

Understanding NMSU's Crop Cost and Return Budgets Enterprise Budgets Series 2/3

New Mexico's Crop Cost and Return Budgets

New Mexico State University's (NMSU) Cooperative Extension Service has developed and published enterprise budgets for many years, including whole farm budgets. Budgets for the previous ten years, since 2013, are available on the NMSU's website (<https://costsandreturns.nmsu.edu/>). The website links to both crop and livestock budgets, although this document will focus on crop budgets.

Crop budgets have been developed at the local or regional level as production practices, weather, and socio-economic demographics, among other factors, vary widely within the state. The budgets for 2022 were prepared for representative farms located in six counties/regions (Curry, Dona Ana & Sierra, Lea, Luna, and Roosevelt). In some cases, more than one farm type may be included for a single county or region. For example, in 2022's budget posting, four different farm types are provided for the Curry County region, representing different irrigation methods and/or crops.

The Enterprise Budgets developed and published by the New Mexico Cooperative Extension Services mostly align with the suggested formats of the United States Department of Agriculture (USDA) (AAEA Chapter 13, 2000) and are similar to formats used by most state Extension offices throughout the US. This document briefly discusses the structure of New Mexico's budgets and how the information in the budget might be used by stakeholders.

Budget Information

The budget uses information obtained from various sources, including primary sources such as producers and input suppliers, as well as secondary information or data such as US Department of Agriculture's statistics, academic journals, NMSU extension specialists' expert opinions. The crop budgets provide Extension's estimates of revenues and costs for a "representative farm with above average management." As such, the information in the budgets should be considered informational, and users should recognize that individual farm and farmer experiences will differ.

Budget Presentation

The budgets are summarized in tables that include:

- farm and acreage summary

- basic cost information
- overhead cost information
- per acre cost and returns
- whole farm summary

This report summarizes and explains the information that a user might expect to see in each of these sections, with an emphasis on the *Budgeted per Acre Cost and Returns* table. The following descriptions use the 2022 Curry County Flood Irrigation budget but are relevant to all the NMSU crop budgets.

Farm and Acreage Summary

The first table readers will observe within the budget is titled *Acreage Summary*. This table summarizes information about the representative farm, including where it is located, the total farm size (in acres), the type of irrigation system used on the farm, and the number of crops that are assumed to be produced. Additionally, the table describes the different crops the farm is assumed to produce, including acreage devoted to each crop and other non-crop uses, like roads and homestead acreage. The table also includes an estimate of the water available to the farm, such as the allocated water rights.

Basic Cost Information

The following table in the budget presentation is titled *Basic Cost Information*. This table summarizes the various input prices assumed to apply to the farm. The presentation of costs is itemized into multiple categories, including wages, purchased inputs (fertilizer, seeds, chemicals), fuel, employee insurance/benefits, financial rates, tax rates, and various management and supervision factors. A careful examination of the basic cost information shows that some of the costs may be considered economic in that they are included in the budget but have no corresponding accounting costs. For example, Table 2 provides supervision differentials for laborers that a producer may or may not pay. Additionally, the budget includes a management rate of seven percent to account for additional management costs but is not paid directly to the farm.

Overhead Cost Information

The third table presented in the budget is *Overhead Cost Information*. This table includes basic homestead costs for the farm, including utilities (electricity and telephone), accounting and legal services, insurance, and taxes. Additionally, the table includes other farm-related expenses not directly associated with production, such as building repairs and maintenance, small tools and homestead equipment, and other miscellaneous fees.

Enterprise Budgets

The next set of tables presents the enterprise budgets for each commodity produced on the farm. The enterprise budgets are generally given in six different sections, including:

- revenues
- purchased inputs
- preharvest operations
- harvest operations
- overhead expenses
- interest expenses

Revenues

The tables representing enterprise budgets may include allowances for various commodity-related revenues, like grazing or government payments. Generally, revenues are calculated simply as the price of the commodity or commodity-related revenue item multiplied by the per-acre yield.

Purchase Inputs

The purchased input section of the budget provides a summary of all purchased inputs required for production and generally includes various chemical purchases, including fertilizers, herbicides, and insecticides. While the budget will often assign a per-unit price and quantity-per-acre for these inputs, it will also include the cost of custom applications on a per-acre basis. In these cases, the budget assumes that the farm operating purchases a service rather than raw inputs. Additionally, the budget includes allocations for crop insurance. The purchased input budgets might consist of a line for purchased water, but for the most part, water and water pumping costs are included in the *preharvest operations* section.

Preharvest Operations

The Preharvest Operations section of the budget itemizes all field operations and their estimated costs, including those for land preparation, seed planting, chemical application, and various mechanical cultivation. The required power unit, like a tractor, for each operation, is identified, and the operation's accomplishment rate is determined. The accomplishment rate is the number of hours it takes to complete the operation for one acre. Costs associated with each pre-harvest operation include variable and fixed costs. Variable costs include labor, fuel and lubrication, and equipment repairs. Fixed costs are spread out over the farm's acreage but are not directly

associated with the operation. Examples of fixed costs include equipment depreciation, interest expense, and taxes.

Harvest Operations

Harvest operations in the NMSU crop cost and return budgets are often simplified by assuming that harvesting is a custom operation. As such, a per-acre cost is assigned to specific harvest operations, like combining and hauling.

Overhead Expenses

Several overhead expenses are included in the budgets. These include costs associated with downtime. Examples of downtime might consist of time needed for maintenance and repairs or the time spent moving equipment between fields. Other overhead expenses include employee benefits, insurance, land taxes, supervision and management expenses, and an allowance for other miscellaneous expenses such as electricity, telephone, accounting and legal, miscellaneous supplies and hand tools, pickup and auto, insurance (general liability, fire/theft), building repair and maintenance, property taxes (non-planted land, other than land and machinery), dues, fees, publications, and farmstead equipment.

Interest Expenses

The budgets include two interest expense categories: interest on operating capital and interest on equipment investment. For budgetary purposes, the interest expense on operating capital is calculated by accounting for the time that money may need to be borrowed for operations. Interest for purchased inputs, calculated on purchased inputs subtracting out fixed costs, is by convention charged for six months. Interest on preharvest operation costs of fuel, lube, and repair is charged for three months. Interest on harvest costs of fuel, lube, and repairs is charged for one month.

Returns

The final section in the enterprise budget tables is a summary of returns titled *Return to Land and Risk*. The table summarizes various measures of return on a “per-acre” basis associated with the operation. The summary includes the gross revenue (per acre), subtracting various costs to obtain intermediate levels of return or income. Costs that are subtracted from gross revenue

include variable operating expenses, fixed expenses, labor and management expenses, and capital expenses. (Figure 1). For example, Net farm income (or net return) is calculated by subtracting variable operating expenses plus fixed expenses from gross revenue (or gross return)

| |
|--|
| Gross Revenue |
| - Variable Operating Expenses |
| = Return Over Variable Expenses or Gross Margin |
| - Fixed Expenses |
| = Net Farm Income or Return to Capital, Labor, Land and Risk |
| - Labor and Management Expenses |
| = Net Operating Profit or Return to Capital, Land and Risk |
| - Capital Expenses |
| = Return to Land and Risk |

Figure 1. Measures of Return in NSMU's Crop Cost and Return Budgets.

Variable operating expenses fluctuate with the cost of items and frequency of purchase. Examples may include fuel, lube, and repair costs.

Fixed expenses include all expenses in the *Fixed Cost* column of the budget, with most of the associated costs found in the preharvest and overhead expense sections.

Labor expenses include all expenses in the *Labor* column of the budget.

Capital expenses are the sum of the two interest expenses described above, i.e., interest on operating capital and interest on equipment. There are opportunity costs.

As the budgets do not account for the cost of land, the *Return on Land and Management* presents revenues minus the expenses identified above remaining to pay for land and owner management.

Summary Tables

The last two tables in the NMSU Crop Cost and Return budgets provide a summary of costs and returns detailed in the enterprise budget and a whole farm summary. The *per acre costs and returns* table summarizes the gross return and the various expense categories necessary to calculate the measures of return described in Figure 1, with the different revenues and expenses for crops assumed to be produced on the farm in other columns. The number of crops depends on the number of crops assumed to be produced on the farm. In the 2022 budget, the number of crops ranged from two in Curry County to thirteen in Doña Ana and Sierra County.

The last table included in the budgets is a whole farm summary that summarizes revenues and expenses for the entire farm. The summary ends with a table that provides two measures of return, *Return to Risk* and *Return on Investment*, that vary depending on land value.

Summary

NMSU's Crop Cost and Return Budgets are estimates of the costs and returns associated with producing crops throughout the state. The budgets are developed and presented in forms consistent with formats that the USDA has suggested. The budgets provide estimates of the costs and returns that might be expected for New Mexico farms with above-average management. As such, users of the budgets should use them as a guide and not consider them exact return and cost estimates.

Understanding NMSU's Crop Cost and Return Budgets with an Example

To learn more about costs and returns, visit the NMSU website (<http://costsandreturns.nmsu.edu>), which has a historical library of enterprise budgets organized by county. The county-level budgets are identified by farming practices such as irrigation or a combination of crops and enterprises such as sprinklers, flooded, or dryland for various crops. For example, if you click Curry Dryland, the website identifies five pages of enterprise budget information. These pages identify the economic characteristics of a representative farm for Curry County (Table 1), basic assumptions used for estimating costs (Table 2), and overhead expenses (Table 3). Four more tables are presented in the enterprise budget, which includes individual crop costs and returns estimates (Table 5-6), a side-by-side summary of individual crop costs and returns (Table 7), and a whole-farm summary (Table 8).

The most important tables regarding cost and returns are the individual crop costs and returns estimates, both on a per-acre basis. The tables are organized by the calendar of work operations

such as purchased inputs, preharvest, harvest, post-harvest operations, and overhead expenses. This information identifies which operations generate the greatest input costs and cash necessary to cover those costs, which is important information to have in hand when conducting a cash flow analysis.

We will review this sheet by dividing it into eight parts based on work operations, using the wheat enterprise sheet in Curry Dryland in 2022 as an example.

Reading Individual Crop Costs and Returns Estimates – Table 5

1) Title

The title of Table 5 shows the size of the representative farm, the level of management, county, projected year, planting and harvesting dates. The table below shows that for the Curry dryland, this farm operates 1,600 acres with above-average management practices. The farm plants dates in early fall and harvest dates in late spring.

| | | | | | | | | | | |
|----------|---|--|--|--|--|--|--|--|--|--|
| TABLE 5. | Wheat, dryland, budgeted per acre costs and returns for a 1,600 acre farm with above average management, Curry County, Projected 2022 | | | | | | | | | |
| | Planting Dates: September 1 - October 15 | | | | | | | | | |
| | Harvesting Dates: June 15 - July 15 | | | | | | | | | |

2) Gross Return – the top part of the sheet

Gross Returns are defined as total cash receipts, which may include direct sales (price per unit times total production units), government payments (program payment, price loss coverage payment), crop insurance payments, and byproducts (grazing, hay, straw, etc...). The example below shows wheat return at \$7.62/bushel * production of 18 bushels = \$137.16. Total return for this example is \$157.16, including grazing return.

| ITEM | PRICE | YIELD | Base | TOTAL |
|-----------------|---------|---------------|------|----------|
| GROSS RETURNS | | | | |
| WHEAT | \$7.62 | 18.00 BUSHELS | | \$137.16 |
| PROGRAM PAYMENT | \$0.00 | 18.00 BUSHELS | 0.85 | \$0.00 |
| PLC PAYMENT | \$0.00 | | | \$0.00 |
| GRAZING | \$20.00 | 1.00 ACRE | | \$20.00 |
| TOTAL(A) | | | | \$157.16 |

3) Purchased Inputs cost – the second part of the sheet

Purchased inputs include seeds, fertilizers, chemicals, and crop insurance. The example below provides seed and herbicide costs calculated as price times quantity. Hence, seed cost equals \$0.40 x 30 lbs. = \$12.00, and herbicide cost is \$7.05. With crop insurance of \$0.08 per acre, the subtotal of purchased inputs costs is \$19.13 per acre.

| PURCHASED INPUTS | PRICE | QUANTITY | PURCHASED INPUTS | FIXED COST | TOTAL |
|------------------|--------|----------|------------------|------------|---------|
| SEED | \$0.40 | 30 LBS | \$12.00 | | \$12.00 |
| HERBICIDE | \$7.05 | 1 ACRE | \$7.05 | | \$7.05 |
| CROP INSURANCE | \$0.08 | | \$0.08 | | \$0.08 |
| SUBTOTAL | | | \$19.13 | | \$19.13 |

4) Preharvest operation costs – the third part of the sheet

Here, this part of the budget includes machinery costs. In general, machinery costs are separated into variable and fixed costs. The variable costs are labor, fuel & lube, and repairs that vary by production level. The fixed costs are depreciation and taxes on the machinery that DO NOT vary by production level.

The table below includes machinery used in preharvest operations, such as a sweep, a rod weeder, and a drill, all powered by tractors. In parenthesis, the 2X indicates the sweep operation is performed twice, i.e., two passes across the field. The next column, *Power Unit*, shows the tractor's horsepower (300 HP), followed by the accomplishment rate per acre, detailing how much labor is required when performing the pre-harvest operations. The remaining columns list labor, fuel & lube, repair, and fixed costs for each implement, followed by the total cost per operation. This example indicates that the sweep plow operation, powered by a 300-hp tractor that requires 0.1 hour (6 minutes) of time, a cost per acre of \$0.78 for labor, \$4.94 for fuel & lube, \$1.83 for repairs, and \$7.03 for fixed costs generating a total cost of \$14.58.

| PREHARVEST OPERATIONS | POWER UNIT | ACCOMPLISHMENT RATE | PURCHASED INPUTS | LABOR | FUEL & LUBE | REPAIRS | FIXED COST | TOTAL |
|-----------------------|------------|---------------------|------------------|--------|-------------|---------|------------|---------|
| SWEEP (2X) | 300 HP | 0.10 HR | | \$0.78 | \$4.94 | \$1.83 | \$7.03 | \$14.58 |
| ROD WEEDER | 300 HP | 0.05 HR | | \$0.39 | \$2.47 | \$0.57 | \$3.23 | \$6.66 |
| DRILL | 300 HP | 0.05 HR | | \$0.39 | \$2.47 | \$0.68 | \$4.58 | \$8.12 |
| SUBTOTAL | | 0.20 HR | | \$1.55 | \$9.87 | \$3.08 | \$14.85 | \$29.35 |

Fixed costs include depreciation and taxes. The depreciation expenses are annual allowances for the deterioration of machinery whose service life is greater than one year. Depreciation is not paid in cash but is an implicit expense to the business since the purchase price of a long-term asset such as machinery cannot, and should not, be deducted in a single year. For example, if a producer buys a tractor, the cost of the tractor is spread over its lifetime, usually in a uniform manner. The tax cost on machinery is the annual rate charged by local and state municipalities in New Mexico.

Estimating machinery cost requires some basic information about machinery types and numbers in use, their annual use, age, expectation of future life, new and current market values, percentage of the enterprise use, and fuel cost (\$ per gallon) based on this information and previously formulated equations, machinery costs are estimated.

5) Harvest operation costs

For the harvest operation, the representative farm used custom operation services, and outside operators were hired to perform the harvest work. The table below shows the hired costs for the combine and haul operations, which can be considered purchased inputs since no additional machinery costs are incurred, such as those included in the previous table. In the example below, the farm paid \$9.25 per acre for combine and \$2.88 per acre for hauling costs.

| HARVEST OPERATIONS | | | | | | | | | | |
|--------------------|--|--|--|--|--|--|--|--|---------|---------|
| COMBINE (CUSTOM) | | | | | | | | | \$9.25 | \$9.25 |
| HAUL (CUSTOM) | | | | | | | | | \$2.88 | \$2.88 |
| SUBTOTAL | | | | | | | | | \$12.13 | \$12.13 |

6) Overhead costs

Overhead expenses are not directly associated with production but contribute to crop production. The table below shows overhead costs, including downtime, insurance (employee liability insurance), employee benefits, land taxes, producer’s supervision and management, and other expenses mentioned above. In the below table, downtime took about 0.05 hours/acre and cost \$0.39 per acre.

| OVERHEAD EXPENSES | ACCOMPLISHMENT RATE | PURCHASED INPUTS | LABOR | FUEL & LUBE | REPAIRS | FIXED COST | TOTAL |
|----------------------------|---------------------|------------------|---------|-------------|---------|------------|---------|
| DOWNTIME | 0.05 HR | | \$0.39 | | | | \$0.39 |
| EMPLOYEE BENEFITS | | | \$0.28 | | | | \$0.28 |
| INSURANCE | | \$0.03 | | | | | \$0.03 |
| LAND TAXES | | | | | | \$40.00 | \$40.00 |
| SUPERVISION AND MANAGEMENT | | | \$11.20 | | | | \$11.20 |
| OTHER EXPENSES | | \$22.26 | | | | | \$22.26 |
| SUBTOTAL | 0.05 HR | \$22.29 | \$11.87 | | | \$40.00 | \$74.16 |

7) Overall returns and costs

The costs below are calculated based on the above tables.

Total operating expense is the sum of the above four tables’ subtotals, including all cost items for growing the wheat enterprise in Curry County dryland (line B).

Net operating profit is gross returns minus total operating expenses. If this value is zero, it is not bad since total operating expenses are covered by paid and unpaid expenses (line C = A-B).

| | | | | | | | |
|-------------------------------------|---------------------|------------------|---------|-------------|---------|------------|----------|
| TOTAL OPERATING EXPENSES(B) | ACCOMPLISHMENT RATE | PURCHASED INPUTS | LABOR | FUEL & LUBE | REPAIRS | FIXED COST | TOTAL |
| | 0.25 HR | \$53.55 | \$13.42 | \$9.87 | \$3.08 | \$54.85 | \$134.78 |
| NET OPERATING PROFIT(C=A-B) | | | | | | | \$22.38 |
| INTEREST ON OPERATING CAPITAL(1) | (\$10.25 @ | 8.50% |) | | | | \$0.87 |
| INTEREST ON EQUIPMENT INVESTMENT(2) | | | | | | | \$8.17 |
| RETURN TO LAND AND RISK(D=C-1-2) | | | | | | | \$13.34 |

The above table also shows the interest on operating capital and equipment investment. These are opportunity costs. If the producer does not use this money for growing crops and saves it in the bank or invests money in other businesses, it could generate a return (Lines I1 and I2). For example, if cash used in crop production could be placed in the bank savings account at a 5% annual yield, the opportunity cost of cash from the crop would be 5% of the operating costs.

Return to Land and Risk: net operating profit minus the interest charge on the use of machinery, equipment, and operating capital (Line D = C – I1 – I2). It is \$13.34 from the above table, meaning that it is the return of wanting to grow wheat on the land rather than other land uses.

8) Budget Summary – income indicators for wheat enterprise

i) Gross margin = Gross return - variable costs, also called returns over variable expenses. This value indicates the farm’s ability to cover costs in the short term. Gross margin is one of the most important measures of whether an enterprise survives in the short term (Line E). The table below shows the gross margin of \$90.56, indicating the enterprise’s ability to cover costs successfully in the short run.

ii) Net farm income = gross margin – fixed cost, also called return on capital, labor, land & risk, indicating covering variables and fixed costs (line F). The table below shows net farm income is \$35.80. Hence, this wheat enterprise is doing fine in 2022.

iii) Net operating profit = Net farm income – labor and management, covering variable, fixed, and labor costs (line D) as mentioned in part (5). This value is also called the return to land and risk. The table below shows that the net operating profit is \$22.38.

| BUDGET SUMMARY | | | |
|----------------------------------|---------|----------|---|
| GROSS RETURN(A) | | \$157.16 | |
| VARIABLE OPERATING EXPENSES | \$66.51 | | |
| RETURN OVER VARIABLE EXPENSES(E) | | \$90.65 | (GROSS MARGIN) |
| FIXED EXPENSES | \$54.85 | | |
| NET FARM INCOME(F) | | \$35.80 | (RETURN TO CAPITAL, LABOR, LAND & RISK) |
| LABOR AND MANAGEMENT COST | \$13.42 | | |
| NET OPERATING PROFIT(C) | | \$22.38 | (RETURN TO CAPITAL, LAND & RISK) |
| CAPITAL COSTS(i1+i2) | \$9.04 | | |
| RETURN TO LAND AND RISK(D) | | \$13.34 | |

Reference

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