


<p>Farm Business Management Reports</p>		<p>EB 1885</p>
	<p>ECONOMIC CASE STUDIES OF EASTERN WASHINGTON NO-TILL FARMERS GROWING WHEAT AND BARLEY IN THE 8-13 INCH PRECIPITATION ZONE</p>	
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Note

This bulletin presents production costs, cultural practices, and profitability of dryland farming systems used by four leading no-till farmers in the 8-13 inch precipitation zone of eastern Washington. The budgets represent particular farms, which explains why the enterprise costs and returns vary over farms. Farmers were interviewed from October 1997 through July 1998. Variability stems from differences in:

- Farm location
- Cultural practices
- Crop yields
- Capital, labor, and management resources
- Type and size of machinery complement
- Size of farm enterprise
- Farm business structure

Input and output prices were held constant at average levels for all farmers. Consequently, differential marketing performance does not contribute to variable economic results.

It is hoped that this recent record of the economic performance of actual no-till farmers will be useful to farmers contemplating adoption of no-till, agricultural lenders, agribusiness representatives, researchers, extension workers, and government service agency personnel.

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Introduction

This study utilizes data collected from personal interviews with four no-till farmers from the 8-13 inch precipitation zone of eastern Washington. The purpose of this study was to evaluate the cultural practices, production costs, and profitability of their no-till farming systems. Results of the winter wheat-summer fallow, and continuous spring wheat crops were compared with a revised 1999 Washington State University (WSU) Cooperative Extension conventional tillage budget for the area (Hinman and Esser). Results for spring barley were compared with a revised 1995 Whitman County Extension conventional tillage budget (Painter, Hinman, and Burns).

Results showed variable, fixed, and total production costs varied among farmers. For these four farmers, the cost of no-till was lower than that of conventional tillage in the extension budgets. Of course, this result cannot be generalized to the no-till and conventional systems of all farmers within the region. The results provide useful insight into what is economically possible with no-till.

Sources of Information

Farms in this study were large commercial farms ranging from 1,000 to 8,000 cultivated acres (Table 1). Crops included are winter wheat, spring wheat, and spring barley. The four case study farmers will be identified in this bulletin by the letters I, J, K, and L.

Because there are relatively few long-term dominantly no-till farmers in the Pacific Northwest and there is no official list of long-term no-till farmers, the sample was not formally random. U.S. Department of Agricultural Natural Resources Conservation Service (USDA NRCS) staff and WSU Department of Crop and Soil Sciences extension faculty recommended these case study candidates. The farmers were recommended because they had practiced no-till for a long time and/or could provide extensive economic details on their no-till farming systems. Another selection criterion was the presence of substantial total acreage dedicated to no-till.

Table 1: Size and Crop Rotation of the Case Study Farms

Farmer	Acres	Crop Rotation
I	1,800	Continuous Hard Red Spring Wheat
J	4,800	Chemical Fallow/Winter Wheat/Spring Barley
K	8,000	Continuous Hard Red Spring Wheat
L	1,000	Summer Fallow/Winter Wheat/Spring Barley

Each interview lasted between one and one-half and three hours. Three types of forms were used to assist in the survey process. The first listed the schedule of operations for each crop. Information was solicited on the operations, month performed, machinery used, source of machinery (owned, custom hired, or rented), acres per hour, fuel consumption, and type and amount of materials used. The second form inventoried the machinery complement including the type of machine, new or used, purchase value, year bought, remaining years of life, average annual hours of use, estimated salvage value, and estimated annual repairs. The last form elicited crop yields for the crop rotation.

Cost results were compared with representative conventional tillage budgets in two WSU extension bulletins (Hinman and Esser; Painter, Hinman, and Burns) for the low rainfall region (Appendix M Tables). The extension budgets were revised slightly to conform to the same budgeting assumptions and input prices as the no-till farmers' budgets.

Table 2 lists the five-year average yields provided by the farmers. Winter wheat yields ranged from 42.5 bushels per acre to 75 bushels per acre. This variation is caused primarily by differences in rainfall.

Table 2: Average Crop Yields and Average Precipitation Per Year of Case Study Farms

Farmer	Winter Wheat (bu/ac)	Spring Wheat (bu/ac)	Spring Barley (ton/ac)	Ppt./Year (in)
I		38.50		11.00
J	75.00		1.85	13.00
K		31.00		8.00
L	42.50		1.62	11.00
Ext.	52.00 ¹	35.00 ¹	1.25 ²	11.50

¹Ext. = Extension (Hinman and Esser)

²Ext. = Extension (Painter, Hinman, and Burns)

Budgeting Procedures

The detailed budget tables for each farmer in Appendices I-L are constructed in accordance with the following assumptions and procedures.

Machinery Data

The purchase price of all machinery purchased used was updated for inflation to 1998 dollars so that fixed and variable costs could be summed to obtain total production costs in the same units of measurement. If the machinery was bought new, 1997 or 1998 ownership costs, from Smathers and Willett, were substituted.

The 1998-dollar values were used to compute depreciation and other ownership costs. When farmers did not estimate salvage values the salvage value from the remaining farm values (RFV) in Smathers and Willett were used.

Farmers' average annual machinery repair costs were used when provided. If the farmer did not supply repair costs, the average values in Smathers and Willett were used.

Hauling

Budgets included all production costs up to and including hauling grain from the combine to storage, but excluded hauling stored grain to market. Hauling water and seed, and other miscellaneous two-ton truck tasks were entered under "Misc. Use, two-ton truck." Use of a farm pickup was entered under "Misc. Use, 3/4-ton pickup." If the farmer provided purchase price and other data on his typical two-ton truck and pickup truck, this data was used. Otherwise, the default data in Painter, Hinman, and Burns was used.

Input and Crop Prices

Average input prices for 1998 were obtained from Pullman, Washington, agricultural input dealers (Appendix Table N). The same input prices were used for all farmers to focus on production efficiency differences. Crop prices used in this bulletin are the Washington marketing year averages for 1993-94 through 1997-98 (Washington Agricultural Statistics Service).

Soft White Winter Wheat	\$ 3.72/bu
Hard Red Spring Wheat	4.50/bu
Spring Barley	85/ton

Although most producers in this study participated in government programs, farm-specific transition payments were not added to the average market prices in this study. Readers who wish to evaluate farm-wide costs and returns could add these government payments.

The five-year average prices considerably exceed crop prices in calendar year 1998. For example, average farm gate soft white wheat prices during 1998 averaged about \$2.70 per bushel.

Insurance

All insurance costs except insurance on machinery were excluded due to incomplete data.

Interest Rate

The effective annual interest rates on operating capital and on the coverage investment on machinery was 10.25%. This interest rate represents both the direct cost of borrowed capital and foregone return on equity capital.

Overhead Costs

Overhead costs cover such items as shop costs, utilities, telephone, legal, and accounting fees. These are estimated to be 5% of total variable costs. This is consistent with WSU extension budgets.

Labor Costs

Labor costs, including benefits, for both hired and owner-operator labor, are charged at \$10.00 per hour.

Land Costs

The average property tax for the four farmers and the extension budgets is set at \$3.00 per acre per year. The net rent land charge for a summer fallow-winter wheat rotation, calculated over a 2-year period, is:

Net rent/2 years = $1/3$ gross revenue from winter wheat
- $1/3$ fertilizer and herbicide expense - land tax for
summer fallow and winter wheat over 2 years

The net rent for spring barley and spring wheat is:

Net rent/year = $1/3$ spring crop revenue - $1/3$ fertilizer
and herbicide expense - land tax

The lessee covers all other production expenses. The landowner receives one-third of the crop returns. Government transition payments are also shared in practice, but are not considered in this study. Net rent for wheat and barley for each case study farmer is presented in Table 3.

Table 3: Net Rent Charges (\$/acre) by Farmer and by Crop

Farmer	Crop		
	WW-SF ^a (\$/2 ac)	HRSW ^b (\$/ac)	SB ^c (\$/ac)
I		42.78	
J	66.17		34.72
K		29.87	
L	34.24		35.00
Average	50.21	36.32	34.86
Extension	52.18	30.06	22.16

NOTE: Ext. = Extension estimates from Hinman and Esser and from Painter, Hinman, and Burns.

^aWW-SF = winter wheat-summer fallow

^bHRSW = hard red spring wheat

^cSB = spring barley

While net rent will not be a cash cost for farmers who own their land, it is a measure of the opportunity cost of the owner-operator using the land rather than renting it out. It varies positively with the farmers' yields. The herbicide and fertilizer expenses also influence net rent.

Fixed and Variable Costs of Production

Total fixed costs of production are incurred whether a crop is grown or not. They include land costs and machinery depreciation, interest, taxes, housing, and insurance. These costs will vary from farm to farm based on crop yields and machinery complements.

Machinery and tractor interest is calculated on the average annual investment in the equipment (Smathers and Willett):

$$(\text{Interest Rate}) \times ((\text{Replacement Cost} + \text{Salvage Value}) / 2)$$

Replacement cost may refer to new or used machinery depending on how each case study farmer replaced individual machines. Per acre machinery interest, depreciation, and other costs for a given operation is determined by multiplying the respective machine hours per acre for the given operation times per hour costs. The per-hour cost figures are determined by dividing the total fixed cost for the machine by the machine's total annual hours of use on the farm. Land fixed costs include taxes and net rent.

Total variable costs of production increase directly with added acres of crops. These include fuel, repairs, fertilizer, chemicals, custom work, overhead, labor for machinery operation, and interest on operating capital. Differences in variable costs among farmers are due mainly to unique fertilizer and/or herbicide rates, and different machinery operations. The sum of fixed and variable costs equals total cost.

Detailed Crop Budget Tables

The budgets for each crop grown for the four no-till farmers and the extension conventional tillage budget are reported in Appendices I, J, K, L, and M. All results in this bulletin are based on these appendix budgets. These budgets follow the budgeting methodology and assumptions described in the previous sections. Readers who wish to see more detail on the summary results presented in the following sections are invited to refer to these appendices. The content of the appendix tables is reviewed briefly below.

Appendix Tables I1, J1, K1, L1, M1, and M2: Machinery Complement and Hourly Machinery Cost.

These appendix tables present the estimated fixed and variable costs per hour of machines used by each case study farmer and the extension budget. Machinery prices (new and used) are in 1998 dollars.

Appendix Tables I2, J2, J4, J6, K2, L2, L4, L6; and M3, M5 and M7: Schedule of Operations and Costs Per Acre.

These tables outline the schedule of field operations by calendar month, the type of machinery used, labor and machinery hours per acre, and variable and fixed costs per acre per operation by farmer and for winter wheat-summer fallow, hard red spring wheat, and spring barley.

Appendix Tables I3, J3, J5, J7, K3, L3, L5, L7; and M4, M6, M8 and M10: Materials and Services.

These tables list specific services and materials used, quantities used, and prices paid for materials and services for each crop for each of the four case study farmers.

Appendix Table N: Prices of Inputs.

This appendix table lists prices for materials and services used in these budgets.

Costs and Returns Summary

Tables 4, 5, and 6 present variable, fixed, and total costs of production, and break-even selling prices to cover variable and total costs for winter wheat summer fallow, hard red spring wheat, and spring barley for the case study farmers and the extension conventional tillage budget. These cost summaries are based on the detailed budget tables by farmer and by crop presented in Appendices I through L. Variable costs per acre

over farmers ranged from \$31.96 to \$77.54 for winter wheat-summer fallow, \$71.30 to \$81.07 for hard red spring wheat, and \$51.38 to \$85.54 for spring barley. Differences in variable costs between farmers will be disaggregated in a later section among planting, fertilizer, tillage, harvest, and other costs.

Table 4: Winter Wheat-Summer Fallow Costs of Production and Break-Even Prices for Two No-Till Farmers and the Extension Conventional Tillage Budget

Farmer	Yield (Bu/ac)	Variable Costs (\$/2 ac)	Fixed Costs (\$/2 ac)	Total Costs (\$/2 ac)	B-E Price for TVC (\$/bu)	B-E Price for TC (\$/bu)
J	75.00	77.54	121.63	199.17	1.03	2.66
L	42.50	31.96	99.92	131.89	0.75	3.10
Av.	58.75	54.75	110.78	165.53	0.89	2.82
Ext.	52.00	38.08	116.81	154.89	0.73	2.98

-----1993-97 Average Market Price -----\$3.72/bu-----
 NOTE: Ext. = Extension (Hinman and Esser).

Table 5: Hard Red Spring Wheat Costs of Production and Break-Even Prices for Two No-Till Farmers and the Extension Conventional Tillage Budget

Farmer	Yield (bu/ac)	Variable Costs (\$/ac)	Fixed Costs (\$/ac)	Total Costs (\$/ac)	B-E Price for TVC (\$/bu)	B-E Price for TC (\$/bu)
I	38.50	71.30	77.03	148.33	1.85	3.85
K	31.00	81.07	64.76	145.83	2.62	4.70
Av.	34.75	76.19	70.90	147.08	2.19	4.23
Ext.	35.00	65.65	46.71	114.36	1.88	3.27

-----1993-97 Average Market Price -----\$4.50/bu-----
 NOTE: Ext. = Extension (Hinman and Esser).

Table 6: Spring Barley Costs of Production and Break-Even Prices for Two No-Till Farmers and the Extension Conventional Tillage Budget

Farmer	Yield (ton/ acre)	Variable Costs (\$/acre)	Fixed Costs (\$/acre)	Total Costs (\$/acre)	B-E Price for TVC (\$/ton)	B-E Price for TC (\$/ton)
J	1.85	85.54	54.50	140.03	46.24	75.69
L	1.62	51.38	43.14	94.52	31.72	58.35
Av.	1.74	68.46	48.82	117.28	38.98	67.02
Ext.	1.25	94.97	52.91	147.88	75.98	118.30

-----1993-97 Average Market Price -----\$85/ton-----
 NOTE: Ext. = Extension (Painter, Hinman, and Burns).

Fixed costs per acre over farmers for winter wheat, spring wheat, and spring barley ranged from \$99.92 to \$121.63, \$64.76 to \$77.03, and \$43.14 to \$54.50, respectively (Tables 4-6). These costs vary from farm to farm based on individual management and machinery complement characteristics.

The break-even selling price for total variable costs (TVC) is the price that would cover total variable costs of production given the average yield provided by each farmer. For example, dividing the total variable costs of winter wheat for Farmer J of \$77.54 by his yield of 75 bushels per-acre results in a break-even price to cover variable costs of \$1.03 per bushel (Table 4). Farmer J's break-even selling price to cover total costs of production, both fixed and variable, is \$2.66 per bushel for winter wheat.

Break-even prices over variable costs are substantially lower than five-year marketing average prices for all crops - winter wheat, spring wheat, and spring barley - for each farmer and for the extension budget. The two winter wheat farmers, Farmers J and L, produce winter wheat at a substantially lower total cost per bushel (break-even price for TC) of \$2.82 than the five-year average price of \$3.72 per bushel (Table 4). Farmer I produces hard red spring wheat for \$0.65 per bushel less than the long-run market price. Although Farmer K produces hard red spring wheat at a break-even selling price of \$4.70, which exceeds the average market price of \$4.50, he stated that in only two of fourteen years did he receive less than \$5.00 per bushel given his actual marketing performance.

Farmers J and L's average production cost for winter wheat of \$2.82 per bushel is lower than the conventional tillage revised extension budget estimate of \$2.98 per bushel (Table 4). However, the no-till farmers' cost per bushel of \$2.82 falls slightly above the depressed 1998 wheat price of \$2.70.

Farmers I and K's average production costs for hard red spring wheat of \$147.08 per acre exceed the conventional tillage extension estimate of \$114.36. The farmers' average break-even selling prices for TVC and TC of \$2.19 and \$4.23, respectively, exceed the extension estimates of \$1.88 and \$3.27, but are lower than the five-year average price of \$4.50 per bushel (Table 5).

Farmers J and L's average production costs for spring barley is \$117.28 per acre, substantially below the conventional tillage extension estimate of \$147.88 per acre. The farmers' average break-even price for TVC and TC of \$38.98 and \$67.02 per ton respectively, are much lower than both the extension estimates of \$75.98 and \$118.30 per ton and the five-year average price of \$85 per ton (Table 6).

The break-even prices over total costs in Tables 4 through 6 show that the case study farmers have achieved a high level of production efficiency compared with the extension conventional tillage cost estimates for all crops except hard red spring wheat.

During 1998, soft white wheat prices were at a multi-year low with farm-gate prices averaging around \$2.70 per bushel in the study region. The conventional wisdom among farmers, lenders, and economists was that the 1998 wheat price was well below production costs for the large majority of PNW farmers. Nonetheless, the no-till farmers in this case study produced wheat at an average total cost of \$2.82 per bushel, only \$0.11 above the depressed 1998 price. This is strong economic evidence in favor of no-till winter wheat production in this low rainfall region.

Is it possible that these results overstate the economic case for no-till winter wheat and spring barley production? Several challenges could be raised:

- (1) Perhaps the two no-till winter wheat farmers are atypically successful due to personal experience, managerial acumen, or favorable agro-climatic environment. While these farmers may be further along on the learning curve than most, they were very humble about mistakes and failures along the way. They did not claim to be blessed with any particular knowledge or luck.
- (2) Perhaps this study has missed or underestimated some major costs of winter wheat or spring barley production. It is true that some costs like machine transport, fixed costs of infrequently used equipment, and insurance have been excluded. On the other hand, general overhead costs, operator labor, and other opportunity costs have been fully included. Readers may judge whether other important costs have been under or overestimated by consulting the detailed budgets in Appendices I through M.
- (3) Possibly the five-year average winter wheat and spring barley yields in Tables 4 and 6 are slightly high and thereby reduce average per unit production costs; however, these were the farmers' best estimates.
- (4) As expected, the per unit production costs for winter wheat are lower relative to recent market prices than are those for hard red spring wheat.

Winter wheat has long been the most productive and profitable crop in the study region. There is less farmer experience and less research with hard red spring wheat than with soft white winter wheat in the study region.

Readers should recognize that the production efficiency results in Tables 4 through 6 do not permit any conclusions about the comparative profitability of the four no-till farms. Profit comparisons require information on both sides of the economic equation-production costs and marketing performance. This study focused only on the no-till farmers' production efficiency, not on their effectiveness in marketing wheat and barley.

Components of Costs for Farmers

Tables 8 through 10 present the percentage share of total production costs for planting, tillage, fertilizer, herbicide and application, harvest, and land cost for winter wheat, hard red spring wheat, and spring barley for the farmers and for the extension conventional tillage budget.

Planting costs ranged from 7 through 10 percent of total cost among the two winter wheat farmers. The average planting share of total costs of 9 percent equaled that for the conventional tillage extension budget (Table 8). Planting costs include drilling and costs of seed, but not the costs of fertilizer applied when seeding. The differences in planting costs for each farmer is due in part to widely different purchase prices for the no-till drill, which ranged from \$15,000 (an older smaller drill for Farmer L) to \$100,000 (a new drill for Farmer K) (Table 7).

Table 7: Farmers' No-Till Drill Cost Data

Farmer	Cost (98\$)	Year Bought	Annual Hrs	TFC \$/hr	TVC \$/hr
	82,631	1990 USED	180	53.71	8.33
J	83,000	1996 USED	400	27.74	2.00
K	100,000	1984 NEW	260	45.00	19.23
L	15,000	1996 USED	300	5.62	2.28

As shown in the appendices Schedule of Operations Tables, some no-till farmers used supplemental tillage with the no-till drill. The two winter wheat farmers' tillage costs ranged from 0 through 12 percent of total cost. As expected with no-till, tillage for the no-till farmers at 6 percent was substantially lower than the conventional tillage extension budget tillage share of 12 percent. Tillage costs include limited operations involving disc, cultivator, rodweeder, harrow, and/or sweep.

Herbicide and application costs for the two winter wheat farmers ranged from 17 through 23 percent of total cost. The farmers' 20 percent cost share for herbicides and application greatly exceeds the 4 percent for the conventional tillage extension budget (Table 8). The no-till farmers are obviously substituting chemical for mechanical weed control.

Table 8: Winter Wheat - Summer Fallow Production Cost Results for Farmers and the Extension Conventional Tillage Budget, 8-13 Inch Precipitation Zone

Grower	Plant	Till.	Herb. & Appl	Fert.	Harvest & Other	Land Cost	Total Cost	Cost/bu	Av. Yield
			% of total cost				(\$/2 ac)	\$/bu	bu/ac
J	10	0	23	14	20	33	199.17	2.66	75.00
L	7	12	17	14	23	26	131.89	3.10	42.50
Av.	9	6	20	14	22	30	165.53	2.82	58.75
Ext.	9	12	4	11	30	34	154.89	2.98	52.00

NOTE: Ext. = Extension (Hinman and Esser).

Table 9: Hard Red Spring Wheat Production Cost Results for Farmers and the Extension Conventional Tillage Budget, 8-13 Inch Precipitation Zone

Grower	Plant.	Till.	Herb. & Appl.	Fert.	Harvest & Other	Land Cost	Total Cost	Cost /bu	Av. Yield
			% of total cost				\$/acre	\$/bu	bu/ac
I	22	0	11	17	22	29	148.33	3.85	38.50
K	22	5	12	20	20	20	145.83	4.70	31.00
Av.	22	3	12	19	21	25	147.08	4.28	34.75
Ext.	10	8	14	17	25	26	114.36	3.27	35.00

NOTE: Ext. = Extension (Hinman and Esser).

Table 10: Spring Barley Production Cost Results for Farmers and the Extension Conventional Tillage Budget, 8-13 Inch Precipitation Zone

Grower	Plant.	Till.	Herb. & Appl.	Fert.	Harvest & Other	Land Cost	Total Cost	Cost /ton	Av. Yield
			% of total cost				\$/ton	\$/ton	t/ac
J	15	0	24	18	18	25	140.03	75.69	1.85
L	16	0	14	18	14	37	94.52	58.35	1.62
Av.	16	0	19	18	16	31	117.28	67.02	1.74
Ext.	16	15	19	10	25	15	147.88	118.30	1.25

NOTE: Ext. = Extension (Painter, Hinman, and Burns).

Farmers J and L's fertilizer costs for winter wheat averaged 14 percent of total cost. This exceeds the 11 percent share for the conventional tillage extension budget (Table 8). Farmer J has the highest average precipitation (Table 2) and fertilizer rates (Table 11). Farmer J's winter wheat yield, 75 bushels per acre (Table 2), was also higher than that of the other farmers.

Table 11: Farmers' Fertilizer (lbs/acre)

	Crop	Nitrogen	Phosphate	Sulfur
J	Winter Wheat	108	28	0
L	Winter Wheat	60	20	5
I	Spring Wheat	71	20	0
K	Spring Wheat	76	20	20
J	Spring Barley	0	0	0
L	Spring Barley	60	15	5

Farmers J and L's harvest and other costs for winter wheat averaged 22 percent of total cost, which was lower than the extension budget share of 30 percent. Variations among the farmers' harvest costs are partially explained by their combined purchase prices, which ranged from \$35,000 to \$200,000 (Table 12).

Table 12: Farmers' Combine Cost Data

Farmer	Cost (98\$)	Year Bought	Annual Hrs	TVC \$/hr	TFC \$/hr
I	165,262	1991 New	190	32.03	97.81
J	175,000	1997 Used	300	17.38	65.60
K	200,000	1990 New	250	23.72	176.57
L	35,000	1989 Used	200	9.53	17.03

Average land cost for the two no-till winter wheat farmers of 30 percent was less than the extension estimate of 34 percent. Land costs vary directly with the level of crop yields based on the net rent formula. The net rent is an opportunity cost for landowners (Table 3).

Farmer J, who farms in a 13-inch precipitation zone, has the highest total cost and the greatest winter wheat yield (Table 2). The cost per bushel of \$2.66 is lower than the farmers' average of \$2.83 and the extension estimate of \$2.98. The farmers' average total cost per acre of \$165.53 exceeds the

conventional tillage extension budget total cost of \$154.89, but their average cost per bushel of \$2.82 is lower than the extension estimate of \$2.98.

Similar production cost share information is provided for hard red spring wheat and spring barley in Tables 8, 9, 11, and 12. Readers are invited to review these spring crop results which differ in some respects from the winter wheat results discussed above.

Concluding Note

Results of this analysis of four no-till farmers located in the 8-13 inch rainfall zone of eastern Washington reveal that no-till can be economically efficient. These no-till farmers grew winter wheat and spring barley at a lower total cost per bushel than the "typical" conventional tillage farm portrayed in recent extension budgets for the region. In contrast, the two no-till hard red spring wheat producers' average cost per bushel exceeded that of the extension conventional estimate. Their average cost for no-till hard red spring wheat ranged from somewhat below to slightly above the five-year average market price.

The case study farmers in this low rainfall region have been particularly successful as recent adopters of no-till. Only Farmer K has been practicing no-till for more than ten years; the others have been practicing no-till for only one to a few years. At this point, they seem to have suffered few agronomic transition costs in adopting no-till.

Readers are cautioned that the results of these no-till budgets are dependant upon the small sample of case study farmers. It is not possible to generalize these results to all no-till farms in the 8-13 inch rainfall zone of the PNW. However, these results show that promising economic results are possible with no-till with proper management.

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APPENDICES

DETAILED BUDGET TABLES FOR FARMERS

Note: Appendices are titled I through N to follow the sequence initiated in a companion bulletin for the 19-22 inch precipitation zone in which appendices are titled A through H. The appendix letters in the two bulletins indicate an individual no-till case study farmer.

TABLE I1: MACHINERY COMPLEMENT AND HOURLY MACHINERY COSTS, FARMER I

MACHINERY	PURCHASE PRICE	YEARS TO TRADE	ANNUAL DEPRECIATION HOURS	INTEREST EST	INSURANCE	TAXES	HOUSING	TOTAL FIXED COST	REPAIR	FUEL AND LUBE	TOTAL VARIABLE COST	TOTAL COST
	\$							COST PER HOUR				
200HP-TRACTOR	11,566.00	15	120	5.82	5.28	.32	.95	12.89	.49	1.63	2.12	15.01
300HP-TRACTOR	122,000.00	25	150	32.53	40.67	2.44	7.32	87.03	2.53	8.17	10.70	97.73
NO-TILL DRILL	82,631.00	20	180	22.95	22.95	1.38	4.13	53.71	8.33	.00	8.33	62.04
75' SPRAYER	18,000.00	10	120	12.34	8.83	.53	1.59	24.17	15.05	.00	15.05	39.22
25' COMBINE	165,262.00	22	190	39.54	43.49	2.61	7.83	97.81	26.32	5.72	32.03	129.84
TRUCK	17,350.00	15	200	5.23	4.75	.29	.86	11.60	4.63	2.59	7.22	18.82
3/4 TON PICKUP	16,500.00	7	500	3.51	2.07	.12	.37	6.29	3.78	2.45	6.23	12.51

TABLE I2: SCHEDULE OF OPERATIONS AND ESTIMATED COSTS PER ACRE FOR HARD RED SPRING WHEAT, FARMER I

OPERATION	TOOLING	MTH	YEAR	MACH HOURS	LABOR HOURS	TOTAL FIXED COST	VARIABLE COST					TOTAL VARIABLE COST	TOTAL COST
							FUEL, LUBE, & REPAIRS	MACH LABOR	SERVICE	MATER.	INTER.		
						\$	\$	\$	\$	\$	\$	\$	
APP HERB 33%	75' SPRAYER, 200HP-TRACTOR	OCT	1996	.01	.01	.38	.17	.12	.00	.77	.09	1.15	1.53
APPLY HERBICIDE	75' SPRAYER, 200HP-TRACTOR	FEB	1997	.03	.03	1.15	.52	.30	.00	4.06	.24	5.13	6.28
SEED/FERTILIZE	NT-DRILL, 300HP-TRACTOR	MAR	1997	.10	.12	14.94	2.01	1.20	.00	37.70	1.70	42.61	57.56
APPLY HERBICIDE	75' SPRAYER, 200HP-TRACTOR	MAY	1997	.03	.03	1.15	.52	.30	.00	5.98	.17	6.97	8.12
HARVEST	25' COMBINE	AUG	1997	.11	.12	10.76	3.52	1.20	.00	.00	.00	4.72	15.48
HAUL GRAIN	TRUCK	AUG	1997	.06	.12	.70	.43	1.20	.00	.00	.00	1.63	2.33
MISC USE	3/4 TON PICKUP	ANN	1997	.25	.29	1.57	1.56	2.90	.00	.00	.22	4.68	6.25
MISC USE	TRUCK	ANN	1997	.05	.06	.58	.36	.60	.00	.00	.05	1.01	1.59
OVERHEAD	UTILITIES, LEGAL, ACCT, ETC.	ANN	1997	.00	.00	.00	.00	.00	.00	3.40	.00	3.40	3.40
TAXES	LAND TAXES	ANN	1997	.00	.00	3.00	.00	.00	.00	.00	.00	.00	3.00
LAND COST	NET RENT	ANN	1997	.00	.00	42.79	.00	.00	.00	.00	.00	.00	42.79
TOTAL PER ACRE				.64	.78	77.03	9.10	7.82	.00	51.90	2.48	71.30	148.33

TABLE I3: MATERIALS AND SERVICES FOR SPRING WHEAT, FARMER I

OPERATION	MONTH	MATERIAL AND/OR SERVICE
APPLY HERBICIDE(33%)	OCTOBER	8 OUNCES OF ROUNDUP @ \$0.29/OUNCE PER APPLIED ACRE
APPLY HERBICIDE	FEBRUARY	14 OUNCES OF ROUNDUP @ \$0.29/OUNCE
SEED/FERTILIZE	MARCH	90 POUNDS OF WHEAT SEED @ \$0.14/POUND 55 POUNDS OF NITROGEN @ \$0.22/POUND 100 POUNDS OF 16-20 @ \$0.13/POUND
APPLY HERBICIDE	MAY	13 OUNCES OF BRONATE @ \$0.46/OUNCE
OVERHEAD	ANNUAL	5% OF VARIABLE COST

TABLE J1: MACHINERY COMPLEMENT AND HOURLY MACHINERY COSTS, FARMER J

MACHINERY	PURCHASE PRICE	YEARS		ANNUAL DEPREC- IATION	INTER- EST	INSUR- ANCE	TAXES	HOUSING	TOTAL FIXED COST	REPAIR	FUEL AND LUBE	TOTAL VARIABLE COST	TOTAL COST
		TO TRADE	TRADE HOURS										
	\$												
400HP-TRACTOR*	125,000.00	15	800	9.42	8.56	.51	1.54	.86	20.89	2.50	5.18	7.68	28.57
400HP-TRACTOR**	125,000.00	15	800	9.42	8.56	.51	1.54	.86	20.89	2.50	8.17	10.66	31.56
35'NO-TILL DRILL	83,000.00	15	400	12.51	11.37	.68	2.05	1.14	27.74	2.00	.00	2.00	29.74
24' COMBINE	175,000.00	22	300	26.52	29.17	1.75	5.25	2.92	65.60	11.67	5.72	17.38	82.98
TRUCK	29,570.00	20	250	5.91	5.91	.35	1.06	.59	13.84	2.00	2.59	4.59	18.43
3/4 TON PICKUP	16,500.00	7	500	3.51	2.07	.12	.37	.21	6.29	1.00	2.59	3.59	9.87

*First entry for the 400-horsepower tractor denotes 6 gallons per hour fuel use for spraying operations

**Second entry for the 400-horsepower tractor denotes 10 gallons per hour fuel use for seeding operations

TABLE J6: SCHEDULE OF OPERATIONS AND ESTIMATED COSTS PER ACRE FOR SPRING BARLEY, FARMER J

OPERATION	TOOLING	MTH YEAR	MACH HOURS	LABOR HOURS	TOTAL FIXED COST	VARIABLE COST					TOTAL VARIABLE COST	TOTAL COST
						FUEL, LUBE, & REPAIRS	MACH LABOR	SERVICE	MATER.	INTER.		
						\$	\$	\$	\$	\$	\$	\$
APPLY HERBICIDE	400HP-TRACTOR, RENTAL SPRAYER	OCT 1996	.05	.06	1.04	.38	.60	.35	1.74	.26	3.33	4.37
APPLY HERBICIDE	400HP-TRACTOR, RENTAL SPRAYER	FEB 1997	.05	.06	1.04	.38	.60	.35	4.64	.30	6.27	7.32
SEED\FERTILIZE	400HP-TRACTOR, 35'NT-DRILL	MAR 1997	.08	.10	4.06	1.10	1.00	1.00	37.50	1.69	42.29	46.35
APPLY HERBICIDE	400HP-TRACTOR, RENTAL SPRAYER	APR 1997	.05	.06	1.04	.38	.60	.35	18.49	.66	20.49	21.53
HARVEST	24' COMBINE	JUL 1997	.10	.11	6.56	1.74	1.10	.00	.00	.02	2.86	9.42
HAUL GRAIN	TRUCK	JUL 1997	.06	.11	.76	.25	1.10	.00	.00	.01	1.36	2.12
MISC USE	3/4 TON PICKUP	ANN 1997	.25	.29	1.57	.90	2.90	.00	.00	.19	3.99	5.56
MISC USE	TRUCK	ANN 1997	.05	.06	.69	.23	.60	.00	.00	.04	.87	1.56
OVERHEAD	UTILITIES, LEGAL, ACCT, ETC.	ANN 1997	.00	.00	.00	.00	.00	.00	4.07	.00	4.07	4.07
TAXES	LAND TAXES	ANN 1997	.00	.00	3.00	.00	.00	.00	.00	.00	.00	3.00
LAND COST	NET RENT	ANN 1997	.00	.00	34.72	.00	.00	.00	.00	.00	.00	34.72
TOTAL PER ACRE			.69	.85	54.50	5.37	8.50	2.05	66.45	3.17	85.54	140.03

TABLE J7: MATERIALS AND SERVICES FOR SPRING BARLEY, FARMER J

OPERATION	MONTH	MATERIAL AND/OR SERVICE
APPLY HERBICIDE	OCTOBER	RENTAL SPRAYER @ \$0.35/ACRE 6 OUNCES OF ROUNDUP @ \$0.29/OUNCE
APPLY HERBICIDE	FEBRUARY	RENTAL SPRAYER @ \$0.35/ACRE 16 OUNCES OF ROUNDUP @ \$0.29/OUNCE
SEED/FERTILIZE	MARCH	RENTAL FERTILIZER MACHINE @ \$1/ACRE 90 POUNDS OF BARLEY SEED @ \$0.14/POUND 80 POUNDS OF NITROGEN @ \$0.22/POUND 50 POUNDS OF 16-20 @ \$0.13/POUND 8 POUNDS OF SULFUR @ \$0.10/ POUND
APPLY HERBICIDE	APRIL	RENTAL SPRAYER @ \$0.35/ACRE 1 PINT OF BRONATE @ \$7.38/PINT 4 OUNCES OF MCPA @ \$2.78/OUNCE
OVERHEAD	ANNUAL	5% OF VARIABLE COST

TABLE K1: MACHINERY COMPLEMENT AND HOURLY MACHINERY COSTS FOR FARMER K

MACHINERY	PURCHASE PRICE	YEARS TO TRADE	ANNUAL HOURS	DEPREC- IATION	INTER- EST	INSUR- ANCE	TAXES	HOUSING	TOTAL FIXED COST	REPAIR	FUEL AND LUBE	TOTAL VARIABLE COST	TOTAL COST
	\$												
				-----COST PER HOUR-----									
250HP-TRACTOR	135,000.00	8	1000	10.99	9.11	.55	1.64	.91	23.19	16.88	.12	16.99	40.18
280HP-75CT	145,000.00	5	400	40.02	26.25	1.57	4.72	2.62	75.19	5.00	7.45	12.45	87.64
20'NO-TILL DRILL	100,000.00	20	260	19.23	19.23	1.15	3.46	1.92	45.00	19.23	.00	19.23	64.23
30' SWEEP	20,000.00	10	130	12.31	9.23	.55	1.66	.92	24.68	7.69	.00	7.69	32.37
30' COMBINE	200,000.00	5	250	104.32	53.92	3.24	9.71	5.39	176.57	18.00	5.72	23.72	200.29
400HP BKT WAGON	25,000.00	40	250	1.70	6.60	.40	1.19	.66	10.54	4.80	2.59	7.39	17.93
TRUCK	18,000.00	10	375	3.95	2.82	.17	.51	.28	7.74	4.00	2.59	6.59	14.32
3/4 TON PICKUP	7,500.00	4	250	4.74	2.05	.12	.37	.21	7.49	6.00	2.59	8.59	16.08

TABLE K2: SCHEDULE OF OPERATIONS AND ESTIMATED COSTS PER ACRE FOR SPRING WHEAT, FARMER K

OPERATION	TOOLING	MTH	YEAR	MACH HOURS	LABOR HOURS	VARIABLE COST					TOTAL VARIABLE COST	TOTAL COST	
						TOTAL FIXED COST	FUEL, LUBE, & REPAIRS	MACH LABOR	SERVICE	MATER. INTER.			
						\$	\$	\$	\$	\$	\$	\$	
SWEEP	280HP-75CT, 30'SWEEP	AUG	1996	.05	.06	5.37	1.07	.55	.00	.00	.00	1.62	6.99
APP HERB 50%	250HP-CT, RENTAL SPRAYER	NOV	1996	.02	.02	.39	.28	.20	.75	2.32	.27	3.82	4.21
APPLY HERBICIDE	250HP-CT, RENTAL SPRAYER	MAR	1997	.03	.04	.77	.57	.40	1.50	3.48	.25	6.19	6.97
SEED/FERTILIZE	280HP-CT, 20'NO-TILL DRILL	MAR	1997	.09	.11	11.49	2.96	1.10	.00	43.45	1.98	49.49	60.99
APP HERB 33%	250HP-CT, RENTAL SPRAYER	APR	1997	.01	.01	.26	.19	.13	.49	5.65	.22	6.68	6.94
HARVEST	30' COMBINE	AUG	1997	.06	.07	11.04	1.48	.72	.00	.00	.00	2.20	13.24
HAUL GRAIN	400HP BANKOUT WAGON	AUG	1997	.03	.07	.32	.22	.70	.00	.00	.00	.92	1.24
MISC USE	3/4 TON TRUCK	ANN	1997	.25	.29	1.87	2.15	2.90	.00	.00	.25	5.30	7.17
MISC USE	TRUCK	ANN	1997	.05	.06	.39	.33	.60	.00	.00	.05	.98	1.36
OVERHEAD	UTILITIES, LEGAL, ACCT, ETC.	ANN	1997	.00	.00	.00	.00	.00	.00	3.86	.00	3.86	3.86
TAXES	LAND TAXES	ANN	1997	.00	.00	3.00	.00	.00	.00	.00	.00	.00	3.00
LAND COST	NET RENT	ANN	1997	.00	.00	29.87	.00	.00	.00	.00	.00	.00	29.87
TOTAL PER ACRE				.59	.73	64.76	9.25	7.30	2.75	58.76	3.01	81.07	145.83

TABLE K3: MATERIALS AND SERVICES FOR SPRING WHEAT, FARMER K

OPERATION	MONTH	MATERIAL AND/OR SERVICE
APPLY HERBICIDE(50%)	NOVEMBER	RENTAL SPRAYER @ \$1.50/ACRE 8 OUNCES OF ROUNDUP @ \$0.29/OUNCE
APPLY HERBICIDE	MARCH	RENTAL SPRAYER @ \$1.50/ACRE 12 OUNCES OF ROUNDUP @ \$0.29/OUNCE
SEED/FERTILIZE	MARCH	100 POUNDS OF WHEAT SEED @ \$0.14/POUND 60 POUNDS OF NITROGEN @ \$0.22/POUND 125 POUNDS OF 16-20 @ \$0.13/POUND
APPLY HERBICIDE(33%)	APRIL	RENTAL SPRAYER @ \$1.50/ACRE 2 OUNCES OF BANVEL @ \$0.80/OUNCE 1 QUART OF 2, 4-D @ \$ 4.05/QUART
OVERHEAD	ANNUAL	5% OF VARIABLE COST

TABLE L1: MACHINERY COMPLEMENT AND HOURLY MACHINERY COSTS, FARMER L

MACHINERY	PURCHASE PRICE	YEARS TO TRADE	ANNUAL HOURS	DEPREC-IATION	INTER-EST	INSUR-ANCE	TAXES	HOUSING	TOTAL FIXED COST	REPAIR	FUEL AND LUBE	TOTAL VARIABLE COST	TOTAL COST
	\$			-----COST PER HOUR-----									
200HP-TRACTOR*	21,120.00	31	800	.85	1.32	.08	.24	.13	2.62	.88	6.53	7.41	10.03
200HP-TRACTOR**	21,120.00	31	800	.85	1.32	.08	.24	.13	2.62	.88	1.63	2.51	5.13
200HP-TRACTOR***	21,120.00	31	800	.85	1.32	.08	.24	.13	2.62	.88	3.45	4.32	6.95
NO-TILL DRILL	15,000.00	22	300	2.27	2.50	.15	.45	.25	5.62	2.28	.00	2.28	7.90
44' CULTIVATOR	13,000.00	28	200	2.32	3.25	.20	.59	.33	6.68	1.50	.00	1.50	8.18
COMBINE	35,000.00	33	200	5.30	8.75	.53	1.58	.88	17.03	3.00	6.53	9.53	26.56
24' DISC	12,300.00	38	200	1.62	3.08	.18	.55	.31	5.74	.25	.00	.25	5.99
60' SPRAYER	14,200.00	10	150	7.79	5.57	.33	1.00	.56	15.26	6.67	.00	6.67	21.92
60' HARROW	2,577.00	11	200	.99	.75	.04	.13	.07	1.99	1.35	.00	1.35	3.34
20' CHISEL	16,000.00	15	280	3.44	3.13	.19	.56	.31	7.64	8.96	.00	8.96	16.60
30' SWEEP	1,000.00	15	250	.27	.60	.04	.11	.06	.54	.32	.00	.32	.86
60' RODWEEDER	12,600.00	44	350	.82	1.80	.11	.32	.18	3.23	.71	.00	.71	3.94
3/4 TON PICKUP	16,500.00	10	350	3.88	2.77	.17	.50	.28	7.60	.71	2.59	3.30	10.90
1976 TRUCK	4,800.00	29	350	.47	.69	.04	.12	.07	1.39	.71	2.59	3.30	4.69

*First entry for the 200-horsepower tractor denotes 8 gallons per hour fuel use for seeding operations
 **Second entry for the 200-horsepower tractor denotes 2 gallons per hour fuel use for spraying operations
 ***Third entry for the 200-horsepower tractor denotes 4 gallons per hour fuel use for tillage operations

TABLE L4: SCHEDULE OF OPERATIONS AND ESTIMATED COSTS PER ACRE FOR WINTER WHEAT, FARMER L

OPERATION	TOOLING	MTH	YEAR	MACH HOURS	LABOR HOURS	TOTAL FIXED COST	VARIABLE COST					TOTAL VARIABLE COST	TOTAL COST						
							FUEL, LUBE, & REPAIRS	MACH LABOR	SERVICE	MATER.	INTER.								
													\$	\$	\$	\$	\$	\$	\$
SEEDING	200HP-TRACTOR, 32' CONV. DRILL	AUG	1996	.13	.16	1.11	.91	1.60	.00	5.60	.00	8.11	9.22						
APPLY HERBICIDE	200HP-TRACTOR, 60' SPRAYER	MAR	1997	.04	.05	.73	.38	.50	.00	14.02	.62	15.52	16.25						
HARVEST	22' COMBINE	AUG	1997	.06	.07	1.02	.57	.70	.00	.00	.00	1.27	2.29						
HAUL GRAIN	TRUCK	AUG	1997	.04	.07	.05	.12	.70	.00	.00	.00	.82	.86						
MISC USE	3/4 TON PICKUP	ANN	1997	.25	.29	1.90	.83	2.90	.00	.00	.19	3.91	5.81						
MISC USE	TRUCK	ANN	1997	.05	.06	.07	.17	.60	.00	.00	.04	.80	.87						
OVERHEAD	UTILITIES, LEGAL, ACCT, ETC.	ANN	1997	.00	.00	.00	.00	.00	.00	1.52	.00	1.52	1.52						
TAXES	LAND TAXES	ANN	1997	.00	.00	3.00	.00	.00	.00	.00	.00	.00	3.00						
LAND COST	NET RENT	ANN	1997	.00	.00	34.24	.00	.00	.00	.00	.00	.00	34.24						
SUMMER FALLOW	TOTAL COST PLUS INTEREST	ANN	1997	.00	.00	57.81	.00	.00	.00	.00	.00	.00	57.81						
TOTAL PER ACRE				.56	.70	99.92	2.97	7.00	.00	21.15	.85	31.96	131.89						

TABLE L5: MATERIALS AND SERVICES FOR SUMMER FALLOW - WINTER WHEAT, FARMER L

OPERATION	MONTH	MATERIAL AND/OR SERVICE
SEED	AUGUST	40 POUNDS OF WHEAT SEED @ \$0.14/POUND
APPLY HERBICIDE	MARCH	0.25 OUNCES OF FINESSE @ \$16.26/OUNCE 6 OUNCES OF SENCOR @ \$1.66/OUNCE
OVERHEAD	ANNUAL	5% OF VARIABLE COST

TABLE L6: SCHEDULE OF OPERATIONS AND ESTIMATED COSTS PER ACRE FOR SPRING BARLEY, FARMER L

OPERATION	TOOLING	MTH	YEAR	MACH HOURS	LABOR HOURS	TOTAL FIXED COST	VARIABLE COST					TOTAL VARIABLE COST	TOTAL COST
							FUEL, LUBE, & REPAIRS	MACH LABOR	SERVICE MATER.	INTER.			
						\$	\$	\$	\$	\$	\$	\$	
APPLY HERBICIDE	200HP-TRACTOR, 60' SPRAYER	OCT	1996	.04	.05	.73	.38	.50	.00	2.90	.31	4.09	4.82
APPLY HERBICIDE	200HP-TRACTOR, 60' SPRAYER	MAR	1997	.04	.05	.73	.38	.50	.00	3.77	.19	4.84	5.57
SEED/FERTILIZE	200HP-TRACTOR, NO-TILL DRILL	MAR	1997	.10	.11	.85	1.04	1.10	.00	28.65	1.28	32.08	32.93
APPLY HERBICIDE	200HP-TRACTOR, 60' SPRAYER	MAY	1997	.04	.05	.73	.38	.50	.00	1.08	.05	2.01	2.73
HARVEST	24' COMBINE	AUG	1997	.04	.05	.10	.10	.50	.00	.00	.00	.60	.71
HAUL GRAIN	TRUCK	AUG	1997	.03	.05	.04	.10	.50	.00	.00	.00	.60	.64
MISC USE	3/4 TON PICKUP	ANN	1997	.25	.29	1.90	.83	2.90	.00	.00	.19	3.91	5.81
MISC USE	TRUCK	ANN	1997	.05	.06	.07	.17	.60	.00	.00	.04	.80	.87
OVERHEAD	UTILITIES, LEGAL, ACCT, ETC.	ANN	1997	.00	.00	.00	.00	.00	.00	2.45	.00	2.45	2.45
TAXES	LAND TAXES	ANN	1997	.00	.00	3.00	.00	.00	.00	.00	.00	.00	3.00
LAND COST	NET RENT	ANN	1997	.00	.00	35.00	.00	.00	.00	.00	.00	.00	35.00
TOTAL PER ACRE				.59	.71	43.14	3.36	7.10	.00	38.85	2.06	51.38	94.52

TABLE L7: MATERIALS AND SERVICES FOR SPRING BARLEY, FARMER L

OPERATION	MONTH	MATERIAL AND/OR SERVICE
APPLY HERBICIDE	OCTOBER	10 OUNCES OF ROUNDUP @ \$0.29/OUNCE
APPLY HERBICIDE	MARCH	13 OUNCES OF ROUNDUP @ \$0.29/OUNCE
SEED/FERTILIZE	MARCH	80 POUNDS OF BARLEY SEED @ \$0.14/POUND 60 POUNDS OF NITROGEN @ \$0.22/POUND 15 POUNDS OF PHOSPHATE @ \$0.25/POUND 5 POUNDS OF SULFUR @ \$0.10/ POUND
APPLY HERBICIDE	MAY	9 OUNCES OF 2, 4-D @ \$0.12/OUNCE
OVERHEAD	ANNUAL	5% OF VARIABLE COST

TABLE M1: MACHINERY COMPLEMENT AND HOURLY MACHINERY COSTS IN THE 10 TO 13 INCH RAINFALL AREA OF ADAMS COUNTY, EXTENSION

MACHINERY	PURCHASE PRICE	YEARS TO TRADE	ANNUAL HOURS	DEPREC-IATION	INTER-EST	INSUR-ANCE	TAXES	HOUSING	TOTAL FIXED COST	REPAIR	FUEL AND LUBE	TOTAL VARIABLE COST	TOTAL COST
	\$								-----COST PER HOUR-----				
300HP-CT	85,000.00	15	1000	4.33	4.73	.32	.95	.53	10.84	5.00	10.35	15.35	26.19
180HP-CT	10,000.00	20	400	1.00	1.35	.09	.27	.15	2.86	8.75	5.18	13.93	16.79
25' LL COMBINE	85,000.00	10	200	22.50	28.13	1.88	5.63	3.13	61.25	20.00	8.63	28.63	89.88
25' HS COMBINE	110,000.00	10	200	22.50	39.38	2.63	7.88	4.38	76.75	20.00	8.63	28.63	105.38
PICKUP	25,000.00	10	400	4.38	3.66	.24	.73	.41	9.41	1.25	3.62	4.87	14.29
TRUCK	30,000.00	15	200	9.00	7.43	.50	1.49	.83	19.23	1.25	2.59	3.84	23.07
4-WHEEL ATV	6,000.00	15	250	1.20	1.35	.09	.27	.15	3.06	.60	.60	1.20	4.26
50HP-WT W/BUCKET	8,500.00	20	100	3.50	4.50	.30	.90	.50	9.70	.75	1.73	2.47	12.18
33' UNDERCUTTER	15,000.00	20	180	3.96	3.94	.26	.79	.44	9.38	11.11	.00	11.11	20.49
58' CULT/HARROW	30,000.00	20	200	7.13	7.09	.47	1.42	.79	16.89	2.00	.00	2.00	18.89
42' CULT/PACK	14,000.00	20	200	3.25	3.38	.23	.68	.38	7.90	1.00	.00	1.00	8.90
72' RODWEEDER	9,000.00	20	400	1.07	1.06	.07	.21	.12	2.53	1.25	.00	1.25	3.78
60' DRILL	15,000.00	20	200	3.56	3.54	.24	.71	.39	8.45	2.50	.00	2.50	10.95
40' OFFSET DISK	6,000.00	20	150	1.90	1.89	.13	.38	.21	4.50	1.33	.00	1.33	5.84
25' OFFSET DISK	6,000.00	10	225	2.53	1.26	.08	.25	.14	4.27	.89	.00	.89	5.16
25' CHISEL	5,000.00	15	250	1.27	.95	.06	.19	.11	2.57	1.20	.00	1.20	3.77
70' TINE HARROW	16,000.00	10	300	3.67	3.15	.21	.63	.35	8.10	.67	.00	.67	8.67
35' CHISEL&MUL TR	21,000.00	20	400	2.49	2.48	.17	.50	.28	5.91	.75	.00	.75	6.66
32' SKEW TREADER	13,000.00	20	275	2.26	2.22	.15	.44	.25	5.32	1.64	.00	1.64	6.96
58' BACK PACK	6,000.00	20	200	1.43	1.42	.09	.28	.16	3.38	5.00	.00	5.00	8.38

SOURCE: EXTENSION (HINMAN AND ESSER)

TABLE M2: MACHINERY COMPLEMENT AND HOURLY MACHINERY COSTS FOR WESTERN WHITMAN COUNTY - 9 TO 14 INCH RAINFALL, EXTENSION

MACHINERY	PURCHASE PRICE	YEARS TO TRADE	ANNUAL HOURS	DEPREC- IATION	INTER- EST	INSUR- ANCE	TAXES	HOUSING	TOTAL FIXED COST	REPAIR	FUEL AND LUBE	TOTAL VARIABLE COST	TOTAL COST
	\$								-----COST PER HOUR-----				
180HP-CT (10YR)	50,000.00	15	1000	2.67	2.70	.18	.54	.30	6.39	6.50	3.68	10.18	16.57
180HP-CT (10YR)	50,000.00	15	1000	2.67	2.70	.18	.54	.30	6.39	6.50	6.44	12.94	19.33
180HP-CT (10YR)	50,000.00	15	1000	2.67	2.70	.18	.54	.30	6.39	6.50	8.28	14.78	21.17
20'OFFSET DISC	17,600.00	12	160	7.34	5.93	.40	1.19	.66	15.52	5.31	.00	5.31	20.83
2-TON TRUCK, 2YR	25,000.00	20	200	6.25	5.63	.38	1.13	.63	14.00	8.10	2.30	10.40	24.40
20' CHISEL, 5YR	5,000.00	10	200	2.00	1.35	.09	.27	.15	3.86	4.25	.00	4.25	8.11
54' TINE HAR, NEW	6,400.00	12	200	2.13	1.73	.12	.35	.19	4.51	2.00	.00	2.00	6.51
ATV SPRAYER	500.00	10	40	1.25	.56	.04	.11	.06	2.03	.25	.00	.25	2.28
40' RODWEEDER	15,400.00	12	200	5.12	4.16	.28	.83	.46	10.86	6.00	.00	6.00	16.86
36' CULTIVATOR	14,000.00	15	75	11.29	9.18	.61	1.84	1.02	23.94	3.73	.00	3.73	27.67
3/4 TON PICKUP	16,500.00	7	500	3.77	1.78	.12	.36	.20	6.23	5.00	4.14	9.14	15.37
52HP-WT W/BUCKET	8,000.00	20	300	1.27	1.26	.08	.25	.14	3.00	.67	2.76	3.43	6.43
36' DISK DRILL	30,000.00	10	120	20.00	13.50	.90	2.70	1.50	38.60	16.67	.00	16.67	55.27
4WD ATV	4,000.00	10	125	2.56	1.73	.12	.35	.19	4.94	1.20	.35	1.54	6.49
20' COMBINE, 5YR	60,000.00	10	270	17.78	12.00	.80	2.40	1.33	34.31	18.52	6.44	24.96	59.27
2-TON TRUCK, 12YR	10,000.00	10	150	5.49	3.53	.24	.71	.39	10.35	8.00	2.76	10.76	21.11
36' 3-BAR TINE	1,200.00	15	130	.49	.50	.03	.10	.06	1.18	.77	.00	.77	1.95
40' 3-BAR TINE	1,400.00	10	200	.56	.38	.03	.08	.04	1.08	.90	.00	.90	1.98
36' 5-BAR FLEX	900.00	15	150	.32	.32	.02	.06	.04	.77	.20	.00	.20	.97
20' 5-BAR FLEX	600.00	20	80	.30	.41	.03	.08	.05	.86	.25	.00	.25	1.11

SOURCE: EXTENSION (PAINTER, HINMAN, AND BURNS)

TABLE M5: SCHEDULE OF OPERATIONS AND ESTIMATED COSTS PER ACRE FOR WINTER WHEAT IN THE 10 TO 13 INCH RAINFALL AREA OF ADAMS COUNTY - OPTION 1, EXTENSION

OPERATION	TOOLING	MTH YEAR	MACH HOURS	LABOR HOURS	TOTAL FIXED COST	VARIABLE COST					TOTAL VARIABLE COST	TOTAL COST
						FUEL, LUBE, & REPAIRS	MACH LABOR	SERVICE	MATER.	INTER.		
						\$	\$	\$	\$	\$	\$	\$
PLANT (1.2X)	180HP-CT, 60' DRILL	SEP 1998	.06	.07	.70	1.07	.90	.00	12.58	1.20	15.75	16.44
APPLY HERBICIDE	CUSTOM AERIAL	APR 1999	.00	.00	.00	.00	.00	3.30	2.40	.17	5.87	5.87
HARVEST (52 BU.)	25' LEVEL LAND COMBINE	JUL 1999	.05	.05	2.79	1.30	.63	.00	.00	.01	1.94	4.73
HARVEST (52 BU.)	25' HILLSIDE COMBINE	JUL 1999	.05	.05	3.49	1.30	.63	.00	.00	.01	1.94	5.43
HARVEST (52 BU.)	CUSTOM HAULING	JUL 1999	.00	.00	.00	.00	.00	4.68	.00	.04	4.72	4.72
MISC USE	PICKUP	ANN 1999	.25	.29	2.35	1.22	3.62	.00	.00	.22	5.06	7.31
MISC USE	TRUCK	ANN 1999	.05	.06	.96	.19	.75	.00	.00	.04	.98	1.95
OVERHEAD	UTILITIES, LEGAL, ACCT, ETC.	ANN 1999	.00	.00	.00	.00	.00	1.81	.00	.00	1.81	1.81
TAXES	LAND TAXES	ANN 1999	.00	.00	3.00	.00	.00	.00	.00	.00	.00	3.00
LAND COST	NET RENT	AUG 1999	.00	.00	52.18	.00	.00	.00	.00	.00	.00	52.18
SUM FALLOW COST	SUMMER FALLOW COST + INTEREST	AUG 1999	.00	.00	51.34	.00	.00	.00	.00	.00	.00	51.34
TOTAL PER ACRE			.45	.52	116.81	5.08	6.52	9.79	14.98	1.70	38.08	154.89

TABLE M6: MATERIALS AND SERVICES FOR WINTER WHEAT IN THE 10-13 INCH RAINFALL AREA OF ADAMS COUNTY-OPTION 1

OPERATION	MONTH	MATERIAL AND/OR SERVICE
PLANT	SEPTEMBER	75 POUNDS OF WHEAT SEED @ \$0.14/POUND 10 POUNDS OF PHOSPHATE @ \$0.25/POUND
APPLY HERBICIDE	APRIL	16 OUNCES OF 2, 4-D @ \$0.25/OUNCE CUSTOM AERIAL \$ \$3.30/ACRE
HARVEST	JULY	CUSTOM HAULING 52 BUSHEL @ \$0.09/BUSHEL
OVERHEAD	ANNUAL	5% OF VARIABLE COST

SOURCE: EXTENSION (HINMAN AND ESSER)

TABLE M7: SCHEDULE OF OPERATIONS AND ESTIMATED COSTS PER ACRE FOR SPRING WHEAT IN THE 10 TO 13 INCH RAINFALL AREA OF ADAMS COUNTY, EXTENSION

OPERATION	TOOLING	MTH YEAR	MACH HOURS	LABOR HOURS	TOTAL FIXED COST	VARIABLE COST					TOTAL VARIABLE COST	TOTAL COST
						FUEL, LUBE, & REPAIRS	MACH LABOR	SERVICE MATER.	INTER.			
						\$	\$	\$	\$	\$	\$	\$
UNDERCUT	300HP-CH, 33' UNDERCUTTER	SEP 1998	.04	.05	.89	1.17	.60	.00	.00	.15	1.91	2.80
SPRAY	CUSTOM AERIAL	FEB 1999	.00	.00	.00	.00	.00	3.50	3.19	.30	6.99	6.99
DISC	300HP-CH, 40' OFFSET DISC	MAR 1999	.06	.07	1.03	.96	.86	.00	.00	.07	1.89	2.92
PLANT	180HP-CT, 60' DRILL	MAR 1999	.06	.07	.70	1.07	.90	.00	13.10	.57	15.63	16.33
CULTIVATE/FERT	300HP-CH, 58' CULT W/BACKPACK	APR 1999	.05	.06	1.44	.85	.75	.00	14.20	.47	16.27	17.71
SPRAY	CUSTOM AIR	MAY 1999	.00	.00	.00	.00	.00	3.50	5.00	.19	8.69	8.69
HARVEST (35 BU.)	25' HILLSIDE COMBINE	JUL 1999	.05	.05	3.49	1.30	.63	.00	.00	.01	1.94	5.43
HARVEST (35 BU.)	25' LEVEL LAND COMBINE	JUL 1999	.05	.05	2.79	1.30	.63	.00	.00	.01	1.94	4.73
HARVEST (35 BU.)	CUSTOM HAULING	JUL 1999	.00	.00	.00	.00	.00	3.15	.00	.02	3.17	3.17
MISC USE	PICKUP	ANN 1999	.25	.29	2.35	1.22	3.62	.00	.00	.22	5.06	7.41
MISC USE	FARM TRUCK	ANN 1999	.05	.06	.96	.19	.69	.00	.00	.04	.92	1.88
OVERHEAD	UTILITIES, LEGAL, ACCT, ETC.	ANN 1999	.00	.00	.00	.00	.00	3.22	.00	.00	3.22	3.22
TAXES	LAND TAXES	ANN 1999	.00	.00	3.00	.00	.00	.00	.00	.00	.00	3.00
LAND COST	NET RENT	AUG 1999	.00	.00	30.06	.00	.00	.00	.00	.00	.00	30.06
TOTAL PER ACRE			.61	.69	46.71	8.06	8.67	13.37	35.49	2.06	67.65	114.36

TABLE M8: MATERIALS AND SERVICES FOR SPRING WHEAT IN THE 10-13 INCH RAINFALL AREA OF ADAMS COUNTY-OPTION 1

OPERATION	MONTH	MATERIAL AND/OR SERVICE
SPRAY	FEBRUARY	11 OUNCES OF ROUNDUP @ \$0.29/OUNCE CUSTOM AERIAL @ \$3.50/ACRE
PLANT	MARCH	60 POUNDS OF WHEAT SEED @ \$0.14/POUND 10 POUNDS OF NITROGEN @ \$0.22/POUND 10 POUNDS OF PHOSPHATE @ \$0.25/POUND
CULTIVATE/FERTILIZE	APRIL	60 POUNDS OF NITROGEN @ \$0.22/POUND 10 POUNDS OF SULFUR @ \$0.10/POUND
SPRAY	MAY	HERBICIDES @ \$5.00/ACRE CUSTOM AERIAL @ \$3.50/ACRE
HARVEST	JULY	CUSTOM HAULING 35 BUSHELS @ 0.09/BUSHEL
OVERHEAD	ANNUAL	5% OF VARIABLE COST

SOURCE: EXTENSION (HINMAN AND ESSER)

TABLE M9: SCHEDULE OF OPERATIONS AND ESTIMATED COSTS PER ACRE FOR SPRING BARLEY, WESTERN WHITMAN COUNTY; 9- TO 14-INCH RAINFALL, EXTENSION

OPERATION	TOOLING	MTH YEAR	MACH HOURS	LABOR HOURS	TOTAL FIXED COST	VARIABLE COST					TOTAL VARIABLE COST	TOTAL COST
						FUEL, LUBE, & REPAIRS	MACH LABOR	SERVICE MATER.	INTER.	TOTAL		
						\$	\$	\$	\$	\$	\$	\$
DISC	180HP-CT, 20' OFFSET DISC	SEP 1994	.13	.14	3.25	2.34	1.44	.00	.00	.31	4.09	7.34
CHISEL	180HP-CT, 20' CHISEL	OCT 1994	.13	.14	1.57	2.44	1.44	.00	.00	.29	4.16	5.73
APPLY HERBICIDE	180HP-CT, 80' SPRAYER	MAR 1995	.01	.01	.08	.11	.13	1.15	2.44	.14	3.97	4.05
CULT/HARROW	180HP-CT, 36' CULTIVATOR/TINE	APR 1995	.08	.10	3.08	1.49	.96	.00	.00	.07	2.53	5.61
FERTILIZE	180HP-CT, 50' FERT. APPLICATOR	APR 1995	.06	.06	.41	.77	.64	.00	15.30	.50	17.21	17.62
RODWEED/HARROW	180HP-CT, 40' RODWD W/TINE HAR.	APR 1995	.07	.08	1.46	1.36	.77	.00	.00	.06	2.19	3.64
PLANT	180HP-CT, 36' DBL. DISC DRILL	APR 1995	.11	.13	5.86	3.34	1.28	.00	11.20	.47	16.30	22.16
APPLY HERBICIDE	180HP-CT, 50' SPRAYER	APR 1995	.03	.04	.43	.41	.37	1.15	6.98	.27	9.17	9.59
APPLY HERBICIDE	180HP-CT, 80' SPRAYER	MAY 1995	.03	.04	.25	.33	.38	1.15	9.25	.25	11.36	11.60
HARVEST	20' COMBINE	JUL 1995	.18	.20	7.15	4.36	2.00	2.48	.00	.07	8.91	16.06
HAUL GRAIN	2 TON TRUCK	JUL 1995	.10	.20	1.61	1.01	2.00	1.35	.00	.03	4.39	6.00
MISC USE	3/4 TON PICKUP	ANN 1995	.25	.29	1.81	1.90	2.90	.00	.00	.22	5.01	6.82
MISC USE	2 TON TRUCK	ANN 1995	.05	.06	.81	.51	.60	.00	.00	.05	1.16	1.96
OVERHEAD	UTILITIES, LEGAL, ACCT, ETC.	ANN 1995	.00	.00	.00	.00	.00	.00	4.52	.00	4.52	4.52
TAXES	LAND TAXES	ANN 1995	.00	.00	3.00	.00	.00	.00	.00	.00	.00	3.00
LAND COST	NET RENT	ANN 1995	.00	.00	22.16	.00	.00	.00	.00	.00	.00	22.16
TOTAL PER ACRE			1.22	1.49	52.91	20.37	14.90	7.28	49.69	2.74	94.97	147.88

TABLE M10: MATERIALS AND SERVICES FOR SPRING BARLEY IN THE 9-14 INCH RAINFALL AREA OF WESTERN WHITMAN COUNTY

OPERATION	MONTH	MATERIAL AND/OR SERVICE
APPLY HERBICIDE	MARCH	4 OUNCES OF ROUNDUP @ \$0.29/OUNCE 6.40 OUNCES OF SURFACTANT @ \$0.14/OUNCE RENTAL SPRAYER @ \$1.15/ACRE
FERTILIZE	APRIL	0.57 POUNDS OF AMMONIUM SULFATE @ \$0.12/POUND 65 POUNDS OF NITROGEN @ \$0.22/POUND 10 POUNDS OF SULFUR @ \$0.10/POUND
PLANT	APRIL	80 POUNDS OF BARLEY SEED @ \$0.14/POUND
APPLY HERBICIDE	APRIL	0.42 QUARTS OF FARGO @ \$10.42/QUART 0.50 PINT OF SUREFIRE @ \$4.50/PINT RENTAL SPRAYER @ \$1.15/ACRE
APPLY HERBICIDE	MAY	1.25 PINT OF MCPA ESTER @ \$2.78/PINT 0.30 OUNCES OF HARMONY EXTRA @ \$16.36/OUNCE 6.40 OUNCES OF SURFACTANT @ \$0.14/OUNCE
OVERHEAD	ANNUAL	5% OF VARIABLE COST

SOURCE: EXTENSION (PAINTER, HINMAN, AND BURNS)

Table H1: Prices of Inputs

	Unit	Price
		\$
Herbicides/Insecticides:		
2, 4-D	Quart	3.75
Amber	Ounce	11.74
Ammonium Sulfate	Pound	0.12
Assert	Gallon	138.00
Assure	Gallon	153.00
Avenge	Gallon	45.50
Banvel	Gallon	101.92
Bronate	Pint	7.38
Buctril	Gallon	61.27
Candice	Ounce	17.28
Canvas	Ounce	18.75
Cerone	Gallon	81.00
Curtail	Gallon	42.50
Dimethoate	Gallon	42.85
Fargo	Pound	1.15
Finesse	Ounce	16.26
Harmony Extra	Ounce	16.36
Hoelon	Pint	8.88
Landmaster	Ounce	0.24
MCPA	Pint	2.78
Pursuit	Ounce	5.56
Roundup	Ounce	0.29
Salt	Pound	0.51
Sencor	Pound	26.50
Surfactant	Ounce	0.14
Surefire	Pint	4.50
Treflan	Pound	4.22

(TABLE H1 Continued)

	Unit	Price
		\$
Fertilizers:		
11-52	Pound	0.18
16-20	Pound	0.13
Boron	Pound	2.90
Nitrogen	Pound	0.22
Phosphate	Pound	0.25
Potash	Pound	0.14
Potassium	Pound	0.14
Sulfur	Pound	0.10
Urea	Pound	0.29
Seeds:		
Barley	Pound	0.14
Hard red spring wheat	Pound	0.18
Soft white spring wheat	Pound	0.14
Soft white winter wheat	Pound	0.14
Lentils	Pound	0.18
Peas	Pound	0.12
Fuel:		
Diesel	Gallon	0.71
Gasoline	Gallon	0.75
Other:		
Burning	Acre	2.00
Land Taxes	Acre	3.00
Machine Operator Labor	Hour	10.00
Truck Driver Labor	Hour	6.50
Combine Driver Labor	Hour	12.00

Use pesticides with care. Apply them only to plants, animals, or sites listed on the label. When mixing and applying pesticides, follow all label precautions to protect yourself and others around you. It is violation of law to disregard label directions. If pesticides are spilled on skin or clothing, remove clothing and wash skin thoroughly. Store pesticides in their original containers and keep them out of the reach of children, pets, and livestock.

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