

Economics of Sugarbeet Production

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Sugarbeet production presents many economic challenges from cost of production and production issues to concerns with government sugar policy. Sugarbeet are the highest value crop produced in the region, with corresponding high costs of production. This chapter will address these costs of production in detail. First, cost of production budgets will be developed to present the cost categories and value associated with both gravity and center pivot irrigated sugarbeet production. Second, an analysis of the different cost categories and the potential to reduce production costs through various management practices will be outlined. Finally, a method to evaluate the farm level economic impact of the adoption of a new production practice or technology will be discussed.

Cost of Production Budgets

Sugarbeet are one of the highest cost crops grown in the region, costing more than \$600 per acre in most production systems. Cash costs regularly exceed \$400 per acre. Expensive specialized machinery, irrigation costs, and high input costs all contribute to the overall production costs.

The budgets used in this chapter were developed using interview data and machinery cost estimates developed by the University of Nebraska. Two enterprise budgets are presented in this chapter. First, the budget for gravity irrigated sugarbeet in the region is shown in *Table 14.1*. Second, a center pivot sprinkler irrigated budget is shown in *Table 14.2*. There are some differences in costs between these budgets, the most significant being the irrigation costs and the allocation of these costs. In addition, the gravity irrigated farms traditionally are smaller acreages resulting in higher fixed costs on a per acre basis.

The budgets are broken down into a variable cost section describing the individual operations and a fixed cost section describing the fixed cost on a cumulative basis. The variable costs for each operation include labor, fuel and lubrication, repairs, and materials and custom work required. Depreciation and interest, as estimated by the University of Nebraska, for the machinery used in these operations is found in the fixed cost section under the machinery heading. In addition, the fixed and variable costs for each operation are listed in *Table 14.3*. These operation costs are helpful when deciding whether to buy new machinery or use custom operations to substitute for machinery ownership. Additional operations may be added to these estimates, as well as extra operations subtracted from the budgets. One should also take care to review the inputs used in these estimates and make adjustments as necessary. Not all growers will use the same set of inputs at the same rates, so adjustments will be necessary in many cases.

Operating interest, general overhead, and operator management are assessed on the variable costs. Operating interest should reflect the amount of interest required to repay operating loans at a lending institution, or repay the grower for interest that could have been earned on money being used to grow a crop.

Process for changing from a defined operation to a custom operation in the budget

Step 1

Remove the variable costs of the plowing operation from the budget. Subtract \$6.35 from the total variable costs of \$372.81 leaving “your cost” of \$366.46.

Example line from gravity budget.

| Variable Costs Operation | Cost per acre | | | | | | Your cost |
|-----------------------------|----------------------|--------------|-------------|--------------|--------------------|-----------------|---------------|
| | Operation Acres/hour | Labor | Fuel & lube | Repairs | Materials & custom | Total | |
| Plow | 2.89 | 3.15 | 1.29 | 1.91 | 0.00 | 6.35 | 0.00 |
| Total Variable Costs | | 77.45 | 9.64 | 19.60 | 217.17 | \$372.81 | 366.46 |

Step 2

Determine the fixed costs for plowing in *Table 14.3* (depreciation = \$4.29 and interest = \$4.19.). Subtract these costs from the depreciation and interest lines on the budget and enter the new values in the “your cost” column. Total the fixed costs using the new values for depreciation and interest.

| Fixed Costs | | | | |
|--------------------------|------------------------|--|-----------------|---------------|
| Machinery | From <i>Table 14.3</i> | | | |
| Depreciation | | | 58.68 | 54.39 |
| Interest | @ 6.50% | | 50.53 | 46.34 |
| Total Fixed Costs | | | \$252.49 | 244.01 |

Step 3

Add in the additional line item for custom plowing as variable cost and adjust the total cost appropriately. For this example, custom plowing will cost \$14.00 per acre to be added into the variable cost section in the “your cost” column.

| Variable Costs Operation | Cost per acre | | | | | | Your cost |
|-----------------------------|----------------------|------------------------------|-------------|---------|--------------------|-----------------|-----------|
| | Operation Acres/hour | Labor | Fuel & lube | Repairs | Materials & custom | Total | |
| Plow (Custom) | | | | | | | 14.00 |
| Total Variable Costs | | As adjusted in step 1 -----> | | | | \$366.46 | 380.46 |
| Total Fixed Costs | | As adjusted in step 2 -----> | | | | \$244.01 | |
| Total of All Costs | | | | | \$625.30 | \$624.47 | |

The general overhead is used to account for such items as farm liability insurance, irrigation supplies, shop supplies and other incidentals necessary to keep the farm operating efficiently. The management charge is what the operator should expect as a return for providing the expertise required to produce a quality sugarbeet crop.

With the high costs of production faced by sugarbeet producers, it is imperative that good production cost estimates be available for use as a planning tool. These budgets are a good place for growers to begin estimating their sugarbeet production costs and, when used in conjunction with their records and knowledge of individual production practices, can be helpful in making sound economic decisions. Use the column labeled “Your Cost” for those areas that may be inaccurate for a specific operation. These enterprise budgets should be used as a planning tool and are not expected to represent any specific actual farm. The user is expected to make the necessary adjustments to fit each farm unit.

The example on page 190 outlines the process for changing from one of the defined operations to a custom operator. The example shows how to insert “custom plowing” for “plowing” in the gravity irrigated budget.

The net result of substituting the custom plowing cost for the grower owned plowing operation is as follows:

- a) A net increase in variable costs by \$7.65, from \$372.81 to \$380.46. Variable costs were reduced by \$6.35 when the plowing operation was removed, and increased by \$14.00 when the custom operation was inserted.
- b) Fixed costs were reduced by \$8.48, from \$252.49 to \$244.01.
- c) Total costs of production were reduced by \$0.83, from \$625.30 to \$624.47.

This process may be used to change, remove or add any operation required to tailor the budget to an individual operation.

Tables 14.1 and 14.2 are fillable tables. Calculate your revenue and type it in the right column. Once the form is filled out, you may click the PRINT button to PRINT this page or click on the CLEAR button to start a new calculation.

Table 14.1

Enterprise budget for gravity irrigated sugarbeet, High Plains Area, March 2000.

| Projected revenue | | | Yield | Price | | | Total | Your |
|--|-------------------------------------|--------------|-----------------------------|--------------|--------------------|-----------------|-----------|---------|
| Crop | | | tons/acre | \$/ton | | | revenue | revenue |
| Sugarbeet | | | 20.00 | 36.00 | | | \$720.00 | _____ |
| Variable Costs | Cost per acre | | | | | | | |
| Operation | Operation acres/hour | Labor | Fuel & lube | Repairs | Materials & custom | Total | Your cost | |
| Disc | 10.63 | 0.83 | 0.50 | 0.60 | 0.00 | 1.93 | _____ | |
| Spread fertilizer | 16.04 | 0.53 | 0.16 | 0.20 | 36.90 | 37.79 | _____ | |
| <i>120-50-0 Fertilization rate</i> | | | | | | | | |
| Plow | 2.89 | 3.15 | 1.29 | 1.91 | 0.00 | 6.35 | _____ | |
| Roller harrow | 6.55 | 1.35 | 0.79 | 0.63 | 0.00 | 2.77 | _____ | |
| Roller harrow w/chem | 6.55 | 1.35 | 0.79 | 0.63 | 18.80 | 21.57 | _____ | |
| <i>Roneet 2.5 pt/ac @ \$7.52/pt</i> | | | | | | | | |
| Plant | 3.50 | 2.52 | 0.57 | 1.62 | 57.78 | 62.49 | _____ | |
| <i>Sugarbeet seed @ \$40.00/acre</i> | | | | | | | | |
| <i>Counter 7 lb/ac @ \$2.54/lb</i> | | | | | | | | |
| Rotary hoe | 13.44 | 0.60 | 0.18 | 0.27 | 0.00 | 1.05 | _____ | |
| Cultivate | 2.50 | 3.60 | 0.84 | 1.45 | 0.00 | 5.89 | _____ | |
| Band spray | 8.50 | 0.98 | 0.15 | 0.48 | 17.48 | 19.09 | _____ | |
| <i>Betamix 12 oz/ac @ \$103.00/gal</i> | | | | | | | | |
| <i>Upbeet 0.17 oz/ac @ \$46.00/oz</i> | | | | | | | | |
| Cultivate | 2.50 | 3.60 | 0.84 | 1.45 | 0.00 | 5.89 | _____ | |
| Band spray | 8.50 | 0.98 | 0.15 | 0.48 | 17.48 | 19.09 | _____ | |
| <i>Betamix 12 oz/ac @ \$103.00/gal</i> | | | | | | | | |
| <i>Upbeet 0.17 oz/ac @ \$46.00/oz</i> | | | | | | | | |
| Ditch | 5.29 | 1.73 | 0.80 | 0.79 | 0.00 | 3.32 | _____ | |
| Hand weeding | | | | | 20.00 | 20.00 | _____ | |
| Irrigation labor | Season | 50.00 | 0.00 | 0.00 | 0.00 | 50.00 | _____ | |
| Spray cercospora | Custom | 0.00 | 0.00 | 0.00 | 8.73 | 8.73 | _____ | |
| <i>Supertin 5 oz/ac @ \$2.34/lb</i> | | | | | | | | |
| <i>Aerial spray @ \$8.00/acre</i> | | | | | | | | |
| Defoliate | 5.60 | 1.65 | 0.47 | 1.24 | 0.00 | 3.36 | _____ | |
| Lift | 2.80 | 3.23 | 1.32 | 7.52 | 0.00 | 12.07 | _____ | |
| Haul to pile | Custom | 0.00 | 0.00 | 0.00 | 40.00 | 40.00 | _____ | |
| <i>Custom trucking @ \$2.00/ton</i> | | | | | | | | |
| Subsoil | 6.58 | 1.35 | 0.79 | 0.33 | 0.00 | 2.47 | _____ | |
| Crop insurance | | | | | | 15.00 | _____ | |
| Operating interest | | | <i>10% for 6 months</i> | | | 16.19 | _____ | |
| General overhead | | | <i>5% of variable costs</i> | | | 17.75 | _____ | |
| Total Variable Costs | | 77.45 | 9.64 | 19.60 | 217.17 | \$372.81 | _____ | |
| Fixed Costs | | | | | | | | |
| Machinery | From Table 14.3 | | | | | | | |
| Depreciation | | | | | | 58.68 | _____ | |
| Interest | | | | | | 50.53 | _____ | |
| <i>@ 6.50%</i> | | | | | | | | |
| Irrigation | | | | | | | _____ | |
| Water taxes | | | | | | 25.00 | _____ | |
| Land | Land investment \$1,200.00 per acre | | | | | | | |
| Interest | | | | | | 60.00 | _____ | |
| Real estate taxes | | | | | | 21.00 | _____ | |
| <i>@ 1.75%</i> | | | | | | | | |
| Operator management | | | | | | 37.28 | _____ | |
| <i>10% of variable costs</i> | | | | | | | | |
| Total Fixed Costs | | | | | | \$252.49 | _____ | |
| Total of All Costs | | | | | | \$625.30 | _____ | |

Table 14.2

Enterprise budget for center pivot irrigated sugarbeet, High Plains Area, March 2000.

| Projected revenue | | Yield | Price | | Total | Your | |
|--|--|---------------|--------------|--------------|--------------------|-----------------|-----------|
| Crop | | tons/acre | \$/ton | | revenue | revenue | |
| Sugarbeets | | 20.00 | 36.00 | | \$720.00 | | |
| Variable Costs | | Cost per acre | | | | | |
| Operation | Operation acres/hour | Labor | Fuel & lube | Repairs | Materials & custom | Total | Your cost |
| Disc | 12.14 | 0.75 | 1.01 | 0.74 | 0.00 | 2.50 | |
| Spread fertilizer | 16.04 | 0.53 | 0.16 | 0.20 | 36.90 | 37.79 | |
| <i>120-50-0 Fertilization rate</i> | | | | | | | |
| Plow | 3.47 | 2.63 | 1.62 | 2.31 | 0.00 | 6.56 | |
| Roller harrow | 9.16 | 0.98 | 0.58 | 0.74 | 0.00 | 2.30 | |
| Plant | 3.50 | 2.14 | 0.76 | 0.94 | 90.21 | 94.05 | |
| <i>Sugarbeet seed @ \$40.00/acre</i> | | | | | | | |
| <i>Counter 7 lb/ac @ \$2.54/lb</i> | | | | | | | |
| <i>Nortron 24 oz/ac @ \$172.95/gal</i> | | | | | | | |
| Rotary hoe | 17.92 | 0.53 | 0.22 | 0.24 | 0.00 | 0.99 | |
| Cultivate | 7.05 | 1.28 | 0.64 | 0.38 | 0.00 | 2.30 | |
| Band spray | 9.16 | 0.98 | 0.15 | 0.48 | 17.48 | 19.09 | |
| <i>Betamix 12 oz/ac @ \$103.00/gal</i> | | | | | | | |
| <i>Upbeet 0.17 oz/ac @ \$46.00/oz</i> | | | | | | | |
| Cultivate | 7.05 | 1.28 | 0.64 | 0.38 | 0.00 | 2.30 | |
| Band spray | 9.16 | 0.98 | 0.15 | 0.48 | 17.48 | 19.09 | |
| <i>Betamix 12 oz/ac @ \$103.00/gal</i> | | | | | | | |
| <i>Upbeet 0.17 oz/ac @ \$46.00/oz</i> | | | | | | | |
| Ditch | 7.05 | 1.28 | 0.64 | 0.38 | 0.00 | 2.30 | |
| Hand weeding | | | | | 15.00 | 15.00 | |
| Irrigation | Season | 5.00 | 21.47 | 4.28 | 17.40 | 48.15 | |
| <i>Electric hookup charge \$17.40/acre</i> | | | | | | | |
| Spray cercospora | Custom | 0.00 | 0.00 | 0.00 | 8.73 | 8.73 | |
| <i>Supertin 5 oz/ac @ \$2.34/lb</i> | | | | | | | |
| <i>Aerial spray @ \$8.00/acre</i> | | | | | | | |
| Defoliate | 5.60 | 1.65 | 0.47 | 1.52 | 0.00 | 3.64 | |
| Lift | 2.80 | 3.23 | 1.64 | 7.29 | 0.00 | 12.16 | |
| Haul to pile | Custom | 0.00 | 0.00 | 0.00 | 60.00 | 60.00 | |
| <i>Custom trucking @ \$3.00/ton</i> | | | | | | | |
| Subsoil | 8.48 | 1.05 | 0.63 | 0.38 | 0.00 | 2.06 | |
| Crop insurance | | | | | | 15.00 | |
| Operating interest | | | | | | 16.95 | |
| <i>10% for 6 months</i> | | | | | | | |
| General overhead | | | | | | 18.55 | |
| <i>5% of variable costs</i> | | | | | | | |
| Total Variable Costs | | 24.29 | 30.78 | 20.74 | 263.20 | \$389.51 | |
| Fixed Costs | | | | | | | |
| Machinery | From Table 14.3 | | | | | | |
| Depreciation | | | | | | 37.50 | |
| Interest | | | | | | 33.50 | |
| Irrigation | Irrigation investment \$48.00 per acre | | | | | | |
| Depreciation | | | | | | 4.56 | |
| Interest | @ 6.25% | | | | | 2.99 | |
| Land | Land investment \$1,100.00 per acre | | | | | | |
| Interest | @ 5.0% | | | | | 55.00 | |
| Real estate taxes | @ 1.75% | | | | | 19.25 | |
| Operator management | 10% of variable costs | | | | | 38.95 | |
| Total Fixed Costs | | | | | | \$191.75 | |
| Total of All Costs | | | | | | \$581.26 | |

Table 14.3

Operation list and associated costs for each operation by irrigation method.

| Operation | Variable costs (\$/acre) | | | Fixed costs (\$/acre) | | Total |
|--------------------------|--------------------------|-------------|---------|-----------------------|----------|-------|
| | Labor | Fuel & lube | Repairs | Depreciation | Interest | |
| Gravity Irrigated | | | | | | |
| Disc | 0.83 | 0.50 | 0.60 | 1.76 | 1.41 | 5.10 |
| Spread fertilizer | 0.53 | 0.16 | 0.20 | 0.39 | 0.33 | 1.61 |
| Plow | 3.15 | 1.29 | 1.91 | 4.29 | 4.19 | 14.83 |
| Roller harrow | 1.35 | 0.79 | 0.63 | 3.85 | 3.14 | 9.76 |
| Roller harrow w/chem | 1.35 | 0.79 | 0.70 | 4.38 | 3.78 | 11.00 |
| Plant | 2.52 | 0.57 | 1.62 | 3.20 | 2.72 | 10.63 |
| Rotary hoe | 0.60 | 0.18 | 0.27 | 0.97 | 0.81 | 2.83 |
| Cultivate | 3.60 | 0.84 | 1.45 | 2.88 | 2.49 | 11.26 |
| Band spray | 0.98 | 0.15 | 0.48 | 0.82 | 0.67 | 3.10 |
| Ditch | 1.73 | 0.80 | 0.79 | 1.71 | 1.44 | 6.47 |
| Defoliate | 1.65 | 0.47 | 1.24 | 8.88 | 7.57 | 19.81 |
| Lift | 3.23 | 1.32 | 7.52 | 19.59 | 16.39 | 48.05 |
| Subsoil | 1.35 | 0.79 | 0.33 | 2.26 | 2.43 | 7.16 |
| Pivot Irrigated | | | | | | |
| Disc | 0.75 | 1.01 | 0.74 | 1.90 | 1.51 | 5.91 |
| Spread fertilizer | 0.53 | 0.16 | 0.20 | 0.42 | 0.51 | 1.82 |
| Plow | 2.63 | 1.62 | 2.31 | 4.21 | 3.59 | 14.36 |
| Roller harrow | 0.98 | 0.58 | 0.74 | 2.24 | 1.80 | 6.34 |
| Plant | 2.14 | 0.76 | 0.94 | 3.83 | 3.66 | 11.33 |
| Rotary hoe | 0.53 | 0.22 | 0.24 | 0.92 | 0.94 | 2.85 |
| Cultivate | 1.28 | 0.64 | 0.38 | 1.37 | 1.01 | 4.60 |
| Band spray | 0.98 | 0.15 | 0.48 | 0.76 | 0.63 | 3.00 |
| Ditch | 1.28 | 0.64 | 0.38 | 1.52 | 1.36 | 5.18 |
| Defoliate | 1.65 | 0.47 | 1.52 | 3.34 | 4.17 | 11.15 |
| Lift | 3.23 | 1.64 | 7.29 | 13.08 | 10.82 | 36.06 |
| Subsoil | 1.05 | 0.63 | 0.38 | 1.78 | 1.86 | 5.70 |

Evaluation of Production Cost Categories

Within the preceding production cost budgets, some areas would be difficult to change through improved management practices, while other areas may be significantly impacted by changing management strategies. Economies of scale can be captured within the sugarbeet production system in many of the cost areas. In addition, careful consideration of management practices such as crop scouting and soil testing will allow the sugarbeet producer to control the input costs per acre.

Agricultural producers can take advantage of economies of scale by spreading machinery, labor, and management resources over the optimum number of acres. Many of the resources required for sugarbeet production are specialized for this crop, requiring large capital or human resource investments to remain competitive. To reduce the per acre impact of these large investments, increased economies of scale may be accomplished by increasing the number of sugarbeet acres farmed. With the present rotational restrictions associated with sugarbeet,

an increase in sugarbeet acreage will require increasing the overall size of the operation or leasing land exclusively for sugarbeet production.

Another strategy for increasing economies of scale would be to share high cost resources among a cooperative group of farmers to spread the cost of those resources over an increased number of sugarbeet acres. Several smaller producers may be able to share the cost of planters, harvest equipment, trucks, and management expertise to decrease the overall fixed costs to each producer. Operators who enter into this type of arrangement will need to develop a level of trust and cooperation that allows for the benefits to be shared among all the participants.

Use of management tools such as crop scouting (either hired or done by the manager), soil testing, and pooling input purchases with other producers will allow the producer to control the high costs of inputs required for sugarbeet production. Crop scouting and soil testing will allow producers to apply pesticides and fertilizers as required instead of making input applications based on historic rates and tradition. With the high cost of inputs required for sugarbeet production, managing these costs is critical to the profitability of sugarbeet production.

Land, water, and labor costs are difficult to reduce within the present sugarbeet production system. This is a crop that requires high quality land with access to a consistent and large water supply. With these requirements, it is difficult to acquire land at low cost. High quality land is usually bid higher by producers interested in renting or owning land that has the productive capability to produce any area crop with a high yield potential. Water costs are either fixed, in the case of the gravity irrigated areas, or tied to the investment and energy costs required for the pumps and machinery required for center pivot irrigation. Sugarbeet is a labor intensive crop that has reduced the amount of labor required over the past several years by adopting plant-to-stand and chemical weed control practices. Growers who have not adopted these practices may realize cost savings with these technologies, but those who have already taken these steps will find limited labor cost savings. The budgets presented in *Tables 14.1* and *14.2* have incorporated plant-to-stand and chemical weed control technology.

Partial Budgets for Decision Making

As new technologies, advancements in equipment, and opportunities to have custom operators complete some of the tasks required for sugarbeet production become available, it is important that growers have the ability to do an economic evaluation. This section will explain how a partial budget may be used to evaluate new or alternative production practices. The partial budget shows how to determine the potential costs and benefits of adopting a new technology such as transgenic sugarbeet.

The partial budget is used to determine the change in net income based on the changes in costs and revenues from the production change being considered. There are four areas to consider when developing a partial budget:

- 1) **The additional costs associated with the change.** For the transgenic sugarbeet example, these costs will include the chemicals to be used, the technology fee associated with the seed, and any additional trips across the field with the sprayer.

- 2) **The reduced returns from any lost production or sales associated with the change.** The first two items will then be totaled to determine the potential income reducing components from the change.
- 3) **The additional returns due to the change.** In the case of transgenic sugarbeet, increased yield times the price received will determine the additional returns.
- 4) **Reduced costs of production.** In the transgenic sugarbeet system, the traditional chemical regime would be considered as reduced costs. The additional returns and reduced costs are then totaled to determine the income-increasing potential of the projected change. The example in *Table 14.4* shows how the partial budget can be used to assist in the decision making process.

Transgenic Sugarbeet Example

University of Nebraska data on Roundup Ready® sugarbeet suggests that an additional two tons of yield may be realized from this technology. This data is used to illustrate how a partial budget (*Table 14.4*) may be used to develop economic projections for changes in the operation.

Table 14.4

Partial budgeting example for implication of transgenic sugarbeet production.

| Proposed change to transgenic sugarbeet production | | |
|---|---|-----------------|
| (1) Additional Costs: | | \$/Acre |
| Roundup Ultra RT | 2 applications @ 1qt/acre @ \$41.25/gal | \$20.63 |
| Broadcast spraying | 2 applications @ \$1.61/acre | 3.22 |
| Technology Fee | Estimated at \$50.00 per acre | 50.00 |
| Hauling costs | 2.0 T/acre increased yield @ \$2.00 per ton | 4.00 |
| Total Additional Costs | | \$77.85 |
| (2) Reduced Returns: | | |
| None | | \$0.00 |
| Total Reduced Returns | | \$0.00 |
| Total Additional Costs and Reduced Returns (A) | | \$77.85 |
| (3) Additional Returns: | | |
| Increased yield | 2.0 T/acre at \$36.00 per ton | \$72.00 |
| Total Additional Returns | | \$72.00 |
| (4) Reduced Costs: | | |
| Betamix | 2 applications @ 12 oz/acre @ \$103.00/gal | \$19.30 |
| Upbeet | 2 applications @ 0.25 oz/acre @ \$46.00/oz | 15.64 |
| Band spraying | 2 applications @ \$1.61/acre | 3.22 |
| Total Reduced Costs | | \$38.16 |
| Total Additional Returns and Reduced Costs (B) | | \$110.16 |
| Net Change in Income (B - A) | | \$32.31 |