



Profitability of Alternative Dryland Crop Rotations in Southeast Wyoming

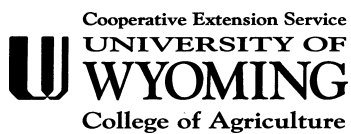
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Dryland wheat producers have experienced low prices and profit margins, creating new challenges to rethink traditional practices. A simple two-year rotation of growing wheat followed by a year of idle summer fallow has been traditionally used to replenish soil moisture for higher and more stable wheat yields. Unfortunately, because of high evaporation and deep soil losses, summer fallow has proven to be a poor practice for storing soil moisture, saving only 20 to 40 percent for the next year's wheat crop. Organic matter and soil quality become degraded by years of summer fallow and erosion. Summer fallow also is costly, as it requires two acres of land to grow one acre of wheat.

Growing wheat as a single crop with summer fallow creates difficult weed, disease, and insect problems due to limited biological diversity. Chemical treatment of resulting weed and pest problems is often ineffective or too expensive to maintain adequate profit margins with a lower valued crop such as wheat. These factors have stimulated researchers to examine new ways to generate profitability in dryland farming, including taking a closer look at alternative crop rotations.

Previous studies in adjacent regions indicated that adding alternative crops, such as corn or sunflowers, to the traditional two-year wheat-fallow (W-F) rotation can be more profitable (Anderson et al., 1999, and Dhuyvetter et al., 1996). Incorporating a three-year rotation, such as wheat-corn-fallow (W-C-F) or wheat-sunflower-fallow (W-S-F), provides the important benefits of breaking critical weed and pest cycles in a more environmentally friendly manner and achieving better use of available soil moisture. Only one-third (versus

one-half) of the land is committed to summer fallow, leaving more acreage for generating crop revenue. However, additional crops in the rotation result in higher operating and management costs. Because of these added costs, it is important to determine whether expanded rotations such as W-C-F or W-S-F are as, or more, profitable than the traditional W-F rotation. This report examines the economics of two particular alternatives, W-C-F or W-S-F, compared with a traditional W-F rotation, based on a specific set of production practices and yield benefits reported by cooperating growers in southeast Wyoming.

Method of Analysis

The profitability of each farming system was evaluated by first constructing per acre enterprise budgets for dryland wheat, fallow, corn, and sunflowers. These enterprise budgets were developed using procedures similar to those used by Agee (1975) and the American Agricultural Economics Association (1998). These procedures entailed developing a representative model farm, complete with machinery and a typical sequence of cultural practices and production inputs, as suggested by cooperating growers. Resulting enterprise budgets for individual crops were then consolidated into a total farm budget framework to generate a net return to farmland for each of the three systems (Kreikemeier, 1999).

Representative Farm

The model farm was 3,780 acres, divided evenly between wheat and fallow with the W-F system (1,890 ac. + 1,890 ac.) and in even thirds with either the W-C-F or W-S-F system (1,260 ac. + 1,260 ac. + 1,260 ac.). Overall farm size was based on necessary acreage to generate average sales of approxi-

mately \$200,000 or more, so the farm could become a self-sustaining unit with little or no dependence on off-farm income.

Table 1 shows an estimated investment requirement exceeding \$1 million for a 3,780-acre farm, including \$945,000 of cropland valued at \$250 per acre (Bastian and Hewlett, 1997). A row crop planter was added to the equipment list for either the W-C-F or the W-S-F rotation. Investments in machinery and equipment were reduced by custom hiring jobs, such as applying fertilizer and chemicals and harvesting and hauling crops, at prevailing custom rates charged in Wyoming's dryland farming areas. (Hewlett et al. 1997).

Appendix Tables 1 through 3 show seasonal field operations associated with each of the cropping rotations. Spraying for Rus-

sian wheat aphid (RWA) resulted in major differences among the three systems. Fifty percent of the wheat acres was sprayed for RWA in the W-F rotation, while only 10 percent of the acres was sprayed in the W-C-F or W-S-F rotations. Treating a smaller percentage of acres for RWA was due to diversification benefits of the extended rotations, resulting in reduced RWA pressure.

All three rotations used a conventional stubble-mulch fallow system, which was consistent with common practice in southeast Wyoming. Therefore, the number and type of fallow operations were virtually identical across all three rotations. The W-S-F rotation included more field operations than the W-C-F, due to the application of nitrogen fertilizer and other chemicals before sunflower was planted.

Table 1. Estimated investment value, 3,780-acre dryland farm.

Items	Description	Value
Land	Tillable crop land, 3,780 acres @ \$250	\$945,000
Other assets		
Vehicles	Pickup Truck, bed, and hoist	\$14,652 \$29,219
Tractors	Four-wheel drive, 260 hp. diesel Front-wheel assist, 160 hp. diesel	\$68,210 \$63,346
Machinery	Field cultivator, 28 ft. Chisel plow, 31 ft. Grain drill, 35 ft. Tine harrow, 30 ft. Row crop planter, 20 ft.	\$11,162 \$14,557 \$28,153 \$6,000 \$18,590
Improvements	Steel bins	\$15,525
Miscellaneous	Grain augers, fuel tanks, shop tools, rotary mower	\$11,464
	Subtotal	\$280,879
	Total	\$1,225,879

Crop Yields and Prices

The average yield for the W-F rotation (34 bu./ac.) was based on a historic average, between 1994 and 1998, of fertilized yields reported by a cooperating grower. During that time, dryland Laramie County yields averaged 28.4 bushels per acre (*Wyoming Agricultural Statistics, 1999*). County-wide yields may have been lower because many Wyoming wheat growers chose not to fertilize. The 34 bushels per acre wheat yield for this analysis was at the lower end of an expected range of dryland wheat yields (25 to 60 bu./ac.) noted at Akron, Colorado (Nielsen, 1995).

Average crop yields and prices used in the economic analysis are presented in Table 2.

Wheat yields associated with extended rotations were upgraded to conform to rotation benefits reported by cooperators. Positive wheat yield effects were reported for a W-C-F rotation, ranging from 7 to 20 bushels per acre, and a W-S-F rotation, ranging from 5 to 7 bushels per acre.

Table 2 shows the average rotation benefits used for this analysis, including a 10 bushel per acre wheat yield increase, from 34 to 44

bushels per acre when rotating wheat with corn. This 10-bushel boost represents a 29 percent yield increase (44 bu. versus 34 bu.). Rotation yield benefits have also been observed at Akron, Colorado, ranging from a 3 percent increase (44.5 to 45.8 bu./ac.) with reduced till and a 60 percent increase (28.7 to 45.8 bu./ac.) with conventional till (Anderson et al., 1999).

A wheat yield benefit from rotating wheat with sunflowers was estimated to be 6 bushels per acre, from 34 to 40 bushels per acre, or an 18 percent increase (See Table 2). Although higher wheat yields are associated with sunflowers in this analysis, lower wheat yields were often realized. For example, lower wheat yields were reported at Akron for W-S-F rotations, in conjunction with reduced tillage systems, because sunflowers tend to draw water from deeper soil profiles. The contrasting higher wheat yields from a sunflower rotation in southeast Wyoming may have been due to a more shallow soil profile, which may minimize or eliminate some of the “water-mining” and resultant negative wheat-yield effects of growing sunflowers in southeast Wyoming.

Table 2. Average prices and yields associated with specified rotations.

Items	Rotations		
	W-F	W-C-F	W-S-F
Wheat yield (bu./ac.)	34	44	40
Corn yield (bu./ac.)	—	36	—
Sunflower yield (cwt./ac.)	—	—	7.5
Wheat price (\$/bu.)	\$3	\$3	\$3
Corn price (\$/bu.)	—	\$2	—
Sunflower price (\$/cwt.)	—	—	\$10

The average yield of 36 bushels per acre for dryland corn in the W-C-F rotation (See Table 2) was based on historic yields reported by a cooperating grower in southeast Wyoming. The 36 bushels per acre average was at the lower end of an expected range of dryland corn yields (30 to 80 bu./ac.) reported at Akron, Colorado (Vigil, et al., 1997).

Similarly, the average sunflower yield shown in Table 2 (7.50 cwt./ac.) was based on an expected yield reported by a cooperating grower in southeast Wyoming. The resulting sunflower yield (750 lbs./ac.) was also at the lower end of an expected yield range (750 to 1,600 lb./ac.) reported at Akron, Colorado (Vigil, et al., 1997).

Crop prices for wheat (\$3/bu.), corn (\$2/bu.), and sunflowers (\$10/cwt.) were based on a four-year average (1996-99) of prices reported in *Wyoming Agricultural Statistics* and *Doane's Agricultural Reports*. Planning prices for wheat and corn in this analysis are slightly higher than current prices but within range of USDA five-year (2000-2005) price projections (*Doane's Agricultural Service*). These projections were \$2.50 to \$3.30 per bushel for wheat and \$1.85 to \$2.40 per bushel for corn. Price projections for sunflowers were not reported.

Results

Costs and returns for each of the three dryland rotations are summarized in Table 3. Total costs, excluding interest on land, are lower for W-F (\$189,937), than either W-C-F (\$226,861) or W-S-F (\$221,793). However, W-F gross returns also are much lower (\$192,780), resulting in a lower rate of return to land (0.30 percent) compared with

W-C-F or W-S-F. When compared with W-F, the W-C-F rotation had a much higher gross return (\$257,040) and higher total cost (\$226,861), which netted the highest rate of return to land (3.19 percent). The W-S-F rotation also had a higher gross return (\$245,700) and total cost (\$221,793) and likewise yielded a better rate return (2.53 percent) than W-F (0.30 percent). The advantage of either W-C-F or W-S-F over the W-F rotation comes from higher sales with extra acres in production (i.e., 67 percent versus 50 percent of total farm acreage), as well as associated cost savings from maintaining fewer acres of fallow.

The extra profit generated from either the W-C-F or W-S-F rotation was not necessarily because either corn or sunflowers contributed large amounts of extra gross revenue. In fact, relatively low dryland yields for corn and sunflowers produced gross returns that were generally below those realized from conventional dryland wheat and net returns that were negative for both corn (-6.62/ac.) and sunflowers (-\$3.66/ac.).

Instead, the improved wheat yield effect from growing wheat with corn, an extra 10 bushels, or wheat with sunflowers, an extra 6 bushels, was the dominant force that contributed to improved farm profitability. Without a benefit of rotational wheat yield improvements, rates of return from either W-C-F or W-S-F actually could be worse than the traditional W-F rotation.

Conclusion

Results of this analysis show modest economic gains in profitability when switching from W-F to either W-C-F or W-S-F. Moreover, this analysis does not include a credit for other important, but difficult to measure, factors such as improved soil and environmental attributes.

Table 3. Costs and returns by alternative rotations. ^{a/}

(1) W-F	Wheat 1,890 ac.			Fallow 1,890 ac.	Total 3,780 ac.
Return (\$)	192,780	—	—	0	192,780
Cost (\$) ^{b/}	-121,822	—	—	-68,115	-189,937
Net return (\$)	70,958	—	—	-68,115	2,843
Rate of return (%) ^{c/}	—	—	—	—	0.30%
(2) W-C-F	Wheat 1,260 ac.	Corn 1,260		Fallow 1,260 ac.	Total 3,780 ac.
Return (\$)	166,320	90,720	—	0	257,040
Cost (\$) ^{b/}	-80,417	-99,189	—	-47,255	-226,861
Net return (\$)	85,903	-8,469	—	-47,255	30,179
Rate of return (%) ^{c/}	—	—	—	—	3.19%
(3) W-S-F	Wheat 1,260 ac.		Sunflowers 1,260	Fallow 1,260 ac.	Total 3,780 ac.
Return (\$)	151,200	—	94,500	0	245,700
Cost (\$) ^{b/}	-77,027	—	-99,113	-45,653	-221,793
Net return (\$)	74,173	—	-4,613	-45,653	23,907
Rate of return (%) ^{c/}	—	—	—	—	2.53%

^{a/} A more detailed summary of per acre and whole farm costs and returns and resulting net incomes for each of the three farming systems is shown in Appendix Table 4 (W-F), Appendix Table 5 (W-C-F), and Appendix Table 6 (W-S-F).

^{b/} Represents all costs, except interest on land. Interest on land (\$56,700) is estimated by multiplying conservative investment value (3,780 ac. x \$250/ac = \$945,000) by a conservative opportunity interest rate (6%).

^{c/} Rate of return to land is based on subtracting all costs, except interest on land, from gross returns, and dividing the residual amount (net return to land) by the designated land value (3,780 ac. * \$250/ac. = \$945,000). For example, the 0.30% rate for wheat is calculated by dividing the \$2,843 net return by \$945,000.

If corn or sunflower yields could be improved to midrange yield levels reported at Akron, Colorado, the economic advantage of either the W-C-F or W-S-F rotation would be even better. For example, raising average corn yield from 36 to 50 bushels per acre and sunflower yields from 7.5 to 10.0 hundred-weight per acre, more than doubles the rates of return to land for W-C-F (from 3.19 percent to 6.46 percent) and W-S-F (from 2.53 percent to 5.65 percent).

Profitability is not the only consideration in this rotation scheme. Diversification

benefits of stabilizing year-to-year farm income, as a result of growing multiple crops, is yet another likely outcome of adopting either a W-C-F or W-S-F rotation (Kreikemeier, 1999).

Findings in this study are limited to specific price, yield, and cost assumptions for a representative model farm. Production costs, and crop yields in particular, can vary considerably from one farm to the next, and therefore, these results should be interpreted with caution.

Works Cited

- American Agricultural Economics Association. *Commodity costs and returns estimation handbook*. Ames, Iowa: American Agricultural Economics Association, 1998.
- Agee, Doug. *Costs of producing dry land winter wheat on summer fallow, southeastern Wyoming, 1975-76*. University of Wyoming: Cooperative Extension Service, B-634, 1975.
- Anderson, R.L., R.A. Bowman, D.C. Nielsen, M.F. Vigil, R.M. Aiken, and J.G. Benjamin. Alternative crop rotations for the Central Great Plains. *Journal of Production Agriculture*, 12, 95-99 (1999).
- Bastian, C. and J. Hewlett. *Wyoming Farm and Ranch Land Market: 1993-95*. University of Wyoming: Experiment Station, B-1049 (1997).
- Doane's Agricultural Services Company. Market Watch. *Doane's Agricultural Report*. St. Louis, Missouri (1983-1999).
- Dhuyvetter, K.C., C.R. Thompson, C.A. Norwood, and A.D. Halvorson. Economics of dryland cropping systems in the Great Plains: A review. *Journal of Production Agriculture*, 9, 216-222 (1996).
- Hewlett, J.P., O. Ahmed and C.E. Olson. *Custom rates for farm/ranch operations in Wyoming, 1995-1996*. University of Wyoming: Cooperative Extension Service, B-1084 (1997).
- Kreikemeier, B. Economics of alternative dryland farming systems in southeast Wyoming. (Non-thesis M.S. paper). Department of Agricultural and Applied Economics, University of Wyoming, Laramie (1999).
- Nielsen, D. C. *Water-use/yield relationships for Central Great Plains Crops*. Central Great Plains Research Station Fact Sheet-95. Akron, Colorado (1995).
- Nielsen, D. C. *Estimating corn yields from precipitation records*. Central Great Plains Research Station Fact Sheet-96. Akron, Colorado (1996).
- Nielsen, D. C. *Sunflower water use relationships*. Central Great Plains Research Station Fact Sheet #1-98. Akron, Colorado (1998).
- Vigil, M.F., D.C. Nielson and R.L. Anderson. *Cost of production and yields of alternative dry land crops*. Central Great Plains Research Station Fact Sheet-97. Akron, Colorado (1997).
- Wyoming Department of Agriculture. *Wyoming Agricultural Statistics*. Cheyenne, Wyoming: Wyoming Agricultural Statistics Service (1999).

Appendix Tables

Appendix Table 1. Operations calendar for wheat-fallow.

Crop/Time period	Operations
Wheat	
Early September	Spray 20% for grasshoppers
Mid September	Plant wheat
Late March	Spray 15% for broadleaf weeds
April	Apply nitrogen fertilizer (30 lbs./acre)
Late May	Spray 50% for RW aphid
Mid July	Custom harvest and haul
August	Spray 50% stubble for weeds
October	Chisel plow, first
Summer-fallow	
Early May	Chisel sweep, second
Late May	Chisel sweep, third
Early July	Field cultivate, first
Late August	Field cultivate, second (with harrow)

Appendix Table 2. Operations calendar for wheat-corn-fallow.

Crop/Time period	Operations
Wheat	
Early September	Spray 20% for grasshoppers
Mid September	Plant wheat
Late March	Spray 15% for broadleaf weeds
April	Apply nitrogen fertilizer (30 lbs./acre)
Late May	Spray 10% for RW aphid
Mid July	Custom harvest and haul
August	Spray 50% stubble for weeds
Corn	
Early May	Plant corn
Early June	Apply nitrogen (40 lbs./acre) and herbicide
Late October	Custom harvest and haul
Mid November	Chisel plow, first
Summer-fallow	
Early May	Chisel sweep, second
Late May	Chisel sweep, third
Early July	Field cultivate, first
Late August	Field cultivate, second (with harrow)

Appendix Table 3. Operations calendar for wheat-sunflower-fallow.

Crop/Time period	Operations
Wheat	
Early September	Spray 20% for grasshoppers
Mid September	Plant wheat
Late March	Spray 15% for broadleaf weeds
April	Apply nitrogen fertilizer (30 lbs./acre)
Late May	Spray 10% for RW aphid
Mid July	Custom harvest and haul
August	Spray 50% stubble for weeds
Sunflower	
Late March	Chisel plow
Mid April	Apply nitrogen (20 lbs./acre) and herbicide
Mid April	Field cultivate
Late April	Field cultivate
Early June	Plant
Mid August	Spray 20% for insects
Late October	Custom harvest and haul
Late October	Chisel plow, first
Summer-fallow	
Early May	Chisel sweep, second
Late May	Chisel plow, third
Early July	Field cultivate, first
Late August	Field cultivate, second (with harrow)

Appendix Table 4. Costs and returns for a 3780-acre wheat-fallow system.

	Wheat		Fallow		Total Farm	
	(per ac.)	1890 ac.	(per ac.)	1890 ac.	(per ac.)	3780 ac.
Returns						
Yield/prod. (bu. or cwt.)	34.0	64,260	—	—	—	—
Price (per bu. or cwt.)	\$3.00	—	—	—	—	—
Gross Returns	\$102.00	\$192,780	\$0.00	\$0.00	\$51.00	\$192,780
Operation costs						
Labor (\$7/hr.)	2.60	4,906	4.21	7,959	3.40	12,865
Fuel, lube, and repairs	2.06	3,886	6.62	12,513	4.34	16,399
Seed	4.80	9,072	—	—	2.40	9,072
Fertilizer	5.40	10,206	—	—	2.70	10,206
Herbicide/insecticide	4.90	9,266	3.33	6,284	4.11	15,550
Custom fertilizer applic.	3.75	7,088	—	—	1.88	7,088
Custom herb./insect. applic.	2.98	5,623	1.75	3,308	2.36	8,931
Custom harvesting	14.78	27,937	—	—	7.39	27,937
Custom hauling	4.76	8,996	—	—	2.38	8,996
Interest: cash costs (9%)	2.44	4,615	1.45	2,717	1.94	7,332
Subtotal, cash costs	\$48.46	\$91,595	\$17.36	\$32,781	\$32.90	\$124,376
Management (5% of receipts)	5.10	9,639	—	—	2.55	9,639
Machinery fixed costs	8.24	15,578	16.04	30,324	12.14	45,902
Subtotal, operating costs	\$61.81	\$116,812	\$33.40	\$63,105	\$47.60	\$179,917
Real estate costs						
Taxes	1.81	3,425	1.81	3,425	1.81	6,850
Fixed costs on R.E. improve.	0.84	1,595	0.84	1,595	0.84	3,170
Subtotal, real estate	\$2.65	\$5,010	\$2.65	\$5,010	\$2.65	\$10,020
Total costs (except interest on land)	\$64.46	\$121,822	\$36.04	\$68,115	\$50.25	\$189,937
Net return to land	\$37.54	\$70,958	(-\$36.04)	(-\$68,115)	\$0.75	\$2,843
Percent return to land					0.30%	

Appendix Table 5. Costs and returns for a 3780-acre wheat-corn-fallow system.

	Wheat		Corn		Fallow		Total Farm	
	(per ac.)	1260 ac.	(per ac.)	1260 ac.	(per ac.)	1260 ac.	(per ac.)	3780 ac.
Returns								
Yield/prod. (bu. or cwt.)	44.0	55,440	36.0	45,360	—	—	—	—
Price (per bu. or cwt.)	\$3.00	—	\$2.00	—	—	—	—	—
Gross Returns	\$132.00	\$166,320	\$72.00	\$90,720	\$0.00	\$0.00	\$68.00	\$257,040
Operation costs								
Labor (\$7/hr.)	3.05	3,847	3.91	4,929	4.59	5,781	3.85	14,557
Fuel, lube, and repairs	1.46	1,838	3.55	4,479	5.37	6,760	3.46	13,077
Seed	4.80	6,048	13.50	17,010	—	—	6.10	23,058
Fertilizer	5.40	6,804	7.20	9,072	—	—	4.20	15,876
Herbicide/insecticide	2.43	3,058	4.63	5,834	4.80	6,042	3.95	14,934
Custom fertilizer applic.	3.75	4,725	1.88	2,363	—	—	1.88	7,088
Custom herb./insect. applic.	1.58	1,985	1.88	2,363	1.75	2,205	1.73	6,553
Custom harvesting	16.08	20,263	17.00	21,420	—	—	11.03	41,683
Custom hauling	6.16	7,762	5.04	6,350	—	—	3.73	14,112
Interest: cash costs (9%)	1.59	2,003	2.11	2,660	1.02	1,279	1.57	5,942
Subtotal, cash costs	\$46.30	\$58,333	\$60.70	\$76,480	\$17.51	\$22,067	\$41.50	\$156,880
Management (5% of receipts)	6.60	8,316	3.60	4,536	—	—	3.40	12,852
Machinery fixed costs	8.28	10,428	11.77	14,833	17.34	21,848	12.46	47,109
Subtotal, operating costs	\$61.17	\$77,077	\$76.07	\$95,849	\$34.85	\$43,915	\$57.37	\$216,841
Real estate costs								
Taxes	1.81	2,283	1.81	2,283	1.81	2,283	1.81	6,850
Fixed costs on R.E. improve.	0.84	1,057	0.84	1,057	0.84	1,057	0.84	3,182
Subtotal, real estate	\$2.65	\$3,340	\$2.65	\$3,340	\$2.65	\$3,340	\$2.65	\$10,020
Total costs (except interest on land)	\$63.82	\$80,417	\$78.72	\$99,189	\$37.50	\$47,255	\$60.02	\$226,861
Net return to land	\$68.18	\$85,903	(-\$6.62)	(-\$8,469)	(-\$37.50)	(-\$47,255)	\$7.98	\$30,179
Percent return to land								3.19%

Appendix Table 6. Costs and returns for a 3780-acre wheat-sunflower-fallow system.

	Wheat		Sunflower		Fallow		Total Farm	
	(per ac.)	1260 ac.	(per ac.)	1260 ac.	(per ac.)	1260 ac.	(per ac.)	3780 ac.
Returns								
Yield/prod. (bu. or cwt.)	40.0	50,400	7.50	9,450	—	—	—	—
Price (per bu. or cwt.)	\$3.00	—	\$10.00	—	—	—	—	—
Gross Returns	\$120.00	\$151,200	\$75.00	\$94,500	\$0.00	\$0.00	\$65.00	\$245,700
Operation costs								
Labor (\$7/hr.)	3.00	3,778	4.46	5,625	4.49	5,662	3.99	15,065
Fuel, lube, and repairs	1.40	1,761	6.44	8,110	7.55	9,507	5.13	19,378
Seed	4.80	6,048	9.35	11,775	—	—	4.72	17,823
Fertilizer	5.40	6,804	7.40	9,324	—	—	4.27	16,128
Herbicide/insecticide	2.43	3,058	7.14	8,994	3.33	4,190	4.30	16,242
Custom fertilizer applic.	3.75	4,725	1.88	2,363	—	—	1.88	7,088
Custom herb./insect. applic.	1.58	1,985	2.58	3,245	1.75	2,205	1.97	7,435
Custom harvesting	15.43	19,444	14.00	17,640	—	—	9.81	37,084
Custom hauling	5.60	7,056	1.05	1,323	—	—	2.22	8,379
Interest: cash costs (9%)	1.50	1,926	2.10	2,652	0.98	1,232	1.54	5,810
Subtotal, cash costs	\$44.91	\$56,585	\$56.39	\$71,051	\$18.09	\$22,796	\$39.80	\$150,432
Management (5% of receipts)	6.00	7,560	3.75	4,725	—	—	3.25	12,285
Machinery fixed costs	7.57	9,542	15.87	19,997	15.49	19,517	12.98	49,056
Subtotal, operating costs	\$58.48	\$73,687	\$76.01	\$95,773	\$33.58	\$42,313	\$56.02	\$211,773
Real estate costs								
Taxes	1.81	2,283	1.81	2,283	1.81	2,283	1.81	6,850
Fixed costs on R.E. improve.	0.84	1,057	0.84	1,057	0.84	1,057	0.84	3,170
Subtotal, real estate	\$2.65	\$3,340	\$2.65	\$3,340	\$2.65	\$3,340	\$2.65	\$10,020
Total costs (except interest on land)	\$61.13	\$77,027	\$78.66	\$99,113	\$36.23	\$45,653	\$58.68	\$221,793
Net return to land	\$58.87	\$74,173	(-\$3.66)	(-\$4,613)	(-36.23)	(-\$45,653)	\$6.32	\$23,907
	Percent return to land							2.53%

