United States
Department of
Agriculture

Natural
Resources
Conservation
Service

TECHNICAL NOTE

AGRONOMY TECHNICAL NOTE NO. 11 March 9, 1995

CASE STUDIES OF CROPPING SYSTEMS

David Buland, Economist

This Technical Note transmits the results of two groups of case studies in South Dakota.

The first study compares 127 CARE crop budgets based on case studies from 46 farms in the Randall/Lower James area. These studies were completed by the Randall/Lower James Crop Residue Alliance. They compared the economic strengths and weaknesses of no-till, reduced-till, and conventional tillage for corn, soybeans, and wheat. This is the second year summary of a three-year study.

The second study summarizes information from 8 no-till farms and 40 fields throughout central South Dakota. This is a brief summary the first year of a three-year study.

The third attachment is an example of a detailed case study used in Sections III and V of the South Dakota Technical Guide. Most of the field budgets in both areas were similarly developed into local information sheets with the farmer's permission.

Both studies show how the CARE crop budget program can be used locally for cost comparisons. The UNIX CARE program is available in CAMPS and FOCS in each local Natural Resources Conservation Service (NRCS) field offices. The newest DOS version of CARE is available from the NRCS State Office in Huron.

Dave Schmidt for

CONNIE M. VICUNA
Acting State Resource Conservationist

Enclosures

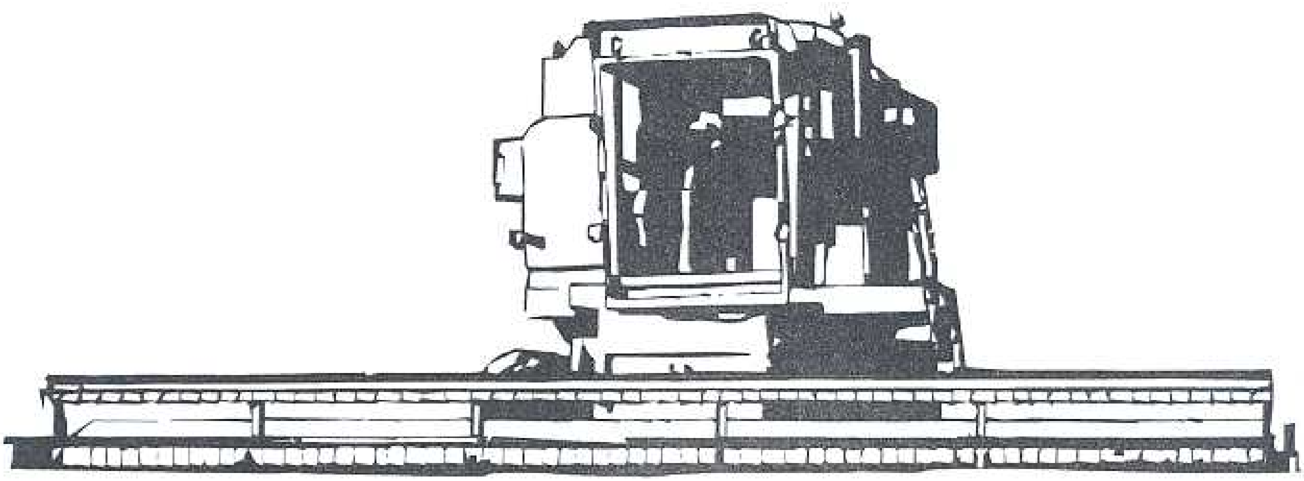
File under Agronomy

CASE STUDIES OF FARMING SYSTEMS

Conventional, No-Till, Ridge-Till,

&

Reduced-Till Systems



1994 CROP YEAR

RANDALL/LOWER JAMES CROP RESIDUE ALLIANCE
AREA OF SOUTH DAKOTA

Case Study Data From 46 Farms, on 127 Fields

Prepared By:

LOWER JAMES ALLIANCE FOR CROP RESIDUE MANAGEMENT

November 1994

This project was completed with the assistance of AmeriCorps members. AmeriCorps/Team USDA

Overview

Profitability is the dominant factor in any business. When a farm business determines which farming system is used, (no-till, ridge-till, conventional, etc.), other factors also come into play. These factors include: labor or time requirements; soil and water conservation; energy conservation; equipment needs, etc. With all these variables it would be hard to imagine justifying a farming system change based on one factor if the change did not result in **equal or increased profitability**.

The ideal farming system for a farm business would be one that has both profitability and environmental advantages over the other farming systems. Recent decades of farming have seen trends of smaller profit margins and increased demands on the producer to prevent degradation of their resources.

Ideal farming systems constantly change over the years as producers try new ways and prove on the land which system best fits each individual farm's needs.

The Randall/Lower James Alliance For Crop Residue Management is a cooperative effort by agribusiness, farmers, and agencies to provide information/education and technical assistance to onfarm users of conservation tillage (ridge till, no-till, and reduced till).

Economic data on crop residue management was one of the top needs identified by the Crop Residue Alliance in November 1992. Specifically, data was needed from farmers in the immediate 16-county alliance area. Data of actual onfarm use of all types of farming systems was needed (conservation tillage and conventional).

From November 1992 through March 1993, 12 farms including all farming systems provided data on the 1992 crop year on 27 fields. From this information, crop budgets were developed using a computer program called the "Cost and Returns Estimator" (CARE) crop budget generator. The final crop budgets were then provided to the farmers who had provided the cropping data. The budgets were also combined and distributed in a report.

From September 1993 through March 1994, 46 farms participated with the Crop Residue Alliance and provided data on 127 fields.

The information from these 1993 crop year budgets are presented in this report. Comparisons between 1992-93 data are also included.

The analysis of this case study data, by crop planted and type of tillage system, provides onfarm data for discussion. Additional information on tillage systems is available from a wide range of other sources. Directing farmers to other farmers who are currently using a particular system is an excellent way to share additional information.

The adoption of conservation tillage systems by farmers continues at a rapid pace (35 percent of South Dakota crop acres in 1993). Critical to its continued adoption is its bottom line economic benefits as conservation tillage has shown.

A review of research led by the Conservation Tillage Information Center (CTIC) provided the following information on a comparison of no-till versus conventional farming systems:

- No-till reduces herbicide run off 70 percent over conventional.
- No-till reduces soil erosion losses 60-95 percent compared to conventional systems.
- No-till reduced water runoff 69 percent versus conventional. This additional water is stored in the soil for crop production.

The information in this report is available for your review thanks to the area farmers who shared this information with the residue alliance. A "huge" thanks to them and best wishes to their business and family in the coming years.

METHODS USED TO GATHER DATA

Case study farms were located in 10 of 16 counties in the Crop Residue Alliance Area:

- Bon Homme
- Charles Mix
- Douglas
- Davison
- Gregory
- Hand
- Hanson
- Jerauld
- Miner
- Sanborn

The 127 fields on which producers shared information had the following crops and tillage systems:

CROP	Conventional	Reduced Till	Ridge Till	No-Till
Corn	4	11	3	15
Soybeans	3	6	3	9
Wheat	3	3	0	4

COMMENTS ON METHODS

Forty-six area farmers met with part-time staff of the Randall/Lower James Alliance and provided information on all operations for the year and how their crops were produced. The data collected included: equipment used, operation dates, chemical, fertilizer, and seeding (rates and types), yield, land costs, etc.

This data was then entered into the CARE budget program to develop an individual budget for each field. The CARE program includes updated databases to add to the basic data costs such as: maintenance and repair, (power unit and implement), fuel usage, labor needs per operation, interest on operating capital, land costs, etc.

Through onfarm visits, farmers and Alliance staff (Greg Roskens, Rich Ferguson, and Marc Goldhammer), needed only about one-half hour to complete the data input form needed for crop budgets on a farm.

CATEGORIZING FARMING SYSTEMS

It is very difficult to categorize many systems as to whether they are no-till, reduced till, or conventional till. For example, if preplant herbicides were tilled-in, (incorporated) and no other tillage done, the field was called reduced till. A couple of no-till fields were cultivated once, though this is not an every year practice.

Also, two cultivations versus one may be the only difference between a conventional system and a reduced system.

From the combination of the 127 fields, the charts and graphs on the following pages were developed to display the data. Also included are some comments on the data, which are for discussion purposes only, as you can best put the information in the proper perspective. A comparison to the 1992 crop year case studies is also included.

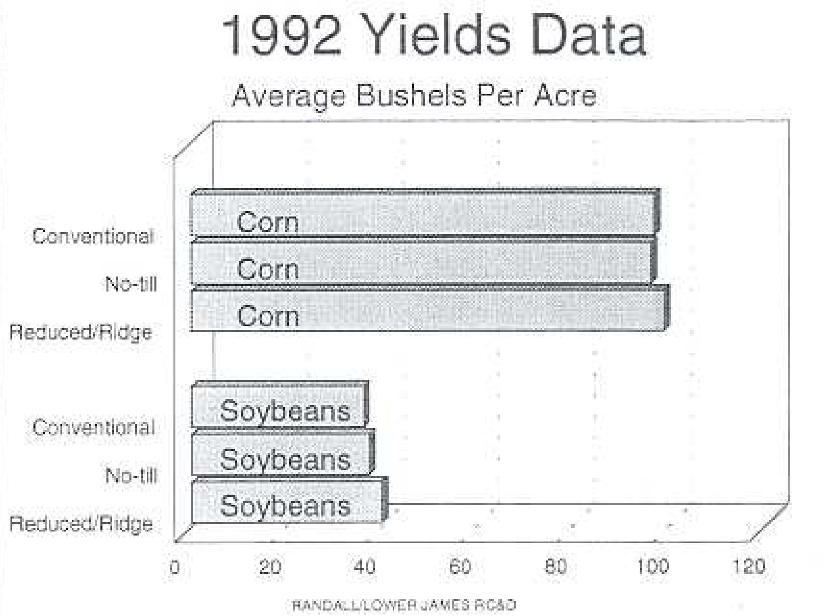
Comments On Yield Data

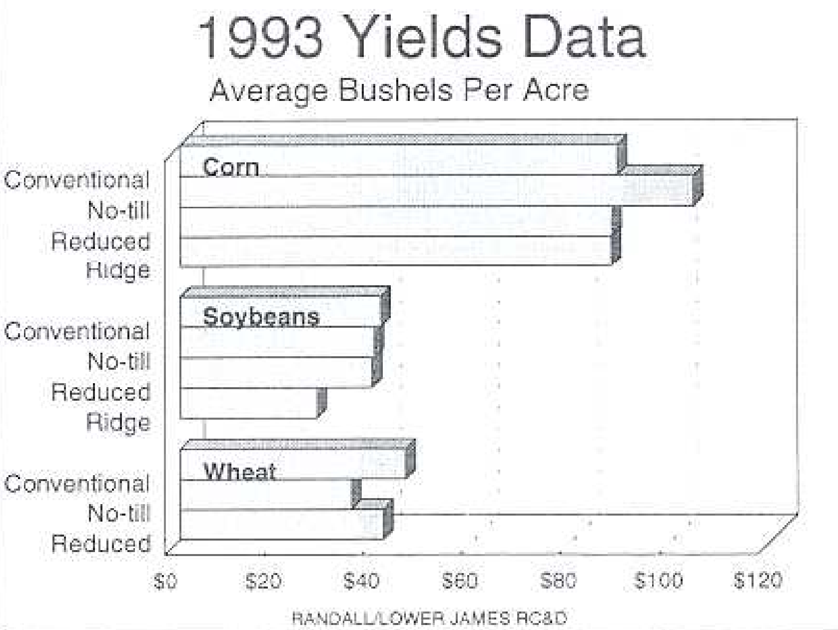
The 1992-93 yields were both above average for the 16-county residue alliance area. The 1992 yields were very similar for all systems and for both corn (95-100 bushels/acre), and soybeans, (35-40 bushels/acre). The 1993 yields showed more variability which may have been a result of the extremely wet weather. Yields for 1993 showed no-till corn with a 10 to15 bushels/acre advantage versus other systems, with most of the high yields from the southwest part of the alliance area.

Conventional soybeans edged out no-till and reduced-till yields by one to three bushels/acre. Ridge-till soybean yields were lower; however, those yields were from a county where pothole flooding was a problem, i.e., 5 acres of zero yield in a 50-acre field. Ridge-till yields, as in the 1992 data, are normally of equal competitiveness and due to the flooding the 1993 data was probably not typical.

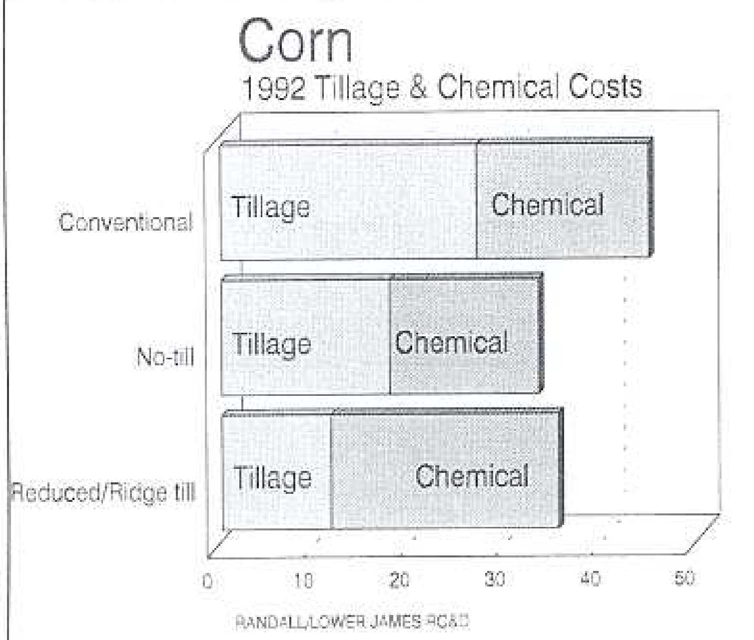
Conventional wheat on the case study farms showed a four to eight bushels/acre yield advantage. All data for wheat came from only 10 fields.

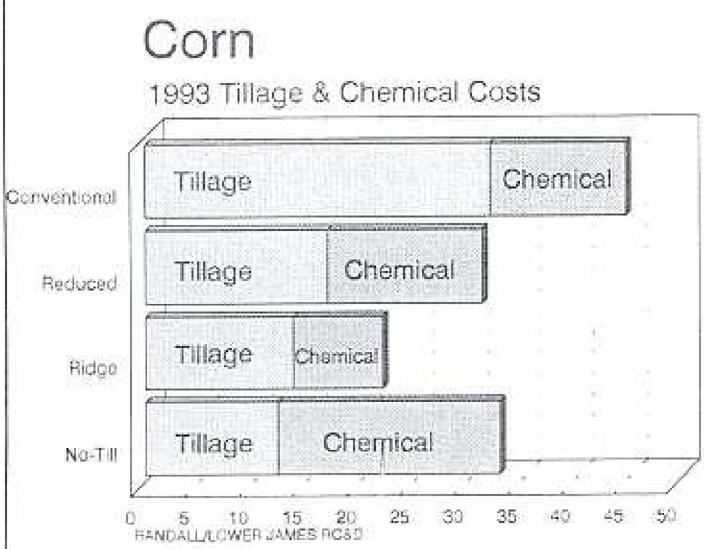
How yields compare through years of dry and wet cycles for the different farming systems is important to area farm businesses.





Corn Production Expenses





Comments On Corn Production Expenses

For 1992-93, production expenses for corn were the least for ridge-till and reduced-till systems, followed by no-till, with conventional systems having the highest costs.

The key to economic success in farming is net return (profit minus production expenses). The previous data reflects only machinery/ tillage and chemical expenses (fuel, labor, chemical application costs, herbicide costs, machinery costs - repair, maintenance, etc.) Other costs are not included, as they are only slightly dependent on the farming system used. These costs include: land costs, seed costs, fertilizer costs, harvest costs, etc.

As expected for both years, conventional systems had the highest tillage costs and the lowest herbicide (chemical) cost, and no-till systems had the highest chemical costs and the lowest tillage costs. It should not be assumed that no-till replaces mechanical weed control with chemical weed control, as other management techniques, such as crop rotation, canopying, and field sanitation, are of equal importance for weed control.

PROFITABILITY: 1993 CORN

The two tables below represent profitability, based on the production expenses and yields from the 1993 case study data. All production expenses are not included, such as land charges, interest on operating capital, etc. **The tables differ only in what yield was used to determine income.**

1993 Corn: Actual Yield

	Conventional Tillage	Reduced Tillage	Ridge Tillage	No-Till
Planting/ Tillage	$32.12	$16.97	$13.77	$12.30
Harvest (Avg.)	22.31	22.31	22.31	22.31
Fertilizer (Avg.)	17.29	17.29	17.29	17.29
Chemical	12.76	14.43	8.37	20.72
Expense	$84.46	$71.00	$61.74	$72.62
Avg. Yield	94bu	87.80bu	87.66bu	104.35bu
Base Price	2.40	2.40	2.40	2.40
Income	$225.60	$210.72	$210.38	$250.44
Bottom Line	$141.14	$139.72	$148.64	$177.82

1993 CORN: ACTUAL YIELD

Actual yield is the average 1993 case study yield for each individual farming system. For example, the no-till yield shown is the average of all the yields from the no-till corn fields in the case stydies. Thus, each farming system (conventional, ridge-till, etc.), has a different yield. The 1993 case studies based on these actual yields showed the no-till corn to be the most profitable.

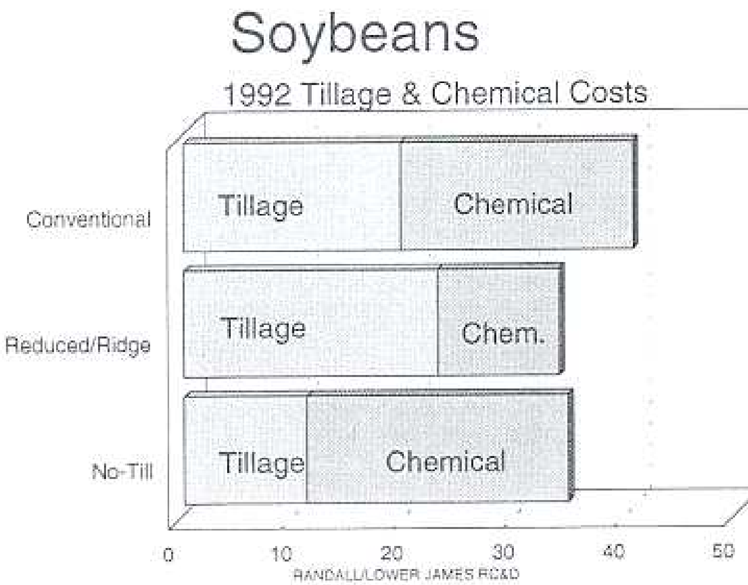
1993 Corn: Average Yield

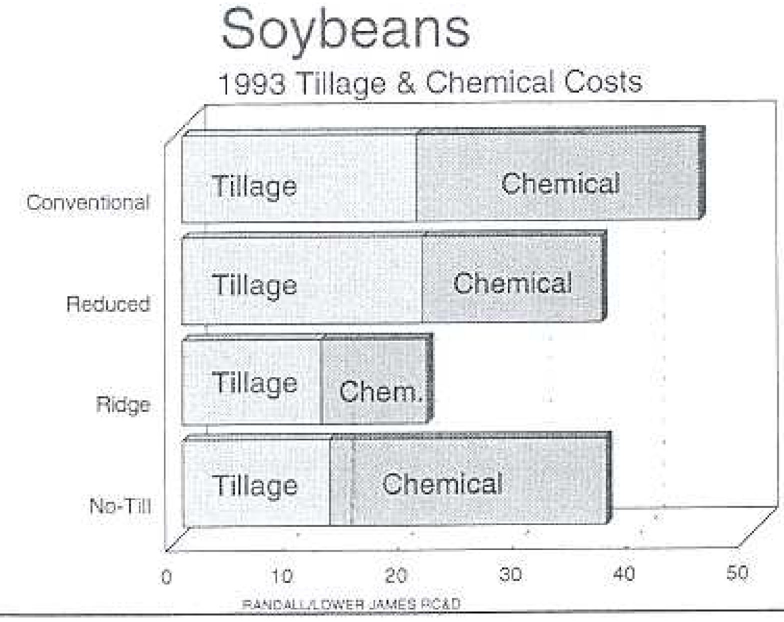
	Conventional Tillage	Reduced Tillage	Ridge Till	No-Till
Planting/ Tillage	$32.12	$16.97	$13.77	$12.30
Harvest (Avg.)	22.31	22.31	22.31	22.31
Fertilizer (Avg.)	17.29	17.29	17.29	17.29
Chemical	12.76	14.43	8.37	20.72
Expense	$84.46	$71.00	$61.74	$72.62
Avg.Yield	93.45	93.45bu	93.45bu	93.45bu
BasePrice	$2.40	$2.40	$2.40	$2.40
Income	$224.28	$224.28	$224.28	$224.28
Bottom Line	$139.82	$153.28	$162.54	$151.66

1993 CORN: AVERAGE YIELD

The yield used in this table is the same for all farming systems. It is the average yield using all corn fields in the case studies, (no-till, ridge-till, conventional, and reduced-till). This table is assuming all farming systems have equal yield potentials. In 1993, the average case study corn yield (93.45 bushels/acre) showed the ridge-till corn to be the most profitable. This yield corresponds to the lowest production expenses in 1993.

Soybean Production Expenses





Data On Soybean Production Expenses

Reduced-till and conventional systems in 1993 had similar costs and the highest machinery costs. The costs for ridge-till and no-till were about half as much. Unlike corn production, where chemical costs were low with conventional systems, the conventional systems had the highest chemical costs, $24.87/acre, ($.70 more per acre than no-till). Ridge-till had chemical costs less than $10/acre and reduced systems averaged about $15/acre chemical costs.

Profitability: 1993 Soybeans

The two tables below represent profitability, based on the production expenses and yields from the 1993 case study data. All production expenses are not included, such as land charges, interest on operating capital, etc. **The tables differ only in what yield was used to determine income.**

1993 Soybean: Actual Yield

Actual yield is the average 1993 case study yield for each individual farming system. For example, the no-till yield shown is the average of all the yields from the no-till soybeans fields in the case stydies. Thus each farming system (conventional, ridge-till, etc.), has a different yield. The 1993, case studies based on these actual yields showed the no-till soybeans to be the most profitable.

1993 Soybean: Actual Yield

	Conventional Tillage	Reduced Tillage	Ridge Till	No-Till
Planting/ Tillage	$20.36	$20.88	$11.99	$12.72
Harvest (Avg.)	21.36	21.36	21.36	21.36
Fertilizer (Avg.)	2.14	2.14	2.14	2.14
Chemical	24.87	15.68	9.22	24.17
Expense	68.73	60.06	44.71	60.39
Avg. Yield	41bu	39.20bu	28bu	39.71bu
Base Price	6.25	6.25	6.25	6.25
Income	256.25	245.00	175.00	248.18
Bottom Line	$187.52	184.94	130.29	$187.79

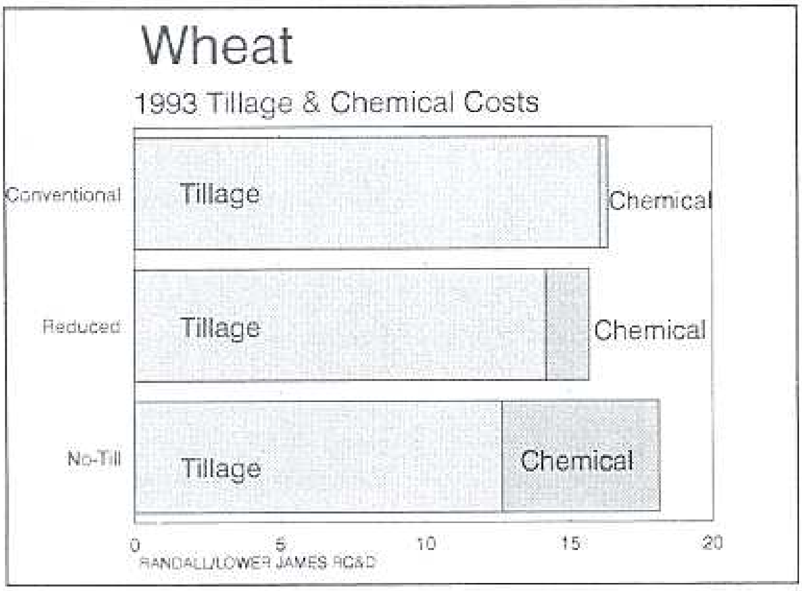
1993 Soybean: Average Yield

The yield used in this table is the same for all farming systems. It is the average yield using all soybean fields in the case studies, (no-till, ridge-till, conventional, and reduced-till). This table is assuming all farming systems have equal yield potentials. In 1993 the average case study of soybean yields (36.97 bushels/acre) showed the ridge-till soybean to be the most profitable. This yield corresponds to the lowest production expenses in 1993.

1993 Soybean: Average Yield

	Conventional Tillage	Reduced Tillage	Ridge Till	No-Till
Planting/ Tillage	$20.36	$20.88	$11.99	$12.72
Harvest (Avg.)	21.36	21.36	21.36	21.36
Fertilizer (Avg.)	2.14	2.14	2.14	2.14
Chemical	24.87	15.68	9.22	24.17
Expense	68.73	60.06	44.71	60.39
Avg. Yield	36.97bu	36.97bu	36.97bu	36.97bu
Base Price	6.25	6.25	6.25	6.25
Income	231.06	231.06	231.06	231.06
Bottom Line	162.33	171.00	186.35	170.67

Wheat Production Expenses



Comments on Wheat Production Expenses

Average tillage costs for all three systems for wheat production ranged from $12.66 to $16.06/acre. No-till had the lowest average tillage costs and conventional systems had the highest average tillage costs.

Average chemical costs ranged from $.86 for conventional systems and $5.46 for no-till systems.

PROFITABILITY: 1993 WHEAT

The two tables below represent profitability, based on the production expenses and yields from the 1993 case study data. All production expenses are not included, such as land charges, interest on operating capital, etc. **The tables differ only in what yield was used to determine income.**

1993 Wheat: Actual Yield

	Conventional Tillage	Reduced Tillage	No-Till
Planting/ Tillage	$16.06	$14.17	$12.66
Harvest (Avg.)	13.46	13.46	13.46
Fertilizer (Avg.)	19.19	19.19	19.19
Chemical	0.86	1.52	5.46
Expense	$49.57	$48.34	$50.77
Avg.Yield	46bu	41.50bu	35bu
BasePrice	$3.00	$3.00	$3.00
Income	$138.00	$124.50	$105.00
Bottom Line	$88.43	$76.16	$54.23

1993 WHEAT: ACTUAL YIELD

Actual yield is the average 1993 case study yield for each individual farming system. For example, the no-till yield shown is the average of all the yields from the no-till wheat fields in the case studies. Thus, each farming system (conventional, ridge-till, etc.), has a different yield. The 1993 case studies based on these actual yields showed the conventional wheat to be the most profitable.

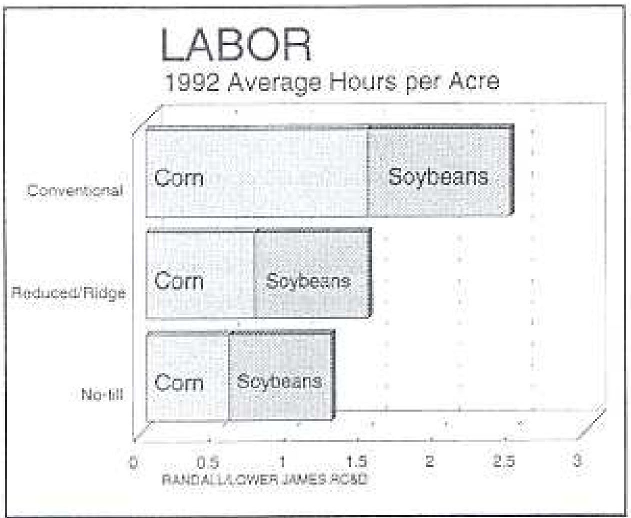
1993 Wheat: Average Yield

	Conventional Tillage	Reduced Tillage	No-Till
Planting/ Tillage	$16.06	$14.17	$12.66
Harvest (Avg.)	13.46	13.46	13.46
Fertilizer (Avg.)	19.19	19.19	19.19
Chemical	0.86	1.52	5.46
Expense	$49.57	$48.34	$50.77
Avg.Yield	40.16bu	40.16bu	40.16bu
BasePrice	$3.00	$3.00	$3.00
Income	$120.48	$120.48	$120.48
Bottom Line	$70.91	$72.14	$69.71

1993 WHEAT: AVERAGE YIELD

The yield used in this table is the same for all farming systems. It is the average yield using all wheat fields in the case studies, (no-till, ridge-till, conventional, and reduced-till). This table is assuming all farming systems have equal yield potentials. In 1993, average case study wheat yield, (40.16 bushels/acre) showed the reduced-till wheat to be the most profitable. This yield corresponds to the lowest production expenses in 1993.

Labor Requirements: All Operations During a Crop Year

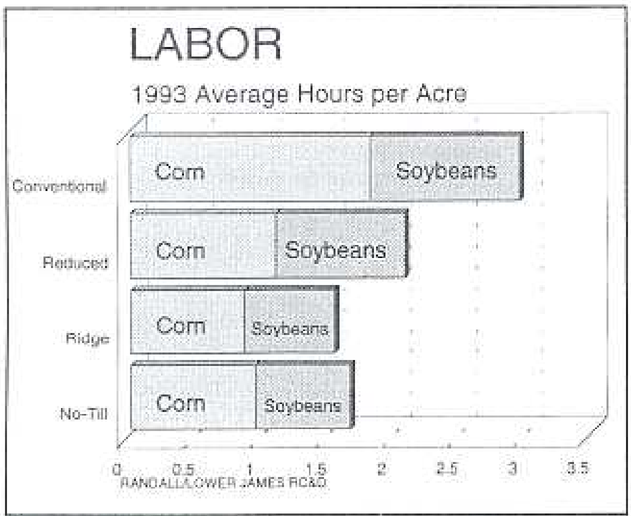


1992 Labor: Corn & Soybean Rotation

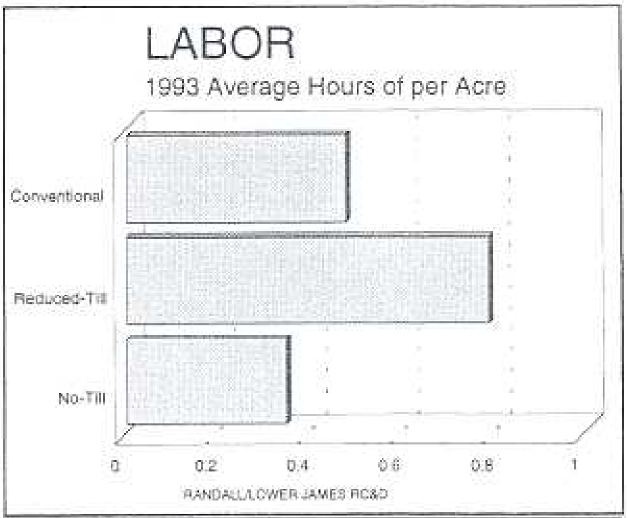
Comments on Labor Requirements

In 1992, no-till case studies were the least labor intensive, and in the 1993 case studies, ridge-till systems were the least labor intensive. In the 1992 studies, the ridge-till systems were combined with the reduced systems, so ridge-till may also have been the least labor intensive in the 1992 studies. Conventional systems were the most labor intensive in both years' studies.

The graphs on this page show the average labor hours per acre for: corn/ soybean 1992, corn/ soybean 1993, and wheat 1993.

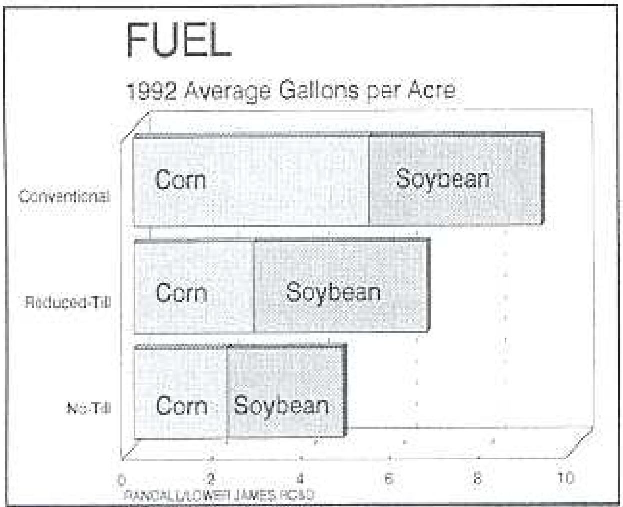


1993 Labor: Corn & Soybean Rotation



1993 Labor: Wheat

Fuel Usage

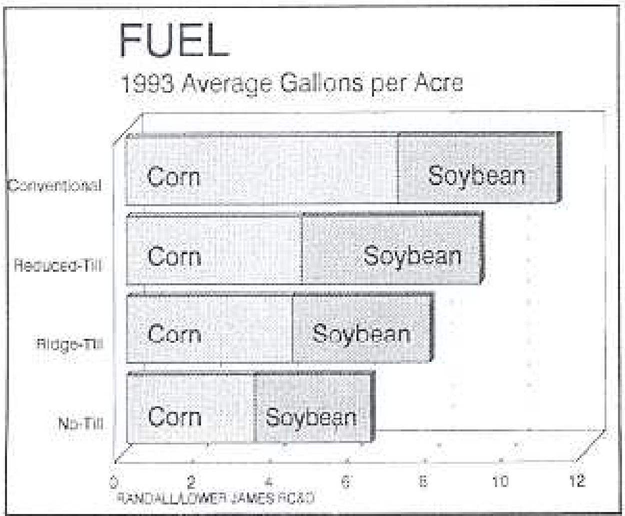


1992 Fuel: Corn/Soybean Rotation

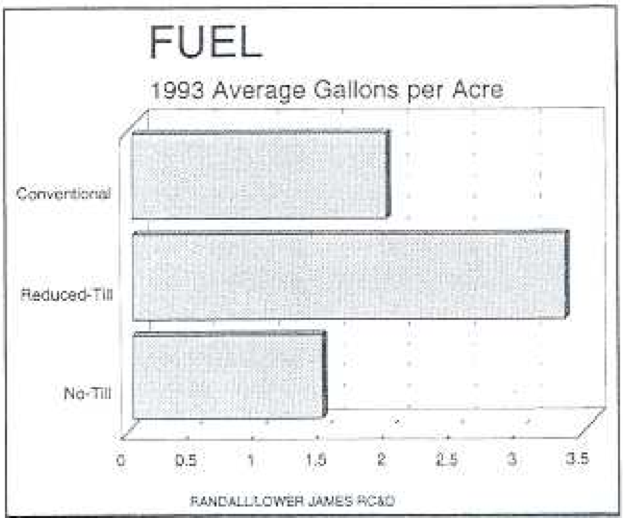
Comments on Fuel Usage

Fuel usage was highest in both years with a conventional tillage system and lowest with a no-till system.

The graphs on this page show the average gallons per acre for corn/ soybean 1992, corn/ soybean 1993, and wheat 1993.

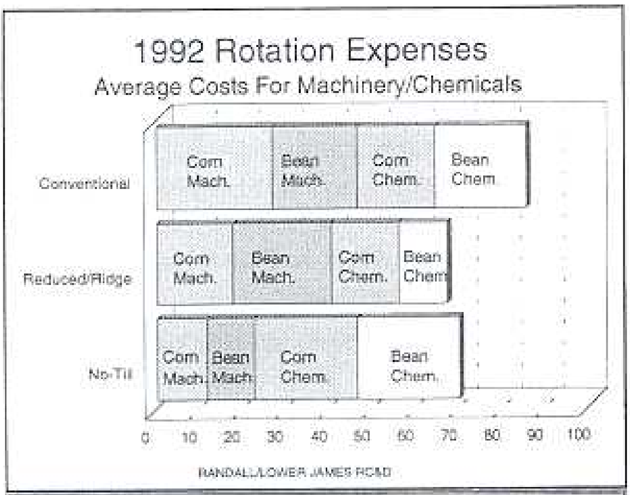


1993 Fuel: Corn/Soybean Rotation

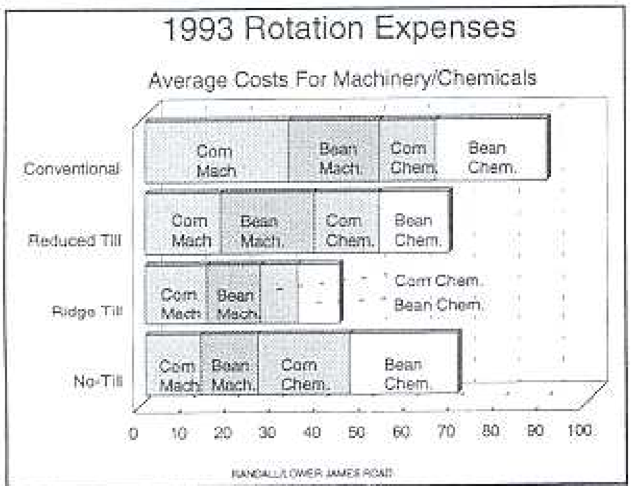


1993 Fuel: Wheat

Rotation Expenses



1992 Rotation Expenses: Corn & Soybean



1993 Rotation Expenses: Corn & Soybean

Comments on Corn/Soybean Rotation Expenses

The graphs on this page show production expenses, (machinery and chemical), for corn/soybean rotation. These costs are a combination of the same year's average budget costs for the rotation crops. For example, the 1993 corn/soybean rotation costs are both 1993 costs.

CENTRAL
SOUTH DAKOTA

NO-TILL CASE STUDIES

1993 CROP YEAR

INTRODUCTION

Farming can be defined in many different ways -- a science, an art, a way of life. At its foundation, however, farming is an enterprise: a person, family, or group engaged in producing food; trading management and labor for a living, a profit.

Profitability is the key element in any business. When a producer experiments with alternative farming systems (minimum till or no-till), other factors also come into play. These other important factors to a farm business include soil and water conservation, fuel conservation, labor or time requirements, equipment modifications or needs, crop marketability, etc. Yet it would be hard to imagine justifying a farming system change based on one of the above factors if the change did not result in equal or increased profitability.

Economic data on alternative farming systems was the top issue identified by the agriculture alliance planning team. The planning team is composed of farm producers, agricultural businesses, Cooperative Extension Service, conservation district employees and supervisors, and Natural Resources Conservation Service personnel from the project area. The project area is a 17-county area in central South Dakota.

The Agriculture Alliance Project is creating a coalition between conservation districts, farmers/ranchers, agricultural businesses, and agencies to provide information, education, and technical assistance to the farmers/ranchers on improved management of cropland and grassland resources.

METHODS

From July 1993 through February 1994, eight no-till farms provided economic information on 40 fields throughout central South Dakota. From this information, crop budgets were developed using the Cost and Return Estimator (CARE) computer program. The CARE program is composed of several databases that compute costs on various inputs such as: depreciation/maintenance/repairs to machinery, labor needs per operation, fuel usage, interest on operating capital, land costs, seed/pesticide/fertilizer costs, etc. Final crop budgets were evaluated on the entire crop system on each farm as far as machinery costs, chemical and fertilizer costs, etc and finally net return.

Crop system information was also gathered from the no-till farms due to the traditional practice of a wheat - summer fallow rotation in central South Dakota. Crop system data will provide information on disease, weed, insect control; plant species diversity (cool season grass, warm season grass, cool season broadleaf, and warm season broadleaf); improved soil quality (increased organic matter and infiltration); and needed equipment modifications. Additional information on crop systems is available from a wide range of sources, with farmers and/or research farms currently using a particular crop system being an excellent source of information.

The farms from which the information was gathered are located in the following counties:

Corson - 1	Edmunds - 1
Lyman - 2	Potter - 1
Tripp - 2	Walworth - 1

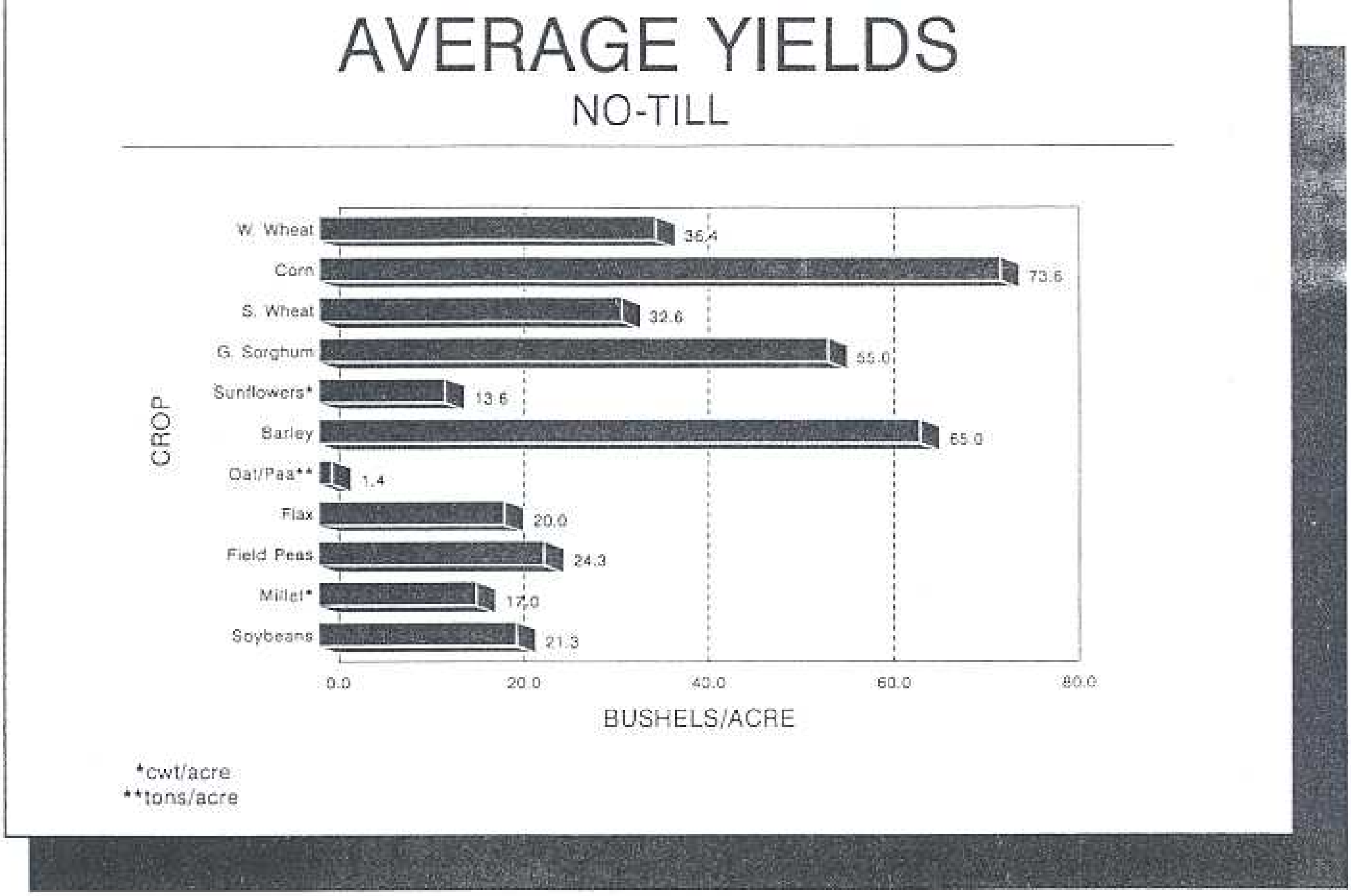
The following information is only for discussion and comparison to your current operation. A tillage system change should not be made solely based on the following information.

The following are input and output prices from the 1993 CARE databases:

- All fertilizer was based on $0.22 per pound.
- Gasoline and diesel were both $0.85 per gallon.
- Labor or wages were $6.50 for machinery operators.
- Crop drying was performed on corn and grain sorghum at a cost of $0.08 per bushel.
- Interest rates were 9 percent for land and 9.25 percent for machinery and operating loans.
- Land charges ranged from $15.00/acre - $29.34/acre depending on the farm location. A weighted average of $25.66/acre for all budgets was used except one where $16.00/acre was used (this budget will be identified).

Crop	Price	Unit
All Wheat	$3.22	bushel
Wheat Gov. Payment	$0.78	ASCS base yield
Grain Sorghum	$1.86	bushel
G. Sorghum Gov. Payment	$0.50	ASCS base yield
Corn	$2.12	bushel
Corn Gov. Payment	$0.63	ASCS base yield
Sunflower	$9.51	hundred weight
Malting Barley	$1.70	bushel
Millet	$5.00	hundred weight
Flax	$4.50	bushel
Soybean	$5.75	bushel
Field Pea	$4.00	bushel
Oat/Field Pea for forage	$72.00	ton @ 12% Moisture *

* Based on Relative Feed Value = 120



4-1

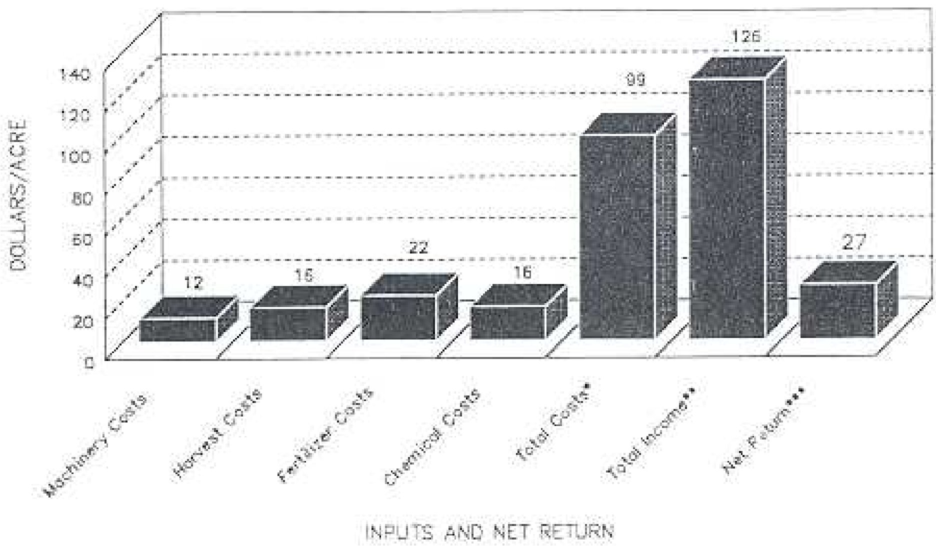
Graph 4-1 shows average crop yields from the eight no-till farms. Each producer was asked for a 10-year average yield on each crop in their rotation.

On the following graphs, all inputs and net return are averages of the **entire** cropping system.

Corson County

NO–TILL

W.Wheat/Corn/Flax or Soybean/S.Wheat Rotation
Expenses and Return



* Total average cost for system. Includes interest costs, ownership costs, operating costs, seed, fuel, drying, and labor costs. Land cost = $16.00/acre.

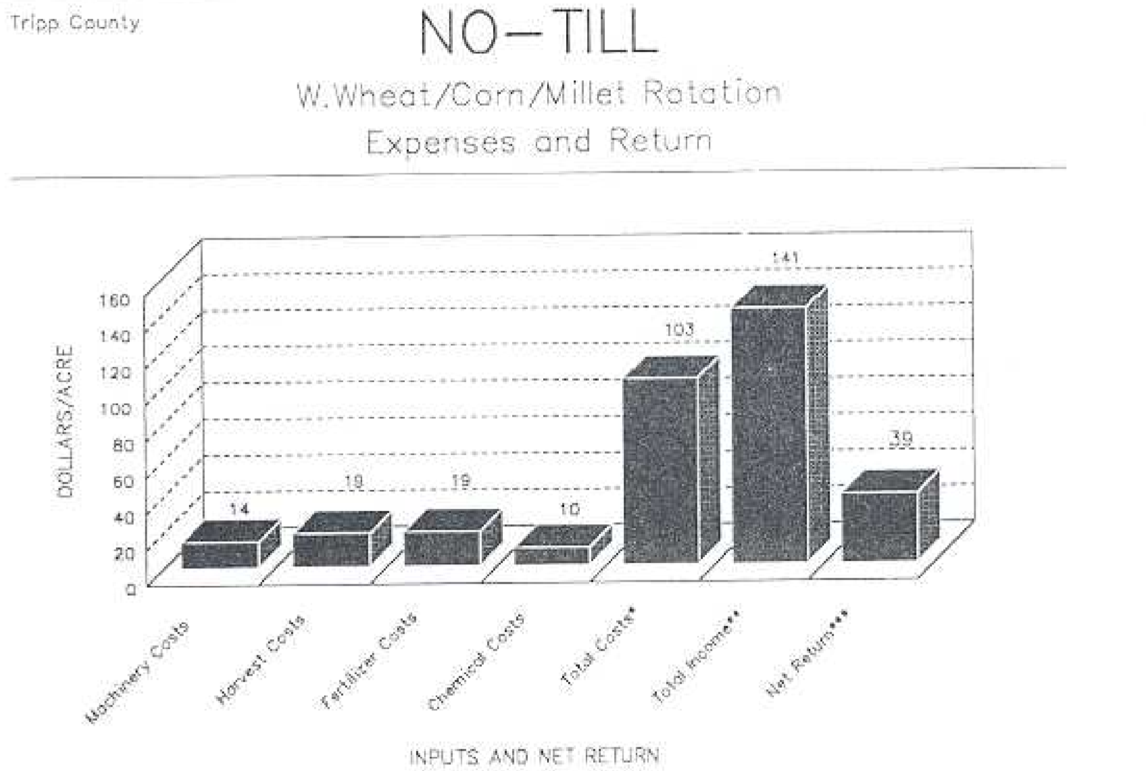
** Total average income for the system. Includes crop receipts and deficiency payments.

*** Grain storage costs and crop insurance are not deducted.

5-1

Graph 5-1 illustrates a winter wheat/corn/flax or soybean/spring wheat rotation that is practiced in Corson County. The wheat crops from this system made the most money at $38-39 per acre. The corn crop made $29.12 per acre. The flax and soybeans are both a break even crop. However, they are considered better than summer fallow due to their position in the rotation by providing disease, weed, and insect control. The flax stubble will provide a better snow catch than soybean stubble for next year's spring wheat crop.

Corson County's average annual precipitation is 16.25 inches. Of the 16.25 inches, 80 percent, or 13 inches, usually falls in April through September. The operator produces crops on mainly the Reeder soil series. The Reeder soil is moderately deep, well drained, and has a loam surface. This soil series also contains other soils ranging from eroded knobs to hardpan spots depending on the landscape position.



* Total average cost for system. Includes interest costs, ownership costs, operating costs, seed, fuel, drying, and labor costs.

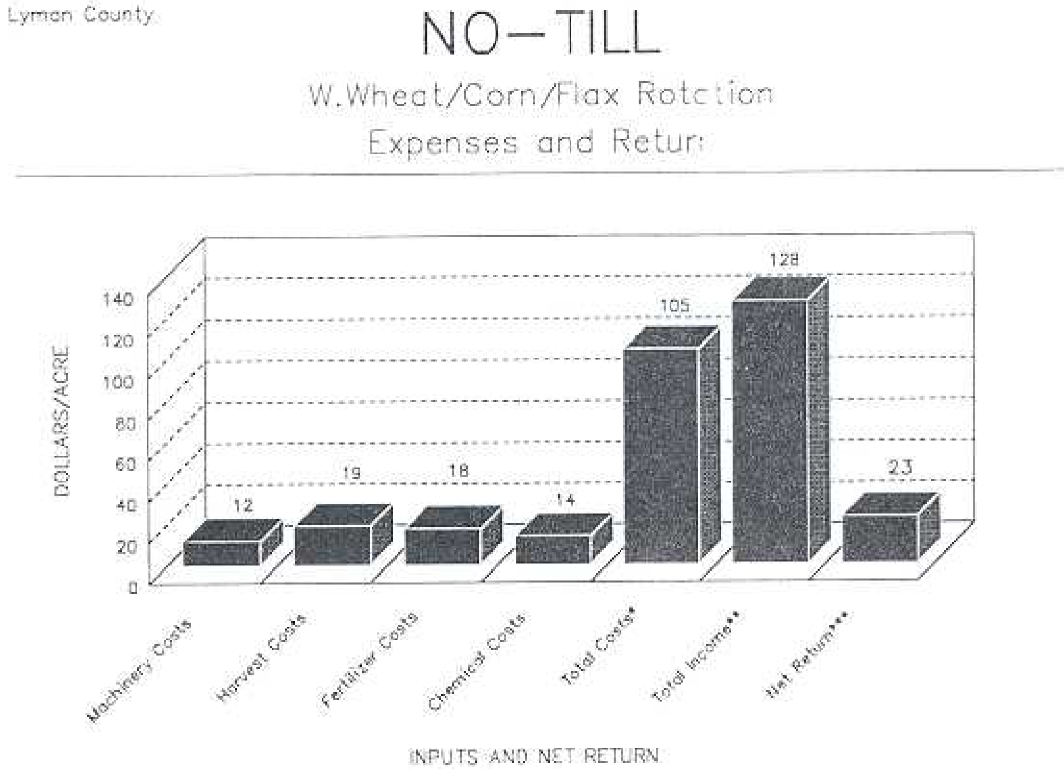
** Total average income for the system. Includes crop receipts and deficiency payments.

*** Grain storage costs and crop insurance are not deducted.

6-1

Graph 6-1 illustrates a winter wheat/corn/millet rotation that is practiced in Tripp County. Both the wheat and the corn crops from this system made the most money at $55-56 per acre. In some years, the millet crop can be an excellent money maker; in other years, it can be a money loser. In this budget the millet crop produced a net profit of $4.84 per acre. This is due to the market's volatility and also weed control performed on the previous year's corn crop and the current year's millet crop. The millet stubble will provide snow catch and protection for the growing winter wheat crop.

Tripp County's average annual precipitation is 20.38 inches. Of the 20.38 inches, 77 percent, or 15.7 inches, usually falls in April through September. The operator produces crops on mainly the Reliance and Opal soil series. The Reliance soil is deep, well drained, and has a silty clay loam surface and subsoil. The Opal soil is moderately deep, well drained, and has a clay surface and subsoil.



* Total average cost for system. Includes interest costs, ownership costs, operating costs, seed, fuel, drying, and labor costs.

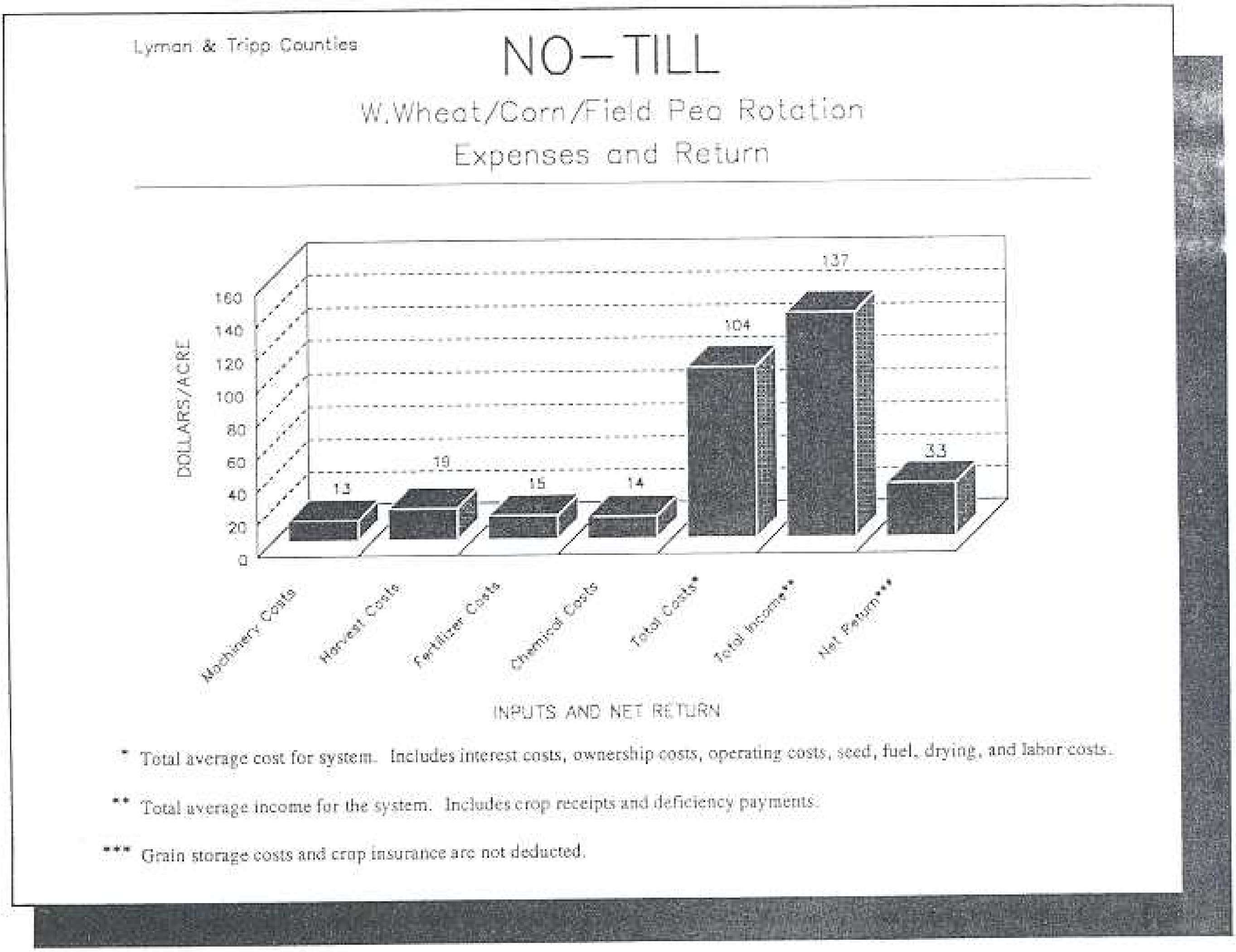
** Total average income for the system. Includes crop receipts and deficiency payments.

*** Grain storage costs and crop insurance are not deducted.

7-1

Graph 7-1 illustrates a winter wheat/corn/flax rotation that is practiced in Lyman County. The wheat crop from this system netted the most money at $43.12 per acre. The corn crop made $29.09 per acre. The flax crop, in most years, is a break even crop; however, in this budget it produced a net loss of $2.89 per acre. The flax stubble will provide snow catch and protection for the growing winter wheat.

Lyman County's average annual precipitation is 16.93 inches. Of the 16.93 inches, 84 percent, or 14.22 inches, usually falls in April through September. The operator produces these crops on mainly the Millboro soil series. The Millboro soil is deep, well drained, and has a silty clay loam surface and a silty clay subsoil.



8-1

Graph 8-1 illustrates a winter wheat/corn/field pea rotation that is practiced in Lyman and Tripp Counties. The wheat crop from this system netted the most money at an average of $49.09 per acre. The corn crop made $42.47 per acre. The field pea crop produced a net profit of $7.47 per acre. The field pea stubble provides little or no snow catch. When comparing graph 8-1 with graph 7-1, note that $3 per acre is being saved on fertilizer costs with field pea being included in the system. Field pea is a legume crop. See attachment A for more information about field peas.

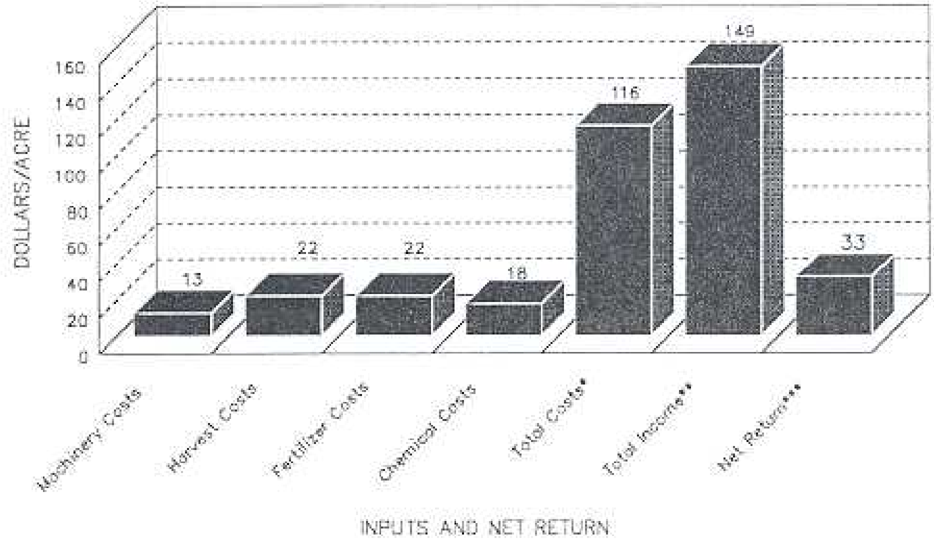
See previous precipitation information for Lyman and Tripp Counties. The operator in Lyman County produces these crops on mainly the Millboro soil series. The Tripp County operator produces the crops on mainly the Reliance and Opal soil series.

Tripp County

NO–TILL

W.Wheat/Corn/Milo/Oat–F.Pe[illegible] Rotation

Expenses and Return



* Total average cost for system. Includes interest costs, ownership costs, operating costs, seed, fuel, drying, and labor costs.

** Total average income for the system. Includes crop receipts and deficiency payments.

*** Grain storage costs and crop insurance are not deducted.

9-1

Graph 9-1 illustrates a winter wheat/corn/grain sorghum/oat-field pea rotation that is practiced in Tripp County. The wheat crop from this system netted the most money at $44.25 per acre. The corn crop made $37.04 per acre. The grain sorghum made $39.56 per acre. The oat-field pea crop is harvested approximately the end of June at 60-65 percent moisture as silage. The oat-field pea forage crop produced a net profit of $9.64 per acre. This was based on a Relative Feed Value (RFV) of 120. Operator substitutes a oat and a field pea crop in place of the oat-field pea combination crop on other acres of his operation.

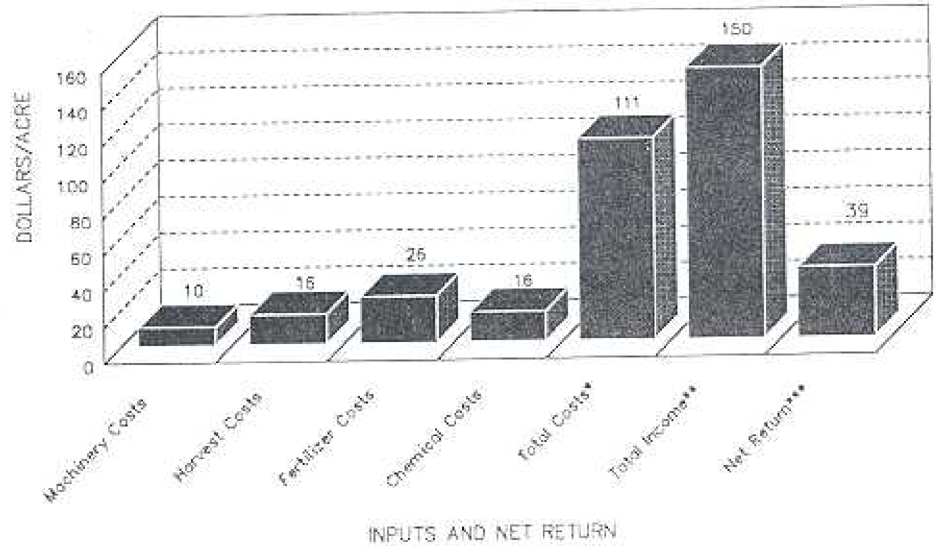
See previous precipitation information for Tripp County. The operator produces these crops on mainly the Millboro soil series. The Millboro soil is deep, well drained, and has a silty clay surface and a silty clay to clay subsoil.

Walworth County

NO–TILL

W.Wheat/Soybean/S.Wheat/Corn/F.Pea Or Flax Rotation

Expenses and Return



* Total average cost for system. Includes interest costs, ownership costs, operating costs, seed, fuel, drying, and labor costs.

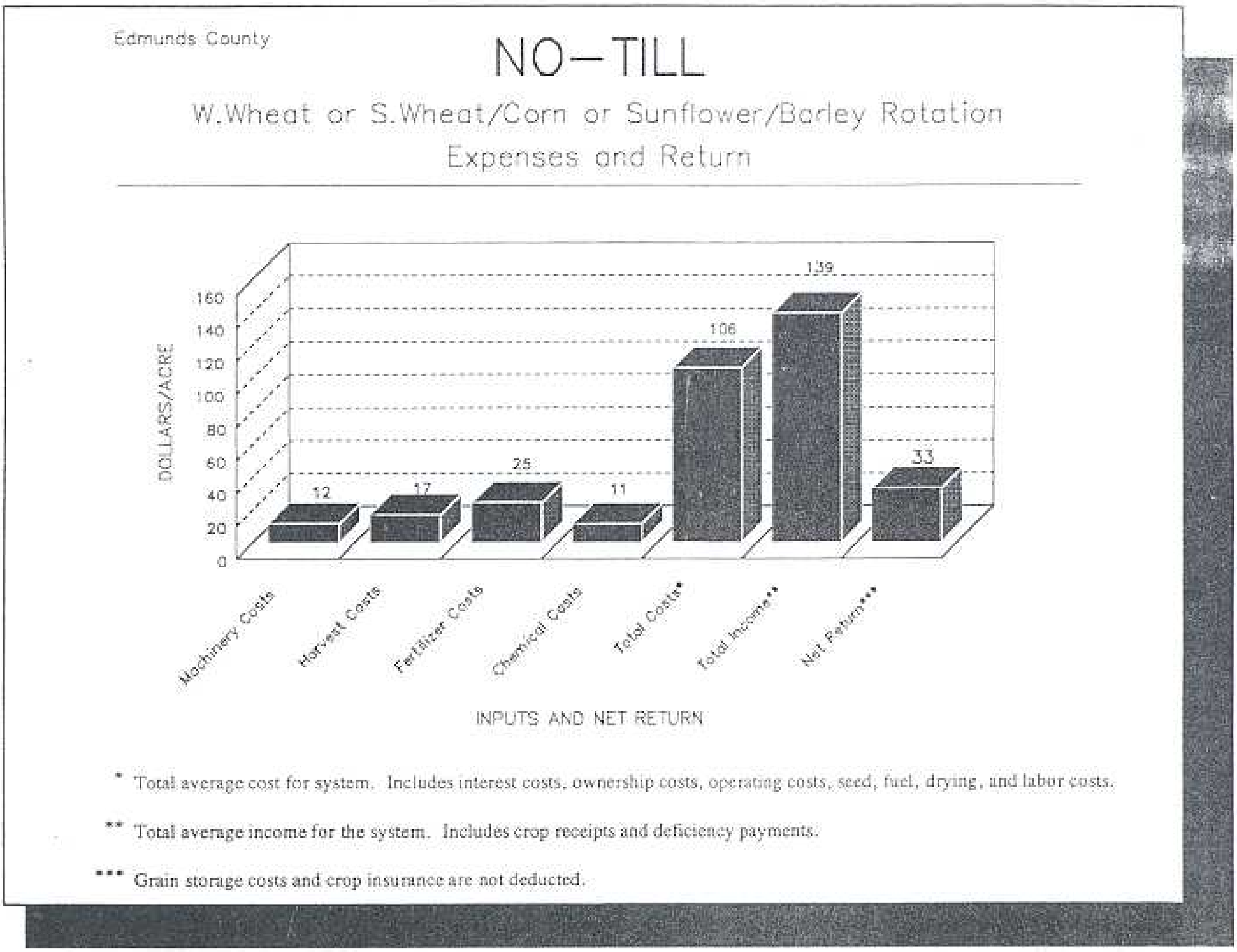
** Total average income for the system. Includes crop receipts and deficiency payments.

*** Grain storage costs and crop insurance are not deducted.

10-1

Graph 10-1 illustrates a winter wheat/soybean/spring wheat/corn/field pea or flax rotation that is practiced in Walworth County. The winter wheat and spring wheat crops from this system netted $51.17 and $43.55 per acre, respectively. The soybean crop made $51.16 per acre. The corn crop made $46.18 per acre. The flax crop lost $7.35 per acre. The field pea crop produced a net profit of $9.95 per acre. Here again, the flax stubble will provide better snow catch and protection for the growing winter wheat. The soybean crop is a high water user in August. The stubble provides little or no snow catch; therefore, spring wheat may show drought stress in abnormally dry years.

Walworth County's average annual precipitation is 17.07 inches. Of the 17.07 inches, 82 percent, or 14 inches, usually falls in April through September. The operator produces these crops on mainly the Highmore soil series. The Highmore soil is deep, well drained, and has a silt loam surface and a silty clay loam to silt loam subsoil.



11-1

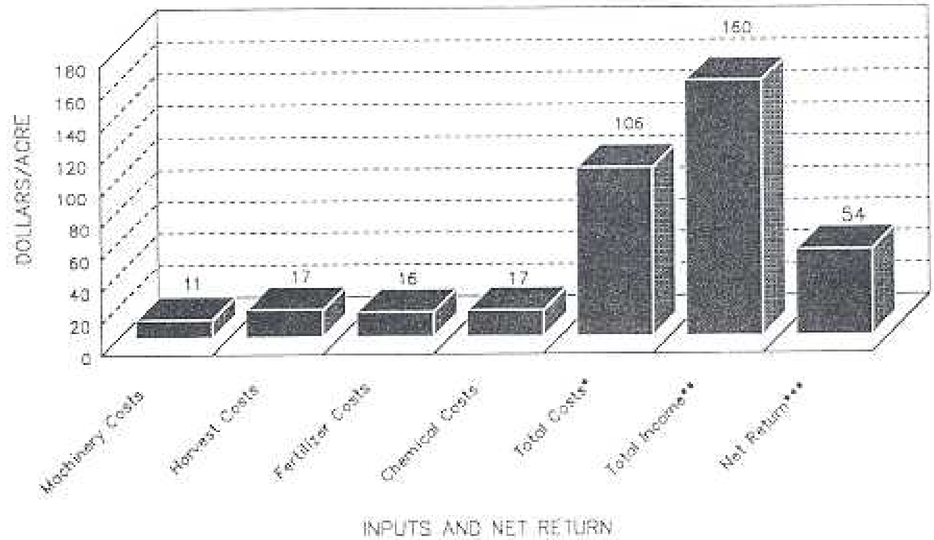
Graph 11-1 illustrates a winter wheat or spring wheat/corn or sunflower/barley rotation that is practiced in Edmunds County. The winter wheat and spring wheat crops from this system netted $20.24 and $13.87 per acre, respectively. The sunflower crop made $59.30 per acre. The corn crop made $51.57 per acre. The barley crop made $30.24 per acre.

Edmunds County's average annual precipitation is 18.35 inches. Of the 18.35 inches, 80 percent, or 14.68 inches, usually falls in April through September. The operator produces these crops on mainly Mondamin, Williams, Bowbells, and Nishon soil series. The Mondamin soil is deep, well drained to moderately well drained, and has a silty clay loam surface and a silty clay to silty clay loam subsoil. The Williams soil is deep, well drained, and has a loam surface and a clay loam subsoil. The Bowbells soil is deep, moderately well drained, and has a loam surface and a clay loam subsoil. The Nishon soil is deep, poorly drained, and has a silt loam surface and a silt loam to clay subsoil.

Potter County

NO-TILL

W.Wheat/Corn/Barley Rotation
Expenses and Return



* Total average cost for system. Includes interest costs, ownership costs; operating costs, seed, fuel, drying, and labor costs.

** Total average income for the system. Includes crop receipts and deficiency payments.

*** Grain storage costs and crop insurance are not deducted.

12-1

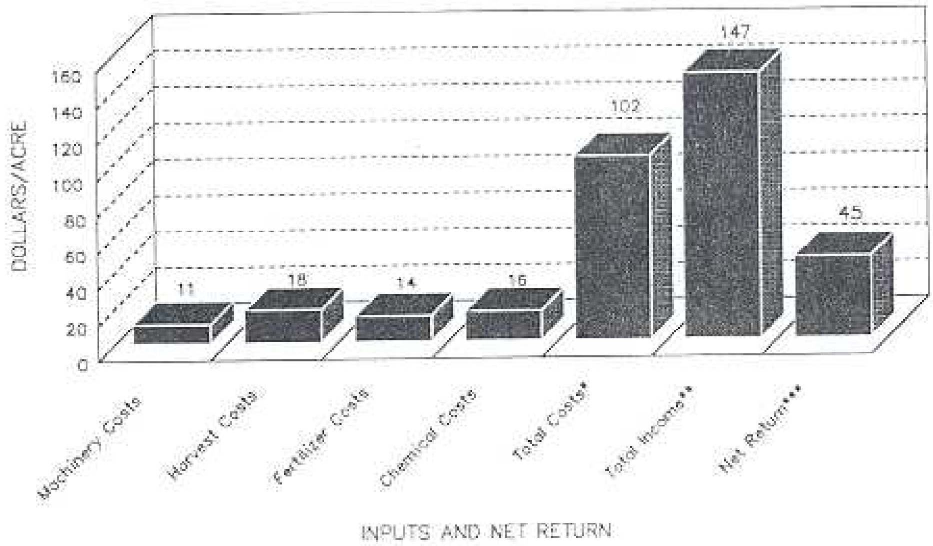
Graph 12-1 illustrates a winter wheat/corn/malting barley rotation that is practiced in Potter County. The wheat crop from this system netted $52.60 per acre. The corn crop made $55.36 per acre. The barley crop produced a net profit of $53.83 per acre.

Potter County's average annual precipitation is 18.16 inches. Of the 18.16 inches, 75 percent, or 13.62 inches, usually falls in April through September. The operator produces these crops on mainly Highmore, Agar, Lowry, and Mobridge soil series. The Highmore soil is deep, well drained, and has a silt loam surface and a silty clay loam to silt loam subsoil. The Agar soil is deep, well drained, and has a silt loam surface and a silty clay loam to silt loam subsoil. The Lowry soil is deep, well drained, and has a silt loam surface and subsoil. The Mobridge soil is deep, moderately well drained, and has a silt loam surface and a silty clay loam to silt loam subsoil.

Potter County

NO-TILL

W.Wheat/Corn/Barley/Soybean/S.Wheat Rotation
Expenses and Return



* Total average cost for system. Includes interest costs, ownership costs, operating costs, seed, fuel, drying, and labor costs.

** Total average income for the system. Includes crop receipts and deficiency payments.

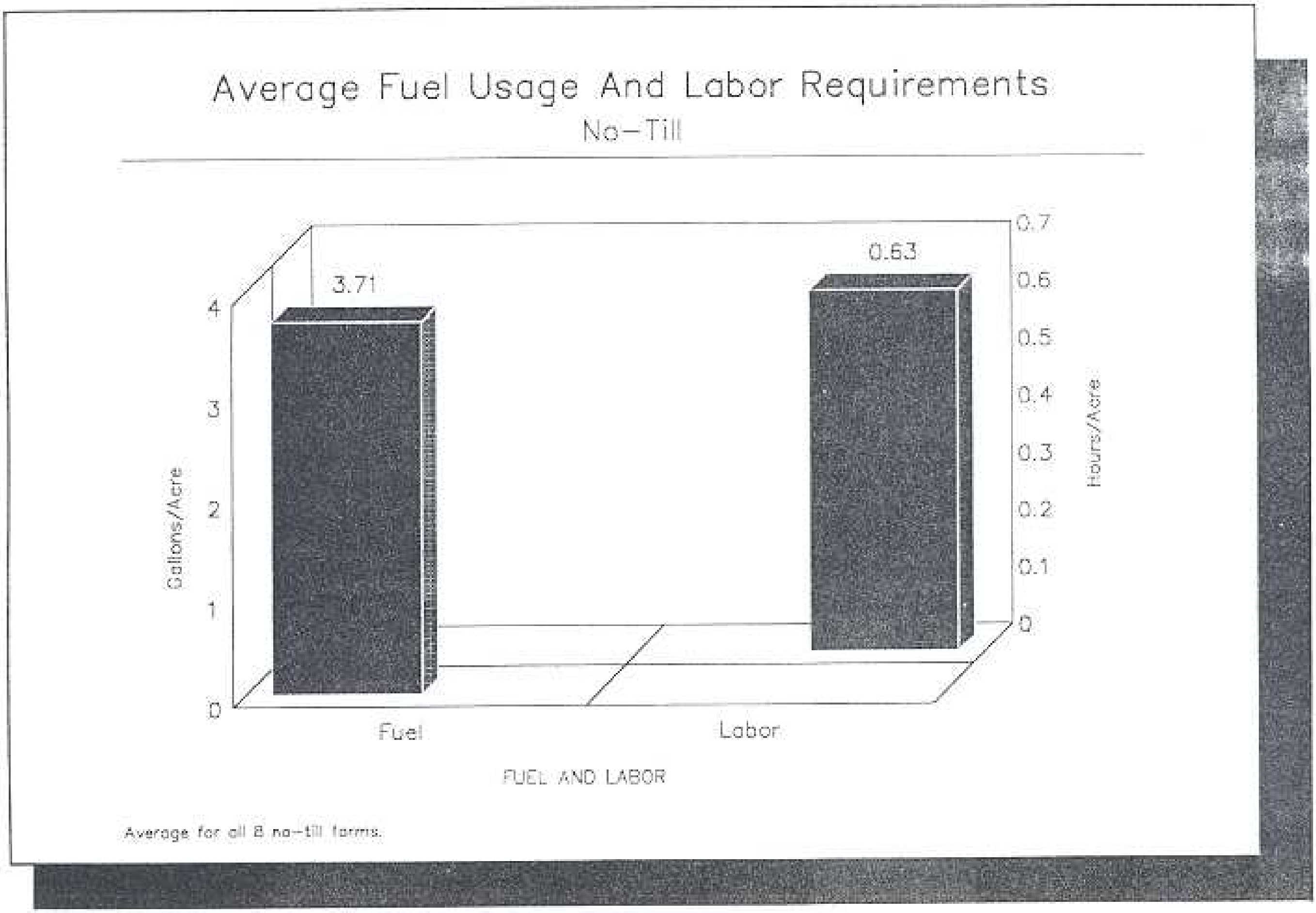
*** Grain storage costs and crop insurance are not deducted.

13-1

Graph 13-1 illustrates a winter wheat/corn/barley/soybean/spring wheat rotation that is practiced in Potter County. The winter wheat and spring wheat crops from this system netted $52.60 and $21.81 per acre, respectively. The soybean crop made $43.52 per acre. The corn crop made $55.36 per acre. The malting barley crop made $53.83 per acre. Again, the soybean crop is a high water user in August and the stubble provides little or no snow catch; therefore, spring wheat may show drought stress in abnormally dry years.

When comparing graphs 12-1 and 13-1 to the other graphs, note the fertilizer inputs are slightly lower. This is due to the malting barley and the soybean crops in the system.

See previous precipitation and soils information for Potter County.



14-1

Graph 14-1 shows average fuel usage (gallons/acre) and labor requirements (hours/acre) for all eight no-till farms. The CARE program will estimate fuel usage of each field operation based on each power unit (tractors) under full load. Some of the farm operators interviewed were using overrated power units for spraying operations and/or drilling operations. Therefore, the average fuel usage shown on graph 14-1 may not accurately reflect the actual on-farm usage.

CONCLUSION

All the operators interviewed stressed the following items as important aspects of a successful no-till system.

1. Adequate straw and chaff spreading at harvest time is critical.

2. Do a chemical burndown when needed after harvest. This aids in the control of viral diseases that may affect new winter wheat crops. It is also easier to control weeds and volunteer wheat growth in the fall than in the spring.

3. Soil testing should be performed every year. Nutrients are initially tied up when switching to a no-till system due to crop residues not being incorporated. The operators interviewed applied fertilizer by several different methods (starters, broadcasting, and deep banding).

4. Proper crop rotation (plant diversity) is very important in a successful no-till system. This aids in disease, weed, and insect control. Rotating at least three of the four different plant species types (cool season grass, warm season grass, cool season broadleaf, and warm season broadleaf) should provide the necessary pests breaks.

5. Do a preplant burndown if needed.

6. Have patience. In the early stages of switching to a no-till system, the soil surface will be wetter and stickier for a longer period of time than the conventional system.

7. Increase seeding rates and plant populations by 10-20 percent over conventional rates. A no-till system conserves water by reducing runoff during intense thunderstorms and by reducing soil evaporation. Seed treatments are also used to aid in producing a healthy and vigorous growing plant.

8. Perform pest (weed, disease, & insect) control. Scout fields regularly for pests and control pests in a timely manner when economic thresholds are reached.

Throughout this winter and the spring of 1995, data will be collected on all crop systems (conventional, minimum, and no-till). In the summer of 1995, a comparison of the different crop systems will be available.

Any questions or comments regarding this report can be directed to Jason Miller, Natural Resources Conservation Service, Murdo Field Office, at (605) 669-2302.

ATTACHMENT A

The following information is extracted from a North Dakota State University Cooperative Extension Service bulletin.

FIELD PEA

ADAPTATION TO NORTH DAKOTA: Cool-season legume that responds to ool temperature and available moisture during flowering.

PLANTING DATE & CONDITIONS: Late April to mid-May. Young plants are tolerant of spring frosts.

INOCULATION: Field peas must be inoculated with the right strain of rhizobia bacteria to fix nitrogen. The inoculant should be mixed with the seed at planting time.

SEEDING PATTERN: Solid seeded.

SEEDING DEPTH: 1.5 to 3 inches.

FERTILITY REQUIREMENTS: Nitrogen fertilizer generally not required unless the soil has less than 20 lbs. per acre of available nitrogen; phosphorus required in large amounts.

WEED CONTROL: Rotary hoe and harrowing before emergence. Treflan, Sonalan, Fargo, Sencor, Poast, Rhomene (MCPA Amine), and several others. Consult the 1994 Weed Control Guide.

WATER USE: Comparable or slightly less than wheat.

SOIL CONDITIONS: Fertile, well drained soils are important.

POTENTIAL INSECTS: Pea Leaf Weevil, Pea Weevil, and Pea aphids are possible but have not been a problem in North Dakota. Appears to be grasshopper resistant.

POTENTIAL DISEASES: Root Rot primarily in North Dakota; Sclerotinia White Mold, Bacterial Blight, and Ascochyta.

HARVEST REQUIREMENTS: Swathed then combined and at times straight harvested with a "raking" pickup attachment. Combining at 16 to 20 percent moisture and air dry to 16 percent moisture is recommended.

DATE HARVESTED: Mid-August.

SEED TYPES: Yellow and green.

MARKETS: Livestock feed, human food, multiple crop forage, and green manure/cover crop.

FEEDING FIELD PEAS:

1. Peas are highly palatable to livestock.

2. Peas provide a fairly good quality protein, with crude protein contents ranging from 22-29 percent. Feed analysis recommended.

3. For the swine producer, peas are a good source of lysine and appear to be adequate in all other essential amino acids with the exception in the sulfur amino acids of methionine and tryptophan.

4. The digestible energy content of field peas is higher than most commonly used feedstuffs. This high digestible energy content is due to the high concentration of easily digested starch in peas.

5. Peas should require no processing other than grinding for use in feeds.

CONSERVATION TREATMENT INFORMATION
LYMAN COUNTY

Crop Rotation: Winter Wheat - Corn - Flax or Field Peas

Soils: Millboro Silty Clay, 3-6% slopes

Conservation Treatment Actions (Kinds, Amounts, and Timing)	Conservation Treatment Effects
CONSERVATION CROPPING SEQUENCE: No-Till Winter Wheat in Flax or Field Pea Residue .Soil Test .Spray Burndown Prior to Planting .Plant and Apply Starter Fertilizer .Fertilize (Broadcast N) .Spray Harmony Extra and 2,4-D .Harvest (Combine) No-Till Corn in Winter Wheat Residue .Soil Test .Spray Burndown in Fall Atrazine & RU .Spray Burndown in Spring .Fertilize (Broadcast N) .Plant and Apply Starter Fertilizer .Harvest (Combine) No-Till Flax in Corn Residue .Soil Test .Spray Burndown in Spring if Needed .Fertilize (Broadcast N) .Plant and Apply Starter Fertilizer .Harvest (Combine) No-Till Field Peas in Corn Residue .Soil Test .Spray Preplant Pursuit .Plant and Apply Starter Fertilizer .Harvest (Combine) **CONSERVATION TILLAGE SYSTEM:** .No-Till **NUTRIENT MANAGEMENT:** .See Actions by Crop Above **PEST MANAGEMENT** .Scout for Economic Pest Levels	**RESOURCE MANAGEMENT SYSTEM INSTALLED:** .Soil Loss 1 tns/ac/yr wind - 2 tns/ac/yr water w/flax .Soil Loss 4 tns/ac/yr wind - 2 tns/ac/yr water w/peas .Nutrients Better Utilized .Residue Improves Soil Tilth Improve Infiltration Decrease Compaction .Sedimentation Potential Reduced Sheet and Rill Wind Concentrated Flow .Fuel Winter Wheat - 1.3 gallons/acre Corn - 1.9 gallons/acre Flax - 0.9 gallons/acre Field Pea - 1.0 gallons/acre .Labor Winter Wheat - 0.3 hours/acre Corn - 0.9 hours/acre Flax - 0.2 hours/acre Field Pea - 0.2 hour/acre

Comments:
The use of brand names does not constitute an endorsement by the Soil Conservation Service.

US Department of Agriculture
Soil Conservation Service

April, 1994
Case Study #1
Technical Guide
Section V

CONSERVATION EFFECTS
LYMAN COUNTY

Comparing A Benchmark With An Alternative System

Effects of Benchmark System: Conventional Tillage	Effects of Alternative System: No-Till	Impacts
A. Soil Erosion (Sheet and Rill) Soil Loss 5 Tons/ac/yr	Soil Loss 2 Tons/ac/yr	Erosion Reduced 3 Tons/ac/yr
B. Soil Erosion (Wind) Soil Loss 8 Tons/ac/yr (WW-Fal) Soil Loss 11 Tns/ac/yr (WW-Can-F)	Soil Loss 1 Tons/ac/yr (WW-C-Flx) Soil Loss 4 Tons/ac/yr (WW-C-Pea)	Erosion Reduced 7 Tons/ac/yr Erosion Reduced 7 Tons/ac/yr
C. Soil Erosion (Gully)	Increased Surface Residue	Decreased Gully Potential
D. Soil Condition/Tilth Low Organic Matter	Increase Organic Matter Residue Improves Tilth	Infiltration Increased Less Soil Compaction Improved Soil Structure
E. Soil Fertility No Legume in Rotation	Field Peas in Rotation	Nitrogen Fixation
F. Water Quality (Surface)- **Sedimentation**	Less Sediment From Erosion	Better Quality of Water
G. Water Quality (Ground)		
H. Plant Management **(Establishment/Growth/Harvest)** Yield Fluctuation	Moisture Conservation/Protection	Yields Will Be Maintained
I. Plant Management (Pests) No Scouting	Scouting for Pests Necessary	Time Required for Scouting
J. Wildlife Habitat/Cover Little Cover Overwinter	Crop Stubble Left Standing	Habitat/Cover Improved
Energy Inputs (Fuel/Labor) Average Labor = 0.3 hrs/ac/yr Average Fuel = 1.9 gal/ac/yr	Average Labor = 0.4 hrs/ac/yr Average Fuel = 1.3 gal/ac/yr	Increased Average hours/ac/yr Decreased Average gallons/ac/yr

GUIDANCE DOCUMENT WORKSHEET
CROPLAND RESOURCE MANAGEMENT SYSTEM (RMS)

__________ Field Office (Lyman Co. Case Study #1)

Soil map symbol	Soils Group Soil Map Unit
MoB	Millboro Silty Clay, 3-6% slopes

The representative resource considerations for these soils and commonly grown crops are:

-- wind erosion
-- sheet and rill erosion
-- ephemeral gully erosion
-- soil moisture mgt for non-irrigated cropland
-- pesticide and nutrient pollution to surface water
-- soil tilth and compaction

RESOURCE

	SOIL				PLANTS		WATER		ANIMALS	
RMS OPTIONS	EROSION		CONDITION		CONDITION	MGT	QUALITY			
(1)	SHEET & RILL	EPHEMERAL GULLY	SOIL TILTH	COMPACTION	PRODUCTIVITY	PESTS	SURFACE WATER CONTAMINANT STREAM OR LAKE PESTICIDES	NUTRIENTS	WILDLIFE FOOD & COVER	LIVESTOCK
OPTION 1										
Conservation Cropping Seq. - 328 WW-Cg-Fx or FP (3 yr. rotation)	+	+	+	0	+	+	+	+	+	0
Conservation Tillage System - 329 All Crops are No-tilled into existing crop residue. FP crop may not meet the 30% ground cover requirement for CTS 329 every year.	+	+	+	+	+	-	+	+	+	+
Nutrient Mgt. - 680 Soil tests are taken annually and crops are fertilized per test results.	0	0	+	0	+	0	0	+	0	+
Pesticide Mgt. - 685 Scouting and proper identification of pests throughout the growing season.	0	0	0	0	0	+	+	0	-	+

WW - winter wheat, Cg - corn for grain, Fx - flax, FP - field peas

CASE STUDY OF A CONVENTIONAL TILLAGE SYSTEM

Total Input Costs and Net Profit or Loss
Lyman County

Crop: Winter Wheat

Implement	Input Item	Amount/acre	Cost/acre
Field Cultivator			2.16
Grain Drill	Plant		5.11
	Seed	1.0 Bushels	5.50
	Starter Fertilizer	9 Pounds N	1.98
		20 Pounds P	4.40
Pull Type Sprayer			1.25
	Harmony Extra	0.4 oz	4.74
	2,4-D Ester	4 oz	0.60
	Ammonium Sulfate	1 Pound	0.25
Combine	Harvest		17.31
Total Input Cost per Acre (Includes Fuel & Labor Costs)			43.30
Capital Costs			2.56
Land Charges			27.18
Total Cost per Acre			73.04
Net Profit or Loss			58.38

Operation and Field Information:
- Seed Variety:
- Crop Row Spacing: 10 inches
- Planting Date: Early-Mid September
- Harvest Date: July
- Crop Moisture at Harvest: 13%
- Crop Yield: 35 Bushels

Cropping Sequence (Rotation) of This Case Study:

Winter Wheat - Fallow / Winter Wheat - Hay Cane - Fallow

Principal Soil(s) in Field: **Millboro Silty Clay, 3-6% slopes**

CASE STUDY OF A CONVENTIONAL TILLAGE SYSTEM

Total Input Costs and Net Profit or Loss
Lyman County

Crop: Fallow after Winter Wheat

Implement	Input Item	Amount/acre	Cost/acre
Chisel	2x in Fall	2.77	5.54
Field Cultivator	3x in Summer	2.16	6.48
Total Input Cost per Acre (Includes Fuel & Labor Costs)			12.02
Capital Costs			0.37
Land Charges			27.18
Total Cost per Acre			39.57
Net Profit or Loss			(39.57)

Cropping Sequence (Rotation) of This Case Study:

Winter Wheat - Fallow / Winter Wheat - Hay Cane - Fallow

Principal Soil(s) in Field: **Millboro Silty Clay, 3-6% slopes**

CASE STUDY OF A CONVENTIONAL TILLAGE SYSTEM
Total Input Costs and Net Profit or Loss
Lyman County

Crop: Cane for Hay

Implement	Input Item	Amount/acre	Cost/acre
Tandem Disk	1x Fall		3.84
Chisel	1x Fall		2.77
Field Cultivator	2x Spring	2.16	4.32
Grain Drill	Plant		5.11
	Seed	10 Pounds	5.60
Swather w/Conditioner			9.11
Baler - 1500 lbs.			7.66
Total Input Cost per Acre (Includes Fuel & Labor Costs)			38.41
Capital Costs			0.84
Land Charges			27.18
Total Cost per Acre			66.43
Net Profit or Loss			(3.93)

Operation and Field Information:
- Seed Variety:
- Crop Row Spacing: 10 inches
- Planting Date: June
- Harvest Date: August
- Crop Moisture at Harvest: 18%
- Crop Yield: 1.7 Tons/acre

Cropping Sequence (Rotation) of This Case Study:

Winter Wheat - Fallow / Winter Wheat - Hay Cane - Fallow

Principal Soil(s) in Field: **Millboro Silty Clay, 3-6% slopes**

CASE STUDY OF A CONVENTIONAL TILLAGE SYSTEM

Total Input Costs and Net Profit or Loss
Lyman County

Crop: Fallow after Hay Cane

Implement	Input Item	Amount/acre	Cost/acre
Field Cultivator	4x in Summer	2.16	8.65
Total Input Cost per Acre (Includes Fuel & Labor Costs)			8.65
Capital Costs			0.14
Land Charges			27.18
Total Cost per Acre			35.97
Net Profit or Loss			(35.97)

Cropping Sequence (Rotation) of This Case Study:

Winter Wheat - Fallow / Winter Wheat - Hay Cane - Fallow

Principal Soil(s) in Field: **Millboro Silty Clay, 3-6% slopes**

CASE STUDY OF A NO-TILL SYSTEM
Total Input Costs and Net Profit or Loss
Lyman County

Crop: Winter Wheat

Implement	Input Item	Amount/acre	Cost/acre
Pull Type Sprayer			1.25
	Roundup RT 3L	12 oz	3.24
	2,4-D 3.8E	8 oz	0.80
	Ammonium Sulfate	1.0 pound	0.25
JD 750 Drill	Plant		7.17
	Seed	1.5 Bushels	8.25
	Starter Fertilizer	10 Pounds N	2.20
	17 Pounds P		3.74
Fertilizer Spreader			1.41
	N Fertilizer	30 Pounds N	6.60
Sprayer			1.25
	Harmony Extra	0.4 oz	4.74
	2,4-D Ester	4 oz	0.60
	Ammonium Sulfate	1.0 Pound	0.25
Combine	Harvest		17.21
Total Input Cost per Acre (Includes Fuel & Labor Costs)			58.96
Capital Costs			3.68
Land Charges			27.18
Total Cost per Acre			89.82
Net Profit or Loss			41.60

Operation and Field Information:

- Seed Variety:
- Crop Row Spacing: 7.5 inches
- Planting Date: Mid-Late September
- Harvest Date: July
- Crop Moisture at Harvest: 13%
- Crop Yield: 35 Bushels
- Operator's Years of Experience with No-Till Systems: 6

Cropping Sequence (Rotation) of This Case Study:

Winter Wheat - Corn - Flax or Field Peas

Principal Soil(s) in Field: Millboro Silty Clay, 3-6% slopes

CASE STUDY OF A NO-TILL SYSTEM
Total Input Costs and Net Profit or Loss
Lyman County

Crop: Corn

Implement	Input Item	Amount/acre	Cost/acre
Pull Type Sprayer			1.25
	Roundup RT 3L	12 oz	3.24
	Atrazine 90WDG	1.5 pounds	4.57
	Ammonium Sulfate	1.0 pound	0.25
Pull Type Sprayer			1.25
	Roundup RT 3L	10 oz	2.88
	2,4-D3.8L Amine	8 oz	0.67
	Ammonium Sulfate	1.0 pound	0.25
Fertilizer Spreader			1.41
	N Fertilizer	60 Pounds N	13.20
JD MaxEmerge	Plant		11.84
	Seed	15,000 Seeds	13.50
	Starter Fertilizer	8 Pounds N	1.76
	24 Pounds P		5.28
Pull Type Sprayer			1.25
	Accent 75DF	0.35 oz	9.76
	X-77	3 oz	0.50
Combine	Harvest		25.51
Dryer	Electricity	.08/bu	5.21
Total Input Cost per Acre (Includes Fuel & Labor Costs)			98.39
Capital Costs			3.90
Land Charges			27.18
Total Cost per Acre			134.17
Net Profit or Loss			27.07

Operation and Field Information:
- Seed Variety:
- Crop Row Spacing: 30 inches
- Planting Date: May
- Harvest Date: October
- Crop Moisture at Harvest: 21%
- Crop Yield: 65 Bushels
- Operator's Years of Experience with No-Till Systems: 6

Cropping Sequence (Rotation) of This Case Study:

Winter Wheat - Corn - Flax or Field Peas

Principal Soil(s) in Field: Millboro Silty Clay, 3-6% slopes

CASE STUDY OF A NO-TILL SYSTEM
Total Input Costs and Net Profit or Loss
Lyman County

Crop: Flax

Implement	Input Item	Amount/acre	Cost/acre
Pull Type Sprayer			1.25
	Roundup RT 3L	32 oz	9.00
	2,4-D 3,8E	10 oz	1.07
	Ammonium Sulfate	1.0 pound	0.25
Fertilizer Spreader			1.41
	N Fertilizer	65 Pounds N	14.30
JD 750 Drill	Plant		5.97
	Seed	1.0 Bushel	9.50
	Starter Fertilizer	10 Pounds N	2.20
		19 Pounds P	4.18
Combine	Harvest		15.21
Total Input Cost per Acre (Includes Fuel & Labor Costs)			64.34
Capital Costs			2.89
Land Charges			27.18
Total Cost per Acre			94.91
Net Profit or Loss			(4.41)

Operation and Field Information:
- Seed Variety:
- Crop Row Spacing: 7.5 inches
- Planting Date: April
- Harvest Date: August
- Crop Moisture at Harvest: 8%
- Crop Yield: 20 Bushels
- Operator's Years of Experience with No-Till Systems: 6

Cropping Sequence (Rotation) of This Case Study:

Winter Wheat - Corn - Flax or Field Peas

Principal Soil(s) in Field: **Millboro Silty Clay, 3-6% slopes**

April, 1994
Case Study #1

CASE STUDY OF A NO-TILL SYSTEM
Total Input Costs and Net Profit or Loss
Lyman County

Crop: Field Peas

Implement	Input Item	Amount/acre	Cost/acre
Pull Type Sprayer			1.25
	Pursuit	3 oz	12.03
JD 750 Drill	Plant		7.96
	Seed	2.3 Bushels	18.00
	Starter Fertilizer	5 Pounds N	1.10
	16 Pounds P	3.52	
	Inoculant	1.0 acre	0.40
Combine	Harvest		15.21
Total Input Cost per Acre (Includes Fuel & Labor Costs)			59.48
Capital Costs			2.72
Land Charges			27.18
Total Cost per Acre			89.38
Net Profit or Loss			**6.62**

Operation and Field Information:

- Seed Variety:
- Crop Row Spacing: 7.5 inches
- Planting Date: April
- Harvest Date: August
- Crop Moisture at Harvest: 16%
- Crop Yield: 24 Bushels
- Operator's Years of Experience with No-Till Systems: 6

Cropping Sequence (Rotation) of This Case Study:

Winter Wheat - Corn - Flax or Field Peas

Principal Soil(s) in Field: **Millboro Silty Clay, 3-6% slopes**

LYMAN COUNTY NET PROFIT OR LOSS SUMMARY

Conventional Tillage Rotation:

Winter Wheat	Fallow
$58.38	$(39.57)
	Total $18.81 / 2 = **$9.41**

No-Till Rotation:

Winter Wheat	Corn	Flax	Field Peas
$41.60	$27.57	($4.41)	$6.62
	Total $64.76 / 3 = **$21.59** with Flax		
	Total $75.79 / 3 = **$25.26** with Field Peas		