FC \times (LM \times 0.01)$$

where

LC = lube cost per hour
FC = fuel cost as defined for the two options
LM = lube multiplier

Repair and Maintenance

Repair, maintenance and depreciation calculation procedure duplicates the *Agricultural Engineers Yearbook* of 1983, sections: ASAE EP391 and ASAE D230.3. The formulae for these calculations are:

$$R = \frac{LP \times RC_1 \times \left[\left(\frac{HPU + AU}{1000} \right)^{RC_2} - \left(\frac{HPU}{1000} \right)^{RC_2} \right]}{AU}$$

where

R = repair and maintenance cost per hour (R & M)
LP = current list price
RC_1 = repair coefficient #1
HPU = hours of previous accumulated use
AU = hours of annual use
RC_2 = repair coefficient #2

Repair Coefficient # 1

RC_1 is a variable that helps determine the shape of the repair curve for a specific machine.

Repair Coefficient #2

RC_2 is an exponent variable which, in conjunction with RC_1, determines the shape of the repair curve.

Repair and maintenance costs are highly variable and unpredictable as to time of occurrence. These equations are but estimates of average values. A typical variation could be expected to range from 50 percent to 200 percent of the estimated cost in this data.

Insurance

Insurance cost is based on a fixed percentage of market value. Insurance cost per hour is calculated by the following formula:

$$INS = \frac{INR \times .01 \times M}{HAU}$$

where
INS	= insurance cost per hour
INR	= insurance rate based on current market value (%)
M	= current market value
HAU	= hours of annual use

Depreciation

Depreciation is based on equations to estimate the remaining value of the machine and on the assumption of constant annual use of the machine. Two values that are specified are factors used to calculate salvage value and hourly depreciation. DF#1 is the percentage of original value that remains after the first year depreciation. DF#2 is a component of the standard double declining balance equation. Values for both depreciation factors were taken from the 1983 *Agricultural Engineers Yearbook*.

Depreciation cost calculation uses the two depreciation factors to calculate salvage value and to adjust current market value. This value is then divided by the number of years of expected ownership times annual use.

The formula for calculating depreciation (D) is:

$$D = \frac{M - SV}{HAU \times YO}$$

where
D	= depreciation per hour
M	= current market value
SV	$= LP \times DF_1 \times DF_2^{YO}$
LP	= list price
DF_1	= depreciation factor #1
DF_2	= depreciation factor #2
YO	= years owned
HAU	= hours of annual use

Interest on Investment

Interest on investment is calculated using the following formula.

$$IC = \frac{(M + SV) \times IR \times .01}{2 \times HAU}$$

where
IC	= hourly interest cost on capital
M	= current market value, purchase price
SV	= salvage value, defined in depreciation calculations
HAU	= hours of annual use
IR	= interest rate, annual percent

Note on Hours of Annual Use of Tractors, Machinery and Implements

Hours of annual use (HAU) is a key variable in all the equations. The machinery cost in the budgets can be significantly different from an actual farm with different annual machinery use.

EQUIPMENT COST CALCULATION PROCEDURE

The costs of equipment such as augers, livestock handling equipment, etc. are calculated with defined data. The option to have costs calculated does not exist as with tractors and machinery. Depreciation, interest, insurance, taxes, fuel consumption, and repair and maintenance costs are all calculated from defined data.

Fuel Costs

Fuel costs are calculated by multiplying the annual use by the fuel price. The annual use is calculated by multiplying the specified gallons per hour of use by the annual hours of use. Not all equipment uses fuel.

Repair and Maintenance Calculations

The hours of owner and hired on-farm labor and off-farm purchased parts and labor for a specific repair and maintenance base hours of use level are defined. The formula for this calculation is as follows:

$$R = \frac{FHL \times CHL + FOL \times COL + PLS}{BASE}$$

where
R	= repair and maintenance cost per hour (R & M)
FHL	= on-farm hired labor (hr)
CHL	= cost of on-farm hired labor for R & M
FOL	= on-farm owner labor for R & M (hr)
COL	= cost of on-farm owner labor for R & M
PLS	= off-farm parts, labor and supplies for R & M
BASE	= operating hours on which repair and maintenance cost is based

Hired Labor

The amount of hired operator labor is specified on an hourly basis when the enterprise budget is defined. The hourly quantity is multiplied by the hourly labor wage stored in the labor resource file to determine hourly hired labor cost. This value is added to repair and maintenance hired labor to determine total hired labor cost.

Insurance

Insurance costs per hour are based on a fixed percentage of market value divided by hours of annual use.

$$INS = \frac{INR \times .01 \times M}{HAU}$$

where
INS	= insurance cost per hour
INR	= insurance rate based on current market value
M	= current market value
HAU	= hours of annual use

Depreciation

Depreciation is a measure of the actual decline in value of the equipment in the current year. It is dependent on the portion of remaining life used in the current year and on the current market value adjusted for salvage value.

$$D = \frac{\frac{HAU}{RL} \times M \times (1 - (SV \times .01))}{HAU}$$

where
D	= current depreciation per hour
HAU	= hours of annual use
RL	= remaining life
M	= current market value
SV	= salvage value as a percent of current market value

Interest on Investment

Interest costs per hour are based on the average amount of investment (market value) adjusted for one-half of depreciation in the current year. The total interest cost is then divided by hours of annual use.

$$IC = \frac{\left(M - \frac{D \times HAU}{2}\right) \times (IR \times .01)}{HAU}$$

where
IC	=	interest cost on capital
M	=	current market value
D	=	depreciation as defined in depreciation calculations
HAU	=	hours of annual use
IR	=	interest rate, annual percent

AUTO AND TRUCK COST CALCULATION PROCEDURES

The costs of operating automobiles and trucks include both fixed ownership costs and variable operating costs. Fixed costs include depreciation, interest on investment, annual insurance premium, license and tax. Operating costs include repair and maintenance costs, fuel costs and owner operator labor costs. Costs are calculated on a per hour and per mile basis.

Fuel

Fuel costs are calculated on both a per hour basis and on a per mile basis. Both are dependent on the efficiency of fuel use and on fuel costs. .

$$FCMI = \frac{FUC}{FU}$$
$$FCHR = FCMI \times MPH$$

where
FCMI	=	fuel cost per mile
FU	=	miles per gallon of fuel
FUC	=	fuel cost per gallon of fuel
FCHR	=	fuel cost per hour
MPH	=	average speed of operation in miles per hour

Repair and Maintenance Calculations

The hours of owner and hired on-farm and off-farm purchased parts and labor for a specific repair and maintenance base hours of use level are defined. The formula for this calculation is as follows:

$$R = \frac{FHL \times CHL + FOL \times COL + PLS}{BASE}$$

where
R	=	repair and maintenance cost per hour (R & M)
FHL	=	on-farm hired labor (hr)
CHL	=	cost of on-farm hired labor for R & M
FOL	=	on-farm owner labor for R & M (hr)
COL	=	cost of on-farm owner labor for R & M
PLS	=	off-farm parts, labor and supplies for R & M
BASE	=	operating hours on which repair and maintenance cost is based

Operator Labor

The number of hours of operator labor used for each vehicle is based on the number of hours the vehicle is in operation. Hours of annual use is determined by multiplying the number of miles the vehicle is driven annually by the average speed of operation.

$$OL = \frac{MAU \times LMULT}{MPH}$$

where
OL	=	hours of owner operator labor used annually
MPH	=	average speed of operation in miles per hour
MAU	=	miles of annual use
LMULT	=	labor multiplier

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Insurance, License, and Taxes

The annual insurance premium and any applicable licensing fees and taxes paid for each vehicle are defined values.

Depreciation

Depreciation is a measure of the actual loss of value in the auto or truck occurring in the current year. Thus it may be different than depreciation used for tax purposes. The formula takes the fraction of remaining life used in the current year (AU/RL) and multiplies it by the current market value of the auto or truck (M) less salvage value (LP * SV * .01).

$$D = \frac{AU}{RL} \times M \times (1 - (SV \times .01))$$

where
D	= current annual depreciation
AU	= annual use based on miles
RL	= remaining life based on miles
M	= current market value
SV	= salvage value as a percent of current market value

Interest on Investment

Interest on investment is calculated as the opportunity cost of capital. Interest is calculated on the actual market value of the vehicle less half the year's depreciation. This is justified by thinking of interest in the following manner: the opportunity cost of capital is the rate of return on capital which could be obtained in an alternative use. The alternative use of capital in this case would be to sell the vehicle and use the receipts in another investment.

$$IC = \left(M - \frac{D}{2}\right) \times (IR \times .01)$$

where
IC	= total interest cost or opportunity cost of investment
M	= current market value
D	= depreciation as defined in depreciation calculations
IR	= interest rate, annual percent

BREEDING, MILKING AND WORKING LIVESTOCK

The cost of owning livestock depends on whether the animals were raised or purchased. Raised animals must include all production inputs associated with raising the animal. Purchased animals are treated like any other purchased asset, so depreciation must be calculated. Livestock costs include interest on investment, insurance and property tax cost.

Livestock Insurance

$$INS = INR \times .01 \times M$$

where
INS	= insurance cost
INR	= insurance rate based on current market value (%)
M	= current market value

Depreciation (Purchased Livestock)

Depreciation is a measure of the actual loss of value in the purchased livestock occurring in the current year. Thus it may be different than depreciation used for tax purposes. The formula takes the fraction of remaining life used in the current year (1/RL) and multiplies it by the current market value of the livestock (M) less salvage value.

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$$D = \frac{M \times (1 - (SV \times .01))}{RL}$$

where

D	=	current annual depreciation
RL	=	remaining life
M	=	current market value
SV	=	salvage value as a percent of current market value

Interest on Investment

Purchased and raised animals are treated as a capital asset. There is an interest opportunity cost of holding onto the animal. This cost is calculated by the following formula:

$$IC = \left(M - \frac{D}{2}\right) \times (IR \times .01)$$

where

IC	=	opportunity cost of holding the animal
M	=	current market value
D	=	depreciation as defined in depreciation calculations
IR	=	interest rate, annual percent

BUILDING COST CALCULATION PROCEDURE

Building costs include both ownership costs and variable or operating costs. Ownership costs include depreciation, interest on investment, insurance and property tax. Operating costs include repair and maintenance costs and annual fuel costs or utility payments. The procedures and formulas to calculate these costs are given below.

Fuel or Utility Cost

Annual fuel or utility cost is defined.

Repair and Maintenance

The repair and maintenance cost calculation procedure requires the following data: off-farm parts and labor cost, and the number of hours of hired labor and operator labor which are used for repair and maintenance.

$$R = FHL \times CHL + FOL \times COL + PLS$$

where

R	=	annual repair and maintenance
FHL	=	on-farm hired labor (hr)
CHL	=	cost of on-farm hired labor
FOL	=	on-farm owner-operator labor (hr)
COL	=	cost of on-farm owner-operator labor
PLS	=	off-farm parts, labor and supplies

Labor

The labor for operation of the building is specified when the enterprise budget is defined. On-farm labor costs for maintenance and repair are calculated when repair and maintenance costs are determined.

Property Tax

The calculation of property tax is also straightforward. Annual property tax is entered as a $/yr value that appears in the fixed cost section of the budget.

Insurance

Insurance is the cost of insuring the capital investment (building) against loss or damage. Thus it is based on a percentage of the current market value of the building.

$$INS = INR \times .01 \times M$$

where
INS = insurance cost
INR = insurance rate based on current market value (%)
M = current market value

Depreciation

Depreciation is a measure of the actual loss of value in the building occurring in the current year. Thus it may be different than depreciation used for tax purposes.

$$D = \frac{M \times (1 - (SV \times .01))}{RL}$$

where
D = current annual depreciation
RL = remaining life (years)
M = current market value
SV = salvage value as a percent of current market value

Interest on Investment

Interest on investment is calculated as the opportunity cost of capital. Interest is calculated on the actual market value of the building less half the year's depreciation.

$$IC = \left(M - \frac{D}{2}\right) \times (IR \times .01)$$

where
IC = total interest or opportunity cost of investment
M = current market value
D = depreciation as defined in depreciation calculations
IR = interest rate, annual percent

OPERATING CAPITAL COST CALCULATION PROCEDURE

Annual operating capital is the short term capital required to finance cash variable and fixed costs during the enterprise production cycle. The MBMS program allows for the internally generated cash (e.g., from the sales of products of the enterprise) to offset the operating input expenses. Any cash surplus is carried forward as savings and any deficit constitutes an operating capital requirement. The annual capital requirement is the weighted average net capital requirement (weighted by the days outstanding). The annual operating capital is not the minimum or maximum of short-term financing required by the enterprise. Annual capital requirements may even be negative if accumulative monthly receipts are greater than expenses over the production cycle.

An example will illustrate how the annual operating capital interest borrowed and interest earned are derived. Suppose you can borrow money at 12% interest, and you can receive 12% interest on any cash surplus (called operating capital borrowed and surplus cash flow in the parameter file). Assume 100% of the operating capital is borrowed. The following table shows the effect of three transactions.

Date	Cash Receipts	Cash Expenses	Difference	Balance to Date	Days Outstanding	Annual Capital	Interest on OC
01/01/84	----	100	100	-100	----	--.---	--.---
01/15/84	50	----	50	-50	15	4.167	0.500
02/01/84	100	----	100	50	15	2.083	0.250
02/15/84	----	----	----	50	14	-1.944	0.233

The annual capital is calculated as the outstanding balance times the days outstanding divided by 360 (e.g., 100 X 15 / 360 = 4.167). This value times the interest rate yields interest paid or received (e.g., 4.167 X .12 = .5). In the budgets annual capital and interest will appear positive (+) for money borrowed and negative (-) for money earned, i.e., interest earned is a negative cost.

There are two operating capital interest rates in the budgets including: (1) interest rate on borrowed capital and (2) interest rate on equity capital. Separating operating capital into these categories allows for different interest rates.