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Ardell. D. Halvorson
United States Department of Agriculture

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Economic Comparison of Three Winter Wheat-Fallow Tillage Systems

A.D. Halvorson, R.L. Anderson, N.E. Toman, and J.R. Welsh

Research Question

Economic information is needed to evaluate the sustainability of tillage systems used for winter wheat production in the Central Great Plains. This research evaluated the costs and returns from three winter wheat-fallow production tillage systems: conventional-till (CT), reduced-till (RT), and no-till (NT).

Literature Summary

Reduced-till and NT systems for winter wheat production using crop-fallow have improved precipitation storage efficiency. These tillage systems conserve more crop residue at the soil surface providing protection from wind and water erosion, which helps producers comply with the soil erosion requirements of the 1985 Food Security Act and 1990 Farm Bill. Little information is available from the Central Great Plains that compares the yield, costs, and returns from various wheat-fallow tillage systems.

Study Description

Yield and cultural data (1987–1992) from a long-term winter wheat-fallow tillage study conducted on a Weld silt loam soil were used in making the economic comparisons. Duplicate sets of plots were available to provide wheat yield data each year. Economic data were developed using 1991 estimated farm costs and Federal Farm Program requirements for a 1200 acre cultivated farm in eastern Colorado with a 706 acre wheat base and farmer owned equipment. Set-aside acres (15% acreage reduction) were not included in this economic analysis. Comparisons were also made using published custom rates.

Applied Questions

What effect does tillage system have on winter wheat yields?

Winter wheat yields were not significantly different among tillage systems during any of the individual crop years. Average 6-yr (1987–1992) grain yields were 40, 40, and 42 bu/acre for the CT, RT, and NT systems, respectively. An average yield of 40.4 bu/acre was used in this analysis for all tillage treatments, since tillage system did not significantly affect yields in this study.

Are reduced till and no-till wheat-fallow production systems as profitable as the traditional conventional till system?

When using farmer estimated costs of production, estimated net returns to land, labor, and capital were 107 and 96% of the CT system for the RT and NT systems, respectively. When labor costs are included, net returns to land, management, risk, and capital were 111 and 100% of CT for the RT and NT systems, respectively. When custom rates were used for the tillage practices, net returns to land, labor, and capital were 123 and 110% of CT for the RT and NT systems, respectively. A summary of costs and returns on a 1200 acre dryland winter wheat farm in eastern Colorado using average yields (1987–1992), farmer-operator costs, and 1991 production prices and government program payments are shown in Table 1.

Estimated tillage costs were $13/acre for CT compared with herbicide and tillage costs of $11/acre for RT and herbicide costs of $19/acre for NT to achieve weed control during fallow periods. One must realize that these costs

Full scientific article from which this summary was written begins on page 381 of this issue.

are estimates. Actual farmer costs will vary from farm to farm depending on age and size of machinery complement used. The results indicate that RT and NT systems are economically viable options for wheat-fallow farmers in the Central Great Plains. The benefits of RT and NT systems can be realized by farmers with the potential for economic gain.

Table 1. Summary of cost and returns on a 1200 acre dryland winter wheat farm in eastern Colorado using average yields (1987–1992), farmer-operator costs, and 1991 production prices and government program payments.

	CT	RT	NT
Total grain, bu (600 wheat acres)	24 240	24 240	24 240
Gross returns, $	93 684	93 684	93 684
Preharvest cost, $	24 498	24 276	29 700
Harvest cost, $	12 150	12 150	12 150
Total production cost, $	36 648	36 426	41 850
Net return over production cost, $	57 036	57 258	51 834
Ownership cost, $	14 550	11 916	11 184
Total of all costs, $	51 138	48 282	53 154
Return available for land, labor, capital, management, and risk, $	42 486	45 342	40 650
Estimated preharvest labor†, $6 h	3 240	1 812	1 254
Return to land, capital, management, risk, $	39 246	43 530	39 396

† Estimated preharvest labor hours: CT = 540 h; RT = 302 h; and NT = 209 h/1200 acres.

Economic Comparison of Three Winter Wheat-Fallow Tillage Systems

A.D. Halvorson,* R.L. Anderson, N.E. Toman, and J.R. Welsh

Economic information is needed to evaluate the sustainability of tillage systems used for winter wheat (*Triticum aestivum* L.) production in the Central Great Plains. This study compared the potential economic returns of conventional stubble-mulch tillage (CT), reduced-till (RT), and no-till (NT) winter wheat production systems using estimated farmer costs or custom costs. Grain yields were not significantly different between tillage systems from 1987 through 1992 with 6-yr average grain yields of 40, 40, and 42 bu/acre for the CT, RT, and NT systems, respectively. Preharvest costs were highest for NT while RT and CT costs were virtually the same when using farmer based costs. Using custom rates, preharvest costs were in the order CT > NT > RT. Returns above production costs were in the order RT > CT > NT when using farmer based costs and an average yield of 40.4 bu/acre for all tillage systems. Returns above production costs were in the order RT > NT > CT when using custom rates. Using farmer estimated costs of production, estimated net returns to land, labor, capital, management, and risk were 107 and 95% of the CT system for RT and NT systems, respectively. When labor costs were included, net returns to land, capital, management, and risk were 111 and 100% of CT for the RT and NT systems, respectively. When custom rates were used for the tillage practices, net returns to land, labor, and capital were 123 and 110% of CT for the RT and NT systems, respectively. If costs or application rates of herbicides could be reduced, the NT system would become even more economically competitive with the other tillage systems. Because the cost variations between tillage systems are minimal, the added benefits of increased precipitation storage efficiency and decreased soil erosion potential with RT and NT must be considered when selecting a tillage system.

THE WATER STORAGE benefits of RT and NT systems for winter wheat-fallow production in the Central Great Plains have been well documented (Anderson and Smika, 1984; Greb, 1980; Greb and Zimdahl, 1980; Greb et al., 1970 and 1979; Smika, 1983 and 1990; Smika and Unger, 1986). In addition to improving precipitation storage efficiency, RT and NT fallow systems conserve more of the crop residue on the soil surface, thus providing protection from wind and water erosion. The reduction in soil erosion potential and improved surface residue levels with RT and NT help producers comply with the soil erosion requirements of the 1985 Food Security Act and the 1990 Farm Bill. A reduction in tillage intensity also contributes to building soil quality by conserving more soil organic matter (Bowman et al., 1990; Havlin et al., 1990; Wood et al., 1991).

In the Central Great Plains, few studies (Peterson et al., 1993) have been conducted to compare yields, costs, and returns from various wheat-fallow tillage systems. Evaluation of the potential costs and benefits of the RT and NT tillage systems is needed if farmers are expected to incorporate RT and NT systems into their farming operations. The objective of this paper is to evaluate the costs and returns from three winter wheat-fallow production tillage systems being evaluated at the USDA-ARS Central Great Plains Research Station, Akron, CO.

MATERIALS AND METHODS

Field Data. The yield and cultural data (1987–1992) from a long-term tillage experiment were used in making the economic comparisons in this evaluation. This experiment is on-going at the Central Great Plains Station on a Weld silt loam soil (montmorillonitic, mesic Aridic Paleustoll). Tillage systems include: CT, where tillage is performed with a Haybuster[1] model 3200 undercutter sweep plow (Haybuster, Jamestown, ND) with 32-in. sweeps and a rodweeder; RT, where a mix of contact and residual herbicides are applied shortly after winter wheat harvest and then tillage is used as needed with a Haybuster undercutter and rodweeder until winter wheat planting in September; and NT, where a mix of contact and residual herbicides are applied shortly after winter wheat harvest followed by additional contact herbicide applications as needed until winter wheat planting. Typical tillage and herbicide application sequences used over the 6 yr for the three tillage systems are shown in Table 1. Herbicide prices for 1991 and application rates used in this analysis are shown in Table 2.

Both phases of the wheat-fallow sequence are present each year; therefore, yield data for each crop year, 1987–1992, are available. The experimental design is a randomized, complete block with four replications. The adjacent north and south sets of plots have identical treatments. The plots are 24 by 100 ft (south plots, 1988, 1990, 1992) and 36 by 100 ft (north plots, 1987, 1989, 1991). For example, the north plots were in wheat in 1987 while the south plots were fallowed.

'Vona' winter wheat was grown in 1987 and 1988, and 'Tam 107' was grown 1989 through 1992. Winter wheat was planted in mid- to late September each crop year. Seeding rates were approximately 35 to 45 lb/acre in 1987 and 1988, and 55 to 65 lb/acre (approximately 900 000 seeds/acre) from 1989 to 1992. Seeding rates were increased in 1989 to optimize grain yield potential. The wheat was seeded with a Noble[1] hoe-type drill (model

A.D. Halvorson, USDA-ARS, P.O. Box 400, Akron, CO 80720; R.L. Anderson and N.E. Toman, Agric. and Resource Economics Dep., Colorado State Univ., Ft. Collins, CO 80523; and J.R. Welsh, USDA-ARS Crops Res. Lab, Ft. Collins, CO 80526. Contribution from USDA-ARS and CSU. Received 16 Aug. 1993. *Corresponding author.

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[1] Mention of tradename or manufacturer is solely to provide specific information and does not constitute a guarantee or endorsement by the USDA.

Table 1. Typical herbicide and tillage operations used in the tillage systems evaluated in this study.

Conventional tillage treatment:
1) Sweep tillage after harvest to control weed growth (generally late July to mid-August).
2) Sweep tillage in late September after harvest.
3) Sweep tillage in early May.
4) Sweep tillage in early to mid-June.
5) Sweep tillage in early July.
6) Sweep or rodweed tillage in late July.
7) Rodweed tillage in late August.

Reduced tillage treatment:
1) Atrazine (1 lb a.i./acre) plus paraquat (0.375 lb a.i./acre) plus surfactant (0.125% v/v) applied at 20 gal/acre in late July to mid-August shortly after wheat harvest to control fall weeds.
2) Sweep tillage in late June.
3) Sweep tillage in late July.
4) Rodweed tillage in late August.

No tillage treatment:
1) Atrazine (1 lb a.i./acre) plus paraquat (0.375 lb a.i./acre) plus surfactant (0.125% v/v) applied at 20 gal/acre in late July to mid-August shortly after wheat harvest to control fall weeds.
2) Paraquat (0.375 lb a.i./acre) plus 2,4-D (0.26 lb a.i./acre) plus surfactant (0.125% v/v) applied at 20 gal/acre in July.
3) Paraquat (0.375 lb a.i./acre) plus 2,4-D (0.25 lb a.i./acre) plus surfactant (0.125% v/v) applied at 20 gal/acre in August.
4) Paraquat (0.375 lb a.i./acre) plus 2,4-D (0.25 lb a.i./acre) plus surfactant (0.125% v/v) applied at 20 gal/acre in September.

Table 2. Estimated herbicide prices used in this economic analysis for 1991.

Herbicide	Price†	Application rate‡	Cost
Atrazine	$2.75/lb a.i.	1.0 lb a.i./acre	$2.75/acre
Paraquat	$5.50/lb a.i.	0.375 lb a.i./acre	$2.06/acre
2,4-D	$2.60/lb a.i.	0.250 lb a.i./acre	$0.65/acre
Surfactant	$17/gal	0.125 (v/v)§	$0.43/acre

† Prices are from 1991 competitive bids from local agricultural chemical suppliers in eastern Colorado.
‡ Manufacturer labeled rates of application were used. Volume of water applied per acre was 20 gal.
§ 0.125 (v/v) = 1 pt/100 gal.

DK-5, with 12-in. row spacing) (Noble, Lethbridge, Alberta, Canada) in 1987 and 1988, a Haybuster[1] hoe drill (model 8000, with 12-in. shank spacing, dual seed rows 3 in. apart) in 1989 and 1990, a Haybuster[1] disk drill (model 1000, 7-in. row spacing) in 1991, and a United Farm Tool[1] disk drill (model 5000, with 8-in. row spacing) (United Farm Tool, Oelwein, IA) in 1992. The use of a hoe drill and the high seeding rate of TAM 107 was assumed for this economic analysis. Herbicides were applied during fallow with a field sprayer wide enough to cover the entire plot in one pass. Nitrogen, as ammonium nitrate, at 50 lb N/acre was applied each crop year, while crop P needs were considered adequate based on soil test results. All grain yields were determined using a plot combine to harvest at least a 50-sq-ft area from each plot and are expressed at 12% water content. Precipitation received during phases of the cropping period is reported in Table 3.

Economic Analysis. The average size farm in Colorado is about 1262 acres (Hudson and Fretwell, 1992). An average of five eastern Colorado counties shows about 600 harvested wheat acres per farm under a wheat-fallow system. To estimate the costs and returns from the three tillage production systems, costs per acre for each system were developed from the cultural practices used. Budgets were then developed for a 1200 acre farm with a 706 acre wheat base to determine the outcome of each tillage system. Because federal farm programs include acreage restrictions (15% acreage reduction or set-aside acres in 1991) and other requirements, we assumed for this analysis that 600 acres were planted to winter wheat and 600 acres were in fallow. Use of set-aside acreage was not considered in this economic analysis other than no wheat was harvested from these acres.

The following information and assumptions were used in creating the farm budgets. Typical equipment costs used in wheat-fallow operations were developed from Cooperative Extension crop enterprise budgets from Colorado State University, the University of Nebraska, and the University of Wyoming and are reflected in operation and ownership costs for each tillage system (Dalsted et al., 1990 and 1991; University of Nebraska, 1991a and 1991b; and University of Wyoming, 1983). All costs and prices were held constant over the 6 yr and were from current budgets (1990–1991) and consistent with 1991 prices. The farmer owns a sprayer and does his or her own spraying. The growing winter wheat crop was not sprayed for broadleaf weeds. Nitrogen fertilizer was broadcast by a custom applicator just prior to planting at a cost of $0.23/lb N. Grain was custom combined and

Table 3. Precipitation received during the fallow period, wheat growing period, and total cropping system period at Akron, CO.

Crop year	Harvest-to-planting†	Planting-to-harvest‡	Total (24 mo) cropping system
	precipitation, in.		
1987	21.6	11.8	33.4
1988	21.6	12.6	34.2
1989	25.4	7.3	32.7
1990	18.6	9.6	28.2
1991	25.7	10.3	36.0
1992	24.4	10.5	34.9
Average	22.9	10.4	33.2
83 yr average	22.5	10.5	33.0

† Harvest-to-planting period = 1 July to 30 September of next year.
‡ Planting-to-harvest period = 1 October to 30 June of next year.

Table 4. Ownership costs of machinery complement used in budgets of dryland wheat-fallow farm, eastern Colorado (Dalsted et al., 1992).

Machine	Size	Performance	Average value	Depreciation	Interest	Insurance	Taxes	Total
		h/acre	$	$/h				
Tractor 2WD	160 hp	–	47 200	6.27	3.15	0.38	0.94	10.74
Sweep plow	25 ft	0.10	5 125	4.12	1.53	0.18	0.51	6.34
Rodweeder	25 ft	0.08	5 200	4.18	1.56	0.19	0.52	6.45
Grain drill	32 ft	0.09	15 680	25.19	9.38	1.13	3.14	38.84
Sprayer	50 ft	0.05	4 050	4.50	1.51	0.18	0.50	6.69
Pickup	¾ton	–	20 000	5.20	1.93	0.23	0.65	8.01

Table 5. Summary of material costs, machine costs, and number of operations used in budget analysis.

Preharvest operation	Material cost	Farmer machine cost	Custom machine cost	Number of operations CT	RT	NT
	$/acre					
Sweep plow	–	1.81	6.00	5	2	0
Rodweed	–	1.36	3.25	2	1	0
Weed spray, fall	5.24	1.12	4.00	0	1	1
Weed spray, summer	3.14	1.12	4.00	0	0	3
Fertilizer N	11.50	–	3.50	1	1	1
Seeding	7.00	1.78	5.25	1	1	1
Combine	–	–	15.00	1	1	1
Pickup truck (0.4 h/acre × $6.15/h)	–	2.46	–	–	–	–

grain hauling was calculated at $0.13/bu. A market price of $3.35/bu for wheat was used with a 1991 government deficiency payment of $0.65/bu on an assumed proven wheat yield base of 32 bu/acre (Washington County Colorado yield average and average for Colorado [Hudson and Fretwell, 1992]).

A machinery complement similar to that found on medium-sized winter wheat-fallow dryland farms in eastern Colorado was used to develop operational and ownership costs for the three different tillage systems. Operational costs include fuel, lubrication, and repair for each implement. Ownership costs include depreciation, interest on investment, insurance, and taxes based on equipment that has reached approximately half of its useful life. Each tillage system has a somewhat different machinery complement. Table 4 contains the ownership data on the machines used in the budget analysis. Machinery costs are shown on an acreage-use basis. As a machine is used more or less frequently, fuel, repair, and replacement costs change accordingly. Pickup truck costs are split between operating costs and ownership costs. Operational costs for tillage, spraying, fertilizer, seeding, and pickup truck are summarized in Table 5.

RESULTS AND DISCUSSION

Winter wheat yields from the three winter wheat-fallow production systems averaged 40, 40, and 42 bu/acre over all years for the CT, RT, and NT systems, respectively (Fig. 1). Grain yields were not significantly different among tillage treatments during any of the individual crop years at the 0.05 probability level. Therefore, we used the 6-yr average grain yield (40.4 bu/acre) of all tillage systems in this farm budget analysis. Grain yields varied from year to year due to variation in total precipitation received during fallow and crop growing periods. Precipitation during the 6 yr included crop years of above and below normal precipitation (Table 3). Although total precipitation during some periods was near normal, the distribution during the crop growing season frequently created periods of crop water stress that resulted in reduced yields. Above average precipitation during a 2-yr fallow-crop period may or may not result in a higher-than-average yield. For example, compare 1988 (32 bu/acre) with 1992 (42 bu/acre) with only 0.7 in. more total precipitation in 1992 (Fig. 1). During 1992, RT and NT fallow systems tended to have higher yields than CT. During the low yield years 1988, 1989, and 1990, NT tended to have more consistent yields than the two other systems. Variable yield patterns such as these are typical of the Central Great Plains winter wheat producing area.

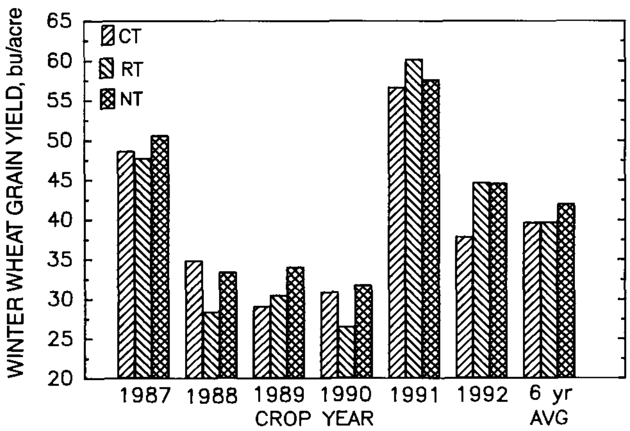

Fig. 1. Winter wheat grain yield as a function of tillage treatment for the years 1987 through 1992.

Table 6. Budget analysis data for three dryland winter wheat-fallow production systems (conventional-till [CT], reduced-till [RT], no-till [NT]) using estimated farmer costs for a medium sized farm in northeast Colorado.

	CT	RT	NT
		$/acre	
Gross returns			
Market returns ($3.35/bu on 40.4 bu/acre)	135.34	135.34	135.34
Deficiency payments ($0.65 on 32 bu/acre)	20.80	20.80	20.80
Total returns	156.14	156.14	156.14
Preharvest costs			
Sweep plow	9.05	3.62	--
Rodweed	2.72	1.36	--
Weed spray, fall	--	6.36	6.36
Weed spray, summer	--	--	12.78
Fertilizer N	15.00	15.00	15.00
Seeding	8.75	8.75	8.75
Pickup truck	2.46	2.46	2.46
Interest (on op. capital, 10% for 8 mo)	2.85	2.91	4.15
Total preharvest costs	40.83	40.46	49.50
Harvest costs			
Combine	15.00	15.00	15.00
Storage/hauling, $0.13/bu	5.25	5.25	5.25
Total harvest costs	20.25	20.25	20.25
Total production costs	61.08	60.71	69.75
Net return over production cost	95.06	95.43	86.39
Ownership costs			
Machine replacement, cropped acres	16.21	12.28	11.31
Machine taxes/insurance, cropped acres	2.04	1.58	1.33
Bin replacement, cropped acres	2.00	2.00	2.00
Real estate taxes, $2/acre, cropped + fallow acres	4.00	4.00	4.00
Total ownership cost	24.25	19.86	18.64
Total all costs	85.33	80.57	88.39
Return available for land, labor, capital, management, and risk	70.81	75.57	67.75

While yields from the three tillage systems were not significantly different, there were differences in cost and returns due to variations in cultural practices, such as use of herbicide vs. cultivation for weed control. The per-acre costs and returns from a projected 1200 acre farm in northeastern Colorado using CT, RT, or NT winter wheat-fallow farming practices are shown in Table 6. On a per-acre basis, preharvest costs were $40.83, $40.46, and $49.50 for CT, RT, and NT, respectively.

Total production costs on a whole-farm basis were $36,648, $36,426, and $41,850 for CT, RT, and NT, respectively (Table 7). The major differences in cost are the herbicides in the NT system vs. the tillage costs in the CT to control weeds during the fallow period. Herbicides were typically applied four times in the NT system vs. one time in the RT and none in the CT (Table 5). Harvest costs were the same for all tillage systems.

Ownership costs for the various systems on a 1200 acre farm were $14,550, $11,916, and $11,184 for CT, RT, and NT, respectively (Table 7). The CT system had a higher ownership cost in our analysis because of greater machinery use and inventory than RT and NT. Ownership costs will vary from farm to farm, depending on the machinery complement used in the farming operation.

Table 7. Summary of cost and returns on a 1200 acre dryland winter wheat farm in eastern Colorado using average yields (1987–1992), farmer-operator costs, and 1991 production prices and government program payments.

	CT	RT	NT
Total grain, bu (600 cropped acres)	24 240	24 240	24 240
Gross returns, $	93 684	93 684	93 684
Preharvest cost, $	24 498	24 276	29 700
Harvest cost, $	12 150	12 150	12 150
Total production cost, $	36 648	36 426	41 850
Net return over production cost, $	57 036	57 258	51 834
Ownership cost, $	14 550	11 916	11 184
Total of all costs, $	51 198	48 342	53 034
Return available for land, labor, capital, management, and risk, $	42 486	45 342	40 650
Estimated preharvest labor†, $6 h	3 240	1 812	1 254
Return to land, capital, management, risk, $	39 246	43 530	39 396

† Estimated preharvest labor hours: CT = 540 h; RT = 302 h; and NT = 209 h/1200 acres.

Budgets developed using the 6-yr average wheat yield for the three production systems gives a yearly gross return of $93,684 for CT, RT, and NT on a whole-farm basis. Gross yields, gross returns, preharvest, harvest, and ownership costs are shown in Table 7. The residual is the money available to pay for land, labor, capital, risk, and management. Returns above production costs for the CT, RT, and NT systems were $95.06, $95.43, and $86.39/acre, respectively (Table 6). The estimated return available for land, labor, capital, management, and risk were $42,486, $45,342, and $40,650 for CT, RT, and NT, respectively (Table 7). NT had the highest cost for fallow operations. This is due to the increased purchases of herbicides used in place of tillage operations that are used in CT and RT systems. The differences between CT and NT systems are decreased if one considers the labor requirements (Table 7). For example, return to land, capital, management, and risk was 111% of CT for the RT system and about the same as CT for the NT system.

No-till fallow uses less equipment and requires fewer trips at a faster speed over the fields, which reduces labor requirements. If farmers have other gainful employment for the time saved, they may gain by using no-till in spite of its slightly higher cash cost.

When custom rates (Sharp and Schaubert, 1990; Schaubert and Sharp, 1992) are used for tillage and spraying operations rather than farmer owned machinery, the RT system remained the most profitable with NT exceeding CT in profitability (Table 8). The RT showed about a $13/acre and $7/acre advantage over CT and NT, respectively, in returns available for land, labor, capital, management, and risk when using custom rates. The CT had the lowest profitability because the tillage costs were assessed at a higher rate than farmer-owned operations.

CONCLUSIONS

The RT system had the highest projected potential returns per farm compared with CT and NT when using farmer estimated costs in this study. When custom rates were used for all operations, the net returns were RT > NT > CT. If costs or application rates of herbicides could be reduced, NT would become even more economically attractive. No-till does afford the added benefit of leaving more crop residues on the soil surface, thereby reducing erosion potential. Assuming a situation of noncompliance for CT and compliance with NT, the per-acre return to land, labor, and capital would be $50 for CT and $67 for NT. Thus, risk management must be considered when making decisions on which tillage system to use. The results of this study suggest that RT and NT systems can be adopted by farmers without economic loss. The benefits of NT and RT systems for storing precipitation more efficiently and reducing soil erosion potential can be realized with the potential for economic gain. The added benefits of increased crop residue on the soil surface with RT and NT will add to soil organic matter and improve soil quality and fertility over the long term.

Table 8. Budget analysis data for three dryland winter wheat-fallow production systems (conventional-till [CT], reduced-till [RT], no-till [NT]) using custom rates for eastern Colorado.

	CT	RT	NT
	$/acre		
Gross returns			
Market returns ($3.35/bu on 40.4 bu/acre)	135.34	135.34	135.34
Deficiency payments ($0.65 on 32 bu/acre)	20.80	20.80	20.80
Total returns	156.14	156.14	156.14
Preharvest costs			
Sweep plow	30.00	12.00	--
Rodweed	6.50	3.25	--
Weed spray, fall	--	9.24	9.24
Weed spray, summer	--	--	21.42
Fertilizer N	15.00	15.00	15.00
Seeding	12.25	12.25	12.25
Pickup truck	2.46	2.46	2.46
Interest on operating capital	4.97	4.16	5.28
Total preharvest costs	71.18	58.36	65.65
Harvest costs			
Combine	15.00	15.00	15.00
Storage/hauling, $0.13/bu	5.25	5.25	5.25
Total harvest costs	20.25	20.25	20.25
Total production costs	91.42	78.61	85.90
Net return over production cost	64.72	74.53	70.24
Ownership costs			
Machine replacement, cropped acres	3.00	3.00	3.00
Machine taxes/insurance, cropped acres	0.60	0.60	0.60
Bin replacement, cropped acres	2.00	2.00	2.00
Real estate taxes, $2/acre, cropped + fallow acres	4.00	4.00	4.00
Total ownership cost	9.60	9.60	9.60
Total all costs	101.02	88.21	95.50
Return available for land, labor, capital, management, and risk	55.12	67.93	60.64

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