



Photo: Terry Day

2009 Crop Rotation Budgets for 15" to 18" Precipitation Zone Under Conventional Tillage, Eastern Washington State

Kathleen Painter, PhD¹ and Ellen Miller²

¹Analyst, Center for Sustaining Ag and Natural Resources
Affiliate, School of Economic Sciences
207A Hulbert Hall
Pullman WA 99164-6210
(509) 335-5807
kpainter@wsu.edu

²Research Assistant, Washington State University

Budget spreadsheets are available at the following link:
<http://csanr.wsu.edu/Publications/FarmMgmtEconomics.htm>

Instructions and Assumptions

Since farming is inherently variable and constantly changing, we hope that this spreadsheet format will be helpful in adjusting these budgets to reflect your particular operation. Enterprise costs and returns vary from one location to the next and over time for any particular farming operation. Variability stems from differences in the following:

- Capital, labor, and natural resources
- Type and size of machinery complement
- Cultural practices
- Size of farm enterprise
- Crop yields
- Input prices
- Commodity prices
- Management skill

Please examine closely the assumptions we have used and make adjustments to reflect your particular operation. Adjustments in the variable costs can easily be made without affecting the overall accuracy of the budget information. Fixed costs in these budgets are based on a budget generator program that incorporates detailed information on the machinery complement and performs complex calculations based on machinery width, tractor horsepower, type of operation, etc. In the variable costs section, fuel and machinery repair costs will be affected by changes in machinery usage. The fixed costs section of the budget presents costs that are incurred regardless of crop production practices. These costs will change if your machinery complement differs from those in the worksheet.

Machinery Costs:

The machinery complement used in these calculations is presented in the last tab of this worksheet. Machinery fixed costs include depreciation, interest on the investment, property taxes, insurance, and housing. For the overall farm operation, these costs do not vary by crop, given the ownership of a specific machinery complement, and are incurred whether or not crops are grown. Machinery fixed costs for a specific field operation are determined by multiplying the machine hours per acre times per hour fixed cost. Per hour fixed costs are determined by dividing the total fixed cost by the annual hours of machinery use.

Machinery interest costs are calculated on the average annual investment in the machine. The formula used to calculate the average machine investment is:

$$(\text{Purchase Cost} + \text{Salvage Value})/2$$

The 7% interest charge made against this average investment represents an opportunity cost (returns forgone by investing in a given machine implement rather than in an alternative investment) or interest paid on money borrowed to finance machine purchases, or both. Machinery interest cost for one acre of the crop enterprise being analyzed is determined by multiplying the respective machine hours per acre times the per hour interest costs shown in the machinery complement worksheet.

Land Costs:

Costs of production among producers tend to be somewhat similar for any particular production system, regardless of production level, when land costs are not taken into consideration. Since the net land rental value is based on production level, land cost varies directly with production level, which in turn directly affects total cost. Land costs, included either as real or as opportunity costs, are based on the share rental arrangement typical in the area. In our study, net land rental cost was calculated as:

$$1/3 \text{ Crop Value} - (1/3 \text{ Fertilizer Cost} + 1/3 \text{ Chemical Cost} + 1/3 \text{ Crop Insurance} + \text{Land Taxes})$$

Land fixed costs include taxes and net rent, which are based on rental agreements typical for the area minus expenditures typically covered by the landlord. The typical lease agreement in the areas surveyed is a one-third land owner and two-third tenant crop share, with the land owner paying land taxes, one-third of the fertilizer cost, one-third of the chemical cost, and one-third of the crop insurance. The tenant covers all other production expenses. **This crop-share percentage can be adjusted in the crop worksheets**, thanks to Herb Hinman's contribution. This valuable tool reveals how factors such as crop and input price increases as well as cropping choices affect revenue for landlords and operators differently.

While the owner-operator will not actually experience a land rental cost, this cost represents the minimum return owner-operators must realize to justify growing the crop themselves. This net rent return represents the income the owner-operator forgoes by producing the crop rather than renting to a tenant who produces the crop. As a result of owning land, the farmer receives both current returns from the farming operation and any long-term appreciation in land value. However, the farmer would continue to realize land value appreciation even if the land is rented out. Consequently, the appropriate land charge for growing the crop is only the forgone net rent. As used in this publication, for land that is owned and not rented, land cost is termed an opportunity cost to indicate that it is not an out-of-pocket expense, but rather a return that is forgone as a result of choosing to use the land to grow this crop. To determine the profitability of crop production relative to other activities, the owner-operator may want to consider these forgone returns, or opportunity costs, along with the usual production expenses.

Input Prices:

Fertilizer prices are based on current (Nov 08) quotes, but they are subject to uncertainty. Chemical input prices are based on February, 2008, quotes from chemical and seed dealers. These prices are subject to change, however, and will affect profitability of different crops. Input price changes can be made on the Input Costs tab (located after the crop budgets). If changes are made on this tab, all of the cost calculations will be automatically updated. If input cost changes are made on individual crop price sheets, the input cost formulas will be over-ridden and this function will no longer work.

Crop Prices:

Grain prices are based on futures prices for July and August 2009, as of Nov. 2008, FOB Lind, Washington. (Source: Union Elevator, <http://www.unionelevator.com>).

Acknowledgments:

I wish to thank everyone who helped gather all of the information needed to create these worksheets. First and foremost, I thank the farmers who were willing to take the time to share their enterprise information in order to create this worksheet. Without their assistance we would not be able to provide this critical information to others. Several colleagues at Washington State University helped as well, including Herbert Hinman (reviewer), Doug Youg (reviewer) Richard Koenig (fertility), Dennis Roe (machinery), and Steve Van Vleet. Sherri Van Vleet and Ellen Miller also provided vital assistance in creating these budgets. In addition, I wish to acknowledge the generous assistance of Robert Smathers, formerly at the University of Idaho. With his permission, we have used the UI spreadsheet format to present our budget information. However, I take responsibility for any errors in these budgets.

Budget spreadsheets are available at the following links:

<http://www.farm-mgmt.wsu.edu/WhatsNew.htm>

<http://csanr.wsu.edu/Publications/FarmMgmtEconomics.htm>

Legend: Follow directions below to preserve equations in this spreadsheet.
Yellow cells: Data are from Summary page (yellow tab).
Orange cells: You may adjust data in orange cells. All other data will adjust automatically to these changes.
Green cells: Data are from Input Costs page (green tab).
Blue cells: Data are from the Machinery page (blue tab).

Summary of Returns by Crop and Rotation (\$/acre/yr)

<u>By Crop:</u>	Total Cost of Operation (\$/acre)	Unit	Yield (unit/ac)	Price* per unit	Revenue per acre (\$/acre)	Returns over TC (\$/acre)	Total Variable Costs (VC) (\$/acre)	Returns over VC (\$/acre)	Fixed Costs (\$/acre)	Labor (\$/acre)	Crop & Cost Share** Operator: Owner:	
<i>Click on name to go to budget.</i>												67% Share to operator
Winter Wheat (WW)	\$313	bu	78	\$5.15	\$402	\$88	\$50	\$351	\$263	\$0	\$95	33% Share to owner
Hard Red Spring Wheat (HRSW)	\$221	bu	42	\$6.34	\$266	\$45	\$137	\$129	\$84	\$0	\$59	
Spring Barley (SB)	\$201	ton	1.5	\$107.00	\$161	-\$40	\$160	\$0	\$41	\$0	\$15	
Summer Fallow (SF)***	\$137				\$0	-\$137	\$123	-\$123	\$14	\$11	\$0	

*August 2009 farmgate prices for grains, posted by the Union Elevator, Lind, WA, www.unionelevator.com, accessed Nov/Dec 2008.

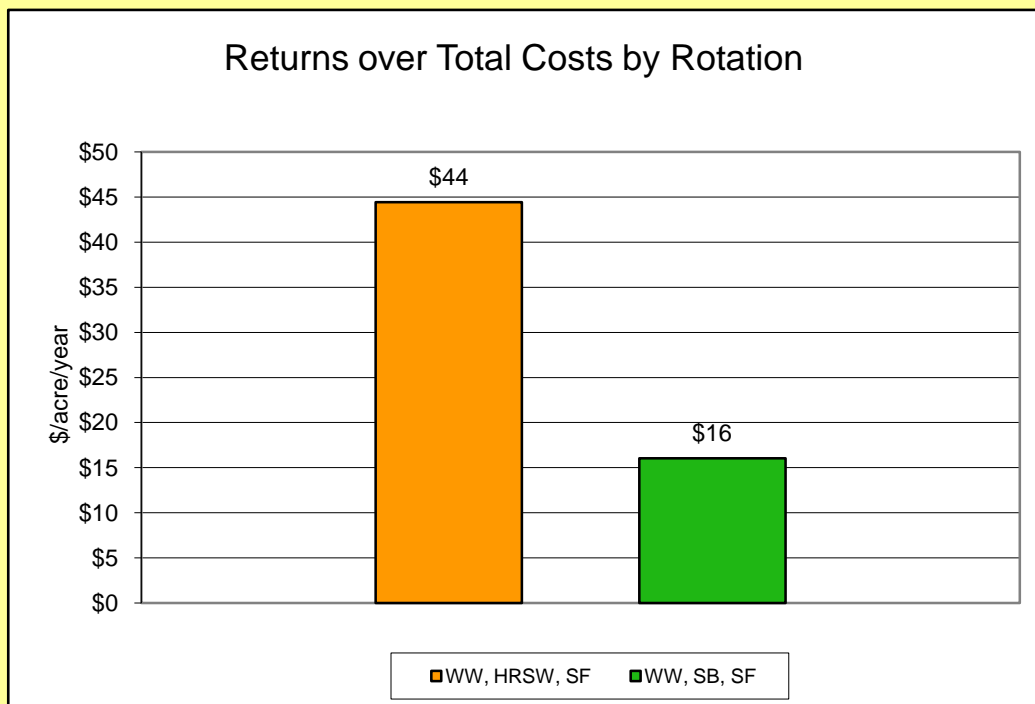
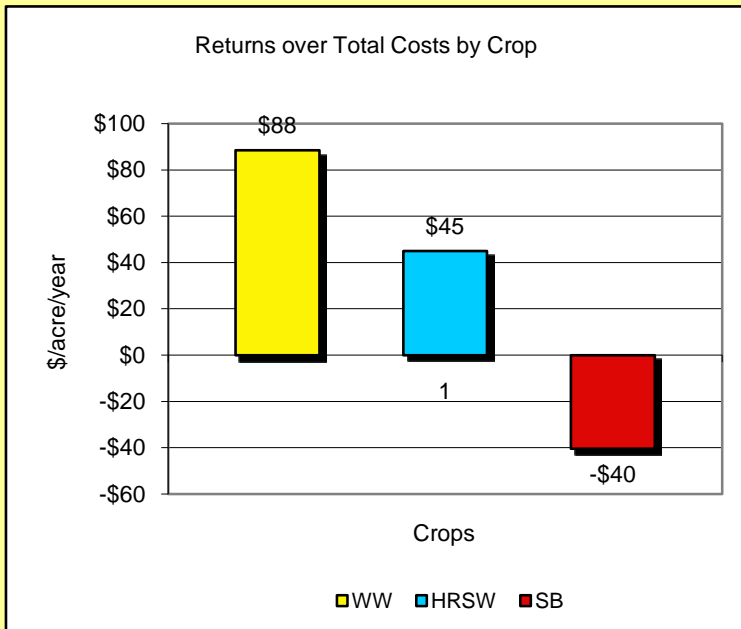
**Crop- and cost-share land cost arrangements split the crop and the costs (chemicals) on pre-determined shares in order to share production risk and provide appropriate incentives for maximizing returns for both parties.

***All summer fallow costs are included in the costs for producing winter wheat, plus one year's interest. These figures are for informational purposes only.

<u>By Rotation:</u>	Total Cost of Operation (\$/ac/yr)	Revenue per acre (\$/ac/yr)	Returns over TC (\$/ac/yr)	Total Variable Costs (VC) (\$/ac/yr)	Returns over VC (\$/ac/yr)	Fixed Costs (\$/ac/yr)	Labor (\$/ac/yr)	Land Payment (Cost-Share) (\$/ac/yr)
WW, HRSW, SF	\$178	\$223	\$44	\$62	\$160	\$116	\$4	\$51
WW, SB, SF	\$171	\$187	\$16	\$70	\$117	\$101	\$4	\$37

Budget spreadsheets are available at the following link:
<http://csanr.wsu.edu/Publications/FarmMgmtEconomics.htm>

Summary of Returns by Crop and Rotation (\$/acre/year)



LEGEND:
 WW = Winter Wheat
 HRSW = Hard Red Spring Wheat
 SB = Spring Barley

Crop Prices (\$/bu):
 \$5.15
 \$6.34
 \$107.00

Input Prices

		2009
	Unit	Price/unit
Fuel:		
Diesel	gal	\$1.75
Gas	gal	\$2.25
Seed:		
Wheat Seed	lb	\$0.15
Barley Seed	lb	\$0.12
Hard Red Spring Wheat	lb	\$0.22
Fertilizer:		
Nitrogen	lb	\$0.55
Phosphorous	lb	\$1.17
Sulfur	lb	\$0.38
Adjuvants:		
Excel 90	oz	\$0.20
Ultra Pro	oz	\$0.02
Pesticides:		
2,4-D	oz	\$0.16
Achieve SC	oz	\$2.00
Discover	oz	\$1.05
Finesse	oz	\$17.50
FarGO	oz	\$12.52
Maverick	oz	\$18.00
Roundup	oz	\$0.39
Starane + Sword	oz	\$0.43
Custom Rental:		
90' Rental Sprayer	acre	\$1.75
Fertilizer Applicator	acre	\$1.00
Labor:		
Hourly machine labor*	hour	\$20.00
Cash rent:		
	acre	\$0.00
Land tax:	acre	\$3.90
Interest:		
Operating Loan	%	7.50%
Machinery Loan	%	7.50%

*Includes all applicable state and federal taxes.

Legend: Follow directions below to preserve equations in this spreadsheet.
Yellow cells: Data are from Summary page (yellow tab).
Orange cells: You may adjust data in orange cells. All other data will adjust automatically.
Green cells: Data are from Input Costs page (green tab).
Blue cells: Data are from the Machinery page (blue tab).

Production Costs for Conventionally Tilled Summer Fallow, 15-18" Precipitation

Item	Quantity Per Acre	Unit	Price or Cost/Unit	Value or Cost/Acre
Variable Costs				
Fertilizer:				\$64.31
Nitrogen (dry)	93	lb	\$0.55	\$51.15
Phosphorous (dry)	8	lb	\$1.17	\$9.36
Sulfur (dry)	10	lb	\$0.38	\$3.80
				\$0.00
Pesticides:				\$20.78
Roundup	44	oz	\$0.39	\$17.16
Excel 90	6.4	oz	\$0.20	\$1.28
Ultra Pro	100	oz	\$0.02	\$2.34
				\$0.00
Machinery:				\$23.25
Fuel	4.31	gal	\$1.75	\$7.55
Lubricants	1	acre	\$1.64	\$1.64
Machinery Repairs	1	acre	\$3.09	\$3.09
Machinery Labor	0.55	acre	\$20.00	\$10.97
				\$0.00
Custom & Consultants:				\$4.50
Rental Sprayer	2	acre	\$1.75	\$3.50
Rental Fertilizer Applicator	1	acre	\$1.00	\$1.00
				\$0.00
Overhead ¹				\$5.64
Operating Interest ²				\$4.94
Total Variable Costs				\$123.42
Fixed Costs:				
Machinery depreciation				\$5.23
Machinery interest				\$4.07
Machinery insurance, taxes, housing, licenses				\$0.69
Land Taxes				\$3.90
Total Fixed Costs				\$13.90
Total Costs per Acre				\$137.32

Notes:

production.

¹Covers legal, accounting, and utility fees. Calculated a 5% of operating expenses.

²Calculated as 7% interest on operating capital for 6 months.

Details on variable and fixed machinery costs, including fuel, repairs, and machine labor, are located in the

[Summer Fallow Machinery Costs table.](#)

Schedule of Operations for Summer Fallow Preceding Winter Wheat, 15-18" Precipitation

Month	Operation	Tooling	Materials/Service
March	Spray Weeds	350HP-CT, 90' Sprayer	Rental Sprayer, 22 oz Roundup, 3.2 oz Excel 90, 50 oz Ultra Pro
May	Spray Weeds	350HP-CT, 90' Sprayer	Rental Sprayer, 22 oz Roundup, 3.2 oz Excel 90, 50 oz Ultra Pro
May	Cultivate	350HP-WT, 40' Cultivator	
May	Cultivate	350HP-WT, 40' Cultivator	
June	Cultiweed/Fertilize*	350HP-WT, 36' Cultiweeder	Rental Fertilizer Applicator, 93 lb N, 8 lb P, 10 lb S
August	Cultiweed	350HP-WT, 36' Cultiweeder	

*Soil test results will determine fertilizer needs, but a typical rate for this yield is provided.

Production Costs for Conventionally Tilled Winter Wheat, 15-18" Precipitation

Item	Quantity Per Acre	Unit	Price or Cost/Unit	Value or Cost/Acre
Gross Returns				
Wheat	78	bu	\$5.15	\$401.70
Variable Costs				
Seed:				\$9.00
Wheat Seed	60	lb	\$0.15	\$9.00
Fertilizer:				\$0.00
				\$0.00
Pesticides:				\$7.54
2,4-D	10	oz	\$0.16	\$1.60
Maverick ¹	0.33	oz	\$18.00	\$5.94
				\$0.00
Machinery:				\$19.22
Fuel	2.08	gal	\$1.75	\$3.64
Lubricants	1	acre	\$0.80	\$0.80
Machinery Repairs	1	acre	\$5.26	\$5.26
Machinery Labor	0.48	acre	\$20.00	\$9.52
				\$0.00
Custom & Consultants:				\$1.75
Rental Sprayer	1	acre	\$1.75	\$1.75
				\$0.00
Other:				\$8.42
Crop insurance ²	1	acre	\$8.42	\$8.42
Storage Facility & Equip. Repairs				\$0.00
Other Labor				\$0.00
Overhead ³				\$2.30
Operating Interest ⁴				\$2.01
Total Variable Costs				\$50.24
Variable Costs per Unit				\$0.64
Net Returns Above Variable Costs				\$351.46

Production Costs for Conventionally Tilled Winter Wheat, 15-18" Precipitation

Fixed Costs:				
Machinery depreciation				\$8.38
Machinery interest				\$5.92
Machinery insurance, taxes, housing, licenses				\$1.88
Summer Fallow Cost				\$147.62
Land Cost*	1	acre	\$95.31	\$95.31
*Based on Share Rent Percentage:				
Landlord	33.00%			
Tenant	67.00%			
Cash Rent				\$0.00
Land Taxes				\$3.90
Total Fixed Costs				\$263.02
Fixed Costs per Unit				\$3.37
Total Costs per Acre				\$313.26
Total Cost per Unit				\$4.02
Returns to Risk				\$88.44

Notes:

Includes costs of previous year's summer fallow plus one year's interest.

¹Maverick should be used at the rate of 2/3 oz per acre on every other wheat crop in order to reduce herbicide resistance. 1/3 oz per acre rate represents an average cost of application per year.

²Average Whitman County CRC insurance premium based on 2008 rates at 75% coverage.

³Covers legal, accounting, and utility fees. Calculated a 5% of operating expenses.

⁴Calculated as 7% interest on operating capital for 6 months.

Details on variable and fixed machinery costs, including fuel, repairs, and machine labor, are located [in the Winter Wheat Machinery Costs table.](#)

Breakeven Analysis:

	- 10%	Base Yield	+ 10%
<u>Price</u>	70.20	78	85.80
Operating Cost Breakeven	\$0.72	\$0.64	\$0.59
Ownership Cost Breakeven	\$3.75	\$3.37	\$3.07
Total Cost Breakeven	\$4.46	\$4.02	\$3.65
	- 10%	Base Price	+ 10%
<u>Yield</u>	\$4.64	\$5.15	\$5.67
Operating Cost Breakeven	10.8	9.8	8.9
Ownership Cost Breakeven	56.7	51.1	46.4
Total Cost Breakeven	67.6	60.8	55.3

Production Costs for Conventionally Tilled Winter Wheat, 15-18" Precipitation

Schedule of Operations for Conventionally Tilled Winter Wheat, 15-18" Precipitation

Month	Operation	Tooling	Materials/Service
September	Drill	350HP-WT, 36' JD-455 Drill	60 lb Wheat Seed
April	Crop Insurance		
May	Spray Weeds	350HP-WT, 90' Sprayer	Rental Sprayer, 10 oz 2,4-D, 1/3 oz Maverick ¹
August	Harvest	30' Combine	

¹Maverick should be used at the rate of 2/3 oz per acre on every other wheat crop in order to reduce herbicide resistance. 1/3 oz per acre rate represents an average cost of application.

Production Costs for Conventionally Tilled Spring Barley, 15-18" Precipitation

Item	Quantity Per Acre	Unit	Price or Cost/Unit	Value or Cost/Acre
Gross Returns				
Barley	1.5	ton	\$107.00	\$160.50
Variable Costs				
Seed:				\$8.40
Barley Seed	70	lb	\$0.12	\$8.40
Fertilizer:				\$48.50
Nitrogen (dry)	60	lb	\$0.55	\$33.00
Phosphorous (dry)	10	lb	\$1.17	\$11.70
Sulfur (dry)	10	5 lb	\$0.38	\$3.80
Pesticides:				\$49.63
2,4-D	12	oz	\$0.16	\$1.92
Finesse	0.24	oz	\$17.50	\$4.20
Achieve SC	9.20	oz	\$2.00	\$18.40
Starane + Sword	22	oz	\$0.43	\$9.46
FarGO	1.25	qt	\$12.52	\$15.65
Machinery:				\$28.93
Fuel	4.38	gal	\$1.75	\$7.67
Lubricants	1	acre	\$1.66	\$1.66
Machinery Repairs	1	acre	\$6.78	\$6.78
Machinery Labor	0.64	acre	\$20.00	\$12.82
Custom & Consultants:				\$6.25
Rental Sprayer	3	acre	\$1.75	\$5.25
Rental Fertilizer Applicator	1	acre	\$1.00	\$1.00
Other:				\$4.83
Crop insurance ¹	1	acre	\$4.83	\$4.83
Storage Facility & Equip. Repairs				\$0.00
Other Labor				\$0.00
Overhead ²				\$7.33
Operating Interest ³				\$6.41
Total Variable Costs				\$160.28
Variable Costs per Unit				\$106.85
Net Returns Above Variable Costs				\$0.22

Production Costs for Conventionally Tilled Spring Barley, 15-18" Precipitation

Fixed Costs:				
Machinery depreciation				\$11.33
Machinery interest				\$8.12
Machinery insurance, taxes, housing, licenses				\$2.13
Land Cost*	1	acre	\$15.09	\$15.09
*Based on Share Rent Percentage:				
Landlord	33.00%			
Tenant	67.00%			
Cash Rent				\$0.00
Land Taxes				\$3.90
Total Fixed Costs				\$40.57
Fixed Costs per Unit				\$27.05
Total Costs per Acre				\$200.86
Total Cost per Unit				\$133.90
Returns to Risk				-\$40.36

Notes:

¹Average Whitman County APH insurance premium based on 2008 rates at 75% coverage.

²Covers legal, accounting, and utility fees. Calculated a 5% of operating expenses.

³Calculated as 7% interest on operating capital for 6 months.

Details on variable and fixed machinery costs, including fuel, repairs, and machine labor, are located [in the Spring Barley Machinery Costs table.](#)

Breakeven Analysis:

	- 10%	Base Yield	+ 10%
<u>Price</u>	1.35	1.5	1.65
Operating Cost Breakeven	\$118.73	\$106.85	\$97.14
Ownership Cost Breakeven	\$30.05	\$27.05	\$24.59
Total Cost Breakeven	\$148.78	\$133.90	\$121.73
	- 10%	Base Price	+ 10%
<u>Yield</u>	\$96.30	\$107.00	\$117.70
Operating Cost Breakeven	1.7	1.5	1.4
Ownership Cost Breakeven	0.4	0.4	0.3
Total Cost Breakeven	2.1	1.9	1.7

Schedule of Operations for Spring Barley, 15-18" Precipitation

Month	Operation	Tooling	Materials/Service
October	Harrow	350HP-WT 72' Super Harrow	
October	Chisel/Harrow/Fertilize*	350HP-WT 26' Chisel/Harrow/Fertilizer	Rental Fertilizer Applicator, 60 lb N, 10 lb S
April	Cultivate/Spray	350HP-WT, 40' Cultivator, Rental Sprayer	Rental Sprayer, 1.25 qt FarGO
May	Drill	350HP-WT, 36' JD-455 Drill	70 lb Barley Seed, 10 lb P
May	Crop Insurance		
May	Spray Weeds	350HP-WT, 90' Sprayer	Rental Sprayer, 12 oz 2,4-D, 0.24 oz Finesse
June	Spray Weeds	350HP-WT, 90' Sprayer	Rental Sprayer, 9.2 oz Achieve SC, 22 oz Starane + Sword
August	Harvest	30' Combine	

*Soil test results will determine fertilizer needs, but a typical rate for this yield is provided.

Production Costs for Conventionally Tilled Hard Red Spring Wheat, 15-18" Precipitation

Item	Quantity Per Acre	Unit	Price or Cost/Unit	Value or Cost/Acre
Gross Returns				
Hard Red Wheat	42	bu	\$6.34	\$266.28
Variable Costs				
Seed:				\$15.40
Hard Red Wheat Seed	70	lb	\$0.22	\$15.40
Fertilizer:				\$57.30
Nitrogen	76	lb	\$0.55	\$41.80
Phosphorous	10	lb	\$1.17	\$11.70
Sulfur	10	lb	\$0.38	\$3.80
Pesticides:				\$10.90
2,4-D	10	oz	\$0.16	\$1.60
Maverick ¹	0.33	oz	\$18.00	\$5.94
Discover	3.2	oz	\$1.05	\$3.36
Machinery:				\$28.93
Fuel	4.38	gal	\$1.75	\$7.67
Lubricants	1	acre	\$1.66	\$1.66
Machinery Repairs	1	acre	\$6.78	\$6.78
Machinery Labor	0.64	acre	\$20.00	\$12.82
Custom & Consultants:				\$4.50
Rental Sprayer	2	acre	\$1.75	\$3.50
Rental Fertilizer Applicator	1	acre	\$1.00	\$1.00
Other:				\$8.42
Crop insurance ²	1	acre	\$8.42	\$8.42
Storage Facility & Equip. Repairs				\$0.00
Other Labor				\$0.00
Overhead ³				\$6.27
Operating Interest ⁴				\$5.49
Total Variable Costs				\$137.21
Variable Costs per Unit				\$3.27
Net Returns Above Variable Costs				\$129.07

Production Costs for Conventionally Tilled Hard Red Spring Wheat, 15-18" Precipitation

	Quantity		Price or	Value or
Fixed Costs:				
Machinery depreciation				\$11.33
Machinery interest				\$8.12
Machinery insurance, taxes, housing, licenses				\$2.13
Land Cost*	1	acre	\$58.69	\$58.69
*Based on Share Rent Percentage:				
Landlord	33.00%			
Tenant	67.00%			
Cash Rent				\$0.00
Land Taxes				\$3.90
Total Fixed Costs				\$84.17
Fixed Costs per Unit				\$2.00
Total Costs per Acre				\$221.39
Total Cost per Unit				\$5.27
Returns to Risk				\$44.89

Notes:

¹Maverick should be used at the rate of 2/3 oz per acre on every other wheat crop in order to reduce herbicide resistance. 1/3 oz per acre rate represents an average cost of application per year.

²Average Whitman County CRC insurance premium based on 2008 rates at 75% coverage.

³Covers legal, accounting, and utility fees. Calculated a 5% of operating expenses.

⁴Calculated as 7% interest on operating capital for 6 months.

Details on variable and fixed machinery costs, including fuel, repairs, and machine labor, are located [in the Hard Red Spring Wheat Machinery Costs table.](#)

Breakeven Analysis:			
	-	Base	+
	10%		10%
	Yield		
Price	37.80	42	46.20
Operating Cost Breakeven	\$3.63	\$3.27	\$2.97
Ownership Cost Breakeven	\$2.23	\$2.00	\$1.82
Total Cost Breakeven	\$5.86	\$5.27	\$4.79
	-	Base	+
	10%		10%
	Price		
Yield	\$5.71	\$6.34	\$6.97
Operating Cost Breakeven	24.0	21.6	19.7
Ownership Cost Breakeven	14.8	13.3	12.1
Total Cost Breakeven	38.8	34.9	31.7

Schedule of Operations for Hard Red Spring Wheat, 15-18" Precipitation

Month	Operation	Tooling	Materials/Service
October	Harrow	350HP-WT, 72' Super Harrow	
October	Chisel/Harrow/Fertilize*	350HP- WT 26' Chisel/Harrow/Fertilizer	Rental Fertilizer Applicator, 76 lb N, 10 lb P, 10 lb S
April	Cultivate	350HP- WT 40' Cultivator	
May	Drill	350HP- WT 36' JD-455 Drill	70 lb Wheat Seed
May	Crop Insurance		
May	Spray Weeds	350HP-WT, 90' Sprayer	Rental Sprayer, 10 oz 2,4-D, 1/3 oz Maverick ²
June	Spray Weeds	350HP-WT, 90' Sprayer	Rental Sprayer, 3.2 oz Discover
August	Harvest	30' Combine	

*Soil test results will determine fertilizer needs, but a typical rate for this yield is provided.

²Maverick should be used at the rate of 2/3 oz per acre on every other wheat crop in order to reduce herbicide resistance. The 1/3 oz per acre rate represents an average cost of application.

Machinery Costs for Conventional Tillage Dryland Grain Farm in the 15" to 18" Rainfall Zone, Eastern WA (units/acre)

Note: Per hour machinery costs can be changed in this master table and they will update throughout. Per acre costs are calculated in the Machine Cost program using the values listed in the Machinery Complement tab.

		Fixed Costs (\$/acre):			Variable Costs (units/acre):						Total Costs (\$/acre)
	Total Annual Usage (miles):	Depreciation	Interest	Taxes, Housing, Insurance, Licenses	Repairs (\$/acre)	Labor (\$/acre)	Labor (hr/ac)	Fuel (\$/acre)	Fuel (gal/ac)	Lube (\$/acre)	Total Cost
Trucks:											
0.75-Ton 4WD Pickup	22000	\$0.58	\$0.31	\$0.14	\$0.45	\$2.50	0.13	\$0.58	0.33	\$0.10	\$4.66
2-Ton Truck	1000	\$0.34	\$0.24	\$0.07	\$0.29	\$0.34	0.02	\$0.12	0.07	\$0.02	\$1.42
Tandem Axle Truck	2000	\$0.58	\$0.42	\$0.03	\$0.57	\$0.69	0.03	\$0.24	0.14	\$0.03	\$2.56
Trap Wagon	1000	\$0.17	\$0.10	\$0.05	\$0.06	\$0.17	0.01	\$0.05	0.03	\$0.01	\$0.61
Tractors, other equipment:											
	Total Annual Usage (hours):	Depreciation	Interest	Taxes, Housing, Insurance, Licenses	Repairs (\$/acre)	Labor (\$/acre)	Labor (hr/ac)	Fuel (\$/acre)	Fuel (gal/ac)	Lube (\$/acre)	Total Cost
4WD-ATV	200	\$0.16	\$0.08	\$0.01	\$0.03	\$1.25	0.06	\$0.14	0.08	\$0.02	\$1.69
50HP-WT	100	\$0.16	\$0.20	\$0.03	\$0.06	\$0.58	0.03	\$0.18	0.10	\$0.03	\$1.25
30' Combine	220	\$5.36	\$3.94	\$1.37	\$1.65	\$2.18	0.11	\$1.59	0.91	\$0.24	\$16.33
<i>350HP-Challenger with:</i>											
36' JD455 Drill	160	\$0.85	\$0.47	\$0.16	\$2.11	\$1.33	0.07	\$1.47	0.59	\$0.22	\$6.61
40' Cultivator	130	\$0.46	\$0.37	\$0.05	\$0.31	\$0.76	0.04	\$1.33	0.76	\$0.20	\$3.48
72' Super Harrow	30	\$0.86	\$0.57	\$0.05	\$0.39	\$0.42	0.02	\$0.74	0.42	\$0.11	\$3.14
26' Chisel & Harrow	90	\$1.45	\$1.10	\$0.13	\$0.77	\$1.64	0.08	\$2.86	1.63	\$0.43	\$8.38
36' Cultiweeder	155	\$0.98	\$0.83	\$0.11	\$0.46	\$1.48	0.07	\$2.58	1.47	\$0.39	\$6.83
90' Sprayer (Rental)	150	\$0.18	\$0.16	\$0.02	\$0.05	\$0.48	0.02	\$0.83	0.47	\$0.12	\$1.84

Note: Farm size is assumed to be 3500 acres for the purposes of machinery cost calculations.

Costs by Crop:

In the following tables, machinery costs by operation are listed in separate tables for each crop:

- [Winter Wheat](#)
- [Spring Barley](#)
- [Hard Red Spring Wheat](#)
- [Summer Fallow](#)

Machinery Costs for Conventional Tillage Summer Fallow in the 15" to 18" Rainfall Zone, Eastern WA (\$/acre)											
		Fixed Costs (\$/acre):			Variable Costs (units/acre):						Total Costs (\$/acre)
	Total Annual Usage (miles):	Depreciation	Interest	Taxes, Housing, Insurance, Licenses	Repairs (\$/acre)	Labor (\$/acre)	Labor (hr/ac)	Fuel (\$/acre)	Fuel (gal/ac)	Lube (\$/acre)	Total Cost
Trucks:											
0.75-Ton 4WD Pickup	22000	\$0.58	\$0.31	\$0.14	\$0.45	\$2.50	0.13	\$0.58	0.23	\$0.10	\$4.66
2-Ton Truck	1000	\$0.34	\$0.24	\$0.07	\$0.29	\$0.34	0.02	\$0.12	0.05	\$0.02	\$1.42
Tandem Axle Truck	2000	\$0.58	\$0.42	\$0.03	\$0.57	\$0.69	0.03	\$0.24	0.10	\$0.03	\$2.56
Trap Wagon	1000	\$0.17	\$0.10	\$0.05	\$0.06	\$0.17	0.01	\$0.05	0.02	\$0.01	\$0.61
Tractors, other equipment:	Total Annual Usage (hours):	Depreciation	Interest	Taxes, Housing, Insurance, Licenses	Repairs (\$/acre)	Labor (\$/acre)	Labor (hr/ac)	Fuel (\$/acre)	Fuel (gal/ac)	Lube (\$/acre)	Total Cost
4WD-ATV	200	\$0.16	\$0.08	\$0.01	\$0.03	\$1.25	0.06	\$0.14	0.05	\$0.02	\$1.69
50HP-WT	100	\$0.16	\$0.20	\$0.03	\$0.06	\$0.58	0.03	\$0.18	0.07	\$0.03	\$1.25
<i>350HP-Challenger with:</i>											
40' Cultivator	130	\$0.46	\$0.37	\$0.05	\$0.31	\$0.76	0.04	\$1.33	0.53	\$0.20	\$3.48
40' Cultivator	130	\$0.46	\$0.37	\$0.05	\$0.31	\$0.76	0.04	\$1.33	0.53	\$0.20	\$3.48
36' Cultivator	155	\$0.98	\$0.83	\$0.11	\$0.46	\$1.48	0.07	\$2.58	1.03	\$0.39	\$6.83
36' Cultivator	155	\$0.98	\$0.83	\$0.11	\$0.46	\$1.48	0.07	\$2.58	1.03	\$0.39	\$6.83
90' Sprayer	150	\$0.18	\$0.16	\$0.02	\$0.05	\$0.48	0.02	\$0.83	0.33	\$0.12	\$1.84
90' Sprayer	150	\$0.18	\$0.16	\$0.02	\$0.05	\$0.48	0.02	\$0.83	0.33	\$0.12	\$1.84
Total		\$5.23	\$4.07	\$0.69	\$3.09	\$10.97	0.55	\$10.79	4.31	\$1.64	\$36.49

[Back to Costs by Crop](#)

Machinery Costs for Conventional Tillage Winter Wheat in the 15" to 18" Rainfall Zone, Eastern WA (\$/acre)											
		Fixed Costs (\$/acre):			Variable Costs (units/acre):						Total Costs (\$/acre)
	Total Annual Usage (miles):	Depreciation	Interest	Taxes, Housing, Insurance, Licenses	Repairs (\$/acre)	Labor (\$/acre)	Labor (hr/ac)	Fuel (\$/acre)	Fuel (gal/ac)	Lube (\$/acre)	Total Cost
Trucks:											
0.75-Ton 4WD Pickup	22000	\$0.58	\$0.31	\$0.14	\$0.45	\$2.50	0.13	\$0.58	0.23	\$0.10	\$4.66
2-Ton Truck	1000	\$0.34	\$0.24	\$0.07	\$0.29	\$0.34	0.02	\$0.12	0.05	\$0.02	\$1.42
Tandem Axle Truck	2000	\$0.58	\$0.42	\$0.03	\$0.57	\$0.69	0.03	\$0.24	0.10	\$0.03	\$2.56
Trap Wagon	1000	\$0.17	\$0.10	\$0.05	\$0.06	\$0.17	0.01	\$0.05	0.02	\$0.01	\$0.61
Tractors, other equipment:	Total Annual Usage (hours):	Depreciation	Interest	Taxes, Housing, Insurance, Licenses	Repairs (\$/acre)	Labor (\$/acre)	Labor (hr/ac)	Fuel (\$/acre)	Fuel (gal/ac)	Lube (\$/acre)	Total Cost
4WD-ATV	200	\$0.16	\$0.08	\$0.01	\$0.03	\$1.25	0.06	\$0.14	0.05	\$0.02	\$1.69
50HP-WT	100	\$0.16	\$0.20	\$0.03	\$0.06	\$0.58	0.03	\$0.18	0.07	\$0.03	\$1.25
30' Combine	220	\$5.36	\$3.94	\$1.37	\$1.65	\$2.18	0.11	\$1.59	0.64	\$0.24	\$16.33
<i>350HP-Challenger with:</i>											
36' JD455 Drill	160	\$0.85	\$0.47	\$0.16	\$2.11	\$1.33	0.07	\$1.47	0.59	\$0.22	\$6.61
90' Sprayer	150	\$0.18	\$0.16	\$0.02	\$0.05	\$0.48	0.02	\$0.83	0.33	\$0.12	\$1.84
Total		\$8.38	\$5.92	\$1.88	\$5.26	\$9.52	0.48	\$5.20	2.08	\$0.80	\$36.97

[Back to Costs by Crop](#)

Machinery Costs for Conventional Tillage Spring Barley in the 15" to 18" Rainfall Zone, Eastern WA (\$/acre)											
		Fixed Costs (\$/acre):			Variable Costs (units/acre):						Total Costs (\$/acre)
	Total Annual Usage (miles):	Depreciation	Interest	Taxes, Housing, Insurance, Licenses	Repairs (\$/acre)	Labor (\$/acre)	Labor (hr/ac)	Fuel (\$/acre)	Fuel (gal/ac)	Lube (\$/acre)	Total Cost
Trucks:											
0.75-Ton 4WD Pickup	22000	\$0.58	\$0.31	\$0.14	\$0.45	\$2.50	0.13	\$0.58	0.23	\$0.10	\$4.66
2-Ton Truck	1000	\$0.34	\$0.24	\$0.07	\$0.29	\$0.34	0.02	\$0.12	0.05	\$0.02	\$1.42
Tandem Axle Truck	2000	\$0.58	\$0.42	\$0.03	\$0.57	\$0.69	0.03	\$0.24	0.10	\$0.03	\$2.56
Trap Wagon	1000	\$0.17	\$0.10	\$0.05	\$0.06	\$0.17	0.01	\$0.05	0.02	\$0.01	\$0.61
Tractors, other equipment:	Total Annual Usage (hours):	Depreciation	Interest	Taxes, Housing, Insurance, Licenses	Repairs (\$/acre)	Labor (\$/acre)	Labor (hr/ac)	Fuel (\$/acre)	Fuel (gal/ac)	Lube (\$/acre)	Total Cost
4WD-ATV	200	\$0.16	\$0.08	\$0.01	\$0.03	\$1.25	0.06	\$0.14	0.05	\$0.02	\$1.69
50HP-WT	100	\$0.16	\$0.20	\$0.03	\$0.06	\$0.58	0.03	\$0.18	0.07	\$0.03	\$1.25
30' Combine	220	\$5.36	\$3.94	\$1.37	\$1.65	\$2.18	0.11	\$1.59	0.64	\$0.24	\$16.33
<i>350HP-Challenger with:</i>											
36' JD455 Drill	160	\$0.85	\$0.47	\$0.16	\$2.11	\$1.33	0.07	\$1.47	0.59	\$0.22	\$6.61
40' Cultivator	130	\$0.46	\$0.37	\$0.05	\$0.31	\$0.76	0.04	\$1.33	0.53	\$0.20	\$3.48
72' Super Harrow	30	\$0.86	\$0.57	\$0.05	\$0.39	\$0.42	0.02	\$0.74	0.30	\$0.11	\$3.14
26' Chisel & Harrow	90	\$1.45	\$1.10	\$0.13	\$0.77	\$1.64	0.08	\$2.86	1.14	\$0.43	\$8.38
90' Sprayer	150	\$0.18	\$0.16	\$0.02	\$0.05	\$0.48	0.02	\$0.83	0.33	\$0.12	\$1.84
90' Sprayer	150	\$0.18	\$0.16	\$0.02	\$0.05	\$0.48	0.02	\$0.83	0.33	\$0.12	\$1.84
Total		\$11.33	\$8.12	\$2.13	\$6.78	\$12.82	0.64	\$10.96	4.38	\$1.66	\$53.81

[Back to Costs by Crop](#)

Machinery Costs for Conventional Tillage Hard Red Spring Wheat in the 15" to 18" Rainfall Zone, Eastern WA (\$/acre)											
		Fixed Costs (\$/acre):			Variable Costs (units/acre):						Total Costs (\$/acre)
	Total Annual Usage (miles):	Depreciation	Interest	Taxes, Housing, Insurance, Licenses	Repairs (\$/acre)	Labor (\$/acre)	Labor (hr/ac)	Fuel (\$/acre)	Fuel (gal/ac)	Lube (\$/acre)	Total Cost
Trucks:											
0.75-Ton 4WD Pickup	22000	\$0.58	\$0.31	\$0.14	\$0.45	\$2.50	0.13	\$0.58	0.23	\$0.10	\$4.66
2-Ton Truck	1000	\$0.34	\$0.24	\$0.07	\$0.29	\$0.34	0.02	\$0.12	0.05	\$0.02	\$1.42
Tandem Axle Truck	2000	\$0.58	\$0.42	\$0.03	\$0.57	\$0.69	0.03	\$0.24	0.10	\$0.03	\$2.56
Trap Wagon	1000	\$0.17	\$0.10	\$0.05	\$0.06	\$0.17	0.01	\$0.05	0.02	\$0.01	\$0.61
Tractors, other equipment:	Total Annual Usage (hours):	Depreciation	Interest	Taxes, Housing, Insurance, Licenses	Repairs (\$/acre)	Labor (\$/acre)	Labor (hr/ac)	Fuel (\$/acre)	Fuel (gal/ac)	Lube (\$/acre)	Total Cost
4WD-ATV	200	\$0.16	\$0.08	\$0.01	\$0.03	\$1.25	0.06	\$0.14	0.05	\$0.02	\$1.69
50HP-WT	100	\$0.16	\$0.20	\$0.03	\$0.06	\$0.58	0.03	\$0.18	0.07	\$0.03	\$1.25
30' Combine	220	\$5.36	\$3.94	\$1.37	\$1.65	\$2.18	0.11	\$1.59	0.64	\$0.24	\$16.33
<i>350HP-Challenger with:</i>											
36' JD455 Drill	160	\$0.85	\$0.47	\$0.16	\$2.11	\$1.33	0.07	\$1.47	0.59	\$0.22	\$6.61
40' Cultivator	130	\$0.46	\$0.37	\$0.05	\$0.31	\$0.76	0.04	\$1.33	0.53	\$0.20	\$3.48
72' Super Harrow	30	\$0.86	\$0.57	\$0.05	\$0.39	\$0.42	0.02	\$0.74	0.30	\$0.11	\$3.14
26' Chisel & Harrow	90	\$1.45	\$1.10	\$0.13	\$0.77	\$1.64	0.08	\$2.86	1.14	\$0.43	\$8.38
90' Sprayer	150	\$0.18	\$0.16	\$0.02	\$0.05	\$0.48	0.02	\$0.83	0.33	\$0.12	\$1.84
90' Sprayer	150	\$0.18	\$0.16	\$0.02	\$0.05	\$0.48	0.02	\$0.83	0.33	\$0.12	\$1.84
Total		\$11.33	\$8.12	\$2.13	\$6.78	\$12.82	0.64	\$10.96	4.38	\$1.66	\$53.81

[Back to Costs by Crop](#)

Machinery Complement for Conventional Tillage Dryland Grain Farm in the 15" to 18" Rainfall Zone, Eastern WA

Type of Machine	Replacement Value	Age When Purchased	Years of Life	Annual Hours of Use	Salvage Value	Annual Repairs (Materials & Labor)	Gallons of Fuel/Hr.	Taxes, Housing, Insur., Licenses	Labor Multiplier	Acres per Hour
	\$				\$	\$		%		
<i>Tractors, ATVs:</i>										
4WD-ATV	6,500	0	10	200	1,000	100	1.2	1.2	1.1	
50HP-WT w/Bucket	15,000	15	20	100	3,500	200	3	1.2	1.1	
350HP Challenger	95,000	0	15	600	20,000	1,200	11	1.2	1.1	
<i>Equipment:</i>										
26' Chisel with Harrow	15,000	12	12	90	3,000	750	13	0.6	1.1	13
40' Cultivator	9,500	12	12	130	2,000	900	11	0.6	1.1	29
36' Cultiweeder	18,000	0	15	155	3,500	750	11	0.6	1.1	15
72' Super Harrow	15,500	0	12	30	2,500	550	11	0.6	1.1	40
35' JD 455 Drill	25,000	10	12	175	1,500	5,000	12	3.0	1.2	15
30' Combine	225,000	5	15	220	30,000	4,000	7	2.6	1.2	11
<i>Trucks:</i>										
				Miles/year:			MPG:			
2-Ton Truck	20,000	15	15	1000	2,000	1,000	6		1.2	
Tandem Axle Truck	35,000	15	15	2000	4,500	2,000	6	10.1	1.2	
Trap Wagon	15,000	10	10	500	3,000	400	12	3.8	1.2	
3/4-Ton Pickup	22,000	5	7	12000	7,500	1,500	12	3.4	1.1	