Eastern Idaho Northern Region: Bonneville & Madison Counties Russet Burbank Potatoes: Production and Storage Costs

Eastern Idaho

Ben Eborn

Introduction to Costs & Returns Estimates

The University of Idaho Extension produces crop costs and returns estimates every other year. The overall goal of this project is to provide the Idaho agricultural industry with an unbiased and consistently calculated estimate of the cost of producing various crops and to track the change in production costs per acre and per unit over time.

The University of Idaho's costs and returns estimates are based on economic costs, not just accounting costs. All resources are valued at a market rate or "opportunity cost". Input prices are taken from the U of I's annual survey of agricultural supply companies. The selling price is a historical average, not a current year's price. Production practices are based on data from growers, crop consultants, and extension personnel throughout Idaho. Although production practices may be similar for individual farms, each farm has a unique set of resources with different levels of productivity, different production problems, and therefore different costs. Farm size, crop rotation, age and type of equipment, and the quality and intensity of management are all crucial factors that influence costs. The cost of production estimates show the typical or representative production costs by region based on documented production practices. These production costs are not area averages, rather they are based on model farms for four areas of the state.

University of Idaho costs and returns estimates can be used as a management tool to help producers in three ways:

1. **Templates.** Excel spreadsheets have been created by the University of Idaho to make enterprise budgeting and record keeping an easy task. You can start by substituting our costs and returns estimates with your own numbers. You can also enter them in the "Your Cost" column.
2. **Marketing.** Estimating production costs on a per acre or per unit basis can help you calculate your farm's break-even prices. Knowing your break-even price to cover operating costs and total costs can help with contract negotiations and selling on the open market.
3. **Benchmarks.** The University of Idaho costs and returns estimates are based on a typical or model farm and are calculated annually using consistent methodology. You can use these estimates as benchmarks by comparing your own total costs or specific cost categories to our estimates. This is a good way to find strengths and weaknesses in your production practices.

It's important to remember, just because your production costs are similar to our estimates, that isn't necessarily a good thing. Our model farms are also typically unprofitable! Average producers usually don't make an economic profit (which includes opportunity costs and non-cash costs such as depreciation). Being profitable requires fine-tuned management and a competitive advantage that the average producer doesn't have. (Being average is not okay in farming)

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Background and Assumptions

The University of Idaho's costs and returns estimates are based on economic costs, not accounting costs. All resources are valued at a market rate or "opportunity cost". Input prices are based on the data collected annually by the University of Idaho from agricultural supply companies. The selling price for the commodity is typically an historical average price, not a current year's projected price. The cost estimate shown here is typical for growing Russet Burbank potatoes under irrigation in eastern Idaho's lower yielding northern counties. The costs shown in Table 1 include the costs to grow, harvest and sort potatoes. The total cost per cwt shown at the bottom of Table 1 is the cost to the end of the piler boom. Transportation costs to a processor or fresh pack facility are not included. Storage costs are shown in Table 2.

Production practices are based on data from potato growers in Bonneville and Madison counties, crop consultants and extension personnel in eastern Idaho. Production practices depicted in this publication are not University of Idaho recommendations. Although production practices may be similar for individual farms, each farm has a unique set of resources with different levels of productivity, different production problems, and therefore different costs. Farm size, crop rotation, age and type of equipment, and the quality and intensity of management are all crucial factors that influence costs.

The Model Farm

The model farm for this costs and returns estimate is a 2,400-acre irrigated farm with 800 acres in potatoes and 1,600 acres in grain. The typical crop rotation is one year of potatoes followed by two years of grain. Corn or an oil seed crop may substitute for grain, and alfalfa hay may be grown in longer rotations.
The farm uses a center pivot irrigation system and surface water delivered to the farm from an irrigation district. The irrigation district charges a flat fee per acre for water. Irrigation power use is based only on pressurization (no lift). Power costs per acre-inch of water applied are calculated using the Idaho Power Schedule 24 Agricultural Irrigation Service rates.

Production Practices

After the straw from the preceding grain crop is removed, the potato ground is watered, disked and ripped. In the spring the ground is disked and marked-out for planting. Potatoes are planted in early May using two 6-row planters with 36-inch row spacing. The seeding rate is 21 hundredweight (cwt). Potatoes are cultivated and hilled once in June with a basin tillage tool. In September, vines are rolled and sprayed with a chemical desiccant. Potato harvest begins three weeks later using a 4-row harvester, 4-row windrower, and six 10-wheeler trucks (300-cwt capacity). Potatoes are hauled from the field to a central location where they are sorted before being transferred to a semi-trailer for transport to a processor or fresh pack shed; or placed into on-farm grower owned storage. Prior to 2013, the University of Idaho published separate storage and non-storage costs and returns estimates for potatoes.

Most fertilizer is split-applied by a custom applicator in two pre-plant applications, fall and spring. A liquid starter fertilizer with nitrogen, phosphate and micronutrients is applied at row mark-out. Additional nitrogen is applied during the growing season through the irrigation system. The weed control program uses cultural,

mechanical (tillage and cultivation), and chemical control methods. A 3-way herbicide tank mix is ground applied in May. Insecticide products are applied in-furrow at planting to control beetles and wire worms. Two additional foliar insecticides are applied by air during the growing season. Six fungicide applications are made to control several different diseases. One fungicide is applied as a seed treatment, and five foliar fungicides are applied by air or chemigation between late June and August. Foliar fungicides are often tank-mixed with an insecticide.

Potatoes receive 20 inches of water during the growing season, 1.0 inch in May, 5 inches in June, 8.0 inches in July, and 6 inches in August. One inch of water is applied pre-harvest in September, and 2.0 inches applied to the grain stubble the previous fall is also credited to potatoes, for a total of 23 inches.

Machinery

Machinery and equipment ownership capital recovery cost is based on 75% of the replacement cost of a new piece of equipment, except for trucks. Truck prices are for a used vehicle with a new self-unloading bed. Equipment used in sorting and handling potatoes is not included. Capital recovery combines depreciation and interest into a single value. Equipment capital recovery (depreciation and interest) is calculated as a cost per acre. This non-cash overhead is shown in the lower part of Table 1. It comes from the Budget Planner program and is automatically calculated using the information from Table 4, taking into account the hours used and the number of acres for each piece of machinery. To keep machinery prices current between years in which a comprehensive survey is conducted, machinery prices are adjusted using USDA's Farm Machinery Prices Paid Index. Equipment prices are collected approximately every five years.

Labor and Management

The cost of labor used in this study includes a base wage rate, plus a percentage to account for various payroll taxes (FICA, SUTA & FUTA), and workman's compensation, as well as benefits such as paid vacation/personal leave days, health insurance and bonuses. Labor is classified by the type of work performed. Labor classifications, labor rates and payroll overhead are shown below.

Labor Values

Labor Class	Base Rate	Payroll Overhead	Effective Rate
General Farm Labor	$14.00	15%	$17.55
Truck Drivers	$14.00	15%	$17.55
Equipment Operators	$18.00	25%	$22.50
Irrigation Labor			
Set Move: HL & WL	$14.00	30%	$17.55
Continuous Move: CP & L	$18.00	25%	$22.50

Set Move includes: handlines and wheellines
Continuous Move includes: center pivots and linear move
Payroll overhead for set move systems includes housing

Equipment operator labor is calculated at 1.2 times machinery use hours. Machinery hours are calculated for all field operations, except those performed by a custom operator. Custom operations are listed separately. Machinery hours are based on a standard engineering equation using: speed x width x overall field efficiency.

General farm labor accounts for extra field labor used during planting and harvest. Irrigation labor and labor to sort potatoes are shown separately.

A management fee based of approximately 5.5% of the total production costs is also included. Prior to 2013, the basis of the 5% charge was expected revenue.

Capital, Land and Overhead Costs

Interest on operating capital is charged from the time an input is applied until harvest and is calculated at a nominal rate of 7.00%. Interest on intermediate term capital, primarily equipment, is calculated using a nominal rate of 6.75%. A general overhead charge, calculated at approximately 3.0% of operating expenses, is included to cover unallocated whole-farm costs such as office expenses, legal and accounting fees, cell phones, internet service and utilities. Irrigation power is shown as a separate cost item and is not included as part of general farm utilities. Fees paid by the grower, listed under other operating costs, include: promotion fees paid to the Idaho Potato Commission and the National Potato Board, inspection fees paid to the Idaho Department of Agriculture, and membership fees paid to grower organizations. The consultant fee, listed under custom operating costs, includes soil and petiole sampling and irrigation scheduling.

Land rent is based on a one-year cash lease for potatoes and covers the ownership costs (depreciation, interest, and insurance) of the irrigation system. Since the charge for water, irrigation system repairs, and irrigation power costs are listed separately, the land rent may appear low because the landowner in many circumstances pays some or even all these expenses.

Budget Format

Table 1 shows both expected revenue, based a specified yield and price, and expenses. Expenses are broken into two main categories: operating and ownership. Operating expenses are those that typically vary with the level of production and involve inputs that are used in a single production cycle. Ownership expenses include a systematic cost recovery over the useful life for inputs used in the production process that have a useful life of more than one year. Machinery and land costs fall into this category. Operating inputs are organized by category. In addition to the cost per unit and cost per acre for each input, a total cost is given for each category. Table 1 also gives a total of all operating, ownership and total costs per acre, as well as these same cost categories per cwt based on a field-run yield basis.

Table 2 begins with the base production cost per hundredweight from Table 1. This includes the cost to grow, harvest and sort potatoes. It's the cost of potatoes "to the end of the piler boom". It shows the base cost of potato production on both a field-run basis from Table 1 and a paid-yield basis, assuming a 90% paid yield.

Storage ownership and repair costs per hundredweight are added to the base cost of growing, harvesting and sorting potatoes. Storage ownership costs are based on annual ownership costs (depreciation and interest) divided by the storage capacity of the storage facility, assuming 90% utilization. Ownership costs do not change based on the length of storage.

Potato storage operating costs increase based on the length of storage. Storage operating costs are calculated on a monthly basis and include: interest, shrink, sanitation chemicals, sprout inhibitor and electricity. Sorting labor is included in the base budget. Table 2 shows the cumulative storage costs per month from October through June. Storage costs are calculated to the end of the month. The cumulative cost is added to the base production cost, storage ownership cost and repair costs to give a total cost per hundredweight by month for the entire storage season.

Potatoes stored beyond June would likely need refrigeration. The cost of refrigeration was not included in the cost of the storage system used to calculate the annual storage ownership and repair costs.

Author
Ben Eborn is a University of Idaho Extension agricultural economist.

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Table 1. 2019 Costs to grow, harvest and sort Eastern Idaho Northern region Russet Burbank potatoes.

Item	Quantity Per Acre	Unit	Price or Cost	Value or Cost/Acre
Gross Returns				
Potatoes	365.00	cwt	7.50	$2,737.50
Total Gross Returns				**$2,737.50**
Operating Inputs				
Seed:				**$303.45**
G-3 Russet Burbank Seed	21.00	cwt	12.50	262.50
Seed Cutting	21.00	cwt	1.95	40.95
Fertilizer:				**$301.55**
Dry Nitrogen - Preplant	135.00	lb	0.42	56.70
Dry P2O5	155.00	lb	0.41	63.55
K2O	160.00	lb	0.31	49.60
Sulfur	80.00	lb	0.22	17.60
Liquid Nitrogen	105.00	lb	0.50	52.50
Liquid P2O5	45.00	lb	0.48	21.60
Micronutrients/Humic Acid - CP	1.00	acre	40.00	40.00
Pesticides & Chemicals:				**$217.54**
Seed Treatment	21.00	cwt	0.70	14.70
Admire Pro	8.00	fl oz	1.30	10.40
Regent 4SC	3.20	fl oz	9.25	29.60
Metribuzin 75DF	0.75	lb	14.35	10.76
Outlook 6EC	18.00	fl oz	0.95	17.10
Prowl H2O	2.00	pt	4.65	9.30
Quadris Flowable	8.00	fl oz	1.20	9.60
Bravo Weather Stik	1.50	pt	4.75	7.13
Luna Tranquility	8.00	fl oz	2.50	20.00
Dithane F45 Rainshield	1.60	qt	9.50	15.20
Revus Top	7.00	fl oz	2.20	15.40
Brigadier	6.00	fl oz	1.35	8.10
Fulfill WDG	5.50	fl oz	6.50	35.75
Reglone	2.00	pt	7.25	14.50
Custom & Consultants:				**$58.00**
Custom Fertilize: 400 - 800 lbs	1.00	acre	7.50	7.50
Custom Fertilize: 0 - 400 lbs	1.00	acre	6.50	6.50
Custom Air Spray - 5.0 gal	2.00	acre	9.00	18.00
Consultant & Soil/Pet. Test	1.00	acre	26.00	26.00
Irrigation:				**$72.04**
Water Assessment	1.00	acre	15.00	15.00
Irrigation Repairs - Center Pivot	23.00	acre-inch	0.55	12.65
Irrigation Power - Center Pivot	23.00	acre-inch	1.93	44.39
Machinery:				**$148.61**
Fuel - Gas	4.51	gal	3.15	14.21
Fuel - Farm Diesel	21.30	gal	2.90	61.77
Fuel - Road Diesel	1.91	gal	3.40	6.49
Lube	1.00	$	11.15	11.15
Machinery Repairs	1.00	$	54.99	54.99
Labor:				**$200.96**
Equipment Operator Labor	4.03	hrs	22.50	90.68
Truck Driver Labor	1.86	hrs	17.55	32.64
Irrigation Labor - Center Pivot	0.92	hrs	22.50	20.70
Irrigation Labor - Chem-Fert	0.76	hrs	22.50	17.10
General Farm Labor	2.27	hrs	17.55	39.84
Sorting:				**$62.42**
Sorting Labor	365.00	cwt	0.134	48.91
Sorting Equipment Repairs & Power	365.00	cwt	0.037	13.51
Other:				**$134.22**
Crop Insurance	1.00	acre	75.00	75.00
Fees & Assessments	329.00	cwt	0.18	59.22
Interest on Operating Capital at 7.00%				$50.23
Total Operating Costs				**$1,549.01**
Operating Costs per Unit				**$4.24**
Net Returns Above Operating Costs				**$1,188.49**

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Table 1. 2019 Costs to grow, harvest and sort Eastern Idaho Northern region Russet Burbank potatoes.

Item	Quantity Per Acre	Unit	Price or Cost	Value or Cost/Acre
Ownership Costs:				
Tractors & Equipment Insurance				5.65
Tractors & Equipment Depreciation & Interest				190.00
Potato Handling Equipment Deprec. & Interest				58.00
Land*				440.00
Overhead				46.00
Management Fee				146.00
Total Ownership Costs				**$885.65**
Ownership Costs per Unit				**$2.43**
Total Costs per Acre				**$2,434.66**
Total Cost per Unit				**$6.67**
Returns to Risk				**$302.84**

Notes:

*Includes irrigation system ownership costs.
Blue font indicates an increase.
Red font indicates a decrease.
A green font indicates a change in product or procedure to derive the cost.
Procedural changes can result in different costs than were published the previous year.

Breakeven Analysis:	- 5%	Base	+ 5%
		Yield	
Price	**346.75**	**365**	**383.25**
Operating Cost Breakeven	$4.47	$4.24	$4.04
Ownership Cost Breakeven	$2.55	$2.43	$2.31
Total Cost Breakeven	$7.02	$6.67	$6.35
		Price	
Yield	**$7.13**	**$7.50**	**$7.88**
Operating Cost Breakeven	217.4	206.5	196.7
Ownership Cost Breakeven	124.3	118.1	112.5
Total Cost Breakeven	341.7	324.6	309.2

Table 2. 2019 Cost per cwt to grow, harvest, sort and store Eastern Idaho Northern region Russet Burbank potatoes based on both field-run and paid yield.

	Storage Costs	Field Run Cost per Cwt	Paid Yield Cost per Cwt
Field-Run Yield		350.00	
Paid Yield %	90%		315.0
Base Cost to Grow, Harvest & Sort		**$6.95**	**$7.72**
Storage System Annual Ownership Costs	$0.391	$0.391	$0.434
Base Cost + Storage Ownership Costs		$7.34	$8.15
Storage System Annual Repairs	$0.044	$0.044	$0.049
Base + Storage System Ownership & Repairs		$7.38	$8.20

	Cumulative Storage Op. Costs	Cumulative Base + All Storage Costs	Cumulative Base + All Storage Costs
October	$0.245	$7.63	$8.47
November*	$0.446	$7.83	$8.70
December	$0.548	$7.93	$8.81
January	$0.650	$8.03	$8.92
February	$0.753	**$8.13**	$9.04
March	$0.854	$8.24	$9.15
April	$1.075	$8.46	$9.40
May	$1.199	$8.58	$9.53
June	$1.345	$8.73	$9.70

* Indicates month when sprout inhibitor applied.

Base cost of production includes cost to grow, harvest & sort potatoes, both operating and ownership. Ownership costs for potato handling equipment are included in the base cost of production.

Storage system includes: storage facility, air system, and the equipment used to place.

Storage operating costs include: repairs (shown separately), plus monthly operating costs: labor, power, chemicals, interest, shrink & insurance.

Storage costs do not include the cost of removing potatoes from storage.

Cumulative storage operating expenses are calculated to the end of the month.