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Estimated Crop Production Costs on Sandy Soils with Center-Pivot Irrigation Systems, Oregon's Columbia Basin, 1978



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ESTIMATED CROP PRODUCTION COSTS ON SANDY SOILS
WITH CENTER-PIVOT IRRIGATION SYSTEMS,
OREGON'S COLUMBIA BASIN, 1978

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Information on current crop production costs is important for sound farm planning. Decisions such as acquiring land, irrigation development, purchasing machinery, and changing production practices depend on cost-return relationships. The purpose of this report is to provide a guide for estimating the costs of producing various crops in northeastern Gilliam, northern Morrow, and northwestern Umatilla counties located in Oregon's Columbia Basin. The major irrigated crops in this area are late potatoes, early potatoes, drybeans, corn, winter wheat, and alfalfa. Typical costs have been estimated for these crops assuming they were grown on sandy soils, elevation 400 to 950 feet, under a center-pivot irrigation system. Cost data were also developed for establishing alfalfa and planting cover crops.

Area growers provided the basic information regarding yields, cultural practices, and production inputs. Additional information was obtained from local suppliers, machinery dealers, county extension agents, lenders, and others familiar with irrigated crop production in the area.

Certain general assumptions were made in the development of these data. A commercially viable farm consisting of 600 to 700 acres of irrigated cropland

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was chosen to be representative of the area. The level of management is considered to be average, and sound agronomic practices are followed.

Fertilizer, seed, chemicals, etc., were charged at 1978 prices. Machinery costs were averaged over the lives of the machines assuming they were purchased in 1978. With a few exceptions, all machinery was assumed to be owned by the operator. The fertilizer applicator and land plane were rented. Chemical applications and delivery of the harvested products were custom hired. Interest on machinery, equipment, and operating capital were charged at nine percent.

Labor was charged at rates comparable to wages paid in the area for farm labor including social security, workman's compensation, and benefits. Hours of labor use included time for miscellaneous activities estimated at 20 percent of machine operating requirements. A separate charge was included for the managerial input of the operator.

A center-pivot irrigation system was used to irrigate the crops under consideration. Investment requirements and ownership costs were averaged over the life of the equipment assuming the system was purchased at 1978 prices. The ownership costs of the center-pivot system are the same for each crop. Only the 130 acres irrigated by the center-pivot system are considered in these cost budgets. Costs for the other 30 acres comprising the section are not included.

The budgeted costs (Table 1 and Tables A-1 to A-8) do not include the cost for delivering irrigation water to the farm because of the considerable variability due to location and water source. Nor do they include a charge for land investment. Pumping costs associated with the distribution of the water on the farm are included.

The crop production costs and supporting tables presented in this report provide guidelines for decision-makers to estimate their individual costs of production. These costs can be used in a variety of farm management decisions. Examples include: budgeting cash flows to arrange for credit needs and schedule debt repayments; estimating income necessary to cover costs of production; selecting crop enterprises; and assessing the feasibility of investments in land, machinery and irrigation development.

Crop production costs are affected by a variety of factors including farm size, location, crop yield, production practices, machinery used, material costs, labor costs, and other factors unique to the individual operation. Because the importance of these factors varies between farms, each grower is encouraged to estimate the costs for the individual operation.

Table 1. Estimated Crop Production Costs Per Acre on Sandy Soils with Center-Pivot Irrigation Systems, Oregon's Columbia Basin, 1978

Crop	Late potatoes	Early potatoes	Drybeans	Corn	Wheat	Alfalfa Production	Alfalfa Estab.	Cover Crop
Yield per acre:	460 cwt.	320 cwt.	18 cwt.	165 bu.	90 bu.	7 T.	0	0
Costs per acre:								
Seed	\$130.00	\$149.50	\$ 33.30	\$ 18.81	\$ 8.10	\$ 0	\$ 41.00	\$15.00
Fertilizer & spreader	183.25	163.25	64.15	117.75	47.75	28.55	49.55	0
Chemicals & application	109.82	66.30	6.38	23.93	5.50	18.50	0	0
Other direct expenses	92.00	64.00	5.40	13.20	10.80	11.40	2.00	0
Machine operating	42.39	42.39	19.46	19.36	13.11	31.48	14.42	5.49
Irrigation pumping	12.08	10.28	9.15	10.57	9.77	12.85	5.98	5.98
Irrigation repairs	9.76	7.29	5.54	7.77	6.70	10.77	1.72	1.72
Irrigation labor	11.16	8.33	6.34	8.88	7.66	12.31	1.97	1.97
Water charge								
Other labor	23.84	23.84	14.32	13.95	8.37	29.53	12.63	4.09
Operating capital interest	23.72	15.96	4.90	10.05	4.35	4.96	2.97	.65
Machinery ownership	64.32	64.32	37.45	36.19	23.33	85.84	21.58	7.85
Irrigation ownership	45.22	45.22	45.22	45.22	45.22	45.22	0 d/	0 d/
Land taxes	12.50	12.50	12.50	12.50	12.50	12.50	0 d/	0 d/
Land interest								
Management	30.40	26.93	10.56	13.53	8.13	12.16	6.15	1.71
Overhead	22.80	20.20	7.92	10.15	6.09	9.12	4.61	1.28
TOTAL COST PER ACRE (Excluding land & water)	\$813.26	\$720.31	\$282.59	\$361.86	\$217.38	\$325.19	\$164.58	\$45.74

a/ Includes such items as land plane rental, custom hauling, crop insurance, bale wire, and gopher control.

b/ Includes fuel, lubrication, and repairs.

c/ Includes depreciation, interest on average investment at 9%, taxes, and insurance.

d/ The operations for establishing alfalfa and planting cover crops are performed in the fall of the year following other crop enterprises. Hence, irrigation ownership costs and land taxes and interest are not included here.

e/ Estimated at 4% of all other costs except land investment, water, and overhead.

f/ Estimated at 3% of all other costs except land investment, water, and management.

APPENDIX A

Crop Budgets

Tables A-1 to A-8

Table A-1. LATE POTATOES (460 hundredweight per acre yield). Estimated Costs per Acre, Oregon's Columbia Basin, 1978

	<u>Labor</u>		<u>Machinery & Equipment</u>		<u>Other</u>		Total cost (\$)	Your costs (\$)
	Hrs.	Value (\$)	Operating ^{a/} (\$)	Ownership ^{b/} (\$)	Item	Cost (\$)		
<u>Cultural Operations</u>								
Chisel (2x)	.277	1.39	1.93	3.23			6.55	
Fertilize	.205	1.03	.41	.57	mtls. spreader rent	182.50 .75	185.26	
Disk and Pack	.173	.87	1.58	2.07			4.52	
Plant	.475	2.37	4.38	11.49	seed	130.00	148.24	
Insecticide					mtls. appl.	19.20 3.00	22.20	
Cultivate (2x)	.416	2.08	2.16	3.72			7.96	
Insecticide (3x)					mtls. appl.	54.80 9.00	63.80	
Herbicide					mtls. appl.	7.25 3.00	10.25	
Pesticide					mtls. appl.	10.57 3.00	13.57	
Hill up and Layby (2x)	.416	2.08	2.12	3.89			8.09	
Irrigate	2.790	11.16	9.76	45.22	power	12.08	78.22	
Water Charge								
<u>Harvest Operations</u>								
Dig	1.828	9.14	25.35	32.41			66.90	
Haul					custom	92.00	92.00	
<u>Other Charges</u>								
Truck	.400	2.00	2.16	4.29			8.45	
Pickup	.576	2.88	2.30	2.65			7.83	
Op. cap. Interest (9 percent)						23.72	23.72	
Land Taxes						12.50	12.50	
Land Interest								
Management ^{c/}						30.40	30.40	
Overhead ^{d/}						22.80	22.80	
TOTAL COST PER ACRE								
(Excluding Land & Water)		35.00	52.15	109.54		616.57	813.26	

^{a/} Includes fuel, lubrication, and repairs.

^{b/} Includes depreciation, interest on average investment at 9%, taxes and insurance.

^{c/} Estimated at 4% of all costs excluding the water charge, land interest, and overhead.

^{d/} Estimated at 3% of all costs excluding the water charge, land interest, and management.

Table A-2. EARLY POTATOES (320 hundredweight per acre yield). Estimated Costs per Acre, Oregon's Columbia Basin, 1978

	<u>Labor</u>		<u>Machinery & Equipment</u>		<u>Other</u>		Total cost	Your costs
	Hrs.	Value	Operating ^{a/}	Ownership ^{b/}	Item	Cost		
		(\$)	(\$)	(\$)		(\$)	(\$)	(\$)
<u>Cultural Operations</u>								
Chisel (2x)	.277	1.39	1.93	3.23			6.55	
Fertilizer	.205	1.03	.41	.57	mtls. spreader rent	162.50 .75	165.26	
Disk and Pack	.173	.87	1.58	2.07			4.52	
Plant	.475	2.37	4.38	11.49	seed	149.50	167.74	
Insecticide					mtls. appl.	19.20 3.00	22.20	
Cultivate (2x)	.416	2.08	2.16	3.72			7.96	
Insecticide					mtls. appl.	32.00 3.00	35.00	
Hillup and Layby (2x)	.416	2.08	2.12	3.89			8.09	
Defoliant					mtls. appl.	6.10 3.00	9.10	
Irrigate	2.082	8.33	7.29	45.22	power	10.28	71.12	
Water Charge								
<u>Harvest Operations</u>								
Dig	1.828	9.14	25.35	32.41			66.90	
Haul					custom	64.00	64.00	
<u>Other Charges</u>								
Truck	.400	2.00	2.16	4.29			8.45	
Pickup	.576	2.88	2.30	2.65			7.83	
Op. Cap. Interest (9 percent)						15.96	15.96	
Land Taxes						12.50	12.50	
Land Interest								
Management ^{c/}						26.93	26.93	
Overhead ^{d/}						20.20	20.20	
TOTAL COST PER ACRE								
(Excluding Land & Water)		32.17	49.68	109.54		528.92	720.31	

^{a/} Includes fuel, lubrication, and repairs.^{b/} Includes depreciation, interest on average investment at 9%, taxes and insurance.^{c/} Estimated at 4% of all costs excluding the water charge, land interest, and overhead.^{d/} Estimated at 3% of all costs excluding the water charge, land interest, and management.

Table A-3. DRYBEANS (18 hundredweight per acre yield). Estimated Costs per Acre, Oregon's Columbia Basin, 1978

	Labor		Machinery & Equipment		Other		Total cost (\$)	Your costs (\$)
	Hrs.	Value (\$)	Operating ^{a/} (\$)	Ownership ^{b/} (\$)	Item	Cost (\$)		
<u>Cultural Operations</u>								
Chisel	.139	.70	.96	1.61			3.27	
Fertilize	.205	1.03	.41	.57	mtls.	63.40		
					spreader rent	.75	66.16	
Disk	.173	.87	1.20	1.72			3.79	
Herbicide					mtls.	3.38		
					appl.	3.00	6.38	
Disk and Pack	.173	.87	1.37	2.04			4.28	
Plant	.222	1.11	1.11	2.32	seed	33.30	37.84	
Cultivate (2x)	.416	2.08	2.16	3.72			7.96	
Irrigate	1.584	6.34	5.54	45.22	power	9.15	66.25	
Water Charge								
<u>Harvest Operations</u>								
Swath	.393	1.97	2.53	6.45			10.95	
Combine	.504	2.52	6.58	13.39			22.49	
Haul					custom	5.40	5.40	
<u>Other Charges</u>								
Truck	.432	2.15	2.33	4.69			9.17	
Pickup	.204	1.02	.81	.94			2.77	
Op. Cap. Interest (9 percent)						4.90	4.90	
Land Taxes						12.50	12.50	
Land Interest								
Management ^{c/}						10.56	10.56	
Overhead ^{d/}						7.92	7.92	
TOTAL COST PER ACRE								
(Excluding Land & Water)		20.66	25.00	82.67		154.26	282.59	

^{a/} Includes fuel, lubrication, and repairs.

^{b/} Includes depreciation, interest on average investment at 9%, taxes and insurance.

^{c/} Estimated at 4% of all costs excluding the water charge, land interest, and overhead.

^{d/} Estimated at 3% of all costs excluding the water charge, land interest, and management.

Table A-4. CORN (165 bushel per acre yield). Estimated Costs per Acre, Oregon's Columbia Basin, 1978

	<u>Labor</u>		<u>Machinery & Equipment</u>		<u>Other</u>		Total cost (\$)	Your costs (\$)
	Hrs.	Value (\$)	Operating ^{a/} (\$)	Ownership ^{b/} (\$)	Item	Cost (\$)		
<u>Cultural Operations</u>								
Chisel (2x)	.277	1.39	1.93	3.23			6.55	
Fertilize	.205	1.03	.41	.57	mtls. spreader rent	117.00 .75	119.76	
Disk	.173	.87	1.20	1.72			3.79	
Herbicide					mtls. appl.	14.18 3.00	17.18	
Disk and Pack (2x)	.347	1.73	2.72	4.14			8.59	
Plant	.222	1.11	1.11	2.32	seed	18.81	23.35	
Cultivate (2x)	.416	2.08	2.16	3.72			7.96	
Insecticide					mtls. appl.	3.75 3.00	6.75	
Irrigate	2.220	8.88	7.77	45.22	power	10.57	72.44	
Water Charge								
<u>Harvest Operations</u>								
Combine	.512	2.56	7.01	16.32			25.89	
Haul					custom	13.20	13.20	
<u>Other Charges</u>								
Truck	.204	1.02	1.10	2.19			4.31	
Pickup	.432	2.16	1.72	1.98			5.86	
Op. Cap. Interest (9 percent)						10.05	10.05	
Land Taxes						12.50	12.50	
Land Interest								
Management ^{c/}						13.53	13.53	
Overhead ^{d/}						10.15	10.15	
TOTAL COST PER ACRE								
(Excluding Land & Water)		22.83	27.13	81.41		230.49	361.86	

^{a/} Includes fuel, lubrication, and repairs.^{b/} Includes depreciation, interest on average investment at 9%, taxes and insurance.^{c/} Estimated at 4% of all costs excluding the water charge, land interest, and overhead.^{d/} Estimated at 3% of all costs excluding the water charge, land interest, and management.

Table A-5. WINTER WHEAT (90 bushel per acre yield). Estimated Costs per Acre, Oregon's Columbia Basin, 1978

	<u>Labor</u>		<u>Machinery & Equipment</u>		<u>Other</u>		Total cost	Your costs
	Hrs.	Value (\$)	Operating ^{a/} (\$)	Ownership ^{b/} (\$)	Item	Cost (\$)		
<u>Cultural Operations</u>								
Chisel	.139	.70	.96	1.61			3.27	
Fertilize	.205	1.03	.41	.57	mtls.	47.00		
					spreader rent	.75	49.76	
Disk and Pack	.173	.87	1.58	2.07			4.52	
Drill	.170	.85	1.51	2.68	seed	8.10	13.14	
Herbicide					mtls.	2.50		
					appl.	3.00	5.50	
Irrigate	1.914	7.66	6.70	45.22	power	9.77	69.35	
Water Charge								
<u>Harvest Operations</u>								
Combine	.486	2.43	6.33	12.82			21.58	
Haul					custom	7.20	7.20	
<u>Other Charges</u>								
Truck	.200	1.00	1.13	2.21			4.34	
Pickup	.298	1.49	1.19	1.37			4.05	
Crop Insurance						3.60	3.60	
Op. Cap. Interest (9 percent)						4.35	4.35	
Land Taxes						12.50	12.50	
Land Interest								
Management ^{c/}						8.13	8.13	
Overhead ^{d/}						6.09	6.09	
TOTAL COST PER ACRE								
(Excluding Land & Water)		16.03	19.81	68.55		112.99	217.38	

^{a/} Includes fuel, lubrication, and repairs.^{b/} Includes depreciation, interest on average investment at 9%, taxes and insurance.^{c/} Estimated at 4% of all costs excluding the water charge, land interest, and overhead.^{d/} Estimated at 3% of all costs excluding the water charge, land interest, and management.

Table A-6. ALFALFA PRODUCTION (7 ton per acre yield). Estimated Costs per Acre, Oregon's Columbia Basin, 1978

	Labor		Machinery & Equipment		Other		Total cost (\$)	Your costs (\$)
	Hrs.	Value (\$)	Operating ^{a/} (\$)	Ownership ^{b/} (\$)	Item	Cost (\$)		
<u>Cultural Operations</u>								
Fertilize	.205	1.03	.41	.57	mtls. spreader rent	27.80 .75	30.56	
Herbicide					mtls. appl.	15.50 3.00	18.50	
Gopher Control						1.60	1.60	
Irrigate	3.078	12.31	10.77	45.22	power	12.85	81.15	
Water Charge								
<u>Harvest Operations</u>								
Swath (4x)	1.376	6.88	8.86	22.58			38.32	
Bale (4x)	1.210	6.05	6.41	22.19	wire	9.80	44.45	
Bale wagon (3x)	1.300	6.50	8.51	29.77			44.78	
Accumulator	.499	2.50	2.11	2.63			7.24	
Loader-balefork	.624	3.12	2.09	3.63			8.84	
<u>Other Charges</u>								
Truck	.200	1.00	1.13	2.22			4.35	
Pickup	.491	2.45	1.96	2.25			6.66	
Op. Cap. Interest (9 percent)						4.96	4.96	
Land Taxes						12.50	12.50	
Land Interest								
Management ^{c/}						12.16	12.16	
Overhead ^{d/}						9.12	9.12	
Amortized Estab. Cost ^{e/}								
TOTAL COST PER ACRE								
(Excluding Land & Water)		41.84	42.25	131.06		110.04	325.19	

^{a/} Includes fuel, lubrication, and repairs.

^{b/} Includes depreciation, interest on average investment at 9%, taxes and insurance.

^{c/} Estimated at 4% of all costs excluding the water charge, land interest, and overhead.

^{d/} Estimated at 3% of all costs excluding the water charge, land interest, and management.

^{e/} The establishment costs (from Table A-7) can be included in these production costs. Assuming a four-year stand life and 9% interest, the amortized establishment cost is \$50.81 per acre (\$164.58 x .3087). For a stand life of three years, the amortization factor is .3951; for five years, .2571; and for six years, .2229.

Table A-7. ALFALFA ESTABLISHMENT. Estimated Costs per Acre, Oregon's Columbia Basin, 1978

	Labor		Machinery & Equipment		Other		Total cost (\$)	Your costs (\$)
	Hrs.	Value (\$)	Operating ^{a/} (\$)	Ownership ^{b/} (\$)	Item	Cost (\$)		
Cultural Operations								
Chisel (2x)	.277	1.39	1.93	3.23			6.55	
Disk	.173	.87	1.20	1.72			3.79	
Land Plane (2x)	.600	3.00	2.42	3.63	plane rent	2.00	11.05	
Fertilize	.205	1.03	.41	.57	mtls.	48.80		
					spreader rent	.75	51.56	
Disk & Pack (2.5x)	.433	2.18	3.96	5.19			11.33	
Drill	.340	1.70	2.26	3.80	seed	41.00	48.76	
Irrigate	.492	1.97	1.72	0 ^{e/}	power	5.98	9.67	
Water Charge								
Other Charges								
Truck	.192	.96	1.04	2.06			4.06	
Pickup	.300	1.50	1.20	1.38			4.08	
Op. Cap. Interest (9 percent)						2.97	2.97	
Land Taxes						0	0 ^{e/}	
Land Interest								
Management ^{c/}						6.15	6.15	
Overhead ^{d/}						4.61	4.61	
TOTAL COST PER ACRE								
(Excluding Land & Water)		14.60	16.14	21.58		112.26	164.58	

^{a/} Includes fuel, lubrication, and repairs.

^{b/} Includes depreciation, interest on average investment at 9%, taxes and insurance.

^{c/} Estimated at 4% of all costs excluding the water charge, land interest, and overhead.

^{d/} Estimated at 3% of all costs excluding the water charge, land interest, and management.

^{e/} The establishment of alfalfa was assumed to be performed in the fall of the year following other crop enterprises. In this context, irrigation ownership costs and land taxes and interest have been charged to the prior crop.

Table A-8. COVER CROP. Estimated Costs per Acre, Oregon's Columbia Basin, 1978

	Labor		Machinery & Equipment		Other		Total cost	Your costs
	Hrs.	Value	Operating ^{a/}	Ownership ^{b/}	Item	Cost		
		(\$)	(\$)	(\$)		(\$)	(\$)	(\$)
<u>Cultural Operations</u>								
Disk	.173	.87	1.20	1.72			3.79	
Disk and Pack	.173	.87	1.58	2.07			4.52	
Drill	.170	.85	1.51	2.68	seed	15.00	20.04	
Irrigate	.492	1.97	1.72	0 ^{e/}	power	5.98	9.67	
Water Charge								
<u>Other Charges</u>								
Pickup	.300	1.50	1.20	1.38			4.08	
Op. Cap. Interest (9 percent)						.65	.65	
Land Taxes						0	0 ^{e/}	
Land Interest								
Management ^{c/}						1.71	1.71	
Overhead ^{d/}						1.28	1.28	
TOTAL COST PER ACRE								
Excluding Land & Water)		6.06	7.21	7.85		24.62	45.74	

- / Includes fuel, lubrication, and repairs.
- / Includes depreciation, interest on average investment at 9%, taxes and insurance.
- / Estimated at 4% of all costs excluding the water charge, land interest, and overhead.
- / Estimated at 3% of all costs excluding the water charge, land interest, and management.
- / The planting of cover crops was assumed to be performed in the fall of the year following other crop enterprises. In this context, irrigation ownership costs and land taxes and interest have been charged to the prior crop.

APPENDIX B

Budget Data

Tables B-1 to B-8

Table B-1. Machinery Inventory, Price, Cost, and Capacity Assumptions

Machine	Size (hp.)	Width (ft.)	Purchase Price ^{a/} (\$)	Years Life (yrs.)	Salvage Value (\$)	Annual Use (hrs.)	Ownership Cost ^{b/} (\$/hr.)	Repair Cost (\$/hr.)	Fuel & Lube (\$/hr.)	Field Capacity ^{d/} (hr./a.)
Wheel tractor	40		9,400	20	1,200	284	3.35	.83	1.58	
Wheel tractor	100		25,000	12	6,250	434	7.26	1.45	3.39	
Wheel tractor, 4WD	130		33,000	8	11,520	658	7.49	2.01	4.41	
Truck	2 T.		12,000	8	2,400	150	12.88	1.75	4.73	
Pickup	3/4 T.		7,500	6	2,160	250	5.51	.73	4.06	
Self-propelled swather	50	12.0	21,700	6	6,650	200	19.70	5.79	1.93	.327
Combine, w/o head	125		44,000	7	12,850	300	24.41	10.97	2.78	
Cutter-bar head		18.0	3,900	12	650	100	5.02	.62		.402
Pickup head		15.0	4,100	12	690	100	5.28	.65		.417
Corn head		12.0	9,100	12	1,530	100	11.72	1.45		.423
Chisel plow		18.0	4,500	12	620	100	5.85	1.35		.115
Tandem disk		15.0	5,600	10	990	199	4.00	3.07		.143
Cultipacker		15.0	3,000	10	530	189	2.26	.91		.143
Drill ^{e/}		12.0	3,900	10	690	100	5.55	2.73		.281
Drill		12.0	3,900	10	690	100	5.55	2.73		.281
Planter, gen. purpose		12.0	2,000	5	650	86	4.69	.72		.183
Potato planter		12.0	10,000	5	3,260	96	21.02	4.04		.393
Cultivator		12.0	2,100	15	200	73	3.35	.84		.172
Lilliston cultivator		12.0	2,000	15	190	82	2.84	.95		.172
Potato digger		6.0	23,500	5	7,660	360	13.17	9.71		1.511
PTO baler			10,000	6	2,690	131	14.20	1.09		.344
PTO bale wagon			11,500	7	2,740	100	19.74	2.60		.430
Accumulator			1,900	10	340	100	2.70	2.47		.344
Loader-balefork			3,300	20	170	100	3.35	1.40		.430

^{a/} Spring 1978 prices.

^{b/} Includes depreciation, interest on average investment at 9 percent, property taxes at 1.1 percent of average value, and insurance at 0.7 percent. of average investment.

^{c/} Gasoline was charged at 59¢ per gallon for the truck and pickup, and 48¢ for the swather. Diesel fuel was 44¢ per gallon. Lubrication is figured at 15 percent of fuel cost.

^{d/} Tractor hours include a miscellaneous requirement for moving between fields, etc., equal to 10 percent of machine field time.

^{e/} Two grain drills are used.

Table B-2. Investment Assumptions for Center-Pivot Irrigation System

Item	Original value ^{a/}	Life (yrs.)	Salvage value	Average value
One sprinkler unit, 1/4 mile	\$28,340	12	\$2,730	\$15,535
Pumps and miscellaneous	8,275	20	830	4,553
Mainlines	<u>11,960</u>	20	<u>0</u>	<u>5,980</u>
	\$45,575		\$3,560	\$26,068

^{a/} Spring 1978 prices.

Table B-3. Annual Ownership Costs for Center-Pivot Irrigation System

Item	Costs
<u>Center-Pivot Ownership Cost: ^{a/}</u>	
Interest	\$ 1,807.92
Depreciation	2,506.42
Taxes	220.97
Insurance	<u>140.62</u>
TOTAL	\$ 4,675.93
<u>Mainline Ownership Cost: ^{a/}</u>	
Interest	\$ 538.20
Depreciation	598.00
Taxes	<u>65.78</u>
TOTAL	\$ 1,201.98
<u>Total Ownership Cost:</u>	
Per Acre ^{b/}	\$ 45.22

^{a/} Ownership cost calculations assumed straight line depreciation, interest on average investment at 9 percent, property taxes at 1.1 percent of average value, and insurance at 0.7 percent of average investment. Mainlines were not insured.

^{b/} Based on one center-pivot system per 130 acres.

Table B-4. Operating Assumptions for Center-Pivot Irrigation System

Item	Center-Pivot
Labor (hrs./a.i. applied)	0.06
Repair (\$/a.i. applied)	0.21

Sources: Lacewell, R.D., and W.F. Hughes, "A Comparison of Capital Requirements and Labor Use, Alternative Sprinkler Irrigation Systems, Texas High Plains," Texas Agricultural Experiment Station Information Report 71-3, 1971; Doran, S.M., and J.C. Holland, "The Cost of Owning and Operating Six Semi-Portable Sprinkler Systems in the Columbia Basin, Washington," Washington State University Cooperative Extension Service, E.M. 2760, 1967; and Cothorn, James, S.W. Howard, and LeRoy Luft, "The Cost of Owning and Operating Five Different Types of Portable Sprinkler Systems," Montana State University, Cooperative Extension Service, Bulletin 1063, 1969.

Table B-5. On-Farm Electricity Cost Assumptions for Center-Pivot Irrigation System

Crops	Components of On-Farm Electricity Costs ^{a/}			Total Cost	
	Fixed Annual Charge ^{b/}	Demand Charge ^{c/}	Energy Charge ^{d/}	Per Acre	Per Acre-Inch ^{e/}
	(\$/ac.)	(\$/ac.)	(\$/ac.)	(\$/ac.)	(\$/a.i.)
Late potatoes (460 cwt.)	\$4.62	\$1.75	\$5.71	\$12.08	\$.26
Early potatoes (320 cwt.)	4.62	1.40	4.26	10.28	.30
Drybeans (18 cwt.)	4.62	1.05	3.48	9.15	.35
Corn (165 bu.)	4.62	1.40	4.55	10.57	.29
Wheat (90 bu.)	4.62	1.23	3.92	9.77	.31
Alfalfa production (7 T.)	4.62	1.93	6.30	12.85	.25
Alfalfa estab. and cover crop	4.62	.35	1.01	5.98	.73

^{a/} Calculations based on rate schedules provided by Umatilla Electric Cooperative Association.

^{b/} Based on horsepower requirements.

^{c/} Based on monthly peak half-hour electricity demand.

^{d/} Based on total electricity demand less total peak half-hour electricity demand.

^{e/} Water application assumptions are listed in Table B-8.

Table B-7. Production Input Price Assumptions

Input	Unit	Cost per unit ^{a/}
Potato seed	cwt.	\$ 6.50
Drybean seed	lb.	.37
Seed corn	bu.	57.00
Wheat seed	lb.	.09
Alfalfa seed	lb.	2.05
Cover crop seed	lb.	1.00
Nitrogen	lb.	.20
Phosphorus	lb.	.34
Potassium	lb.	.09
Sulfur	lb.	.12
Zinc	lb.	.60
Boron	lb.	1.30
Fertilizer spreader rental	a.	.75
Dyfonate	lb.	.48
Temik-15G	lb.	1.60
Sencor	lb.	7.25
Difolatan	gal.	9.40
Monitor	qt.	7.60
Dinitro	qt.	4.07 ^{b/}
Treflan	gal.	27.00
Atrazine	lb.	2.60
Lasso	qt.	4.25
Nudrin	qt.	3.75
2, 4-D	pt.	1.05
Banvel-D	oz.	.27
Kerb	lb.	7.00
Paraquat	qt.	8.50
Custom chemical application	a.	3.00
Crop insurance (wheat)	bu.	.04
Bale wire	t.	1.40
Gopher control	a.	1.60
Land plane rental	a.	1.00
Custom potato hauling	cwt.	.20
Custom drybean hauling	cwt.	.30
Custom corn hauling	bu.	.08
Custom wheat hauling	bu.	.08
Machinery labor	hr.	5.00
Irrigation labor	hr.	4.00

^{a/} Spring 1978 prices.

^{b/} Price includes 3 1/3 gallons of diesel fuel per quart at 44¢ per gallon.

Table B-8. Assumed Schedule of Water Applications Per Acre

Month	Crop: Yield per acre:	Late potatoes 460 cwt. (a-i/ac)	Early potatoes 320 cwt. (a-i/ac)	Drybeans 18 cwt. (a-i/ac)	Corn 165 bu. (a-i/ac)	Wheat 90 bu. (a-i/ac)	Alfalfa production 7 T. (a-i/ac)	Alfalfa establishment 0 (a-i/ac)	Cover crop 0 (a-i/ac)
January									
February									
March		.9	1.3				1.9		
April		2.5	3.0			3.0	5.8		
May		3.8	7.5	2.0	4.1	9.6	6.4		
June		9.8	9.8	6.6	8.1	11.0	8.8		
July		14.3	13.1	12.3	11.1	6.0	11.3		
August		11.4		5.5	9.9		9.3	1.0	1.0
September		3.8			3.8		5.4	4.4	4.4
October						2.3	2.4	2.8	2.8
November									
December									
TOTAL		46.5	34.7	26.4	37.0	31.9	51.3	8.2	8.2

Source: Vonocil, James A. "Estimated Irrigation and Water Application Requirements: Northern Morrow County and Northwest Umatilla County, Oregon." Oregon's Northern Columbia River Basin Irrigation System Development Project. Working Paper No. 1, May 19, 1976.

APPENDIX C

Machinery and Equipment Cost Calculations

APPENDIX C

MACHINERY AND EQUIPMENT COST CALCULATIONS

This section explains the calculations of the machinery and equipment costs in the crop budgets presented in this report. It should also be helpful to farmers in estimating the costs of owning and operating their machinery and equipment.

The first step is to estimate purchase price, salvage value, years life, and hours used annually. (Tables B-1 through B-3 list this information for the machinery and equipment used in preparing the budgets.) An annual interest rate also needs to be specified based on the rate paid for borrowed capital.

Average investment is then calculated by adding the purchase price and the salvage value and dividing this sum by two. Average investment is used to determine some of the ownership costs discussed below. In addition to the ownership costs, machinery and equipment operating costs also are discussed.

Ownership Costs

Ownership costs include depreciation, interest on the investment, taxes, insurance, and, if appropriate, housing. These costs are fixed in that they are incurred whether the equipment is used much or little.

Depreciation is the loss in value due to age, use, and obsolescence. Although depreciation is partly influenced by use, it is considered an ownership cost. To calculate average annual depreciation costs, subtract the estimated salvage value from the purchase price and divide by the years of life.

Interest costs are calculated by multiplying the average investment by the interest rate. The interest rate assumed in this report is nine percent.

Personal property tax is the local tax rate times the average investment (or assessed value) for the equipment. The tax rate assumed in this report is 1.1 percent of the average investment.

Insurance costs typically vary from 0.5 to 1.0 percent of the average investment annually. A percentage of 0.7 is used in this report.

Housing costs are incurred only if the equipment is sheltered. The cost is estimated by determining the square footage required to house the equipment and multiplying by the average annual cost of providing a square foot of shelter including depreciation, interest, taxes, insurance, and repair costs. Housing costs are not included in this report.

Operating Costs

Operating costs include fuel, lubricants, and repairs. These costs vary directly with equipment use. Past records and personal experience are probably the best source for determining these costs.

Annual fuel costs depend on engine size, fuel type, load, etc. Multiplying the gallons of fuel consumed per hour times the fuel price per gallon times the hours used annually determines annual fuel costs.

Lubricants include engine oil, other lubricants, and filters. The lubricant costs are approximately 15 percent of the fuel costs.

Repair costs depend upon the type of machinery, nature of work, hours of use, maintenance schedule, and other variables. Parts and service labor should be included in estimating annual repair costs.

Allocating Costs Per Acre

The total average annual ownership cost is the sum of depreciation, interest, taxes, insurance, and housing. This total is divided by the hours used annually to calculate the average ownership cost per hour. The total average annual operating cost is the sum of fuel, lubricant, and repair costs. Again, this total is divided by the hours used annually to calculate the average operating cost per hour. The ownership and operating costs per hour are then multiplied by the number of hours the machine is used per acre to determine the total machinery and equipment costs per acre.



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