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Oregon wheat sales, 80 percent of which are made to foreign customers, represent a significant contribution to Oregon's economy. The annual value of wheat produced in Oregon was over $79 million in 1972, accounting for 18 percent of the state's crop production value.

Oregon wheat production was estimated at 37 million bushels in 1972. Almost two-thirds of the state's total is winter wheat produced under summerfallow rotation in the Columbia Plateau counties of Wasco, Sherman, Gilliam, Morrow, and Umatilla. Rainfall in this area typically ranges from 8 to 15 inches annually.

Objective and Scope of the Study

The objective of this study is to provide a guide to the estimation of wheat cost information for Oregon's major wheat-growing area. Information on the cost of producing wheat is important for sound farm planning. For example, acquiring additional land, purchasing machinery, or changing production practices depends on the production costs relative to returns. This information can also be used as a standard against which the wheat grower can compare his operation.

The information presented is an example of wheat production costs on a synthesized, technically-efficient, case-study farm on the Oregon Columbia Plateau. It has been prepared to typify production costs and yields for a specific soil and climate situation, using a particular set of production practices described below. The figures should not be interpreted as "average" costs for wheat production, because there is a wide variety of situations and practices for which they are not representative.

Source of Data

A committee of wheat growers provided the basic information regarding the size of the study farm, production practices followed, machinery costs, labor requirements, material costs, land charges, and overhead expenses. Additional information was obtained from lenders, local suppliers, and machinery dealers. The data were then analyzed and summarized for review by the committee members, county extension agents, and others familiar with wheat production in the study area.

Certain general assumptions applied to the development and analysis of the data. A technically efficient one-man farm was assumed. The cost for the grower's labor was based on the cash wage for comparable hired labor plus the cost for social security, workmens' compensation, etc. No specific charge was included for the managerial input of the operator.

Fertilizer, seed, chemicals, etc., were charged at current market prices for the area at the time the budget was prepared, July 1973. Machinery was included at the average annual cost over its life, assuming it was purchased at current prices for new machinery, except for machines which are most commonly purchased used. The value of land was based on its market value for agricultural production.

Characteristics of the Study Farm

The study farm comprises 2,700 acres of cropland owned and operated by one man. The farm specializes in wheat production, harvesting 1,350 acres annually with the remaining 1,350 acres in fallow. Under wheat-fallow rotation the normal wheat yield is 30 bushels per harvested acre. Large year-to-year yield variations are common, however.

Reference to the 1969 U. S. Census of Agriculture gives some indication of the relative position of the study farm among all farms in Wasco, Sherman, Gilliam, Morrow, and Umatilla counties. There were 1,762 farms with sales of at least $2,500 in the five-county area in 1969. One hundred ninety-five of these farms harvested 1,000 to 1,999 acres of cropland. Another 54 farms harvested 2,000 or more acres.

Several tillage systems are practiced in this area, including various stubble-mulch fallow systems and mold-board plowing. The traditional practice of mold-board plowing was chosen for this study. All machinery is owned except for the

The author gratefully acknowledges the wheat growers, county extension agents, and others helpful in developing the data for this study.

fertilizer applicator, which is provided by the fertilizer dealer as part of the cost for nitrogen. The herbicide is sprayed by airplane on a custom basis. All machinery is assumed to be purchased new except for one truck and the trap wagon used for servicing machines in the field. The machinery specifications and costs for the study farm are presented in the Appendix tables.

The size of the machinery complement was chosen to provide a technically efficient one-man operation. It is assumed that the machinery can be operated 180 hours per month during the critical seasons. This does not include the time required for moving machinery, repairing breakdowns, bad weather, or other contingencies.

Although several growers in this area have on-farm storage for their grain, the study farm is assumed not to have these facilities available. Consequently, the wheat is hauled directly from the combine to the local elevator. Costs are calculated to include delivery to the elevator, but no subsequent marketing costs are included.

At current prices, the total value of all assets controlled by the operator of this study farm is $475,150. Eighty-five percent of this figure represents investment in land. The remaining $70,150 is the average value of the machinery complement.

The operator of the study farm is assumed to provide all of the labor required, except for 225 hours for hauling wheat during the harvest season.

Estimated Wheat Production Costs

The estimated production costs per harvested acre for white winter wheat at a normal yield of 30 bushels are presented (Table 1). The cultural and harvest operations are listed according to the

Table 1. Estimated Production Costs Per Acre Harvested, by Operation, White Winter Wheat on a 2,700-Acre Dryland Farm, Oregon Columbia Plateau, 1973

	Hours per acre	Labor cost	Machinery cost		Other		Total cost
			Operating[a]	Ownership[b]	Item	Cost	
Cultural operations[c]		($)	($)	($)		($)	($)
Mold-board plow, 12-16 in.	.167	.67	.91	1.42			3.00
Springtooth, 40′ (1.5x)	.100	.40	.51	1.01			1.92
Rod weed, 48′, (4x)	.200	.80	1.07	1.60			3.47
Fertilize	.040	.16	.15	.21	30# N	2.73[d]	3.25
Drill seed, 6-8′	.067	.27	.50	1.42	50# seed	3.35	5.54
Haul seed	.008	.03	.02[f]	.05			.10
Spray herbicide	—Custom—		1.25		chemical	1.75	3.00
Harvest							
Combine, 18′ HS	.167	.67	1.35	3.39			5.41
Haul grain		.50[e]	.61[f]	1.34			2.45
Other charges							
Pickup truck			.58[f]	.77			1.35
Trap wagon			.41[f]	.20			.61
Crop insurance[g]						3.00	3.00
Operating capital interest (8.5%)						1.45	1.45
Miscellaneous[h]							
Interest on land (2 acres @ $150						2.00	2.00
@ $7.5%)						22.50	22.50
Taxes on land (2 acres % $2.70)						5.40	5.40
TOTAL COST PER HARVESTED ACRE[i]		3.50	7.35	11.42		42.18	64.45

[a] Machinery operating costs include repairs, maintenance, fuel, oil, and lubrication.
[b] Machinery ownership costs include depreciation, interest on average investment, property taxes, and insurance.
[c] Where Morning Glory control is necessary, add $2.50 herbicide plus $1.25 for application.
[d] Fertilizer cost includes use of the applicator.
[e] Hired labor cost for hauling grain is based on 225 hours @ $3.00.
[f] Based on the following mileages: 200 miles on trucks hauling seed, 6,100 miles on trucks hauling grain, 1,200 miles on pickup, and 2,700 miles on trap wagon.
[g] Crop insurance includes hail, fire, and Federal Crop Insurance.
[h] Miscellaneous expenses include other machinery, tools, shop, utilities, acounting fees, office, bookkeeping supplies, etc.
[i] The total cost does not include the management input, which might be appropriately charged at $2 to $4 per harvested acre.

machine used, with the times-over (e.g., 1.5x) indicated in parentheses where it is other than one. The labor, machinery, and material costs are shown for each operation. Machinery costs are divided into operating costs including repairs, maintenance, fuel, oil, and lubrication, and ownership costs which include depreciation, interest on average investment, property taxes, and insurance.

The cost of fertilizer at 9.1 cents per pound includes the use of the applicator which is pulled by the farmer's own tractor. Fifty pounds of seed wheat is applied at a cost of $3.35 per acre. Herbicide is applied by airplane at a custom rate of $1.25 per acre. The cost of chemicals is an average of lower-cost materials used on 85 to 90 percent of the acreage, and more expensive sprays on the remaining 10 to 15 percent.

The other charges not associated with a particular cultural operation are also itemized. These include expenses associated with the pickup truck, trap wagon, crop insurance (hail, fire, and federal), and interest on the operating capital required to finance the production process. The miscellaneous expense category includes other machinery not specifically listed (such as a chisel plow and extra drill), tools, shop, utilities, accounting fees, office, miscellaneous supplies, etc.

Interest on land is treated as an opportunity cost. With a market value of $150 per acre, and an alternative investment opportunity with a 7.5 percent return, then $11.25 becomes the assumed opportunity cost of an acre of land. With the wheat-fallow rotation, a crop is produced on only one acre out of two, so the interest on land per harvested acre is $22.50 (2 x $11.25). Property taxes on land are also charged for two acres.

The various cost categories are totaled by column for labor, machinery operation, machinery ownership, and other items (Table 1). The total estimated wheat cost per harvested acre amounts to $64.45. The cost per bushel of wheat produced is calculated by dividing the total cost by the normal yield. With a normal yield of 30 bushels, this would amount to $2.15 per bushel. Remember, this cost figure includes hauling the grain to storage, but not the cost of storage or marketing.

The cost of wheat production is affected by a variety of factors including farm size, crop yield, production practices, machinery component, material costs, labor costs, etc. Because of the differences in wheat farms, each grower should determine the costs of his own operation for making management decisions. Table 2 is provided so that the grower can insert his costs in the blanks and compare them with those for the study farm.

Table 2. Estimated Production Costs Per Harvested Acre, by Category, White Winter Wheat on a 2,700-Acre Dryland Farm, Oregon Columbia Plateau, 1973

	Study figures	Your figures
Fertilizer (30# @ 9.1¢)	$2.73	$
Wheat seed (50# @ 6.7¢)	3.35	
Herbicide and application	3.00	
Fuel and lubricant	2.18	
Machinery repair	3.92	
Crop insurance	3.00	
Operating capital interest (8.5%)	1.45	
Interest on machinery (8.5%)	4.42	
Interest on land (7.5%)	22.50	
Machinery depreciation	5.83	
Taxes on machinery	.80	
Taxes on land	5.40	
Machinery insurance	.37	
Hired labor (0.167 hrs. @ $3.00)	.50	
Operator labor (0.750 hrs. @ $4.00)	3.00	
Miscellaneous	2.00	
TOTAL PRODUCTION COSTS PER HARVESTED ACRE	$64.45	$

Table 3. Estimated Wheat Production Costs Per Bushel at Various Yields and Land Values, 2,700-Acre Dryland Farm, Oregon Columbia Plateau, 1973

Normal yield	Value of land per acre		
	$125	$150	$175
	($/bushel)		
25	2.37	2.56	2.74
30	1.99	2.15	2.30
35	1.72	1.86	1.99

Effects of Crop Yields and Land Values

The value of land per acre and the normal yield expected on that land generally are interrelated—the higher the yield, the higher the land value. The information for the study farm was analyzed to determine the effect of various assumptions regarding land value and normal yield. In making this analysis, it was assumed that as the yield per acre increased, the per-acre labor and machinery operating costs for combining and hauling would increase proportionally. All other per-acre costs were assumed to be constant. Increasing the value of land was assumed to result in a proportional increase in interest on land investment and land taxes.

The results indicate that a change in weather patterns, cultural practices, or variety which increases yield would have an important effect on cost per bushel (Table 3). An increase in the yield from 30 to 35 bushels per acre would result in a 29-cent per bushel reduction in production costs. An increase in the value of land, of course, has the opposite effect. A $25 per acre increase in land values would increase per-bushel production costs by 15 cents, assuming a constant yield of 30 bushels.

Effects of Changing Farm Size

The costs per harvested acre associated with owning the machinery complement, i.e., depreciation, interest, taxes, and insurance, are related to the size of the farm. If the total fixed cost of machine ownership can be spread over more acres of cropland, the result is a lower cost per acre (Table 4). Compared to the study farm, a larger operation, with 3,000 crop acres, with the same machinery complement, would have a 4-cent lower production cost per bushel. This size of operation would require operating the machinery 200 hours in critical months. The extent to which this is possible, of course, is a function of weather, breakdowns, and other contingencies. Conversely, a smaller, 2,400 crop-acre unit, would have a 5-cent per bushel higher production cost.

Table 4. Estimated Wheat Production Costs at Various Size Assumptions for the Dryland Farm, Oregon Columbia Plateau, 1973

Cropland in farm	Production cost	
	Per harvested acre	Per bushel
(acres)	($)	($)
2,400	65.88	2.20
2,700	64.45	2.15
3,000	63.31	2.11

APPENDIX

Table A-1. Annual Machinery Ownership Costs for the 2,700-Acre Dryland Wheat Farm, Oregon Columbia Plateau, 1973

	Depreciation[a]	Interest[b] (8.5%)	Insurance (0.6%)	Taxes (1.8%)	Total ownership
Crawler tractor, 90 DBHP	$1,833	$1,785	$126	$ 378	$ 4,122
Mold-board plow, 12-16″	333	298	21	63	715
Springtooth, 40′	350	233	17	50	650
Rod weeder, 48′	400	255	18	54	727
Grain drills; 6-8′	680	587	41	124	1,432
Combine, 18′ HS	2,400	1,700	120	360	4,580
Truck, 2-ton (new)	650	489	35	30[d]	1,203
Truck, 2-ton (used)	440	204	14	16[d]	675
Pickup	640	289	100[c]	10[d]	1,039
Trap wagon (used)	140	123	9	0[d]	272
TOTAL	$7,866	$5,963	$501	$1,085	$15,415

[a] Calculated by subtracting the salvage value from the purchase cost and dividing this difference by the life of the machine.
[b] Calculated as interest on the average investment over the life of the machine, found by adding the purchase cost and salvage value and dividing the sum by two.
[c] Also includes liability and collision insurance.
[d] No property taxes, but appropriate license fees are figured.

Table A-2. Annual Machinery Operating and Total Costs for the 2,700-Acre Dryland Wheat Farm, Oregon Columbia Plateau, 1973

	Repairs	Fuel	Lube	Total operating	Total machinery cost
Crawler tractor, 90 DBHP	$1,664	$ 991	$155	$2,810	$ 6,932
Mold-board plow, 12-16″	405	------	------	405	1,120
Springtooth, 40′	203	------	------	203	853
Rod weder, 48′	459	------	------	459	1,186
Grain drills, 6-8′	351	------	------	351	1,783
Combine, 18′ HS	1,350	392	81	1,823	6,403
2 Trucks, 2-ton	347	441	63	851	2,729
Pickup	360	360	60	780	1,819
Trap wagon	148	378	27	553	825
TOTAL	$5,287	$2,562	$386	$8,235	$23,650

Table A-3. Machinery Cost Assumptions for the 2,700-Acre Dryland Wheat Farm, Oregon Columbia Plateau, 1973

	Purchase cost[a]	Life	Salvage value	Repairs	Fuel[b]	Lube
	($)	(*yrs.*)	($)			
Crawler tractor, 90 DBHP	32,000	12	10,000	$2.15/hr.	$1.28/hr.	$.20/hr.
Mold-board plow, 12-16"	5,500	12	1,500	1.80/hr.	------	------
Springtooth, 40'	4,500	10	1,000	1.50/hr.	------	------
Rod weeder, 48'	5,000	10	1,000	1.70/hr.	------	------
Grain drills, 6-8'	12,000	15	1,800	3.90/hr.	------	------
Combine, 18' HS	32,000	10	8,000	6.00/hr.	1.74/hr.	0.36/hr.
Truck, 2-ton (new)	9,000	10	2,500	5.5¢/mi.	7¢/mi.	1.0¢/mi.
Truck, 2-ton (used)	3,500	5	1,300	5.5¢/mi.	7¢/mi.	1.0¢/mi.
Pickup	5,000	5	1,800	3.0¢/mi.	3¢/mi.	0.5¢/mi.
Trap wagon (used)	2,500	15	400	5.5¢/mi.	14¢/mi.	1.0¢/mi.

[a] Cost of new machinery, based on estimated 1973 prices except where otherwise noted.
[b] The net cost (less tax rebates and credits) was figured at 19¢ per gallon for diesel fuel and 29¢ for gasoline.

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