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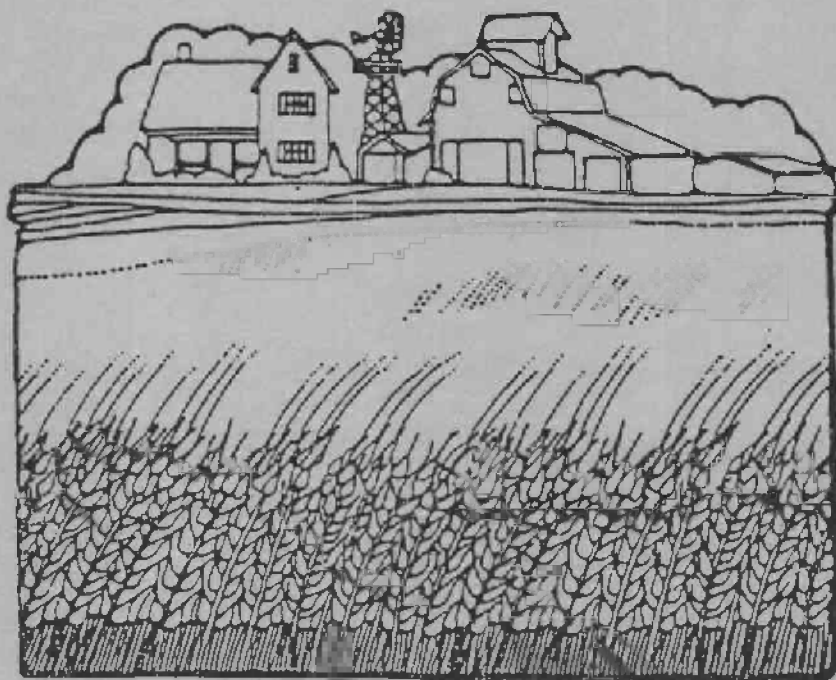
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# Dryland Wheat Production and Marketing Costs in Oregon's Columbia Plateau



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# DRYLAND WHEAT PRODUCTION AND MARKETING COSTS IN OREGON'S COLUMBIA PLATEAU, 1990-91

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Oregon growers produced 53.8 million bushels of wheat in 1989 with an estimated farm value of \$228.8 million, making wheat among the highest valued farm crops in the state. Wheat production is a particularly important agricultural enterprise in Oregon's Columbia Plateau. In 1989, five counties in the Columbia Plateau accounted for \$134.8 million of wheat sales from 650,000 harvested acres<sup>2</sup>, or about 59% of the state's total production.

The purpose of this study is to present estimated costs of producing and marketing wheat in the Columbia Plateau counties of Gilliam, Morrow, Sherman, Umatilla, and Wasco. Cost information for a summer fallow-winter wheat rotation is detailed for a mold-board plow tillage system. Growers, agricultural lenders, and others concerned with the wheat industry will find this information useful in estimating the physical and financial requirements of producing dryland wheat in the area.

## Sources of Information

Wheat growers provided the basic information regarding the size of the study farm, production practices followed, machinery, labor, and material requirements, land rental values, and overhead expenses. Additional information was obtained from local suppliers, machinery dealers, and lenders. The data were then summarized and reviewed by wheat growers, county agents, and others familiar with dryland wheat production in the study area.

Given these procedures, the figures reported in this study should be viewed as

"typical" or "representative" rather than averages. Because soil types, rainfall, farm size, machinery use, and cultural practices followed vary from farm to farm and greatly influence costs of production, growers are encouraged to estimate costs for their own operations.

## Study Assumptions

The following assumptions underlie the costs reported in this study. These assumptions should be carefully reviewed and evaluated when interpreting the costs presented in this study.

1. The owner-operator-manager of the study farm has 2,500 acres of cropland with 1,250 acres in winter wheat and 1,250 acres in fallow each year.
2. Long term average wheat yield is 42.43 bushels per acre, the 15 year average of wheat production in Wasco, Sherman, Gilliam and Morrow Counties.
3. Production inputs such as fertilizer, seed, and chemicals are charged at October 1990 prices. August 1990 prices were used for fuel reflecting pre-Middle East hostility levels.

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<sup>1</sup> The authors are respectively, Wasco County Extension Agent, District Farm Management Agent, Hood River/Wasco Counties, and Sherman County Extension Agent. The assistance of wheat growers, county agents, and others who helped develop this data is gratefully acknowledged.

<sup>2</sup> Source: Extension Economic Information Office, Oregon State University, 1990 preliminary figures.

4. Machinery values are based on October 1990 replacement costs. (See Tables 1, 2 and 3 for detailed machinery costs.) Machinery costs are calculated assuming the equipment is half depreciated. Depreciation is charged to provide an indication of earnings needed to replace depreciable assets. When an enterprise is being evaluated to determine its long-run viability, it is important to consider the ability of the enterprise to replace the depreciable assets on a new cost basis. Interest costs reflect the cost of investing in machinery and equipment. The number of times-over for each operation (e.g., 1.5X) is indicated if it is other than one.
5. The operator's labor (\$9/hr.) and managerial input (\$5.80/ac.) is treated as an opportunity cost - that is, the operator has an alternative use for these inputs that could earn the budgeted amount.
6. Marketing costs include put-through charges at the elevator, storage for an average of six months, transportation to Portland, and the Oregon Wheat Commission assessment. Thus, the total cost estimates are on a "delivered to Portland" basis.
7. No participation in USDA wheat and feed grain programs is assumed.

#### **Components of Enterprise Budgets**

Every enterprise budget has three main parts: income, variable costs, and fixed costs. The wheat budget shown in Figure A will be referred to as the details of the three main budget parts are discussed. Following that, several other features of enterprise budgets are discussed under separate subheadings.

#### **Gross Income**

Income is identified in Figure 1.(A). It shows the product being sold, product quantity and unit, and the expected price per unit. Total income per product is simply the quantity multiplied by price per unit, or 42.43 bushels per acre x 2.87 per bushel = \$121.77 per acre, in this case. Note that the budget includes a blank for you to enter your own expected income. Income is easy to calculate, but it requires careful consideration of expected yields and prices. The yield in this study represents the 15 year average of the wheat production in Wasco, Sherman, Gilliam and Morrow Counties. The market price is the average price per bushel for soft white wheat in Portland for the month of October 1990. For this example, the October price is used since all inputs (except fuel) are reported using October 1990 figures. This points out once again that the budgets must be customized for your particular market and output levels.

The purpose of the enterprise budget may affect the yield and price estimates. If the ultimate objective is to project the next year's cash flow budget more specific information about market surpluses or deficits might lead you to use estimates that differ considerably from long term averages. On the other hand, if you intend to use the information to construct a long-term, whole-farm planning budget, you would be well advised to use estimates more in line with long term averages on your farm. For wheat that is contracted or under the farm program, the contract price or target price may be the correct price to use.

#### **Variable costs**

Variable costs are shown in Figure 1.(B). Variable costs are those that occur only if wheat is produced, and include labor, machinery, and materials costs. Variable costs are grouped according to

stage of production. For this study, the budgets include costs for 2 acres, one acre of summer fallow and one acre of winter wheat. The budget shows the farm operations at various production stages - summer fallow establishment, summer fallow maintenance, crop production, harvesting, and marketing.

There are two types of variable costs: cash and noncash. Cash costs are incurred for items such as fuel, fertilizer, and repairs. Noncash costs are incurred for labor supplied by the farm operator. Unless otherwise stated, this budget treats labor as if it is operator labor and, therefore, a noncash cost.

For each cultural operation, costs are included for labor, machinery, and materials. Quantities and prices are included for any materials used. Consider the Drill Seed operation. It includes a labor charge (C) of \$1.00 per acre, machinery costs (D) of \$4.58 per acre, and materials cost (E) of \$6.90 per acre. The labor charge is based on the time required per acre to seed, allowing time for setting up, adjusting, and putting away the tractor and drills. The machinery costs include fuel, oil lubricants, and repairs for the tractor and drills. The materials cost is for seed, based on (G) 60 pounds per acre at 9.5 cents per pound. The total variable cost (F) of seeding wheat for this budget is \$12.48 per acre.

Operating capital interest is charged on all variable cash expenses, to reflect the opportunity cost of short-term capital invested in the production of this crop. An opportunity cost is the return you could realize if the funds for these expenses were invested in another alternative - a savings account for example. Interest is charged from the dates the expenses are incurred until the date the product is sold at a rate of 12 percent. Operating capital interest (H) is \$1.95 per acre in the wheat budget.

Total variable cost (I) is found by summing the variable costs for each stage which totals \$101.07 per acre. Total gross income minus total variable cost (J) is \$20.70 per acre. This shows that, in the short run, income more than covers variable costs. Whatever income remains will be used to pay for the fixed factors of production.

### Fixed Costs

The fixed costs of production are shown in (K). They represent costs for land, machinery and equipment that are incurred whether or not a crop is produced. Fixed costs are often referred to as ownership costs. It should be emphasized that if the enterprise budget is for a new enterprise, and the necessary land, machinery and equipment have not yet been obtained, these ownership costs are still avoidable at that point by not producing and not obtaining assets. Like variable costs, fixed costs are also divided into cash and noncash costs. Cash costs include cash leases, insurance, and taxes on machinery, equipment, buildings, and land. Cash fixed costs in the wheat budget are estimated to be \$4.76 per acre.

Non-cash fixed costs consist of interest and depreciation, where all interest is treated as an opportunity cost. If, in your own case, machinery and equipment is partially debt financed, you may wish to treat the interest on the loan as a cash fixed cost and charge an opportunity cost rate on the equity portion as a non-cash fixed cost.

Depreciation of machinery and equipment must be included in enterprise budgets, to reflect the fact that in the long run, a crop must pay for replacement of machinery and equipment used in its production. Depreciation provides a means of spreading replacement costs over the useful lives of machinery and equipment. Since land does not wear out

(if properly maintained), there is no depreciation charge on it. However, a charge for land is included and is based on farm use value. There are a number of ways of determining a charge for land - share rent, cash rent, and current market value, for example. Arguments have arisen over which method, if any, should be used. It is not our intent to resolve this problem. But since land is a resource used in the production of wheat (just like labor, seed, and fertilizer), some charge should be made.

Interest costs are included as opportunity costs to reflect the fact that capital invested in farmland, machinery, and buildings could be invested in other interest-earning assets. Interest rates (12% for operating and 13% for machinery and equipment) used represent real rates of interest, and are calculated by subtracting inflation rates from long-term interest rates. Total non-cash fixed costs are estimated to be \$86.31 per acre in the wheat budget.

Fixed costs of production per acre tend to vary greatly from one farm to another, and the fixed costs included in OSU's budgets should be viewed as guides to what costs should be considered. If you cash rent land, you should include the cost of the lease as a cash fixed cost. If you custom-hire all of your machinery work, you should eliminate all fixed machinery costs and include all the custom charges under the appropriate variable machinery cost headings. If you own your land and have outstanding debt against it, you should include your mortgage interest payments as cash fixed costs and charge a non-cash land interest cost against the equity. If the value of your land reflects a significant non-agricultural or speculative demand (if for example it is located near an urban area) it probably isn't very realistic to expect an agricultural enterprise to be able to cover the full opportunity cost. It may be more realistic to charge the enterprise the "net

rental price," i.e., the amount you would realistically expect to pay to rent similar land for an agricultural use. These examples illustrate the diversity of situations that exist with respect to fixed costs. The point is: modify this enterprise budget to fit your situation!

The wheat budget estimates total fixed costs to be \$91.07 per acre by adding cash fixed costs and non-cash fixed costs. The total of all costs of production is \$192.14 per acre, which includes total variable costs plus total fixed costs. By subtracting total costs from total gross income, a loss of \$70.37 is calculated for net projected returns. Thus, the budget estimates that over a long term period, the wheat crop is not paying for all the resources used in its production. Even assuming Farm Program participation and a target price of \$4.00 per bushel, wheat production could not pay for all the costs assumed in this budget.

### Break-even Analysis

Break-even prices are calculated for all crop budgets, based on the costs and yields assumed in the budgets. A break-even price is the price for a product that would exactly pay for the cost of producing it. Referring back to Figure A, the break-even price over total variable costs (L) is calculated as:

$$\text{Break-even price over Total Variable Costs} = \text{Total Variable Costs/Yield}$$

For wheat, a break-even price of \$2.38 per bushel over variable costs is estimated. The price represents the minimum price at which wheat could be sold to cover total variable costs. Similarly, the break-even price over total cost (M) of \$4.53 per bushel represents the minimum price at which wheat could be sold to cover all costs of production. In the long run, break-even prices over total costs should be equal to or less than average prices received by growers.

## Machinery Costs

Machinery costs, both variable and fixed, often represent a substantial portion of the costs included in enterprise budgets. For that reason, detailed tables showing the values and associated costs of machinery and equipment are included with this budget. The machinery tables associated with the wheat budget are shown in Tables 1, 2 and 3.

Table 1 displays all the machinery and equipment used in the budget along with the major assumptions regarding their values and use. Current market values are calculated by adding list price to salvage value and dividing the total in half. The result is the average value of the asset, and this implies that one-half of its useful life remains. Useful lives are estimated by growers and engineers. Remaining life is one-half of useful life, again reflecting that the assets have half of their life remaining. Hours of annual use are calculated based on the size, speed, and efficiency of each asset and its use in this and other enterprises.

The costs of owning and operating the machinery are shown in Table 2. These costs are calculated from equations based on economic and engineering relationships, and provide "ballpark" figures. The only way of accurately estimating your own machinery costs is by keeping detailed machinery use time logs, repair and maintenance logs, fuel usage charts, and ownership records.

Machinery costs are divided into variable and fixed costs. Variable machinery costs include fuel, oil, lubricants, repairs, and maintenance charges. These costs are calculated based on current values, annual use, size, and horsepower ratings. Machinery total variable costs per hour are multiplied by hours of use per acre to obtain variable costs per acre.

Machinery fixed costs include depreciation, interest, housing, and insurance. Costs per hour for each of these are based on asset values, ages, annual use, and interest rates. Fixed costs per hour are multiplied by asset use per acre to calculate fixed costs per acre. Total fixed costs per acre in Table 3 correspond to the fixed machinery costs included in the budgets.

"Annual use" in Table 1 should include the use by all enterprises on the farm, not just the enterprise included in this particular budget. Since fixed costs tend not to change with amount of use, you would overestimate fixed cost per acre if you divided total fixed costs by the number of acres in this enterprise.

Total machinery cost per acre is estimated by adding variable plus fixed machinery costs per acre as in Table 3.

## Concluding Note

The cost estimates presented in this report are based on a number of assumptions. The situation described is not characteristic of all farm operations. It is essential to use the figures reported primarily as a guide. The "Your Cost" column in Figure A should be used to calculate your own estimated cost of production. Considerable judgment should be exercised in generalizing costs to situations differing from those identified above.

## Acknowledgement

The authors would like to extend their sincerest thanks to the producers, agribusinesses, Extension agents and specialists, and the Oregon Wheat Growers League, for their input and continued support for this study. Without their assistance, this report would not be possible.

Long-time users of this study will be quick to note the format change which was made to make the study compatible with other OSU estimated production budgets. For a further explanation of the inputs and interpretations, refer to Oregon State University Extension Bulletin EM 8354, "Understanding and

Using Enterprise Budgets" by Tim Cross, Extension Economist and Bart Eleveld, Extension Farm Management Specialist. Single copies are free of charge from your local Extension office or contact Tim Cross, Agricultural and Resource Economics Department, Oregon State University, Corvallis, Oregon, 97331.

**FIGURE 1.** 1990 Winter Wheat, Mid-Columbia Plateau Region, \$/Acre Economic Costs and Returns.

GROSS INCOME	Description	Quantity	Unit	\$ per Unit	Total	Your Income
	Winter Wheat	42.43	bushels	2.87	121.77	_____
(A)	Total GROSS Income				121.77	_____
VARIABLE CASH COSTS	Description	Labor Costs	Machinery 1 Costs	Materials	Total 2	Your Cost
Summer fallow Establishment	Times Performed					
Moldboard Plow	1.0	1.55	6.48	0.00	8.03	_____
Cultivator	1.0	0.49	1.41	0.00	1.90	_____
Summer fallow Maintenance						
Cultivator	0.5	0.24	0.70	0.00	0.94	_____
Rod Weed	3.0	1.36	4.00	0.00	5.36	_____
			Summer fallow Sub-Total		16.23	_____
Crop Production						
Fertilize	1.0	0.32	0.82	8.69	9.83	_____
Nitrogen	45# x .193=8.69					
(B) Drill Seed	1.1	(C) 1.00	(D) 4.58	(E) 6.27	(F) 11.85	_____
Wheat Seed	(G) 60# x .095=5.70					
Herbicides	1.0	0.00	0.00	12.80	12.80	_____
Chemicals	1.0 acre x 9.00=9.00					
Custom Appli.	1.0 acre x 3.80=3.80					
Harvesting Operations						
Combine		1.77	6.48	0.00	8.25	_____
Hauling Grain		2.25	2.62	0.00	4.87	_____
Marketing		0.00	0.00	20.79	20.79	_____
Handling	42.43 bu x .11=4.67					
Storage	42.43 bu x 6 mon x .02=5.09					
Transportation	42.43 bu x .24=10.18					
Wheat Comm. Assessment	42.43 bu x .02=.85					
Other Charges						
Pickup & Truck Repairs, Fuel & Lube		0.00	2.77	0.00	2.77	_____
Other Machinery		0.00	1.03	0.00	1.03	_____
Miscellaneous		4.06	1.00	5.00	10.06	_____
Interest: Operating Capital (H)		0.00	0.00	1.89	1.95	_____
Total VARIABLE COSTS (I)		13.04	28.46	56.07	100.43	_____
GROSS INCOME minus VARIABLE COSTS (J)					21.34	_____

1 Refer to Table 3, Column E for variable costs per operation.

2 Does not include fixed costs. Refer to Table 3, Column F for fixed costs per acre.

**FIGURE 1.** 1990 Winter Wheat, Mid-Columbia Plateau Region, \$/Acre Economic Costs and Returns.

FIXED COSTS	Description	Unit		
<b>CASH Costs</b>				
	Machinery and Equipment Insurance	acre	.82	_____
	Pickup & Truck Insurance	acre	0.23	_____
	Conservation Practices	acre	0.30	_____
	Crop, Hail & Fire Insurance	acre	3.41	_____
			<u>4.76</u>	<u>_____</u>
<b>Total CASH Costs</b>				
			4.76	_____
<b>NON-CASH Costs</b>				
	Machinery and Equipment Depreciation, Interest & Housing	acre	21.51	_____
	Pickups & Truck Depreciation, Interest & Housing	acre	5.05	_____
	(K) Other Machinery Depreciation & Interest	acre	3.95	_____
	Land Charge	acre	50.00	_____
	Management	acre	5.80	_____
			<u>86.31</u>	<u>_____</u>
<b>Total NON-CASH Costs</b>				
			86.31	_____
<b>Total FIXED COSTS</b>				
			91.07	_____
<b>Total of All Costs Per Acre</b>				
			191.51	_____
<b>NET PROJECTED RETURNS</b>				
			- 69.73	_____

(L) - Break-Even Price, Total Variable Cost

\$2.37 per bushel

(M) - Break-Even Price, Total Cost

4.51 per bushel



Table 1. Machinery and Equipment Cost Assumptions

Machine	Size	Current Market Value	Hours of Annual Use	Expected Life (yrs)
Tractor	Crawler Tractor	\$77,500	1,294	15.0
Combine	20' Hillside	83,750	250	10.0
Truck a	2 ton	17,000	230	10.0
Truck b	2 ton, Older	10,500	220	10.0
Pickup	3/4 Ton, 4 x 4	12,500	286	10.0
Moldboard Plow	10-16"	13,650	215	15.0
Cultivator	40'	9,750	101	15.0
Rod Weeder	48'	9,950	169	10.0
Grain Drills	4-8'	16,750	127	15.0
Other Machinery c		13,750	1,250 ac.	10.0

Table 2. Machinery and Equipment Cost Calculations (per hour basis)

Machine	Size	COSTS PER HOUR					Total
		Variable		Depreciation	Fixed		
		Fuel & Lube	Repair & Maint.		Housing & Interest	Insurance	
Tractor	Crawler Tractor	\$7.65	\$15.04	\$3.22	\$ 4.96	\$0.36	\$31.22
Combine	20' Hillside	5.46	27.54	27.18	26.63	1.92	88.73
Truck a	2 ton	5.01	5.44	4.60	7.05	0.51	22.62
Truck b	2 ton, Older	5.01	3.30	2.97	4.56	0.33	16.17
Pickup	3/4 Ton, 4 x 4	4.39	4.37	2.72	4.20	0.34	16.01
Moldboard Plow	10-16"		14.98	3.83	4.61	0.35	23.76
Cultivator	40'		3.45	5.82	12.54	0.53	22.34
Rod Weeder	48'		3.68	5.32	4.90	0.37	14.27
Grain Drills	4-8'		18.38	7.24	10.28	0.78	36.67
		COSTS PER ACRE					
Other Machinery c			1.03	2.74	1.21	0.00	4.98

Table 3. Estimated Cost of Each Operation with Power-Unit.

A	B	C	D	E	F	G
Operation	Miles per Hour	Acres per Hour	Labor	Machinery		Total Cost per Acre
				Variable Cost per Acre	Fixed Cost per Acre	
Moldboard Plow	4.5	5.82	\$1.55	\$6.48	\$5.41	\$13.43
Cultivate	4.5	18.55	.49	1.41	2.24	4.14
Rod Weed	4.0	19.78	1.36	1.33	1.68	4.38
Drill Seed	4.0	10.86	.91	3.78	3.77	8.47
Combine	3.0	5.09	1.77	6.48	10.95	19.20

a. Truck is used year round.

b. Truck is used only during harvest.

c. Other machinery includes items such as: one set of older disc type drills, trap wagon, disc, rotary hoe and harrow.



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