



Eastern Idaho South District: Bannock, Bingham & Power Counties

Russet Burbank Potatoes with Fumigation: Production & Storage Costs

Eastern Idaho

Ben Eborn

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 higher yielding southern counties, with the yield adjusted for fumigation. The costs shown in Tables 1 – 6 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 7.

Production practices are based on data from potato growers in Bingham, Bannock and Power 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 2017 Idaho Power Schedule 24 Agricultural Irrigation Service rates. Power costs per acre-inch for water pumped from different depths and for different irrigation systems are found in the Crop Input Cost Summary located at:

<https://www.uidaho.edu/cals/idaho-agbiz/crop-budgets>

Production Practices

After the straw from the preceding grain crop is removed, the potato ground is disked, watered, disk-ripped and fumigated in the fall. In the spring the ground is chisel plowed and marked-out for planting. Potatoes are planted in late April using two 6-row planters with 36-inch row spacing. The seeding rate is 21 hundredweight (cwt). Potatoes are cultivated and hilled once in May 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. The costs associated with this second option are shown in Table 7. 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. Disease and insect pressure were both high in 2015, resulting in more foliar applications of both fungicides and insecticides. For insect control, a systemic insecticide is applied in-furrow at planting. Four additional foliar insecticides are applied by air during the growing season. Seven fungicide applications are made to control a number of different diseases. One fungicide is soil applied at planting, and six foliar fungicides are applied by air or chemigation from late June through August. Fungicides are often tank-mixed with an insecticide.

Potatoes receive 23 inches of water during the growing season, 2.0 inch in May, 6 inches in June, 8.0 inches in July, and 7.0 inches in August. One inch of water is applied pre-harvest in September, and 3.0 inches applied the previous fall are also credited to potatoes, for a total of 27 inches.

Machinery

Machinery and equipment used to produce potatoes is shown in Tables 4 and 5. Equipment used in sorting or handling potatoes is not included. The repair and ownership costs for this equipment is, however, shown in Tables 1 and 2. Table 4 lists the field equipment and their hourly operating and ownership costs, while Table 5 lists the equipment and their annual ownership costs. Machinery 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. Capital recovery combines depreciation and interest into a single value. To keep machinery prices current between years when 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	\$9.85	15%	\$11.35
Truck Drivers	\$13.35	15%	\$15.35
Equipment Operators	\$15.75	25%	\$19.70
Irrigation Labor			
Set Move: HL & WL	\$10.75	30%	\$14.00
Continuous Move: CP & L	\$15.75	25%	\$19.70

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 primarily during planting and harvest.

A management fee based of approximately 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 6.25 percent. Interest on intermediate term capital, primarily equipment, is calculated using a nominal rate of 6.0 percent. A general overhead charge, calculated at approximately 2.5 percent 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 land owner 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 95% 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.

University of Idaho costs and returns estimates for both crops and livestock can be found at:

<https://www.uidaho.edu/cals/idaho-agbiz>

Author

Ben Eborn is a University of Idaho Extension agricultural economist.

Disclaimer

The practices and chemicals specified in the publication are not recommendations. Always read and follow the directions printed on the pesticide label. Due to constantly changing pesticide laws and labels, some pesticides may have been cancelled or had certain uses prohibited. The use of trade names for various products simplifies presentation of this material and should not be considered an endorsement, nor is any criticism implied of similar products not mentioned.

Table C-1. 2017 Costs to grow, harvest and sort Eastern Idaho Southern region Russet Burbank potatoes with fumigation.

Item	Quantity Per Acre	Unit	Price or Cost	Value or Cost/Acre
Gross Returns				
Potatoes	420.00	cwt	7.50	\$3,150.00
Total Gross Returns				\$3,150.00
Operating Inputs				
Seed:				
G-3 Russet Burbank Seed	21.00	cwt	13.00	273.00
Seed Cutting	21.00	cwt	1.75	36.75
Fertilizer:				
Dry Nitrogen - Preplant	140.00	lb	0.40	56.00
Dry P2O5	185.00	lb	0.38	70.30
K2O	215.00	lb	0.31	66.65
Sulfur	85.00	lb	0.22	18.70
Liquid Nitrogen	120.00	lb	0.50	60.00
Liquid P2O5	50.00	lb	0.56	28.00
Micronutrients/Humic Acid - CP	1.00	acre	32.00	32.00
Pesticides & Chemicals:				
Vapam 42%	35.00	gal	5.50	192.50
Seed Treatment	21.00	cwt	0.65	13.65
Admire Pro	8.00	fl oz	1.25	10.00
Moncut 70DF	1.00	lb	29.80	29.80
Metribuzin 75DF	0.67	lb	11.90	7.97
Eptam 7E	3.50	pt	6.30	22.05
Prowl 3.3EC	2.00	pt	5.15	10.30
Quadris Flowable	8.00	fl oz	1.50	12.00
Omega 500DF	5.50	fl oz	3.20	17.60
Endura	5.50	oz	4.55	25.03
Bravo Weatherstik	1.00	pt	5.60	5.60
Dithane F45 Rainshield (2x)	3.20	qt	8.50	27.20
Ranman	2.75	fl oz	5.10	14.03
Agri-Mek .75SC	3.50	fl oz	2.25	7.88
Brigadier	6.00	fl oz	1.40	8.40
Reglone	2.00	pt	8.95	17.90
Custom & Consultants:				
Custom Fumigate - Deep Injection	1.00	acre	45.00	45.00
Custom Fertilize: 400 - 800 lbs	1.00	acre	8.00	8.00
Custom Fertilize: 0 - 400 lbs	1.00	acre	7.25	7.25
Custom Air Spray - 5.0 gal	3.00	acre	9.00	27.00
Consultant & Soil/Pet. Test	1.00	acre	26.00	26.00
Irrigation:				
Water Assessment	1.00	acre	38.00	38.00
Irrigation Repairs - Center Pivot	25.50	acre-inch	0.53	13.52
Irrigation Power - Center Pivot	25.50	acre-inch	1.94	49.47
Machinery:				
Fuel - Gas	4.52	gal	2.45	11.07
Fuel - Farm Diesel	20.47	gal	2.20	45.03
Fuel - Road Diesel	2.02	gal	2.75	5.56
Lube	1.00	\$	9.46	9.46
Machinery Repairs	1.00	\$	53.52	53.52
Labor:				
Equipment Operator Labor	3.88	hrs	19.70	76.44
Truck Driver Labor	1.98	hrs	15.35	30.39
Irrigation Labor - Center Pivot	1.02	hrs	19.70	20.09
Irrigation Labor - Chem-Fert	0.82	hrs	19.70	16.15
General Farm Labor	2.22	hrs	11.35	25.20
Sorting:				
Sorting Labor	420.00	cwt	0.115	48.30
Sorting Equipment Repairs & Power	420.00	cwt	0.035	14.70
Other:				
Crop Insurance: MP + Hail	1.00	acre	80.00	80.00
Fees & Assessments	400.00	cwt	0.18	72.00
Interest on Operating Capital at 6.25%				\$66.60
Total Operating Costs				\$1,852.05
Operating Costs per Unit				\$4.41
Net Returns Above Operating Costs				\$1,297.95

Table C-1. 2017 Costs to grow, harvest and sort Eastern Idaho Southern region Russet Burbank potatoes with fumigation.

Item	Quantity Per Acre	Unit	Price or Cost	Value or Cost/Acre
Ownership Costs:				
Tractors & Equipment Insurance				5.40
Tractors & Equipment Depreciation & Interest				178.00
Potato Handling Equipment Deprec. & Interest				64.00
Land*				535.00
Overhead				46.00
Management Fee				141.00
Total Ownership Costs				\$969.40
Ownership Costs per Unit				\$2.31
Total Costs per Acre				\$2,821.45
Total Cost per Unit				\$6.72
Returns to Risk				\$328.55
Notes:				
*Includes irrigation system ownership costs.				
Breakeven Analysis:				
	-	Base	+	
	5%		5%	
		Yield		
<u>Price</u>	399	420	441	
Operating Cost Breakeven	\$4.64	\$4.41	\$4.20	
Ownership Cost Breakeven	\$2.43	\$2.31	\$2.20	
Total Cost Breakeven	\$7.07	\$6.72	\$6.40	
		Price		
<u>Yield</u>	\$7.13	\$7.50	\$7.88	
Operating Cost Breakeven	259.9	246.9	235.2	
Ownership Cost Breakeven	136.1	129.3	123.1	
Total Cost Breakeven	396.0	376.2	358.3	

Table C-2. 2017 Cost per cwt to grow, harvest, sort and store Eastern Idaho Southern region Russet Burbank potatoes with fumigation based on both field-run and paid yield.

	Storage Costs	Field Run Cost per Cwt	Paid Yield Cost per Cwt
Field-Run Yield		420.00	
Paid Yield %	95%		399.0
Base Cost to Grow, Harvest & Sort		\$6.72	\$7.07
Storage System Annual Ownership Costs	\$0.365	\$0.365	\$0.384
Base Cost + Storage Ownership Costs		\$7.08	\$7.46
Storage System Annual Repairs	\$0.042	\$0.042	\$0.044
Base + Storage System Ownership & Repairs		\$7.12	\$7.50
	Cumulative Storage Op. Costs	Cumulative Base + All Storage Costs	Cumulative Base + All Storage Costs
October	\$0.228	\$7.35	\$7.74
November*	\$0.408	\$7.53	\$7.93
December	\$0.497	\$7.62	\$8.02
January	\$0.590	\$7.72	\$8.12
February	\$0.681	\$7.81	\$8.22
March	\$0.772	\$7.90	\$8.31
April	\$0.969	\$8.09	\$8.52
May	\$1.081	\$8.21	\$8.64
June	\$1.214	\$8.34	\$8.78

Data entered directly by user. All other values are calculated.
 Calculated values.

* 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.