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Estimated Crop Production Costs on Loam Soils with Side-Roll Irrigation Systems, Oregon's Columbia Basin, 1978



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ESTIMATED CROP PRODUCTION COSTS ON LOAM SOILS
WITH SIDE-ROLL 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 are late potatoes, drybeans, wheat, and alfalfa. Wheat is grown under full or supplemental irrigation as well as dryland conditions in this area. Typical costs have been estimated for these crops assuming they were grown on loam soils, elevation 700 to 950 feet, under a side-roll irrigation system.^{1/} 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 this area.

^{1/} On higher elevation loam soils (950 to 1,200 feet) the costs of production decrease \$0.30 to \$4.00 per acre depending on the crop. See Table C-2.

The author gratefully acknowledges the assistance of R. C. Hinman, Area Extension Agent, for conducting the field work for this study. The cooperation and contributions of Luther A. Fitch, Darrell C. Maxwell, and Harold E. Kerr, County Extension Agents, are also greatly appreciated. Special recognition for help in this study is also extended to Dr. A. Gene Nelson, Farm Management Specialist, Oregon State University.

Certain general assumptions were made in the development of these data. A commercially viable farm consisting of 600 to 700 acres of irrigated cropland 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 was 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 side-roll 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 for the side-roll equipment were determined according to the peak-month irrigation requirement for each crop (Tables B-3 and B-8).

The budgeted costs (Table 1 and Tables A-1 to A-15) 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 in estimating their individual costs of production. These costs can be useful for a variety of farm management decisions. Examples include: budgeting cash flows to arrange for credit needs and schedule debt repayment; 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 among farms, each grower is encouraged to estimate the costs for the individual operation.

Table 1. Estimated Crop Production Costs Per Acre on Loam Soils with Side-Roll Irrigation Systems, Oregon's Columbia Basin, 1978

Crop	Late potatoes	Drybeans	Wheat	Alfalfa production	Alfalfa estab.	Cover crop
Yield per acre	420 cwt.	20 cwt.	85 bu.	6.5 T.	0	0
Costs per acre:						
Seed	\$ 130.00	\$ 33.30	\$ 8.10	\$ 0	\$ 32.80	\$ 15.00
Fertilizer and spreader	163.25	54.15	33.35	21.35	25.65	0
Chemicals and appl.	109.82	6.51	5.50	11.50	0	0
Other direct expenses ^{a/}	84.00	6.00	10.20	10.70	2.00	0
Machine operating ^{b/}	42.39	19.23	13.11	31.48	14.42	5.49
Irrigation pumping	5.81	4.03	3.94	5.19	1.07	1.07
Irrigation repairs	5.42	3.09	3.40	5.58	.77	.77
Irrigation labor	23.66	13.49	14.83	24.34	3.36	3.36
Water charge						
Other labor	23.84	14.14	8.37	29.53	12.63	4.09
Operating capital int.	21.76	4.59	3.58	3.83	1.94	.58
Machinery ownership ^{c/}	64.32	37.35	23.33	85.84	21.58	7.85
Irrigation ownership ^{c/}	36.27	32.39	29.67	30.53	0 ^{d/}	0 ^{d/}
Land taxes	12.50	12.50	12.50	12.50	0 ^{d/}	0 ^{d/}
Land interest						
Management ^{e/}	28.92	9.63	6.80	10.89	4.65	1.53
Overhead ^{f/}	21.69	7.22	5.10	8.17	3.49	1.15
TOTAL COST PER ACRE (Excluding Land and Water)	\$ 773.65	\$ 257.62	\$ 181.78	\$ 291.43	\$ 124.36	\$ 40.89

^{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 percent, 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, the 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.

Table 1 (cont.). Estimated Crop Production Costs Per Acre on Loam Soils with Side-Roll Irrigation Systems, Oregon's Columbia Basin, 1978

Crop:	Winter wheat annual cropping ^{a/}	Spring wheat annual cropping ^{a/}	Winter wheat annual cropping ^{a/}	Spring wheat annual cropping ^{a/}	Winter wheat producing year ^{b/}	Winter wheat fallow year ^{b/}	Dryland wheat producing year ^{c/}	Dryland wheat fallow year ^{c/}
Yield per acre	60 bu	50 bu	45 bu	38 bu	70 bu	55 bu	28 bu	0
Costs per acre:								
Seed	\$ 5.40	\$ 8.10	\$ 4.50	\$ 6.75	\$ 5.40	\$ 5.40	\$ 4.50	\$ 0
Fertilizer & spreader	21.95	16.95	13.95	11.95	20.95	13.95	0	0
Chemicals & appl.	4.32	4.32	4.32	4.32	4.32	4.32	4.32	0
Other direct expenses ^{d/}	7.20	6.00	5.40	4.56	8.40	6.60	3.36	0
Machine operating ^{e/}	15.21	13.94	13.94	13.31	12.10	10.83	8.15	5.72
Irrigation pumping	1.99	2.06	1.48	1.23	1.99	1.48	0	0
Irrigation repairs	2.05	2.08	1.45	1.19	2.05	1.45	0	0
Irrigation labor	8.93	9.07	6.34	5.18	8.93	6.34	0	0
Water charge							0	0
Other labor	12.35	11.86	11.86	11.62	10.15	9.67	6.02	4.94
Operating capital int.	2.52	2.28	2.13	1.93	2.49	2.14	.76	.33
Machinery ownership ^{f/}	25.52	22.96	22.96	21.68	21.41	18.84	13.91	7.57
Irrigation ownership ^{f/}	17.01	17.51	16.32	14.80	17.01	16.32	0	0
Land taxes	7.50	7.50	7.50	7.50	7.50	7.50	3.13	3.13
Land interest								
Management h/	5.25	4.99	4.48	4.25	4.91	4.19	1.77	.87
Overhead i/	3.95	3.75	3.36	3.19	3.68	3.15	1.32	.65
TOTAL COST PER ACRE (Excluding Land & Water)	\$141.17	\$133.37	\$119.99	\$113.46	\$131.29	\$112.18	\$ 47.24	\$ 23.21

a/ These crops are grown in the following rotation: winter wheat, winter wheat, spring wheat.

b/ These crops are grown in the following rotation: winter wheat, fallow.

c/ These crops are grown in the following rotation: dryland wheat, fallow.

d/ Includes such items as custom hauling and crop insurance.

e/ Includes fuel, lubrication, and repairs.

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

g/ Only mainline ownership costs included (see Table B-3).

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

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

APPENDIX A

Crop Budgets

Tables A-1 to A-15

Table A-1. LATE POTATOES (420 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 (2x)	.277	1.39	1.93	3.23			6.55	
Fertilize	.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	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	
Hillup and layby (2x)	.416	2.08	2.12	3.89			8.09	
Irrigate	5.916	23.66	5.42	36.27	power	5.81	71.16	
Water charge								
<u>Harvest Operations</u>								
Dig	1.828	9.14	25.35	32.41			66.90	
Haul					custom	84.00	84.00	
<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)						21.76	21.76	
Land taxes						12.50	12.50	
Land interest								
Management ^{c/}						28.92	28.92	
Overhead ^{d/}						21.69	21.69	
TOTAL COST PER ACRE								
(Excluding Land & Water)		47.50	47.81	100.59		577.75	773.65	

^{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. DRYBEANS (20 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	53.40 .75	56.16	
Herbicide					mtls. appl.	3.51 3.00	6.51	
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	3.372	13.49	3.09	32.39	power	4.03	53.00	
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	6.00	6.00	
<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)						4.59	4.59	
Land taxes						12.50	12.50	
Land interest								
Management ^{c/}						9.63	9.63	
Overhead ^{d/}						7.22	7.22	
TOTAL COST PER ACRE								
(Excluding Land & Water)		27.63	22.32	69.74		137.93	257.62	

^{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. WINTER WHEAT (85 bushel 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 (2x)	.139	.70	.96	1.61			3.27	
Fertilize	.205	1.03	.41	.57	mtls. spreader rent	32.60 .75	35.36	
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. appl.	2.50 3.00	5.50	
Irrigate	3.708	14.83	3.40	29.67	power	3.94	51.84	
Water charge								
<u>Harvest Operations</u>								
Combine	.486	2.43	6.33	12.82			21.58	
Haul					custom	6.80	6.80	
<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						3.40	3.40	
Op. cap. interest (9 percent)						3.58	3.58	
Land taxes						12.50	12.50	
Land interest								
Management ^{c/}						6.80	6.80	
Overhead ^{d/}						5.10	5.10	
TOTAL COST PER ACRE								
(Excluding Land & Water)		23.20	16.51	53.00		89.07	181.78	

^{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. ALFALFA PRODUCTION (6.5 ton per acre yield). Estimated Costs Per Acre, Oregon's Columbia Basin, 1978

	Labor		Machinery & Equipment		Other		Total	Your
	Hrs.	Value	Operating ^{a/}	Ownership ^{b/}	Item	Cost	cost	costs
		(\$)	(\$)	(\$)		(\$)	(\$)	(\$)
<u>Cultural Operations</u>								
Fertilize	.205	1.03	.41	.57	mtls.	20.60		
					spreader rent	.75	23.36	
Herbicide					mtls.	8.50		
					appl.	3.00	11.50	
Gopher control						1.60	1.60	
Irrigate	6.084	24.34	5.58	30.53	power	5.19	65.64	
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	9.10	43.75	
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)						3.83	3.83	
Land taxes						12.50	12.50	
Land interest								
Management ^{c/}						10.89	10.89	
Overhead ^{d/}						8.17	8.17	
Amortized Estab. Costs ^{e/}								
<u>TOTAL COST PER ACRE^{e/}</u>								
(Excluding Land & Water)		53.87	37.06	116.37		84.13	291.43	

^{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-5) can be included in these production costs. Assuming a four-year stand life and 9% interest, the amortized establishment cost is \$38.39 per acre (\$124.36 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-5. ALFALFA ESTABLISHMENT. 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	
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.	24.90		
					spreader rent	.75	27.66	
Disk and pack (2.5x)	.433	2.18	3.96	5.19			11.33	
Drill	.340	1.70	2.26	3.80	seed	32.80	40.56	
Irrigate	.840	3.36	.77	0 ^{e/}	power	1.07	5.20	
Water charge								
<u>Other Charges</u>								
Truck	.192	.96	1.04	2.06			4.06	
Pickup	.300	1.50	1.20	1.38			4.08	
Op. cap. interest (9 percent)						1.94	1.94	
Land taxes						0	0 ^{e/}	
Land interest								
Management ^{c/}						4.65	4.65	
Overhead ^{d/}						3.49	3.49	
TOTAL COST PER ACRE								
(Excluding Land & Water)		15.99	15.19	21.58		71.60	124.36	

^{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 and the planting of cover crops were 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 would not be charged.

Table A-6. COVER CROP. Estimated Costs Per Acre, Oregon's Columbia Basin, 1978

	<u>Labor</u>		<u>Machinery & Equipment</u>		<u>Other</u>		<u>Total</u>	<u>Your</u>
	<u>Hrs.</u>	<u>Value</u>	<u>Operating</u> ^{a/}	<u>Ownership</u> ^{b/}	<u>Item</u>	<u>Cost</u>	<u>cost</u>	<u>costs</u>
		(\$)	(\$)	(\$)		(\$)	(\$)	(\$)
<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	.840	3.36	.77	0 ^{e/}	power	1.07	5.20	
Water charge								
<u>Other Charges</u>								
Pickup	.300	1.50	1.20	1.38			4.08	
Op. cap. interest (9 percent)						.58	.58	
Land taxes						0	0 ^{e/}	
Land interest								
Management ^{c/}						1.53	1.53	
Overhead ^{d/}						1.15	1.15	
<u>TOTAL COST PER ACRE</u>								
(Excluding Land & Water)		7.45	6.26	7.85		19.33	40.89	

^{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 and the planting of cover crops were 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 would not be charged.

Table A-7. WINTER WHEAT (60 bushel per acre yield).^{a/} Estimated Costs Per Acre, Oregon's Columbia Basin, 1978

	Labor		Machinery & Equipment		Other		Total cost (\$)	Your costs (\$)
	Hrs.	Value (\$)	Operating ^{b/} (\$)	Ownership ^{c/} (\$)	Item	Cost (\$)		
<u>Cultural Operations</u>								
Chisel	.139	.70	.96	1.61			3.27	
Disk	.173	.87	1.20	1.72			3.79	
Fertilize	.205	1.03	.41	.57	mtls.	21.20		
					spreader rent	.75	23.96	
Disk and pack	.173	.87	1.58	2.07			4.52	
Drill	.170	.85	1.75	2.71	seed	5.40	10.71	
Herbicide					mtls.	1.32		
					appl.	3.00	4.32	
Irrigate	2.232	8.93	2.05	17.01	power	1.99	29.98	
Move lines ^{d/}	.471	1.88	.38	.53			2.79	
Water charge								
<u>Harvest Operations</u>								
Combine	.389	1.95	5.07	10.25			17.27	
Haul					custom	4.80	4.80	
<u>Other Charges</u>								
Truck	.360	1.80	1.94	3.86			7.60	
Pickup	.480	2.40	1.92	2.20			6.52	
Crop insurance						2.40	2.40	
Op. cap. interest (9 percent)						2.52	2.52	
Land taxes						7.50	7.50	
Land interest								
Management ^{e/}						5.27	5.27	
Overhead ^{f/}						3.95	3.95	
TOTAL COST PER ACRE								
(Excluding Land & Water)		21.28	17.26	42.53		60.10	141.17	

^{a/} This crop is grown in the following rotation: winter wheat, winter wheat, spring wheat.

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

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

^{d/} A charge for moving irrigation equipment is included because the equipment is shared with other crop enterprises.

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

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

Table A-8. SPRING WHEAT (50 bushel per acre yield).^{a/} Estimated Costs Per Acre, Oregon's Columbia Basin, 1978

	Labor		Machinery & Equipment		Other		Total cost (\$)	Your costs (\$)
	Hrs.	Value (\$)	Operating ^{b/} (\$)	Ownership ^{c/} (\$)	Item	Cost (\$)		
<u>Cultural Operations</u>								
Chisel	.139	.70	.96	1.61			3.27	
Disk	.173	.87	1.20	1.72			3.79	
Fertilize	.205	1.03	.41	.57	mtls. spreader rent	16.20 .75	18.96	
Disk and pack	.173	.87	1.58	2.07			4.52	
Drill	.170	.85	1.75	2.71	seed	8.10	13.41	
Herbicide					mtls. appl.	1.32 3.00	4.32	
Irrigate	2.268	9.07	2.08	17.51	power	2.06	30.72	
Move lines ^{d/}	.471	1.88	.38	.53			2.79	
Water charge								
<u>Harvest Operations</u>								
Combine	.292	1.46	3.80	7.69			12.95	
Haul						4.00	4.00	
<u>Other Charges</u>								
Truck	.360	1.80	1.94	3.86			7.60	
Pickup	.480	2.40	1.92	2.20			6.52	
Crop insurance						2.00	2.00	
Op. cap. interest (9 percent)						2.28	2.28	
Land taxes						7.50	7.50	
Land interest								
Management ^{e/}						4.99	4.99	
Overhead ^{f/}						3.75	3.75	
TOTAL COST PER ACRE								
(Excluding Land & Water)		20.93	16.02	40.47		55.95	133.37	

^{a/} This crop is grown in the following rotation: winter wheat, winter wheat, spring wheat.

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

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

^{d/} A charge for moving irrigation equipment is included because the equipment is shared with other crop enterprises.

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

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

Table A-9. WINTER WHEAT (45 bushel per acre yield).^{a/} Estimated Costs Per Acre, Oregon's Columbia Basin, 1978

	Labor		Machinery & Equipment		Other		Total cost	Your costs
	Hrs.	Value	Operating ^{b/}	Ownership ^{c/}	Item	Cost		
		(\$)	(\$)	(\$)		(\$)	(\$)	(\$)
<u>Cultural Operations</u>								
Chisel	.139	.70	.96	1.61			3.27	
Disk	.173	.87	1.20	1.72			3.79	
Fertilize	.205	1.03	.41	.57	mtls.	13.20		
					Spreader rent	.75	15.96	
Disk and pack	.173	.87	1.58	2.07			4.52	
Drill	.170	.85	1.75	2.71	seed	4.50	9.81	
Herbicide					mtls.	1.32		
					appl.	3.00	4.32	
Irrigate	1.584	6.34	1.45	16.32	power	1.48	25.59	
Move lines ^{d/}	.471	1.88	.38	.53			2.79	
Water charge								
<u>Harvest Operations</u>								
Combine	.292	1.46	3.80	7.69			12.95	
Haul					custom	3.60	3.60	
<u>Other Charges</u>								
Truck	.360	1.80	1.94	3.86			7.60	
Pickup	.480	2.40	1.92	2.20			6.52	
Crop insurance						1.80	1.80	
Op. cap. interest (9 percent)						2.13	2.13	
Land taxes						7.50	7.50	
Land interest								
Management ^{e/}						4.48	4.48	
Overhead ^{f/}						3.36	3.36	
TOTAL COST PER ACRE								
(Excluding Land & Water)	18.20		15.39	39.28		47.12	119.99	

^{a/} This crop is grown in the following rotation: winter wheat, winter wheat, spring wheat.

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

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

^{d/} A charge for moving irrigation equipment is included because the equipment is shared with other crop enterprises.

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

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

Table A-10. SPRING WHEAT (38 bushel per acre yield).^{a/} 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 ^{b/}	Ownership ^{c/}	Item	Cost		
		(\$)	(\$)	(\$)		(\$)	(\$)	(\$)
<u>Cultural Operations</u>								
Chisel	.139	.70	.96	1.61			3.27	
Disk	.173	.87	1.20	1.72			3.79	
Fertilize	.205	1.03	.41	.57	mtls.	11.20		
					spreader rent	.75	13.96	
Disk and pack	.173	.87	1.58	2.07			4.52	
Drill	.170	.85	1.75	2.71	seed	6.75	12.06	
Herbicide					mtls.	1.32		
					appl.	3.00	4.32	
Irrigate	1.296	5.18	1.19	14.80	power	1.23	22.40	
Move lines ^{d/}	.471	1.88	.38	.53			2.79	
Water charge								
<u>Harvest Operations</u>								
Combine	.243	1.22	3.17	6.41			10.80	
Haul					custom	3.04	3.04	
<u>Other Charges</u>								
Truck	.360	1.80	1.94	3.86			7.60	
Pickup	.480	2.40	1.92	2.20			6.52	
Crop insurance						1.52	1.52	
Op. Cap. interest (9 percent)						1.93	1.93	
Land taxes						7.50	7.50	
Land interest								
Management ^{e/}						4.25	4.25	
Overhead ^{f/}						3.19	3.19	
TOTAL COST PER ACRE								
(Excluding Land and Water)	16.80		14.50	36.48		45.68	113.46	

^{a/} This crop is grown in the following rotation: winter wheat, winter wheat, spring wheat.

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

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

^{d/} A charge for moving irrigation equipment is included because the equipment is shared with other crop enterprises.

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

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

Table A-11. WINTER WHEAT (70 bushel per acre yield).^{a/} Estimated Costs Per Acre, Oregon's Columbia Basin, 1978

	Labor		Machinery & Equipment		Other		Total	Your
	Hrs.	Value	Operating ^{b/}	Ownership ^{c/}	Item	Cost	cost	cost
		(\$)	(\$)	(\$)		(\$)	(\$)	(\$)
<u>Cultural Operations</u>								
Fertilize	.205	1.03	.41	.57	mtls.	20.20		
					spreader rent	.75	22.96	
Drill	.170	.85	1.75	2.71	seed	5.40	10.71	
Herbicide					mtls.	1.32		
					appl.	3.00	4.32	
Irrigate	2.232	8.93	2.05	17.01	power	1.99	29.98	
Move lines ^{d/}	.471	1.88	.38	.53			2.79	
Water charge								
<u>Harvest Operations</u>								
Combine	.438	2.19	5.70	11.54			19.43	
Haul					custom	5.60	5.60	
<u>Other Charges</u>								
Truck	.360	1.80	1.94	3.86			7.60	
Pickup	.480	2.40	1.92	2.20			6.52	
Crop insurance						2.80	2.80	
Op. Cap. interest (9 percent)						2.49	2.49	
Land taxes						7.50	7.50	
Land interest								
Management ^{e/}						4.91	4.91	
Overhead ^{f/}						3.68	3.68	
TOTAL COST PER ACRE								
(Excluding Land and Water)	19.08		14.15	38.42		59.64	131.29	

^{a/} This crop is grown in the following rotation: winter wheat, fallow (irrigated).

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

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

^{d/} A charge for moving irrigation equipment is included because the equipment is shared with other crop enterprises.

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

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

Table A-12. WINTER WHEAT (55 bushel per acre yield).^{a/} Estimated Costs Per Acre, Oregon's Columbia Basin, 1978

	Labor		Machinery & Equipment		Other		Total cost (\$)	Your costs (\$)
	Hrs.	Value (\$)	Operating ^{b/} (\$)	Ownership ^{c/} (\$)	Item	Cost (\$)		
<u>Cultural Operations</u>								
Fertilize	.206	1.03	.41	.57	mtls. spreader rent.	13.20 .75	15.96	
Drill	.170	.85	1.75	2.71	seed	5.40	10.71	
Herbicide					mtls. appl.	1.32 3.00	4.32	
Irrigate	1.584	6.34	1.45	16.32	power	1.48	25.59	
Move lines ^{d/}	.471	1.88	.38	.53			2.79	
Water charge								
<u>Harvest Operations</u>								
Combine	.341	1.71	4.43	8.97			15.11	
Haul					custom	4.40	4.40	
<u>Other Charges</u>								
Truck	.360	1.80	1.94	3.86			7.60	
Pickup	.480	2.40	1.92	2.20			6.52	
Crop insurance						2.20	2.20	
Op. cap. interest (9 percent)						2.14	2.14	
Land taxes						7.50	7.50	
Land interest								
Management ^{e/}						4.19	4.19	
Overhead ^{f/}						3.15	3.15	
TOTAL COST PER ACRE								
(Excluding Land and Water)	16.01		12.28	35.16		48.73	112.18	

- ^{a/} This crop is grown in the following rotation: winter wheat, fallow (irrigated).
^{b/} Includes fuel, lubrication, and repairs.
^{c/} Includes depreciation, interest on average investment at 9%, taxes, and insurance.
^{d/} A charge for moving irrigation equipment is included because the equipment is shared with other crop enterprises.
^{e/} Estimated at 4% of all costs excluding the water charge, land interest, and overhead.
^{f/} Estimated at 3% of all costs excluding the water charge, land interest, and management.

Table A-13. FALLOW (irrigated). 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	_____
Disk	.173	.87	1.20	1.72			3.79	_____
Rodweed (3x)	.195	.97	1.64	2.04			4.65	_____
Irrigate				9.23 ^{c/}			9.23	_____
<u>Other Charges</u>								
Pickup	.480	2.40	1.92	2.20			6.52	_____
Op. cap. interest (9 percent)						.33	.33	_____
Land taxes						7.50	7.50	_____
Land interest								_____
Management ^{d/}						1.42	1.42	_____
Overhead ^{e/}						1.07	1.07	_____
<u>TOTAL COST PER ACRE</u>								
(Excluding Land)		4.94	5.72	16.80		10.32	37.78	_____

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

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

^{c/} Fallow ground is not irrigated, however, a charge for mainline ownership is included.

^{d/} Estimated at 4% of all costs excluding land interest and overhead.

^{e/} Estimated at 3% of all costs excluding land interest and management.

Table A-14. DRYLAND WINTER WHEAT (28 bushel per acre yield).^{a/} Estimated Costs Per Acre, Oregon's Columbia Basin, 1978

	<u>Labor</u>		<u>Machinery & Equipment</u>		<u>Other</u>		<u>Total cost</u>	<u>Youth cost</u>
	<u>Hrs.</u>	<u>Value</u>	<u>Operating^{b/}</u>	<u>Ownership^{c/}</u>	<u>Item</u>	<u>Cost</u>		
		(\$)	(\$)	(\$)		(\$)	(\$)	(\$)
<u>Cultural Operations</u>								
Drill	.170	.85	1.75	2.71	seed	4.50	9.81	
Herbicide					mtls.	1.32		
					appl.	3.00	4.32	
<u>Harvest Operations</u>								
Combine	.195	.97	2.54	5.14			8.65	
Haul						2.24	2.24	
<u>Other Charges</u>								
Truck	.360	1.80	1.94	3.86			7.60	
Pickup	.480	2.40	1.92	2.20			6.52	
Crop insurance						1.12	1.12	
Op. cap. interest (9 percent)						.76	.76	
Land taxes						3.13	3.13	
Land interest								
Management ^{d/}						1.77	1.77	
Overhead ^{e/}						1.32	1.32	
TOTAL COST PER ACRE								
(Excluding Land)		6.02	8.15	13.91		19.16	47.24	

^{a/} This crop is grown in the following rotation: dryland winter wheat, fallow (dryland).

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

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

^{d/} Estimated at 4% of all costs excluding land interest and overhead.

^{e/} Estimated at 3% of all costs excluding land interest and management.

Table A-15. FALLOW (dryland). Estimated Costs Per Acre, Oregon's Columbia Basin, 1978

	<u>Labor</u>		<u>Machinery & Equipment</u>		<u>Other</u>		Total	Your
	Hrs.	Value	Operating ^{a/}	Ownership ^{b/}	Item	Cost	cost	costs
		(\$)	(\$)	(\$)		(\$)	(\$)	(\$)
<u>Cultural Operations</u>								
Chisel	.139	.70	.96	1.61			3.27	
Disk	.173	.87	1.20	1.72			3.79	
Rodweed (3x)	.195	.97	1.64	2.04			4.65	
<u>Other Charges</u>								
Pickup	.480	2.40	1.92	2.20			6.52	
Op. cap. interest (9 percent)						.33	.33	
Land taxes						3.13	3.13	
Land interest								
Management ^{c/}						.87	.87	
Overhead ^{d/}						.65	.65	
TOTAL COST PER ACRE								
(Excluding Land)		4.94	5.72	7.57		4.98	23.21	

^{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 land interest and overhead.

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

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 ^{c/} (\$/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 ^{e/}
Pick-up 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
Rodweeder		36.0	6,100	10	1,080	200	4.34	3.10		.054
Drill ^{f/}		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/} This figure was used for an 85 bushel yield. For lower yields, it was adjusted downward.

^{f/} Two grain drills are used.

Table B-2. Investment Assumptions for Side-Roll Irrigation System

Item	Original value ^{a/}	Life (yrs)	Salvage value	Average value
One wheel line, 1320 ft.	\$3,850	15	\$370	\$2,110
Pumps and miscellaneous	880	20	90	485
Mainline	2,150	20	0	1,075
	<u>\$6,880</u>		<u>\$460</u>	<u>\$3,670</u>

^{a/} Spring 1978 prices.

Table B-3. Annual Ownership Costs for Side-Roll Irrigation System

Item	
Side-Roll Ownership Cost: ^{a/}	
Interest	\$233.55
Depreciation	271.50
Taxes	28.55
Insurance	18.17
Total	<u>\$551.77</u>
Mainline Ownership Cost: ^{a/}	
Interest	\$ 96.75
Depreciation	107.50
Taxes	11.83
Total	<u>\$216.08</u>
Total Ownership Cost: ^{b/}	
Per Acre	\$ 32.81
Per Acre-inch in peak month	2.344

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

^{b/} Assuming two 11-hour sets per day and 3.0 acre-inches of water applied per acre, 1.82 acres could be irrigated per set. This implies that a total of 109.2 acres could be irrigated once-over in 30 days. One line, then, applies 327.6 acre-inches per month (3.0 acre-inches per acre times 109.2 acres). Given these assumptions, to irrigate a crop requiring 14 acre-inches in the peak month, one side-roll line would be required per 23.4 acres.

Table B-4. Operating Assumptions for Side-Roll Irrigation System

Item	Side-Roll
Labor (hrs./a.i. applied)	0.12
Repair (\$/a.i. applied)	0.11

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 Side-Roll Irrigation System

Crop	Components of On-Farm Electricity Costs ^{a/}			Total Cost	
	Fixed Annual Charge ^{b/}	Demand Charge ^{c/}	Energy Charge ^{d/}	Per Acre	Acre-inch ^{e/}
	(\$/ac.)	(\$/ac.)	(\$/ac.)	(\$/ac.)	(\$/a.i.)
Late Potatoes (420 cwt.)	2.40	.88	2.53	5.81	.12
Drybeans (20 cwt.)	2.06	.53	1.44	4.03	.14
Wheat (85 bu)	1.82	.53	1.59	3.94	.13
Alfalfa production (6.5 T)	1.89	.70	2.60	5.19	.10
Alfalfa estab. and cover crop	.53	.18	.36	1.07	.15
Winter wheat (70 bu & 60 bu)	.69	.35	.95	1.99	.11
Spring wheat (50 bu)	.74	.35	.97	2.06	.11
Winter wheat (55 bu & 45 bu)	.63	.18	.67	1.48	.11
Spring wheat (38 bu)	.50	.18	.55	1.23	.11

^{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-6. Summary of Assumptions for Production Input Quantities Per Acre

[illegible]

Table B-7. Production Input Price Assumptions

Input	Unit	Cost per unit ^{a/}
Potato seed	cwt.	\$ 6.50
Drybean seed	lb.	.37
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
Fertilizer spreader rental	a.	.75
2, 4-D	pt.	1.05
Banvel-D	oz.	.27
Dyfonate	lb.	.48
Temik-15G	lb.	1.60
Sencor	lb.	7.25
Difolatan	gal.	9.40
Monitor	qt.	7.60
Treflan	gal.	27.00
Kerb	lb.	7.00
Simizine	lb.	3.00
Custom chemical application	a.	3.00
Crop insurance (wheat)	bu.	.04
Gopher control	a.	1.60
Bale wire	t.	1.40
Land plane rental	a.	1.00
Custom potato hauling	cwt.	.20
Custom drybean hauling	cwt.	.30
Custom wheat hauling	bu.	.08
Machinery labor	hr.	5.00
Irrigation labor	hr.	4.00

^{a/} Spring 1978 prices.

Table B-8. Assumed Schedule of Water Applications Per Acre, Loam Soils, Elevation, 700 to 950 feet.

Month	Crop:	Late potatoes 420 cwt.	Drybeans 20 cwt.	Winter wheat 85 bu	Alfalfa produc. 6.5 T	Alfalfa establ. 0	Cover crop 0	Winter wheat 60 bu	Spring wheat 50 bu	Winter wheat 45 bu	Spring wheat 38 bu	Winter wheat 70 bu	Winter wheat 55 bu
	Yield:	(a-i/ac)	(a-i/ac)	(a-i/ac)	(a-i/ac)	(a-i/ac)	(a-i/ac)	(a-i/ac)	(a-i/ac)	(a-i/ac)	(a-i/ac)	(a-i/ac)	(a-i/ac)
Jan													
Feb								2.4	2.1	4.2	3.3	2.4	4.2
Mar								2.4	2.1	4.2	3.3	2.4	4.2
Apr	2.7				5.0			4.6	4.9			4.6	
May	4.1		2.2	10.4	6.9								
Jun	10.7		7.3	12.1	9.6								
Jul	16.0		13.7	6.7	12.6								
Aug	13.0		4.9		10.6								
Sep	2.8				6.0	3.5	3.5	1.6	1.3	.8	.8	1.6	.8
Oct				1.7		3.5	3.5	3.0	3.6	1.6	1.3	3.0	1.6
Nov								3.0	3.6	1.6	1.3	3.0	1.6
Dec								1.6	1.3	.8	.8	1.6	.8
TOTAL	49.3	28.1	30.9	50.7	7.0	7.0	18.6	18.9	13.2	10.8	18.6	13.2	

Source: Vomocil, 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

High Elevation Loam Soils Data, 950 to 1200 Feet

Tables C-1 and C-2

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ERRATA SHEET

This replaces Table C-1 on Page 30.

Table C-1. Assumed Schedule of Water Applications Per Acre, High Elevation Loam Soils, 950 to 1200 Feet.

Month	Crop:	Late potatoes 420 cwt.	Drybeans 20 cwt.	Winter wheat 85 bu.	Alfalfa produc. 6.5 T	Alfalfa establ. 0	Cover crop 0	Winter wheat 60 bu	Spring wheat 50 bu	Winter wheat 45 bu	Spring wheat 38 bu	Winter wheat 70 bu	Winter wheat 55 bu
	Yield:	(a-i/ac)	(a-i/ac)	(a-i/ac)	(a-i/ac)	(a-i/ac)	(a-i/ac)	(a-i/ac)	(a-i/ac)	(a-i/ac)	(a-i/ac)	(a-i/ac)	(a-i/ac)
Jan													
Feb							2.2	1.9	3.2	3.8	3.2	2.2	3.8
Mar							2.2	1.9	3.2	3.8	3.2	2.2	3.8
Apr	2.3				4.3		4.2	4.5				4.2	
May	3.6	1.9	9.3		6.1								
Jun	9.9	6.7	11.0	8.9									
Jul	15.3	13.1	6.4	12.1									
Aug	13.0	4.9		10.6									
Sep					3.3	3.3	1.4	1.4	.5	.8	.5	1.4	.8
Oct			1.6		3.3	3.3	2.8	3.1	1.4	1.4	1.4	2.8	1.4
Nov							2.8	3.1	1.4	1.4	1.4	2.8	1.4
Dec							1.4	1.4	.5	.8	.5	1.4	.8
TOTAL	46.8	26.6	28.3	47.7	6.6	6.6	17.0	17.3	10.2	12.0	10.2	17.0	12.0

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

Table C-2. Cost Per Acre Comparisons, Loam Soils, Elevations 700 to 950 Feet and 950 to 1200 Feet.

Crop	Yield per acre	Costs per acre ^{a/}	
		Loam soils 700 to 950 ft.	High loam soils 950 to 1200 ft.
		(\$/ac)	(\$/ac)
Late potatoes	420 cwt.	\$ 773.65	\$ 770.47
Drybeans	20 cwt.	257.62	255.38
Winter wheat	85 bu.	181.78	177.73
Alfalfa production	6.5 T.	291.43	288.52
Alfalfa establish.	0	124.36	124.05
Cover crop	0	40.89	40.58
Winter wheat	60 bu.	141.17	139.25
Spring wheat	50 bu.	133.37	131.41
Winter wheat	45 bu.	119.99	118.33
Spring wheat	38 bu.	113.46	112.82
Winter wheat	70 bu.	131.29	129.36
Winter wheat	55 bu.	112.18	110.51
Fallow (irrigated)	0	37.78	37.78
Dryland winter wheat	28 bu.	47.24	47.24
Fallow (dryland)	0	23.21	23.21

^{a/} Excludes a water charge and land interest.

NOTE: Cost differences are due to the lower irrigation requirements on the high elevation Loam Soils. See Tables B-8 and C-1.

APPENDIX D

Machinery and Equipment Cost Calculations

APPENDIX D

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 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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