7-1-1987

Cost of Production and Net Returns for Alternative Farming Systems in Northeastern South Dakota: 1986 and "Normalized" Situations

Thomas Dobbs
South Dakota State University

Lyle A. Weiss
South Dakota State University

Mark G. Leddy
South Dakota State University

COSTS OF PRODUCTION AND NET RETURNS FOR ALTERNATIVE FARMING SYSTEMS IN NORTHEASTERN SOUTH DAKOTA: 1986 AND "NORMALIZED" SITUATIONS

by

Thomas L. Dobbs*, Lyle A. Weiss**,
and Mark G. Leddy***

Research Report 87-5

July 1987

Economics Department
South Dakota State University

*Professor of Economics
**Research Assistant
***Graduate Research Assistant

PREFACE

This report is a product of the initial year of research under South Dakota State University (SDSU) Agricultural Experiment Station Project H-076, entitled "Economics of Farming Systems Alternatives in Eastern South Dakota". The overall objective of this research project is to determine the economic practicality in eastern South Dakota of "alternative" farming systems which may entail less use of chemical fertilizers, pesticides, and herbicides than do "conventional" systems. The initial step in achieving that overall objective is to make preliminary estimates of crop enterprise and farming system costs and returns. We have done this for two sets of farming systems being studied by the SDSU Plant Science Department at the Northeast Research Station near Watertown, S.D. As the Plant Science Department research continues over a period of years at the Northeast Station, crop enterprise budgets will be adjusted to reflect new yield, cropping practice, etc. information. We also expect to develop farming system budgets for other parts of eastern South Dakota.

We are deeply indebted to Dr. James Smolik of SDSU's Plant Science Department for his ongoing cooperation. Dr. Smolik serves both as Director of the Northeast Station and as Project Leader of the Plant Science farming systems study at that Station. Other Plant Science faculty who have provided advice, assistance, or reviews of preliminary enterprise budgets include Dr. Paul Fixen, Dr. Diane Rickerl, Extension Soils Specialist James Gerwing, and Extension Weeds Specialist Leon Wrage.

The advice and assistance of Extension Agent Ron Thaden is also especially appreciated. Mr. Thaden made preliminary estimates in 1986 of costs and returns associated with farming systems at the Northeast Research Station. Those estimates served as initial building blocks in our work. We

also asked for Ron's advice on numerous matters as we developed the enterprise budgets contained in this report. Moreover, the microcomputer spreadsheet which we modified for use in our enterprise budget calculations was initially developed by Mr. Thaden and fellow SDSU Extension staff members Curtis Hoyt and Steven Gylling.

Appreciation is also extended to Dr. Burton Pflueger, Extension Farm Financial Management Specialist, for reviewing a draft version of the enterprise budgets.

TLD, LAW, and MGL

CONTENTS

Text of Report — Page

Crop Rotations..... 1
Organization of the Report..... 3
Interpretation of the Tables..... 4
Overview of Results..... 8
Table 1. Results of Farming Systems Analyses Based upon 1986 Yields and Cropping Practices..... 10
Table 2. 1986 Yield Summary..... 11
Table 3. Results of Farming Systems Analyses Based upon "Normalized" Yields and Cropping Practices..... 12
Table 4. "Normalized" Yield Summary..... 13

Farming System Crop Budgets and Assumptions

Farming Systems Study I..... 15
Alternative Rotation Assumptions and Explanations..... 16
Results for Alternative Rotation, 1986..... 17
Results for Alternative Rotation, Normal Year..... 20

Conventional Rotation Assumptions and Explanations..... 23
Results for Conventional Rotation, 1986..... 24
Results for Conventional Rotation, Normal Year..... 27

Ridge Till Rotation Assumptions and Explanations..... 30
Results for Ridge Till Rotation, 1986..... 31
Results for Ridge Till Rotation, Normal Year..... 34

Farming Systems Study II..... 37
Alternative Rotation Assumptions and Explanations..... 38
Results for Alternative Rotation, 1986..... 39
Results for Alternative Rotation, Normal Year..... 42

Conventional Rotation Assumptions and Explanations..... 45
Results for Conventional Rotation, 1986..... 46
Results for Conventional Rotation, Normal Year..... 49

Minimum Till Assumptions and Explanations..... 52
Results for Minimum Till Rotation, 1986..... 53
Results for Minimum Till Rotation, Normal Year..... 56

Continuous No Till Winter Wheat Assumptions and Explanations..... 59
Results for Continuous No Till Winter Wheat, 1986..... 60
Results for Continuous No Till Winter Wheat, Normal Year..... 63

Annexes Page

A. General Procedures for Estimation of Machinery Costs..... 67
B. General Procedures for Estimation of Other Budget Items..... 73
C. Assumptions for Maintenance Costs on Set Aside Acres..... 77

References..... 79

COSTS OF PRODUCTION AND NET RETURNS FOR ALTERNATIVE FARMING SYSTEMS IN NORTHEASTERN SOUTH DAKOTA: 1986 AND "NORMALIZED" SITUATIONS

Initial crop budgets developed under the South Dakota State University (SDSU) Agricultural Experiment Station Project on "Economics of Farming Systems Alternatives in Eastern South Dakota" are contained in this research report. Budgets were prepared for crop enterprises and rotations being examined in a companion "farming systems" study at SDSU's Northeast Research Station near Watertown, S.D. That companion study is being conducted by SDSU's Plant Science Department. The Plant Science study was initiated during the 1985 crop year.

The budgets contained herein are serving as a basis for initial economic analyses of "low-input", "conventional", and selected other farming systems under consideration. Mr. Mark Leddy, SDSU Graduate Research Assistant in Economics, is presently conducting detailed sensitivity and "whole farm" analyses with the budgets. The results of those analyses will be reported later in a thesis and other publications. Therefore, only a limited narrative is included in the present research report. We will present just enough description of the content and preliminary results for readers to understand and use the report. The budgets will be revised and updated, as appropriate, when sufficient new crop yield and other agronomic and economic information is generated over the 5-year life of this project.

Crop Rotations

The SDSU studies at the Northeast Research Station are grouped into two sets of comparisons. Farming Systems Study I compares an Alternative rotation with Conventional and Ridge Till rotations. The crops in each of these rotations are shown in the top portions of Tables 1 and 3. The Alternative rotation is a "low-input" or "organic" rotation in which no chemical

fertilizers or herbicides are used. Soybeans, corn, oats (as a nurse crop for alfalfa), and alfalfa are included (in that order) in the 4-year Alternative rotation. Corn, soybeans, and spring wheat (in that order) are included in both the Conventional and the Ridge Till rotations of Farming Systems Study I.

Four systems are compared in Farming Systems Study II. Those systems and the crops (in order) are shown in the bottom portions of Tables 1 and 3. The Alternative rotation in this case contains soybeans, spring wheat, oats (as a nurse crop for sweet clover), and sweet clover. The sweet clover is included strictly as a green manure crop; it is mowed and chiseled, but not harvested. Conventional and Minimum Till rotations in Farming Systems Study II included soybeans followed by spring wheat followed by barley. The final comparison in Farming Systems Study II is a continuous No Till winter wheat option.

Tillage, seeding, fertilizer, herbicide, harvesting, and labor assumptions for each crop in each system are presented just prior to each set of budgets. One set of assumptions refers to operations as carried out by the Plant Science Department at the Northeast Research Station during the 1986 crop year. The other set refers to "judgments" of Plant Science personnel about the "normalized" situation. The "normalized" budgets contain best guesses about "average" (over time) tillage, fertilizer, herbicide, and other practices. For example, a judgment was made that, at some point, phosphorous fertilizer would need to be regularly included in systems other than the Alternative systems. Over the course of this research project, actual practices will be monitored, and future budgets will likely reflect some changes from the currently estimated "normalized" assumptions.

Yields included in 1986 and "normalized" budgets for each crop, in each system, are shown in Tables 2 and 4. Table 2 contains yields actually measured at the Northeast Research Station for the Farming System trials during the 1986 crop year. Yields shown in Table 4, for the "normalized" budgets, are based upon our review of historical, research, and other data. Plant Science and Economics staff involved in the Farming Systems studies used their "best judgment" about what each crop in each system might yield, on average, over time (after a "transition period" has passed). The "normalized" yields shown in Table 4 are based upon that collective judgment. Also, those yields are meant to correspond to the "normalized" farming (tillage, fertilization, herbicide, etc.) practices.

Organization of the Report

Immediately following the narrative section of this report are Tables 1 through 4. These tables contain a brief data summary of the crop rotation budget results.

The main body of this research report--consisting of budgeting assumptions and budget spreadsheets--then follows. Roughly the first half of that section pertains to crops and rotations included in Farming Systems Study I; the remainder pertains to Farming Systems Study II. A set of "assumptions and explanations" is presented for each system analyzed. Following that is an "input section" microcomputer spreadsheet, showing data inputed for the system. The next spreadsheet for each farming system consists of the "input summary and results". That shows the calculated costs and returns for each crop in the system, with income over all costs for each crop shown in the very bottom row. Costs for farm program set aside acres are also shown. Next, income over all costs for a 540-crop acre farm is shown for the subject farming system. Farm program participation assumptions are incorporated in

the calculations leading to results shown. The results are shown in both tabular and bar chart form.

Three annexes follow the main body of tables. Annex A consists of "General Procedures for Estimation of Machinery Costs". Following that, as Annex B, are "General Procedures for Estimation of Other Budget Items". The last annex (C) contains "Assumptions for Maintenance Costs on Set Aside Acres".

At the end of the report is a list of references drawn on in estimating the crop enterprise budgets.

Interpretation of the Tables

A brief explanation of data contained in spreadsheet tables for one farming system may help readers to utilizing the tables for all of the systems. We will refer here to the tables for the "Alternative" system in Farming Systems Study I.

First presented is the list of "Assumptions and Explanations" for both 1986 and "normalized" budgets.

Following that is the "Input Section" table for the Alternative system with 1986 assumptions. The first four rows contain yield, price, and farm program data used in determining total income per acre. Then appears all of the information inputed for calculation of direct (or operating) costs. Information for calculation of fixed costs appears at the bottom.

Results of microcomputer spreadsheet calculations for the Alternative system in 1986 are shown in the next ("Input Summary and Results...") table. The fifth row of that table, for example, shows total income per acre for each crop in the system. This is $241.40 for corn. Several subsequent rows show the direct costs per acre, by type of cost, for each crop in the system. Among other calculated results for each crop, as we read down the table, are

the following (with the numbers for corn given here in parentheses): (1) total direct (operating) costs per acre ($86.67); (2) total fixed costs per acre ($37.25); (3) production costs per acre, which is the sum of direct and fixed costs ($123.92); (4) land charges per acre ($21); (5) total production and land costs per acre ($144.92); and (6) income over all costs per acre ($96.48).

Numbers in parentheses on the "Input Summary and Results..." tables refer to negative numbers. One must interpret results for individual crops in the rotations with great caution, however. Costs were allocated to crops according to the calendar year of operation. For example, costs of a fall tillage operation were allocated to the crop just harvested, not to the crop to be planted in the following spring. Similarly, establishment costs for alfalfa are included in the oats column, since those costs occur during the calendar year in which oats is the principal crop. This cost allocation convention was followed throughout the budgeting exercise. Since the present study focuses on comparisons of alternative farming "systems"—in which crops constitute interrelated components of rotations--this seemed to be the most straightforward and least arbitrary way to allocate costs. The implication of this approach, however, is that only systems (rotations) should be compared for profitability purposes; individual crops should not be.

The next sheet contains information needed in examining the profitability of the system. Income over all costs for the Alternative system with 1986 yield and cost assumptions is shown for a "typical" northeast South Dakota crop farm. This farm is assumed to have 540 crop acres (exclusive of farmstead, pasture, and waste land). In each case, we assume participation in the Federal farm program at minimum levels of set aside; that minimum is 20% of the corn and 20% of the oats acreage bases in the case of

the Farming Systems Study I Alternative rotation. Set aside requirements, loan levels, and deficiency payment levels for 1987 were used in both the 1986 and the "normalized" budgets. (Local loan levels for 1987 were estimated.) Product prices outside the farm program (such as for alfalfa and soybeans) were also based upon estimated 1987 levels--as were all input prices--in the case of both 1986 and "normalized" budgets.

Allocation of acreage to each crop was done in such a way that (a) the farm is in compliance with minimum set aside requirements and (b) equal acreage is devoted to each crop in the rotation. Formulas such as the following one for the Farming Systems Study I Alternative system were used to determine those acreage allocations in each case.

$T = 4C + S$

where T = Total cropable acres
C = Acres in each of four crops
S = Set aside acres

and $S = .25\ C + .25C = .5C$

because 20% set aside requirements for both corn and oats mean that 1 acre must be set aside for every 4 acres planted to each of those crops (i.e., 5 acres of crop base x .20 = 1 acre of set aside)

Solving for C, we get:

$T = 4C + S = 4C + .5C = 4.5C$

$540 \text{ acres} = 4.5C$

$C = 540 \text{ acres} \div 4.5 = 120 \text{ acres}$ in each of the four crops

And, solving for S, we get:

$S = .5C = .5 \times 120 \text{ acres} = 60 \text{ acres}$ set aside

These results are shown in the "crop distribution" row of the table labeled "Alternative Rotation 1986: Farming Systems Study I, Summary Data for Representative Farm in Northeast South Dakota".

Proceeding to the next row in that same table, we see "income over all costs/acre". This information (including the negative, or cost, figure for set aside acres) comes directly from the second to last row of the table on the preceding page. "Income over all costs/crop" is calculated by multiplying the acreage for the crop times the "income over all costs/acre" for that crop. For corn in this Alternative system, this calculation is as follows: 120 acres x $96.48/acre = $11,577. The total (whole farm) result is the sum of the individual crop and set aside acreage results. For the 540-acre farm using this Alternative farming system--with 1986 yields and cropping practices and 1987 farm program provisions and prices--the income over all costs comes to $18,952. It is important to note that this is a return after all direct (including both hired and family labor) and fixed (including land) costs are deducted. We can think of this as a net return to "management", if we wish.

The bottom portion of the same page shows in the form of a bar chart income over all costs associated with each crop and (in the last bar) the whole farm. Data for this chart comes from the last row of the table above it. Readers should keep in mind the earlier caveat about how costs have been allocated to crops on a calendar year basis. Nevertheless, this chart is useful in envisioning the net return (income) associated with the various crop calendar years in the system.

Following the tables for the Alternative farming system with 1986 yields and cropping practices is an identical set of tables for the same system with "normalized" yields and practices. Note that "income over all costs" for the whole (540-crop acre) farm in this case is $5,383, compared to $18,952 in the 1986 case. This much lower net income is due to the assumption that yields

over time will average much less than the 1986 levels experienced at the Northeast Research Station for many crops, when moisture was quite abundant.

Overview of Results

An overview of the results to date of this analysis of alternative farming systems in northeastern South Dakota is contained in Tables 1 and 3. Summary results for 1986 yields and cropping practices appear in Table 1, and the corresponding yields are shown in Table 2. Tables 3 and 4 contain comparable information for the "normalized" yields and cropping practices. Results in terms of dollars/acre are shown in Tables 1 and 3 for the following items: (1) direct costs other than labor; (2) gross income; (3) income over non-labor and non-land costs (i.e., return to land, labor, and management); (4) income over non-land costs (i.e., return to land and management); and (5) income over all costs (i.e., return to management).

We can see in Table 1 that the Conventional system has the highest income over all costs per acre ($40) in Farming Systems Study I when 1986 yields and cropping practices are considered. Ridge Till and Alternative systems are close behind, however. In terms of income over non-labor and non-land costs, the Alternative system is slightly higher than the Ridge Till system and only $2/acre lower than the Conventional system. (It should be noted that there was no attempt in the crop budgets to distinguish between family and hired labor.)

In Farming Systems Study II, the No Till Winter Wheat shows the highest income over all costs and the Alternative system shows the lowest when 1986 yield and cropping practice assumptions are used. All systems show net positive returns to management after deducting charges for land, labor, and other factors of production.

Net returns for all systems are lower when "normalized" yield and cropping practice assumptions are used, as can be seen in Table 3. Relatively abundant moisture caused yields of corn, wheat, barley, and alfalfa to be higher in 1986 than they are likely to be, on average, over a period of several years. Nevertheless, net returns after covering all costs are positive for all systems even under the "normalized" situation--at least with the current farm program provisions and support levels in effect.

The Alternative system exhibits somewhat lower income overall costs than other systems in Farming Systems Study I when "normalized" assumptions are used, but the Alternative system exhibits nearly the same net income as other systems in Study II. In fact, the Alternative system has the highest income over non-labor and non-land costs ($41/acre) in Study II. These results indicate that the Alternative systems have good prospects for being economically viable. Also, the Alternative systems have significantly lower "direct costs other than labor" than do other systems. Sensitivity analyses to be reported in Mark Leddy's M.S. thesis and later publications will provide insights on how different yield, fertilizer and herbicide, farm program, and other conditions impact the relative profitability of Alternative ("low input" or "organic") farming sytems.

Table 1. Results of Farming Systems Analyses Based upon 1986 Yields and Cropping Practices (1987 Farm Program and Price Assumptions)

System	Dollars/Acre				
	Direct Costs Other Than Labor	Gross Income	Income Over Non-labor and Non-land Costs	Income Over Non-land Costs	Income Over All Costs
Farming Systems Study I*					
1. Alternative (soybeans-corn-oats-alfalfa)	44	147	73	61	35
2. Conventional (corn-soybeans-s. wheat)	65	166	75	66	40
3. Ridge Till (corn-soybeans-s. wheat)	67	159	70	63	37
Farming Systems Study II*					
1. Alternative (soybeans-s. wheat-oats-s. clover)	31	103	48	37	11
2. Conventional (soybeans-s. wheat-barley)	55	140	58	48	22
3. Minimum Till (soybeans-s. wheat-barley)	60	140	57	49	23
4. No Till Winter Wheat	48	129	61	54	28

*Crops shown in order in which they occur in each rotation.

Table 2. 1986 Yield Summary

Farming Systems Study I

	Yields (bu. or ton)/Acre				
	Corn	Soybeans	S. Wheat	Oats	Alfalfa
Alternative	100	30		57	6.1
Conventional	115	28	58		
Ridge Till	120	25	51		

Farming Systems Study II

	Yields (bu.)/Acre					
	W. Wheat	Soybeans	S. Wheat	Oats	Barley	S. Clover
Alternative		28	55	60		Not harvested
Conventional		29	56		89	
Minimum Till		33	56		77	
No Till Winter Wheat	51					

Table 3. Results of Farming Systems Analyses Based upon "Normalized" Yields and Cropping Practices (1987 Farm Program and Price Assumptions)

System	Dollars/Acre				
	Direct Costs Other Than Labor	Gross Income	Income Over Non-labor and Non-land Costs	Income Over Non-land Costs	Income Over All Costs
Farming Systems Study I*					
1. Alternative (soybeans-corn-oats-alfalfa)	42	121	49	36	10
2. Conventional (corn-soybeans-s. wheat)	63	143	54	45	19
3. Ridge Till (corn-soybeans-s. wheat)	65	145	58	51	25
Farming Systems Study II*					
1. Alternative (soybeans-s. wheat-oats-s. clover)	30	96	41	31	5
2. Conventional (soybeans-s. wheat-barley)	57	124	40	30	4
3. Minimum Till (soybeans-s. wheat-barley)	61	122	38	30	4
4. No Till Winter Wheat	50	110	39	33	7

*Crops shown in order in which they occur in each rotation.

Table 4. "Normalized" Yield Summary

Farming Systems Study I

	Yield (bu. or ton)/Acre				
	Corn	Soybeans	S. Wheat	Oats	Alfalfa
Alternative	75	28		70	3.6
Conventional	82	30	42		
Ridge Till	84	31	42		

Farming Systems Study II

	Yield (bu.)/Acre					
	W. Wheat	Soybeans	S. Wheat	Oats	Barley	S. Clover
Alternative		28	40	70		Not harvested
Conventional		30	42		70	
Minimum Till		30	42		65	
No Till Winter Wheat	40					

Farming Systems Study I

1. Alternative System

2. Conventional System

3. Ridge Till System

ASSUMPTIONS AND EXPLANATIONS
Alternative Rotation: Farming Systems Study I

Crop		1986 Budgets	Normalized Budgets
1. Corn			
a.	Machine operations:	Disc twice (once in spring, once in fall), field cultivate, plant, rotary hoe twice, cultivate twice, combine, haul	Same as 1986
b.	Seeding:	16 MVK @ $.75/MVK	19 MVK @ $.75/MVK
c.	Machine labor:	1.57 hrs./acre @ $6/hr.	Same as 1986
d.	Other labor:	Grain drying: $.0041/bu. for 100 bu./acre	Grain drying: $.0041/bu. for 75 bu./acre
2. Oats/Alfalfa			
a.	Machine operations:	Disc twice in spring, field cultivate, drill, harrow, swath, combine, haul, spread manure in September	Same as 1986 except disk once, field cultivate w/harrow, drill w/packer
b.	Seeding:	Oats: 48 lbs/acre @ $.09375 Alfalfa 9.5 lbs/acre @ $2.25/lb.	Same as 1986
c.	Fertilizer:	2 tons/acre of dry matter (equivalent to 32.7 - 31.1 - 143 lb./acre N-P-K) applied in September	Same as 1986
d.	Machine labor:	2.05 hrs./acre @ $6/hr.	1.9 hrs./acre @ $6/hr.
3. Alfalfa			
a.	Machine operations:	Swath 3 cuttings, rake 3 cuttings, bale, bale stacking, 1 pass chisel w/sweeps, 1 pass chisel wo/sweeps	Same as 1986 except 2 passes chisel w/sweeps
b.	Machine labor:	3.25 hrs./acre @ $6/hr.	3.56 hrs./acre @ $6/hr.
4. Soybeans			
a.	Machine operations:	Disc, field cultivate, plant, rotary hoe, cultivate twice, combine, haul	Same as 1986 except rotary hoe twice
b.	Seeding:	1 bu./acre @ $8.50/bu.	Same as 1986
c.	Machine labor:	1.24 hr./acre @ $6/hr.	1.37 hr./acre @ $6/hr.
d.	Other labor:	Hand weeding: 1.14 hrs./acre @ $4/hr.	Same as 1986
5. Set Aside			
a.	Machine operations:	Field cultivate, chisel	Same as 1986
b.	Machine labor:	.4 hrs./acre @ $6/hr	Same as 1986

ALTERNATIVE ROTATION 1986: Farming Systems Study I

INPUT SECTION	Corn	Oats	Alfalfa	Soybean	Set Aside
RECEIPTS:					
Estimated grain yield (units/ac.)	100	57	6.1	30	0
Estimated selling price or value ($/unit)	$1.66	$0.88	$30.00	$5.00	$0.00
GOVERNMENT PAYMENT:					
Base yield (units/ac.)	63	53	0	0	0
Deficiency payment ($/unit)	$1.21	$0.66	$0.00	$0.00	$0.00
DIRECT COSTS:					
Seed (units/ac.)	16	1	0	1	0
($/unit)	$0.75	$25.88	$0.00	$8.50	$0.00
Fertilizer 1 (units/ac.)	0	0	0	0	0
($/unit)	$0.00	$0.00	$0.00	$0.00	$0.00
Fertilizer 2 (units/ac.)	0	0	0	0	0
($/unit)	$0.00	$0.00	$0.00	$0.00	$0.00
Fertilizer application ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Herbicide 1 (units/ac.)	0	0	0	0	0
($/unit)	$0.00	$0.00	$0.00	$0.00	$0.00
Herbicide 2 (units/ac.)	0	0	0	0	0
($/unit)	$0.00	$0.00	$0.00	$0.00	$0.00
Herbicide application ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Insecticide (units/ac.)	0	0	0	0	0
($/unit)	$0.00	$0.00	$0.00	$0.00	$0.00
Insecticide application ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Crop insurance ($/ac.)	$17.27	$1.55	$0.00	$4.42	$0.00
Storage ($/unit)	$0.11	$0.11	$0.00	$0.11	$0.00
Drying ($/unit)	$0.15	$0.00	$0.00	$0.00	$0.00
Overhead ($/ac.)	$5.50	$5.00	$5.00	$5.50	$2.50
Custom machine hire					
Tillage ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Planting ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Harvesting ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Fuel and lubrication ($/ac.)	$4.02	$5.31	$5.22	$3.35	$1.53
Machinery repair ($/ac.)	$8.16	$13.77	$10.14	$6.51	$1.25
Crop operating loan borrowed (months)	6	6	6	6	6
Interest APR(%)	12.00	12.00	12.00	12.00	12.00
Labor 1 (hrs./ac.)	1.57	2.05	3.25	1.24	0.40
($/hr)	$6.00	$6.00	$6.00	$6.00	$6.00
Labor 2 (hrs./ac.)	0.00	0.00	0.00	1.14	0.00
($/hr.)	$0.00	$0.00	$0.00	$4.00	$0.00
FIXED COSTS:					
Interest, Housing, and Ins. on Machinery	15.28	17.92	16.55	12.27	2.40
Depreciation on machinery & equipment	$16.72	$19.49	$18.27	$14.38	$2.19
Land Cost ($/acre)	$350	$350	$350	$350	$350
Real Estate Tax Percentage	1.50	1.50	1.50	1.50	1.50

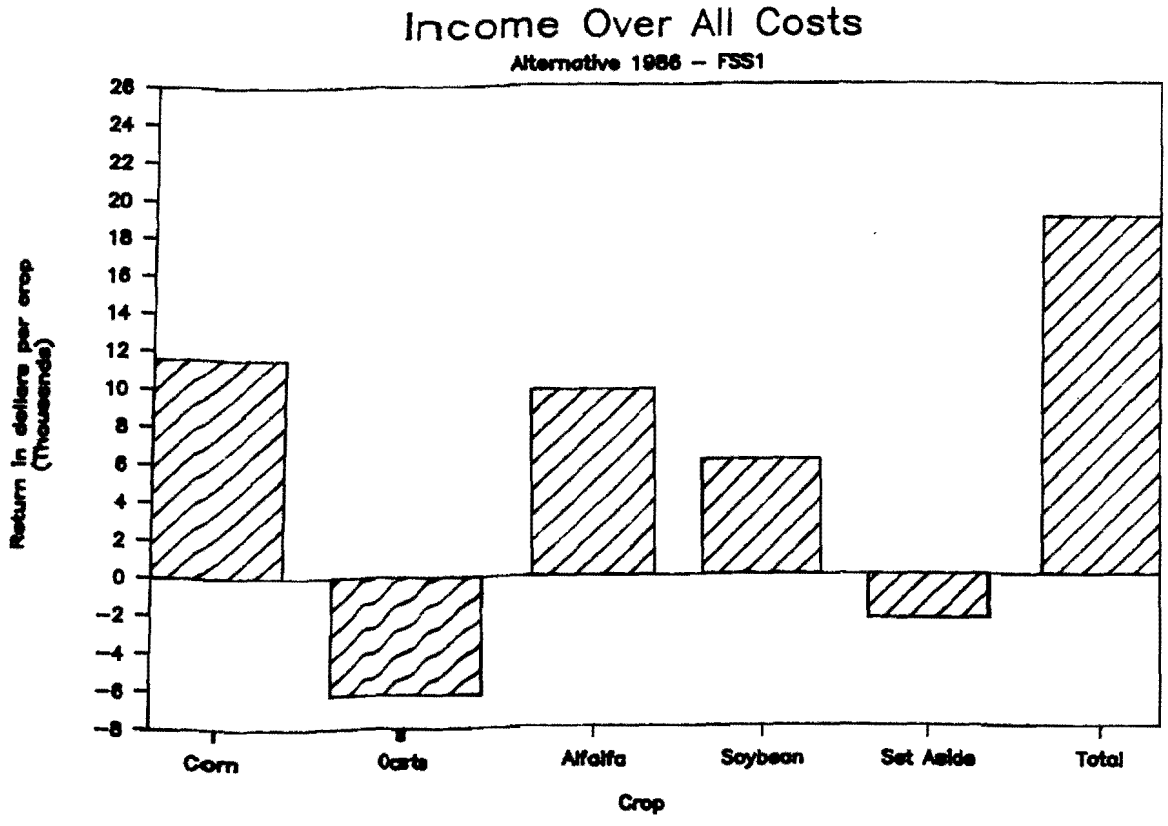
(end of Input Section)

INPUT SUMMARY AND RESULTS--ALTERNATIVE ROTATION 1986: FARMING SYSTEMS STUDY I

	Corn	Oats	Alfalfa	Soybean	Set Aside
RECEIPTS:					
Estimated grain yield (units/ac.)	100	57	6.1	30	0
Estimated selling price or value ($/unit)	$1.66	$0.88	$30.00	$5.00	$0.00
GOVERNMENT PAYMENT:					
Base yield (units/ac.)	63	53	0	0	0
Deficiency payment ($/unit)	$1.21	$0.66	$0.00	$0.00	$0.00
I. Total income per acre	$241.40	$85.43	$184.20	$149.00	$0.00
DIRECT COSTS:					
Seed ($/ac.)	$12.00	$25.88	$0.00	$8.50	$0.00
Fertilizer ($/ac.).	$0.00	$0.00	$0.00	$0.00	$0.00
Fertilizer application ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Herbicide ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Herbicide application ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Insecticide ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Insecticide application ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Crop insurance ($/ac.)	$17.27	$1.55	$0.00	$4.42	$0.00
Storage ($/ac.)	$11.04	$6.36	$0.00	$3.31	$0.00
Drying ($/ac.)	$14.93	$0.00	$0.00	$0.00	$0.00
Overhead ($/ac.)	$5.50	$5.00	$5.00	$5.50	$2.50
Custom machine hire ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Fuel and lubrication ($/ac.)	$4.02	$5.31	$5.22	$3.35	$1.53
Machinery repair ($/ac.)	$8.16	$13.77	$10.14	$6.51	$1.25
Interest on non labor direct costs ($/ac)	$4.32	$3.42	$1.20	$1.87	$0.31
Labor charge($/ac.)	$9.44	$12.30	$19.50	$12.00	$2.42
II. Total direct (operating) costs	$86.67	$73.60	$41.06	$45.46	$8.01
Income over direct costs (I minus II)	$154.73	$11.83	$143.14	$103.54	($8.01)
Breakeven price per unit (direct costs)	$0.87	$1.28	$6.69	$1.53	ERR
FIXED COSTS:					
Interest, Housing & Ins. on machinery ($/ac)	$15.28	$17.92	$16.55	$12.27	$2.40
Deprec. on machinery and equipment ($/ac.)	$16.72	$19.49	$18.27	$14.38	$2.19
Real estate taxes ($/ac.)	$5.25	$5.25	$5.25	$5.25	$5.25
III. Total fixed costs	$37.25	$42.66	$40.07	$31.90	$9.84
IV. Production costs ($/ac., excluding land) (II plus III)	$123.92	$116.26	$81.13	$77.36	$17.85
Production costs ($/unit)	$1.25	$2.03	$13.21	$2.60	ERR
V. Land charges ($/ac.)	$21.00	$21.00	$21.00	$21.00	$21.00
VI. Total production and land costs ($/ac.). (IV plus V)	$144.92	$137.26	$102.13	$98.36	$38.85
Production and land costs ($/unit)	$1.46	$2.39	$16.63	$3.30	ERR
Breakeven yield (units/ac.) (at selling price)	87.3	156.0	3.4	19.7	ERR
VII. Income over all costs ($/acre) (I minus IV)	$96.48	($51.83)	$82.07	$50.64	($38.85)
Income over all costs ($/unit)	$0.97	($0.90)	$13.37	$1.70	ERR

ALTERNATIVE ROTATION 1986: FARMING SYSTEMS STUDY I
SUMMARY DATA FOR REPRESENTATIVE FARM IN NORTHEAST SOUTH DAKOTA.

	Corn	Oats	Alfalfa	Soybean	Set Aside	Total
Farm Program Set-aside Requirement (%)	20	20	0	0	0	
Crop Distribution (acres)	120	120	120	120	60	540
Income Over All Costs ($/acre)	$96.48	($51.83)	$82.07	$50.64	($38.85)	
Income Over All Costs ($/crop)	$11,577	($6,219)	$9,848	$6,077	($2,331)	$18,952



ALTERNATIVE ROTATION NORMAL YEAR: - Farming Systems Study I

INPUT SECTION

	Corn	Oats	Alfalfa	Soybean	Set Aside
RECEIPTS:					
Estimated grain yield (units/ac.)	75	70	3.6	28	0
Estimated selling price or value ($/unit)	$1.66	$0.88	$30.00	$5.00	$0.00
GOVERNMENT PAYMENT:					
Base yield (units/ac.)	63	53	0	0	0
Deficiency payment ($/unit)	$1.21	$0.66	$0.00	$0.00	$0.00
DIRECT COSTS:					
Seed (units/ac.)	19	1	0	1	0
($/unit)	$0.75	$25.88	$0.00	$8.50	$0.00
Fertilizer 1 (units/ac.)	0	0	0	0	0
($/unit)	$0.00	$0.00	$0.00	$0.00	$0.00
Fertilizer 2 (units/ac.)	0	0	0	0	0
($/unit)	$0.00	$0.00	$0.00	$0.00	$0.00
Fertilizer application ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Herbicide 1 (units/ac.)	0	0	0	0	0
($/unit)	$0.00	$0.00	$0.00	$0.00	$0.00
Herbicide 2 (units/ac.)	0	0	0	0	0
($/unit)	$0.00	$0.00	$0.00	$0.00	$0.00
Herbicide application ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Insecticide (units/ac.)	0	0	0	0	0
($/unit)	$0.00	$0.00	$0.00	$0.00	$0.00
Insecticide application ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Crop insurance ($/ac.)	$13.02	$1.89	$0.00	$4.15	$0.00
Storage ($/unit)	$0.11	$0.11	$0.00	$0.11	$0.00
Drying ($/unit)	$0.15	$0.00	$0.00	$0.00	$0.00
Overhead ($/ac.)	$5.50	$5.00	$5.00	$5.50	$2.50
Custom machine hire..					
Tillage ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Planting ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Harvesting ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Fuel and lubrication ($/ac.)	$4.02	$5.00	$5.89	$3.57	$1.53
Machinery repair ($/ac.)	$8.16	$13.81	$10.99	$6.75	$1.25
Crop operating loan borrowed (months)	6	6	6	6	6
Interest APR(%)	12.00	12.00	12.00	12.00	12.00
Labor 1 (hrs./ac.)	1.57	1.90	3.56	1.37	0.40
($/hr)	$6.00	$6.00	$6.00	$6.00	$6.00
Labor 2 (hrs./ac.)	1.00	0.00	0.00	1.14	0.00
($/hr.)	$0.31	$0.00	$0.00	$4.00	$0.00
FIXED COSTS:					
Interest, Housing, and Ins. on Machinery	15.28	16.98	17.82	12.78	2.40
Depreciation on machinery & equipment	$16.72	$18.64	$20.13	$14.85	$2.19
Land Cost ($/acre)	$350	$350	$350	$350	$350
Real Estate Tax Percentage	1.50	1.50	1.50	1.50	1.50

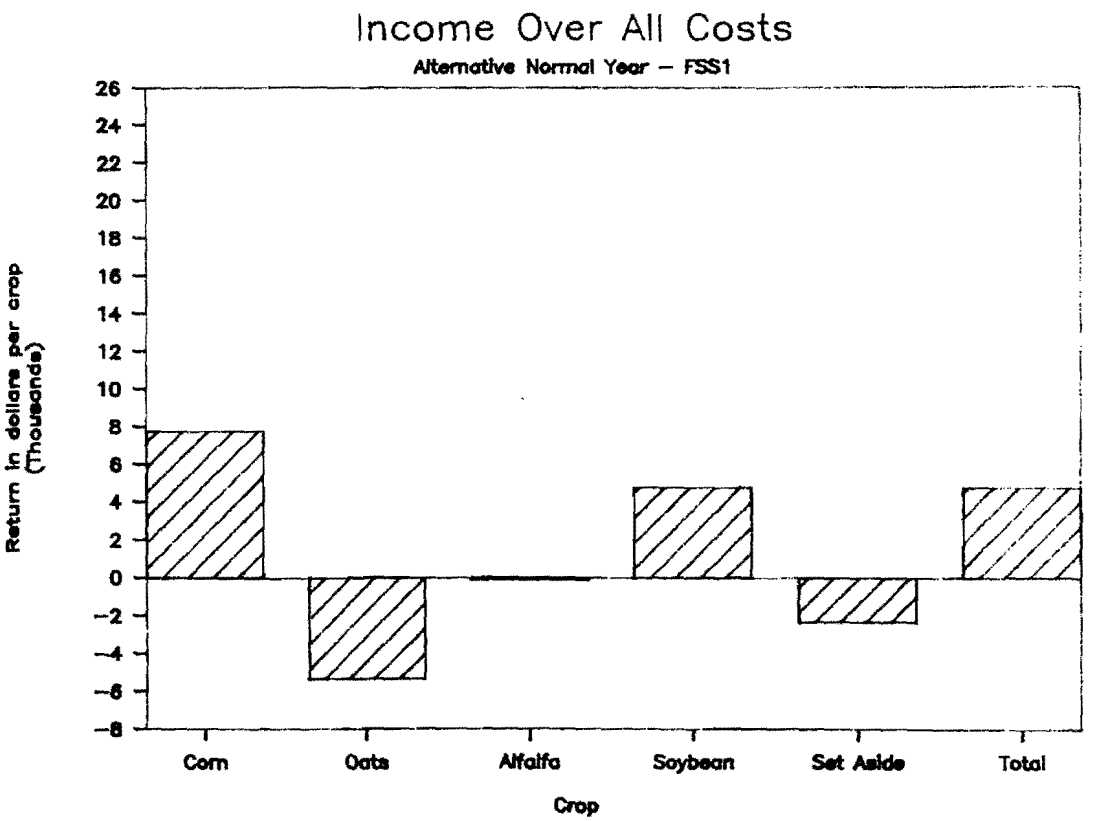
(End of Input Section)

INPUT SUMMARY AND RESULTS--ALTERNATIVE ROTATION NORMAL YEAR: FARMING SYSTEMS STUDY I

	Corn	Oats	Alfalfa	Soybean	Set Aside
RECEIPTS:					
Estimated grain yield (units/ac.).....	75	70	3.6	28	0
Estimated selling price or value ($/unit)...	$1.66	$0.88	$30.00	$5.00	$0.00
GOVERNMENT PAYMENT:					
Base yield (units/ac.).....	63	53	0	0	0
Deficiency payment ($/unit).....	$1.21	$0.66	$0.00	$0.00	$0.00
I. Total income per acre.....	$200.73	$96.58	$108.00	$140.00	$0.00
DIRECT COSTS:					
Seed ($/ac.).....	$14.25	$25.88	$0.00	$8.50	$0.00
Fertilizer ($/ac.).	$0.00	$0.00	$0.00	$0.00	$0.00
Fertilizer application ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Herbicide ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Herbicide application ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Insecticide ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Insecticide application ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Crop insurance ($/ac.).....	$13.02	$1.89	$0.00	$4.15	$0.00
Storage ($/ac.).....	$8.33	$7.77	$0.00	$3.11	$0.00
Drying ($/ac.).....	$10.94	$0.00	$0.00	$0.00	$0.00
Overhead ($/ac.).....	$5.50	$5.00	$5.00	$5.50	$2.50
Custom machine hire ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Fuel and lubrication ($/ac.).....	$4.02	$5.00	$5.89	$3.57	$1.53
Machinery repair ($/ac.).....	$8.16	$13.81	$10.99	$6.75	$1.25
Interest on non labor direct costs ($/ac)...	$3.80	$3.51	$1.29	$1.87	$0.31
Labor charge($/ac.).....	$9.75	$11.42	$21.36	$12.78	$2.42
II. Total direct (operating) costs.....	$77.76	$74.28	$44.53	$46.23	$8.01
Income over direct costs (I minus II)....	$122.97	$22.30	$63.47	$93.77	($8.01)
Breakeven price per unit (direct costs)..	$1.04	$1.06	$12.37	$1.65	ERR
FIXED COSTS:					
Interest, Housing & Ins. on machinery ($/ac)	$15.28	$16.98	$17.82	$12.78	$2.40
Deprec. on machinery and equipment ($/ac.)..	$16.72	$18.64	$20.13	$14.85	$2.19
Real estate taxes ($/ac.).....	$5.25	$5.25	$5.25	$5.25	$5.25
III. Total fixed costs.....	$37.25	$40.87	$43.20	$32.88	$9.84
IV. Production costs ($/ac., excluding land) (II plus III)	$115.01	$115.15	$87.73	$79.11	$17.85
Production costs ($/unit)...	$1.53	$1.65	$24.37	$2.83	ERR
V. Land charges ($/ac.).....	$21.00	$21.00	$21.00	$21.00	$21.00
VI. Total production and land costs ($/ac.). (IV plus V)	$136.01	$136.15	$108.73	$100.11	$38.85
Production and land costs ($/unit).....	$1.81	$1.95	$30.20	$3.58	ERR
Breakeven yield (units/ac.)..... (at selling price)	81.9	154.7	3.6	20.0	ERR
VII. Income over all costs ($/acre)..... (I minus IV)	$64.72	($39.57)	($0.73)	$39.89	($38.85)
Income over all costs ($/unit).....	$0.86	($0.57)	($0.20)	$1.42	ERR

ALTERNATIVE ROTATION NORMAL YEAR: FARMING SYSTEMS STUDY 1
MMAF DATA FOR REPRESENTATIVE FARM IN NORTHEAST SOUTH DAKOTA.

	Corn	Oats	Alfalfa	Soybean	Set Aside	Total
Farm Program Set-aside Requirement (%).....	20	20	0	0	0	
Crop Distribution (acres)..	120	120	120	120	60	540
Income Over All Costs..... ($/acre)	$64.72	($39.57)	($0.73)	$39.89	($38.85)	
Income Over All Costs..... ($/crop)	$7,766	($4,749)	($88)	$4,787	($2,331)	$5,385



Crop	1986 Budgets	Normalized Budgets
1. Corn		
a. Machine operations:	Fertilizer spreader, disc, field cultivate, plant applying Lasso II 15G, cultivate twice, combine, haul	Fertilizer spreader, field cultivate, plant applying Lasso II 15G, harrow, cultivate twice, combine, haul
b. Seeding:	16 MVK/acre @ $.75/MVK	19 MVK/acre @ $.75/MVK
c. Fertilizer:	100 lbs. N/acre @ $.18/lb.	100 lbs. N/acre @ $.18/lb. 20 lbs. P/acre @ $.18/lb.
d. Herbicide:	Lasso II 15G: Band 7 lbs./acre @ $.85/lb.	Same as 1986
e. Machine labor:	1.37 hrs./acre @ $6/hr.	1.33 hrs./acre @ $6/hr.
f. Other labor:	Grain drying: $.0041/bu. for 115 bu./acre	Grain drying: $.0041/bu. for 82 bu./acre
2. Soybeans		
a. Machine operations:	Ground floater for Treflan, disc twice, plant, cultivate twice, combine, haul	Same as 1986
b. Seeding:	1 bu./acre @ $8.50/bu.	Same as 1986
c. Fertilizer:		20 lbs. P/acre @ $.18/lb. applied with planter
d. Herbicide:	Treflan 4E: 1.5 pts./acre @ $3.36/pt.	Same as 1986
e. Machine labor:	1.08 hrs./acre @ $6/hr.	Same as 1986
f. Other labor:	Hand weeding: 1.07 hrs./acre @ $4/hr.	Same as 1986
g. Other:	Ground floater for Treflan @ $2.59/acre	Same as 1986
3. Spring Wheat		
a. Machine operations:	Fertilizer spreader, disc, field cultivate, drill, spray Hoelon and Buctril in one pass, swath, combine, haul, fall plow	Same as 1986
b. Seeding:	75 lbs./acre @ $.1083/lb.	Same as 1986
c. Fertilizer:	90 lbs. N/acre @ $.18/lb.	90 lbs. N/acre @ $.18/lb. 20 lbs. P/acre @ $.18/lb.
d. Herbicide:	Hoelon 3E: 2 pts./acre @ $6.19/pt. Buctril 2E: 1 pt./acre @ $5.46/pt.	Same as 1986
e. Machine labor:	1.81 hrs./acre @ $6/hr.	Same as 1986
4. Set Aside		
a. Machine operations:	Field cultivate, spray, chisel	Same as 1986
c. Herbicide:	2, 4-D Amine: .6243 pts./acre @ $1.47/pt. Roundup 3L: .312 pt./acre @ $10.36/pt.	Same as 1986
c. Machine labor:	.35 hrs./acre @ $6/hr.	Same as 1986

CONVENTIONAL ROTATION 1986: FARMING SYSTEMS STUDY I

INPUT SECTION	Corn	Soybean	S. Wheat	Other	Set Aside
RECEIPTS:					
Estimated grain yield (units/ac.)	115	28	58	0	0
Estimated selling price or value ($/unit)	$1.66	$5.00	$2.37	$0.00	$0.00
GOVERNMENT PAYMENT:					
Base yield (units/ac.)	63	0	27	0	0
Deficiency payment ($/unit)	$1.21	$0.00	$2.10	$0.00	$0.00
DIRECT COSTS:					
Seed (units/ac.)	16	1	75	0	0
($/unit)	$0.75	$8.50	$0.11	$0.00	$0.00
Fertilizer 1 (units/ac.)	100	0	90	0	0
($/unit)	$0.18	$0.00	$0.18	$0.00	$0.00
Fertilizer 2 (units/ac.)	0	0	0	0	0
($/unit)	$0.00	$0.00	$0.00	$0.00	$0.00
Fertilizer application ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Herbicide 1 (units/ac.)	7	1.5	2	0	0.62
($/unit)	$0.85	$3.36	$6.19	$0.00	$1.47
Herbicide 2 (units/ac.)	0	0	1	0	0.31
($/unit)	$0.00	$0.00	$5.46	$0.00	$10.36
Herbicide application ($/ac.)	$0.00	$2.59	$0.00	$0.00	$0.00
Insecticide (units/ac.)	0	0	0	0	0
($/unit)	$0.00	$0.00	$0.00	$0.00	$0.00
Insecticide application ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Crop insurance ($/ac.)	$19.89	$4.16	$5.27	$0.00	$0.00
Storage ($/unit)	$0.11	$0.11	$0.11	$0.00	$0.00
Drying ($/unit)	$0.15	$0.00	$0.00	$0.00	$0.00
Overhead ($/ac.)	$5.50	$5.50	$5.00	$0.00	$2.50
Custom machine hire					
Tillage ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Planting ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Harvesting ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Fuel and lubrication ($/ac.)	$3.72	$3.04	$5.22	$0.00	$1.12
Machinery repair ($/ac.)	$7.42	$6.56	$10.34	$0.00	$1.00
Crop operating loan borrowed (months)	6	6	6	0	6
Interest APR(%)	12.00	12.00	12.00	0.00	12.00
Labor 1 (hrs./ac.)	1.37	1.08	1.81	0.00	0.35
($/hr)	$6.00	$6.00	$6.00	$0.00	$6.00
Labor 2 (hrs./ac.)	0.00	1.07	0.00	0.00	0.00
($/hr.)	$0.00	$4.00	$0.00	$0.00	$0.00
FIXED COSTS:					
Interest, Housing, and Ins. on Machinery	13.46	12.75	16.99	0.00	1.85
Depreciation on machinery & equipment	$15.76	$15.01	$18.37	$0.00	$1.75
Land Cost ($/acre)	$350	$350	$350	$0	$350
Real Estate Tax Percentage	1.50	1.50	1.50	0.00	1.50

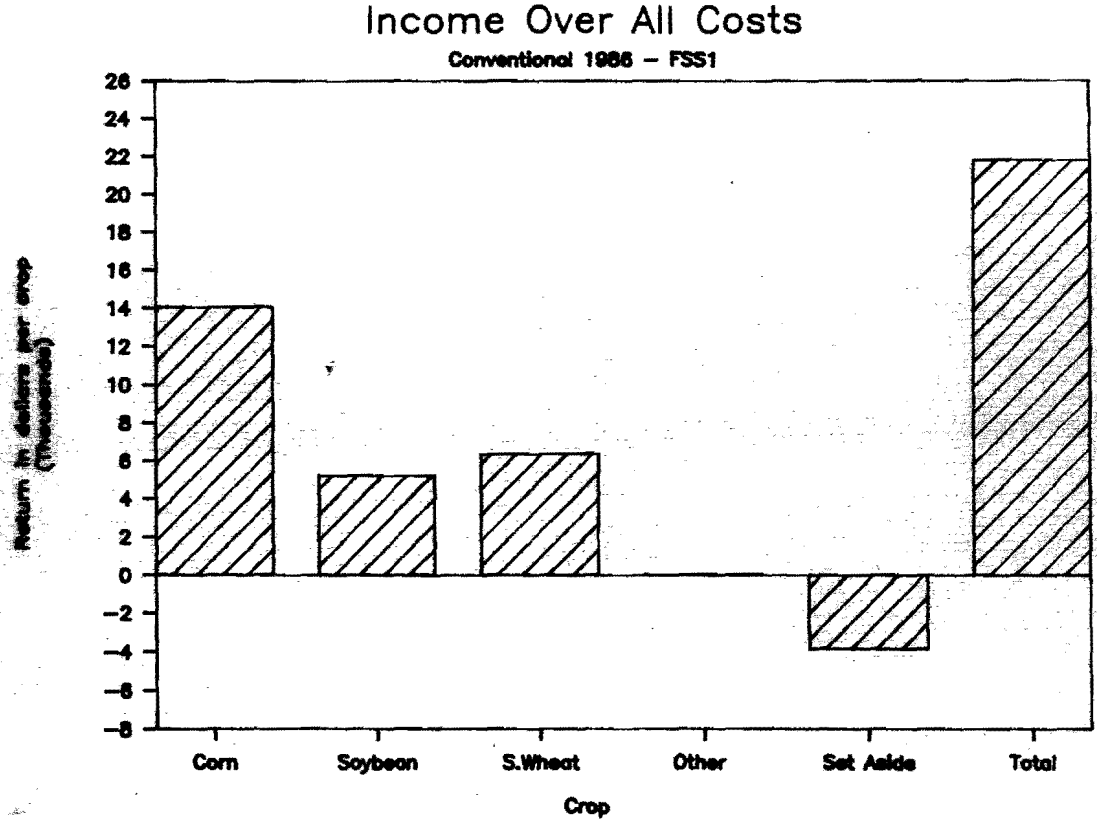
(end of Input Section)

INPUT SUMMARY AND RESULTS: CONVENTIONAL ROTATION--FARMING SYSTEMS STUDY I

	Corn	Soybean	S.Wheat	Other	Set Aside
RECEIPTS:					
Estimated grain yield (units/ac.).....	115	28	58	0	0
Estimated selling price or value ($/unit)...	$1.66	$5.00	$2.37	$0.00	$0.00
GOVERNMENT PAYMENT:					
Base yield (units/ac.).....	63	0	27	0	0
Deficiency payment ($/unit).....	$1.21	$0.00	$2.10	$0.00	$0.00
I. Total income per acre.....	$266.47	$140.50	$193.92	$0.00	$0.00
DIRECT COSTS:					
Seed ($/ac.).....	$12.00	$8.50	$8.12	$0.00	$0.00
Fertilizer ($/ac.).	$18.00	$0.00	$16.20	$0.00	$0.00
Fertilizer application ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Herbicide ($/ac.).....	$5.95	$5.04	$17.84	$0.00	$4.15
Herbicide application ($/ac.).....	$0.00	$2.59	$0.00	$0.00	$0.00
Insecticide ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Insecticide application ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Crop insurance ($/ac.).....	$19.89	$4.16	$5.27	$0.00	$0.00
Storage ($/ac.).....	$12.72	$3.12	$6.43	$0.00	$0.00
Drying ($/ac.).....	$17.19	$0.00	$0.00	$0.00	$0.00
Overhead ($/ac.).....	$5.50	$5.50	$5.00	$0.00	$2.50
Custom machine hire ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Fuel and lubrication ($/ac.).....	$3.72	$3.04	$5.22	$0.00	$1.12
Machinery repair ($/ac.).....	$7.42	$6.56	$10.34	$0.00	$1.00
Interest on non labor direct costs ($/ac)...	$6.06	$2.28	$4.40	$0.00	$0.52
Labor charge($/ac.).....	$8.20	$10.74	$10.83	$0.00	$2.12
II. Total direct (operating) costs.....	$116.65	$51.53	$89.65	$0.00	$11.42
Income over direct costs (I minus II)....	$149.82	$88.97	$104.27	$0.00	($11.42)
Breakeven price per unit (direct costs)..	$1.02	$1.83	$1.55	ERR	ERR
FIXED COSTS:					
Interest, Housing & Ins. on machinery ($/ac)	$13.46	$12.75	$16.99	$0.00	$1.85
Deprec. on machinery and equipment ($/ac.)..	$15.76	$15.01	$18.37	$0.00	$1.75
Real estate taxes ($/ac.).....	$5.25	$5.25	$5.25	$0.00	$5.25
III. Total fixed costs.....	$34.47	$33.01	$40.61	$0.00	$8.85
IV. Production costs ($/ac., excluding land) (II plus III)	$151.12	$84.54	$130.26	$0.00	$20.27
Production costs ($/unit)...	$1.32	$3.01	$2.25	ERR	ERR
V. Land charges ($/ac.).....	$21.00	$21.00	$21.00	$0.00	$21.00
VI. Total production and land costs ($/ac.). (IV plus V)	$172.12	$105.54	$151.26	$0.00	$41.27
Production and land costs ($/unit).....	$1.50	$3.76	$2.61	ERR	ERR
Breakeven yield (units/ac.)..... (at selling price)	103.7	21.1	63.8	ERR	ERR
VII. Income over all costs ($/acre)..... (I minus IV)	$94.35	$34.96	$42.66	$0.00	($41.27)
Income over all costs ($/unit).....	$0.82	$1.24	$0.74	ERR	ERR

CONVENTIONAL ROTATION 1986: FARMING SYSTEMS STUDY I
SUMMARY DATA FOR REPRESENTATIVE FARM IN NORTHEAST SOUTH DAKOTA.

	Corn	Soybean	S.Wheat	Other	Set Aside	Total
Farm Program Set-aside Requirement (%).....	20	0	27.5	0	0	
Crop Distribution (acres)..	149	149	149	0	93	540
Income Over All Costs..... ($/acre)	$94.35	$34.96	$42.66	$0.00	($41.27)	
Income Over All Costs..... ($/crop)	$14,057	$5,209	$6,356	$0	($3,838)	$21,785



CONVENTIONAL ROTATION NORMAL YEAR: FARMING SYSTEMS STUDY I

INPUT SECTION	Corn	Soybean	S. Wheat	Other	Set Aside
RECEIPTS:					
Estimated grain yield (units/ac.)	82	30	42	0	0
Estimated selling price or value ($/unit)	$1.66	$5.00	$2.37	$0.00	$0.00
GOVERNMENT PAYMENT:					
Base yield (units/ac.)	63	0	27	0	0
Deficiency payment ($/unit)	$1.21	$0.00	$2.10	$0.00	$0.00
DIRECT COSTS:					
Seed (units/ac.)	19	1	75	0	0
($/unit)	$0.75	$8.50	$0.11	$0.00	$0.00
Fertilizer 1 (units/ac.)	100	0	90	0	0
($/unit)	$0.18	$0.00	$0.18	$0.00	$0.00
Fertilizer 2 (units/ac.)	20	20	20	0	0
($/unit)	$0.18	$0.18	$0.18	$0.00	$0.00
Fertilizer application ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Herbicide 1 (units/ac.)	7	1.5	2	0	0.62
($/unit)	$0.85	$3.36	$6.19	$0.00	$1.47
Herbicide 2 (units/ac.)	0	0	1	0	0.31
($/unit)	$0.00	$0.00	$5.46	$0.00	$10.36
Herbicide application ($/ac.)	$0.00	$2.59	$0.00	$0.00	$0.00
Insecticide (units/ac.)	0	0	0	0	0
($/unit)	$0.00	$0.00	$0.00	$0.00	$0.00
Insecticide application ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Crop insurance ($/ac.)	$14.23	$4.45	$3.82	$0.00	$0.00
Storage ($/unit)	$0.11	$0.11	$0.11	$0.00	$0.00
Drying ($/unit)	$0.15	$0.00	$0.00	$0.00	$0.00
Overhead ($/ac.)	$5.50	$5.50	$5.00	$0.00	$2.50
Custom machine hire					
Tillage ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Planting ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Harvesting ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Fuel and lubrication ($/ac.)	$3.70	$3.04	$5.22	$0.00	$1.12
Machinery repair ($/ac.)	$7.53	$6.56	$10.34	$0.00	$1.00
Crop operating loan borrowed (months)	6	6	6	0	6
Interest APR(%)	12.00	12.00	12.00	0.00	12.00
Labor 1 (hrs./ac.)	1.33	1.08	1.81	0.00	0.35
($/hr)	$6.00	$6.00	$6.00	$0.00	$6.00
Labor 2 (hrs./ac.)	0.00	1.07	0.00	0.00	0.00
($/hr.)	$0.00	$4.00	$0.00	$0.00	$0.00
FIXED COSTS:					
Interest, Housing, and Ins. on Machinery	12.74	12.75	16.99	0.00	1.85
Depreciation on machinery & equipment	$14.97	$15.01	$18.37	$0.00	$1.75
Land Cost ($/acre)	$350	$350	$350	$0	$350
Real Estate Tax Percentage	1.50	1.50	1.50	0.00	1.50

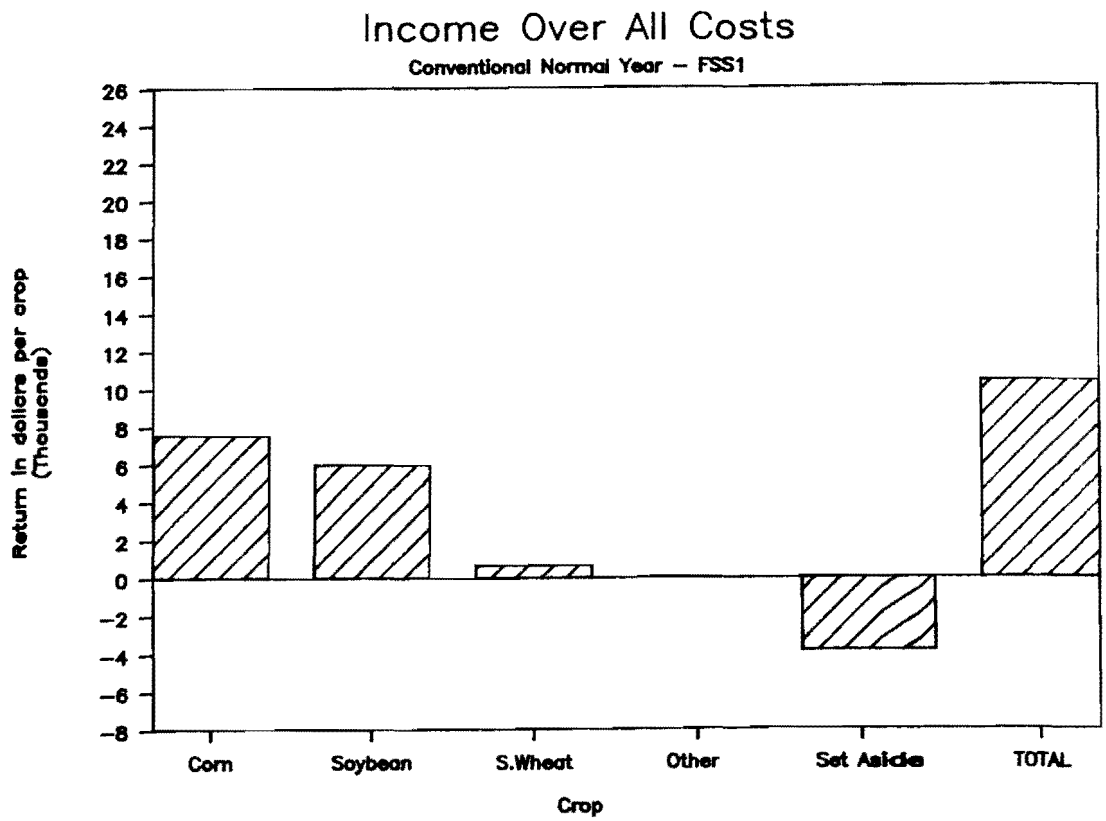
(end of Input Section)

INPUT SUMMARY AND RESULTS: CONVENTIONAL ROTATION NORMAL YEAR--FARMING SYSTEMS STUDY I

	Corn	Soybean	S.Wheat	Other	Set Aside
RECEIPTS:					
Estimated grain yield (units/ac.).....	82	30	42	0	0
Estimated selling price or value ($/unit)...	$1.66	$5.00	$2.37	$0.00	$0.00
GOVERNMENT PAYMENT:					
Base yield (units/ac.).....	63	0	27	0	0
Deficiency payment ($/unit).....	$1.21	$0.00	$2.10	$0.00	$0.00
I. Total income per acre.....	$212.35	$150.00	$156.24	$0.00	$0.00
DIRECT COSTS:					
Seed ($/ac.).....	$14.25	$8.50	$8.12	$0.00	$0.00
Fertilizer ($/ac.).	$21.60	$3.60	$19.80	$0.00	$0.00
Fertilizer application ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Herbicide ($/ac.).....	$5.95	$5.04	$17.84	$0.00	$4.15
Herbicide application ($/ac.).....	$0.00	$2.59	$0.00	$0.00	$0.00
Insecticide ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Insecticide application ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Crop insurance ($/ac.).....	$14.23	$4.45	$3.82	$0.00	$0.00
Storage ($/ac.).....	$9.10	$3.33	$4.66	$0.00	$0.00
Drying ($/ac.).....	$12.30	$0.00	$0.00	$0.00	$0.00
Overhead ($/ac.).....	$5.50	$5.50	$5.00	$0.00	$2.50
Custom machine hire ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Fuel and lubrication ($/ac.).....	$3.70	$3.04	$5.22	$0.00	$1.12
Machinery repair ($/ac.).....	$7.53	$6.56	$10.34	$0.00	$1.00
Interest on non labor direct costs ($/ac)...	$5.57	$2.52	$4.43	$0.00	$0.52
Labor charge($/ac.).....	$7.98	$10.74	$10.83	$0.00	$2.12
II. Total direct (operating) costs.....	$107.72	$55.86	$90.06	$0.00	$11.42
Income over direct costs (I minus II)....	$104.63	$94.14	$66.18	$0.00	($11.42)
Breakeven price per unit (direct costs)..	$1.31	$1.86	$2.14	ERR	ERR
FIXED COSTS:					
Interest, Housing & Ins. on machinery ($/ac)	$12.74	$12.75	$16.99	$0.00	$1.85
Deprec. on machinery and equipment ($/ac.)..	$14.97	$15.01	$18.37	$0.00	$1.75
Real estate taxes ($/ac.).....	$5.25	$5.25	$5.25	$0.00	$5.25
III. Total fixed costs.....	$32.96	$33.01	$40.61	$0.00	$8.85
IV. Production costs ($/ac., excluding land) (II plus III)	$140.68	$88.87	$130.67	$0.00	$20.27
Production costs ($/unit)...	$1.72	$2.96	$3.11	ERR	ERR
V. Land charges ($/ac.).....	$21.00	$21.00	$21.00	$0.00	$21.00
VI. Total production and land costs ($/ac.). (IV plus V)	$161.68	$109.87	$151.67	$0.00	$41.27
Production and land costs ($/unit).....	$1.97	$3.66	$3.61	ERR	ERR
Breakeven yield (units/ac.)..... (at selling price)	97.4	22.0	64.0	ERR	ERR
VII. Income over all costs ($/acre)..... (I minus IV)	$50.67	$40.13	$4.57	$0.00	($41.27)
Income over all costs ($/unit).....	$0.62	$1.34	$0.11	ERR	ERR

CONVENTIONAL ROTATION NORMAL YEAR: FARMING SYSTEMS STUDY I
SUMMARY DATA FOR REPRESENTATIVE FARM IN NORTHEAST SOUTH DAKOTA.

	Corn	Soybean	S.Wheat	Other	Set Aside	TOTAL FARM
Farm Program Set-aside Requirement (%).....	20	0	27.5	0	0	
Crop Distribution (acres)..	149	149	149	0	93	540
Income Over All Costs..... ($/acre)	$50.67	$40.13	$4.57	$0.00	($41.27)	
Income Over All Costs..... ($/crop)	$7,551	$5,979	$680	$0	($3,838)	$10,372



ASSUMPTIONS AND EXPLANATIONS
Ridge Till Rotation: Farming Systems Study I

Crop		1986 Budgets	Normalized Budgets
1. Corn			
a.	Machine operations:	Ridge till planter applying Lasso II 15G and Nitrogen, cultivate twice (ridging the last), combine, haul	Same as 1986 except apply Phosphorus with planter
b.	Seeding:	20 MVK/acre @ $.75/MVK	19 MVK/acre @ $.75/MVK
c.	Fertilizer:	100 lbs. N/acre @ $.18/lb.	100 lbs. N/acre @ $.18/lb. 20 lbs. P/acre @ $.18/lb.
d.	Herbicide:	Lasso II 15G: Band 7 lbs./acre @ $.85/lb.	Same as 1986
e.	Machine labor:	.95 hrs./acre @ $6/hr.	Same as 1986
f.	Other labor:	Grain drying: $.0041/bu. for 120 bu./acre	Grain drying: $.0041/bu. for 84 bu./acre
2. Soybeans			
a.	Machine operations:	Ridge till planter applying Lasso II 15G, conventional cultivate twice, spray Blazer, combine, haul	Same as 1986 except apply Phosphorus with planter
b.	Seeding:	1 bu./acre @ $8.50/bu.	Same as 1986
c.	Fertilizer:		20 lbs. P/acre @ $.18/lb.
d.	Herbicide:	Lasso II 15G: Band 7 lbs./acre @ $.85/lb. Blazer 2L; 1.5 pt./acre @ $10.16/pt.	Same as 1986
e.	Machine labor:	.94 hrs./acre @ $6/hr.	Same as 1986
f.	Other labor:	Hand weeding: 1.35 hrs./acre @ $4.00/hr.	Same as 1986
3. Spring Wheat			
a.	Machine operations:	Fertilizer spreader, field cultivate, hoe drill, spray Hoelon and Buctril in one pass, swath, combine, haul, ridge till cultivate in fall	Same as 1986
b.	Seeding:	75 lbs./acre @ $.1083/bu.	Same as 1986
c.	Fertilizer:	90 lbs. N/acre @ $.18/lb.	90 lbs. N/acre @ $.18/lb. 20 lbs. P/acre @ $.18/lb.
d.	Herbicide:	Hoelon 3E: 2 pts./acre @ $6.19/pt. Buctril 2E: 1 pt./acre @ $5.46/pt.	Same as 1986
e.	Machine labor:	1.42 hrs./acre @ $6/hr.	Same as 1986
4. Set Aside			
a.	Machine operatins:	Field cultivate, spray, chisel	
b.	Herbicide:	2, 4-D Amine: .6243 pts./acre @ $1.47/pt. Roundup 3L; .312 pts./acre @ $10.36/pt.	Same as 1986
c.	Machine labor:	.35 hrs/acre @ $6/hr.	Same as 1986

RIDGE TILL ROTATION 1986: Farming Systems Study I

INPUT SECTION	Corn	Soybean	S. Wheat	Other	Set Aside
RECEIPTS:					
Estimated grain yield (units/ac.)	120	25	51	0	0
Estimated selling price or value ($/unit)	$1.66	$5.00	$2.37	$0.00	$0.00
GOVERNMENT PAYMENT:					
Base yield (units/ac.)	63	0	27	0	0
Deficiency payment ($/unit)	$1.21	$0.00	$2.10	$0.00	$0.00
DIRECT COSTS:					
Seed (units/ac.)	20	1	75	0	0
($/unit)	$0.75	$8.50	$0.11	$0.00	$0.00
Fertilizer 1 (units/ac.)	100	0	90	0	0
($/unit)	$0.18	$0.00	$0.18	$0.00	$0.00
Fertilizer 2 (units/ac.)	0	0	0	0	0
($/unit)	$0.00	$0.00	$0.00	$0.00	$0.00
Fertilizer application ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Herbicide 1 (units/ac.)	7	7	2	0	0.62
($/unit)	$0.85	$0.85	$6.19	$0.00	$1.47
Herbicide 2 (units/ac.)	0	1.5	1	0	0.31
($/unit)	$0.00	$10.16	$5.46	$0.00	$10.36
Herbicide application ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Insecticide (units/ac.)	0	0	0	0	0
($/unit)	$0.00	$0.00	$0.00	$0.00	$0.00
Insecticide application ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Crop insurance ($/ac.)	$20.76	$3.66	$4.63	$0.00	$0.00
Storage ($/unit)	$0.11	$0.11	$0.11	$0.00	$0.00
Drying ($/unit)	$0.15	$0.00	$0.00	$0.00	$0.00
Overhead ($/ac.)	$5.50	$5.50	$5.50	$0.00	$2.50
Custom machine hire					
Tillage ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Planting ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Harvesting ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Fuel and lubrication ($/ac.)	$2.52	$2.45	$3.48	$0.00	$1.12
Machinery repair ($/ac.)	$6.15	$5.89	$8.85	$0.00	$1.00
Crop operating loan borrowed (months)	6	6	6	0	6
Interest APR(%)	12.00	12.00	12.00	0.00	12.00
Labor 1 (hrs./ac.)	0.95	0.94	1.42	0.00	0.35
($/hr)	$6.00	$6.00	$6.00	$0.00	$6.00
Labor 2 (hrs./ac.)	0.00	1.34	0.00	0.00	0.00
($/hr.)	$0.00	$4.00	$0.00	$0.00	$0.00
FIXED COSTS:					
Interest, Housing, and Ins. on Machinery	10.02	10.23	13.45	0.00	1.85
Depreciation on machinery & equipment	$12.49	$12.60	$15.53	$0.00	$1.75
Land Cost ($/acre)	$350	$350	$350	$0	$350
Real Estate Tax Percentage	1.50	1.50	1.50	0.00	1.50

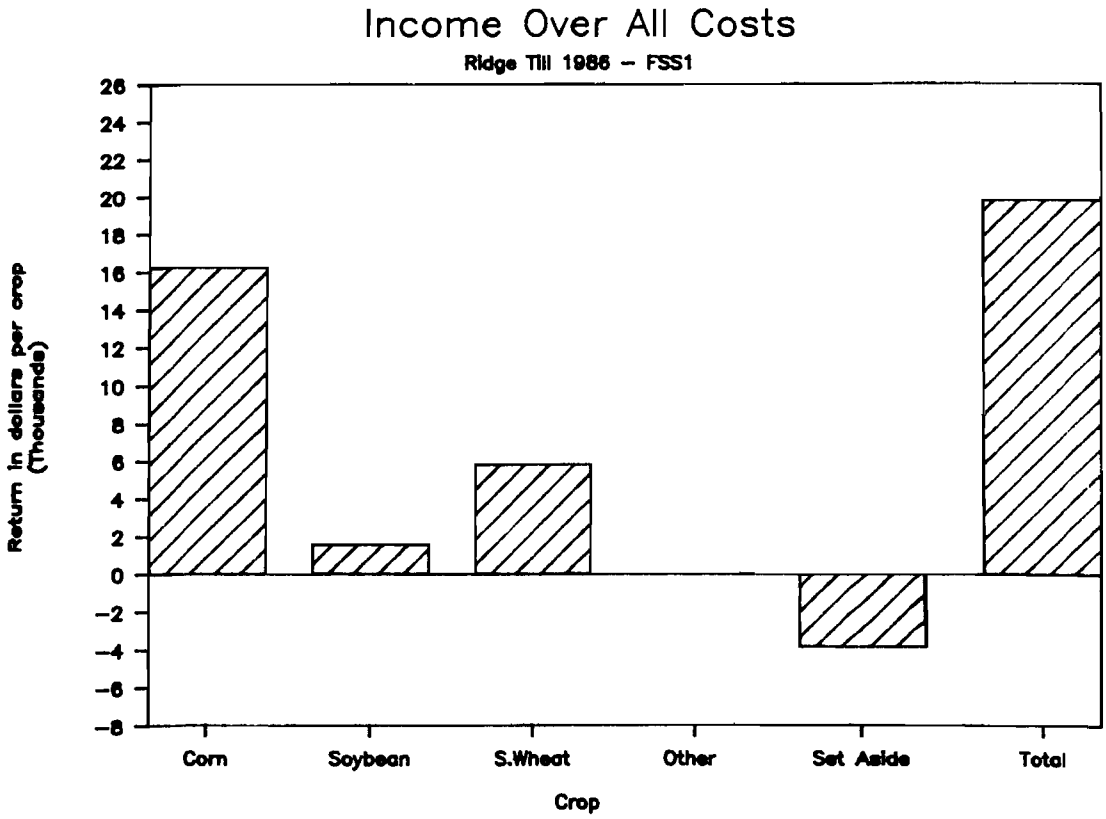
(end of Input Section)

INPUT SUMMARY AND RESULTS--RIDGE TILL ROTATION 1986: FARMING SYSTEMS STUDY I

	Corn	Soybean	S. Wheat	Other	Set Aside
RECEIPTS:					
Estimated grain yield (units/ac.).....	120	25	51	0	0
Estimated selling price or value ($/unit)...	$1.66	$5.00	$2.37	$0.00	$0.00
GOVERNMENT PAYMENT:					
Base yield (units/ac.).....	63	0	27	0	0
Deficiency payment ($/unit).....	$1.21	$0.00	$2.10	$0.00	$0.00
I. Total income per acre.....	$274.77	$123.50	$177.33	$0.00	$0.00
DIRECT COSTS:					
Seed ($/ac.).....	$15.00	$8.50	$8.10	$0.00	$0.00
Fertilizer ($/ac.).	$18.00	$0.00	$16.20	$0.00	$0.00
Fertilizer application ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Herbicide ($/ac.).....	$5.95	$21.19	$17.84	$0.00	$4.15
Herbicide application ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Insecticide ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Insecticide application ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Crop insurance ($/ac.).....	$20.76	$3.66	$4.63	$0.00	$0.00
Storage ($/ac.).....	$13.28	$2.74	$5.65	$0.00	$0.00
Drying ($/ac.).....	$17.94	$0.00	$0.00	$0.00	$0.00
Overhead ($/ac.).....	$5.50	$5.50	$5.50	$0.00	$2.50
Custom machine hire ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Fuel and lubrication ($/ac.).....	$2.52	$2.45	$3.48	$0.00	$1.12
Machinery repair ($/ac.).....	$6.15	$5.89	$8.85	$0.00	$1.00
Interest on non labor direct costs ($/ac)...	$6.22	$2.95	$4.16	$0.00	$0.52
Labor charge($/ac.).....	$5.70	$11.02	$8.52	$0.00	$2.12
II. Total direct (operating) costs.....	$117.01	$63.91	$82.93	$0.00	$11.41
Income over direct costs (I minus II)....	$157.75	$59.59	$94.40	$0.00	($11.41)
Breakeven price per unit (direct costs)..	$0.98	$2.59	$1.63	ERR	ERR
FIXED COSTS:					
Interest, Housing & Ins. on machinery ($/ac)	$10.02	$10.23	$13.45	$0.00	$1.85
Deprec. on machinery and equipment ($/ac.)..	$12.49	$12.60	$15.53	$0.00	$1.75
Real estate taxes ($/ac.).....	$5.25	$5.25	$5.25	$0.00	$5.25
III. Total fixed costs.....	$27.76	$28.08	$34.23	$0.00	$8.85
IV. Production costs ($/ac., excluding land) (II plus III)	$144.77	$91.99	$117.16	$0.00	$20.26
Production costs ($/unit)...	$1.21	$3.72	$2.30	ERR	ERR
V. Land charges ($/ac.).....	$21.00	$21.00	$21.00	$0.00	$21.00
VI. Total production and land costs ($/ac.). (IV plus V)	$165.77	$112.99	$138.16	$0.00	$41.26
Production and land costs ($/unit).....	$1.39	$4.57	$2.71	ERR	ERR
Breakeven yield (units/ac.)..... (at selling price)	99.9	22.6	58.3	ERR	ERR
VII. Income over all costs ($/acre)..... (I minus IV)	$108.99	$10.51	$39.17	$0.00	($41.26)
Income over all costs ($/unit).....	$0.91	$0.43	$0.77	ERR	ERR

RIDGETILL ROTATION 1986: FARMING SYSTEMS STUDY I
SUMMARY DATA FOR REPRESENTATIVE FARM IN NORTHEAST SOUTH DAKOTA.

	Corn	Soybean	S.Wheat	Other	Set Aside	Total
Farm Program Set-aside Requirement (%).....	20	0	27.5	0	0	
Crop Distribution (acres)..	149	149	149	0	93	540
Income Over All Costs..... ($/acre)	$108.99	$10.51	$39.17	$0.00	($41.26)	
Income Over All Costs..... ($/crop)	$16,240	$1,567	$5,837	$0	($3,837)	$19,806



RIDGE TILL ROTATION NORMAL YEAR: Farming Systems Study I

INPUT SECTION	Corn	Soybean	S. Wheat	Other	Set Aside
RECEIPTS:					
Estimated grain yield (units/ac.)	84	31	42	0	0
Estimated selling price or value ($/unit)	$1.66	$5.00	$2.37	$0.00	$0.00
GOVERNMENT PAYMENT:					
Base yield (units/ac.)	63	0	27	0	0
Deficiency payment ($/unit)	$1.21	$0.00	$2.10	$0.00	$0.00
DIRECT COSTS:					
Seed (units/ac.)	19	1	75	0	0
($/unit)	$0.75	$8.50	$0.11	$0.00	$0.00
Fertilizer 1 (units/ac.)	100	0	90	0	0
($/unit)	$0.18	$0.00	$0.18	$0.00	$0.00
Fertilizer 2 (units/ac.)	20	20	20	0	0
($/unit)	$0.18	$0.18	$0.18	$0.00	$0.00
Fertilizer application ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Herbicide 1 (units/ac.)	7	7	2	0	0.62
($/unit)	$0.85	$0.85	$6.19	$0.00	$1.47
Herbicide 2 (units/ac.)	0	1.5	1	0	0.31
($/unit)	$0.00	$10.16	$5.46	$0.00	$10.36
Herbicide application ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Insecticide (units/ac.)	0	0	0	0	0
($/unit)	$0.00	$0.00	$0.00	$0.00	$0.00
Insecticide application ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Crop insurance ($/ac.)	$14.58	$4.59	$3.82	$0.00	$0.00
Storage ($/unit)	$0.11	$0.11	$0.11	$0.00	$0.00
Drying ($/unit)	$0.15	$0.00	$0.00	$0.00	$0.00
Overhead ($/ac.)	$5.50	$5.50	$5.50	$0.00	$2.50
Custom machine hire					
Tillage ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Planting ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Harvesting ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Fuel and lubrication ($/ac.)	$2.52	$2.18	$3.48	$0.00	$1.12
Machinery repair ($/ac.)	$6.15	$5.54	$8.85	$0.00	$1.00
Crop operating loan borrowed (months)	6	6	6	0	6
Interest APR(%)	12.00	12.00	12.00	0.00	12.00
Labor 1 (hrs./ac.)	0.95	0.94	1.42	0.00	0.35
($/hr)	$6.00	$6.00	$6.00	$0.00	$6.00
Labor 2 (hrs./ac.)	0.00	1.34	0.00	0.00	0.00
($/hr.)	$0.00	$4.00	$0.00	$0.00	$0.00
FIXED COSTS:					
Interest, Housing, and Ins. on Machinery	10.02	9.67	13.45	0.00	1.85
Depreciation on machinery & equipment	$12.49	$14.91	$15.53	$0.00	$1.75
Land Cost ($/acre)	$350	$350	$350	$0	$350
Real Estate Tax Percentage	1.50	1.50	1.50	0.00	1.50

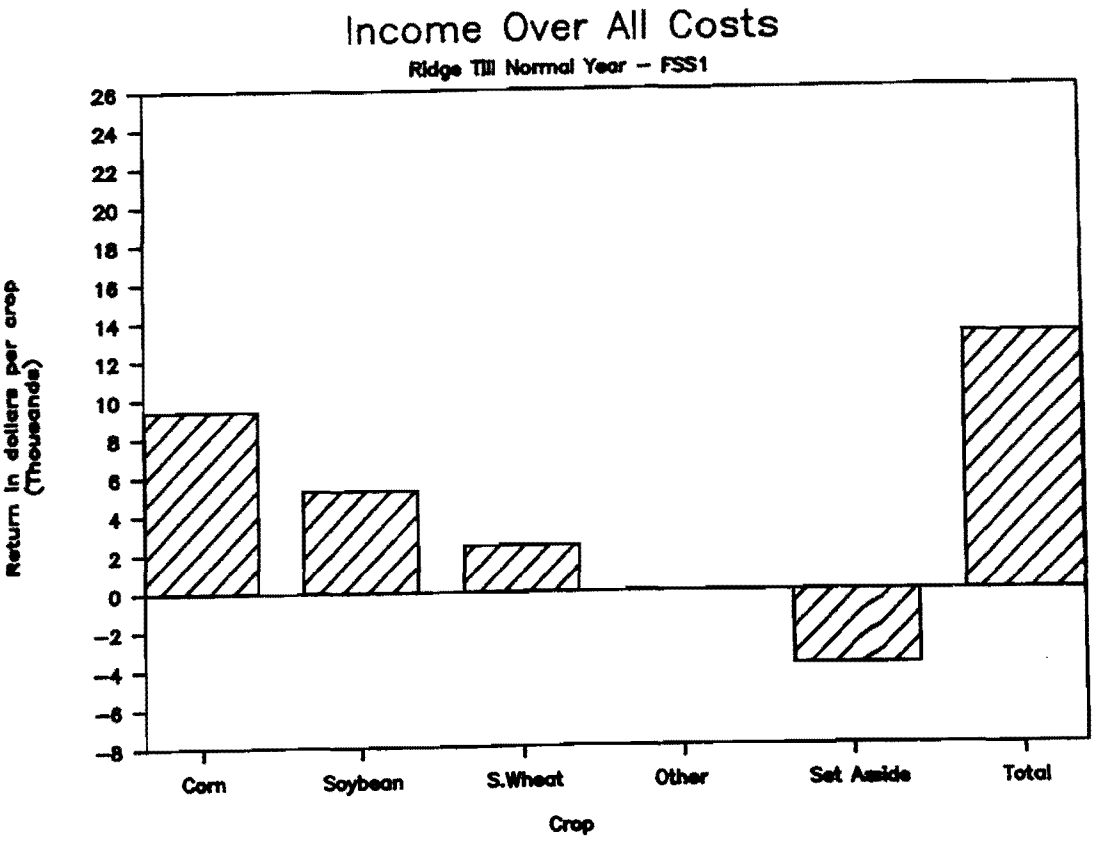
(end of Input Section)

INPUT SUMMARY AND RESULTS--RIDGE TILL ROTATION NORMAL YEAR: Farming Systems Study I

	Corn	Soybean	S. Wheat	Other	Set Aside
RECEIPTS:					
Estimated grain yield (units/ac.)	84	31	42	0	0
Estimated selling price or value ($/unit)	$1.66	$5.00	$2.37	$0.00	$0.00
GOVERNMENT PAYMENT:					
Base yield (units/ac.)	63	0	27	0	0
Deficiency payment ($/unit)	$1.21	$0.00	$2.10	$0.00	$0.00
I. Total income per acre	$215.67	$155.00	$156.24	$0.00	$0.00
DIRECT COSTS:					
Seed ($/ac.)	$14.25	$8.50	$8.10	$0.00	$0.00
Fertilizer ($/ac.)	$21.60	$3.60	$19.80	$0.00	$0.00
Fertilizer application ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Herbicide ($/ac.)	$5.95	$21.19	$17.84	$0.00	$4.15
Herbicide application ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Insecticide ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Insecticide application ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Crop insurance ($/ac.)	$14.58	$4.59	$3.82	$0.00	$0.00
Storage ($/ac.)	$9.32	$3.44	$4.66	$0.00	$0.00
Drying ($/ac.)	$12.60	$0.00	$0.00	$0.00	$0.00
Overhead ($/ac.)	$5.50	$5.50	$5.50	$0.00	$2.50
Custom machine hire ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Fuel and lubrication ($/ac.)	$2.52	$2.18	$3.48	$0.00	$1.12
Machinery repair ($/ac.)	$6.15	$5.54	$8.85	$0.00	$1.00
Interest on non labor direct costs ($/ac)	$5.47	$3.23	$4.26	$0.00	$0.52
Labor charge($/ac.)	$5.70	$11.00	$8.52	$0.00	$2.12
II. Total direct (operating) costs	$103.64	$68.77	$84.84	$0.00	$11.41
Income over direct costs (I minus II)	$112.03	$86.23	$71.40	$0.00	($11.41)
Breakeven price per unit (direct costs)	$1.23	$2.22	$2.02	ERR	ERR
FIXED COSTS:					
Interest, Housing & Ins. on machinery ($/ac)	$10.02	$9.67	$13.45	$0.00	$1.85
Deprec. on machinery and equipment ($/ac.)	$12.49	$14.91	$15.53	$0.00	$1.75
Real estate taxes ($/ac.)	$5.25	$5.25	$5.25	$0.00	$5.25
III. Total fixed costs	$27.76	$29.83	$34.23	$0.00	$8.85
IV. Production costs ($/ac., excluding land) (II plus III)	$131.40	$98.60	$119.07	$0.00	$20.26
Production costs ($/unit)	$1.56	$3.18	$2.83	ERR	ERR
V. Land charges ($/ac.)	$21.00	$21.00	$21.00	$0.00	$21.00
VI. Total production and land costs ($/ac.). (IV plus V)	$152.40	$119.60	$140.07	$0.00	$41.26
Production and land costs ($/unit)	$1.81	$3.86	$3.33	ERR	ERR
Breakeven yield (units/ac.) (at selling price)	91.8	23.9	59.1	ERR	ERR
VII. Income over all costs ($/acre) (I minus IV)	$63.27	$35.40	$16.17	$0.00	($41.26)
Income over all costs ($/unit)	$0.75	$1.14	$0.39	ERR	ERR

RIDGE TILL ROTATION NORMAL YEAR: FARMING SYSTEMS STUDY 1
SUMMARY DATA FOR REPRESENTATIVE FARM IN NORTHEAST SOUTH DAKOTA.

	Corn	Soybean	S.Wheat	Other	Set Aside	Total
Farm Program Set-aside Requirement (%).....	20	0	27.5	0	0	
Crop Distribution (acres)..	149	149	149	0	93	540
Income Over All Costs..... ($/acre)	$63.27	$35.40	$16.17	$0.00	($41.26)	
Income Over All Costs..... ($/crop)	$9,427	$5,274	$2,410	$0	($3,837)	$13,273



Farming Systems Study II

1. Alternative System

2. Conventional System

3. Minimum Till System

4. Continuous No Till Winter Wheat

ASSUMPTIONS AND EXPLANATIONS
Alternative Rotation: Farming Systems Study II

Crop	1986 Budgets	Normalized Budgets
1. Oats/Sweet Clover		
a. Machine operations:	Disc, field cultivate, drill, harrow, swath, combine, haul	Same as 1986 except use a packer behind drill
b. Seeding:	Oats: 48 lbs./acre @ $.09375/lb. Sweet Clover: 9.5 lbs./acre @ $.75/lb.	Same as 1986
c. Machine labor	1.38 hrs./acre @ $6/hr.	Same as 1986
2. Sweet Clover		
a. Machine operations:	Mow, chisel with sweep, chisel without sweep	Same as 1986
b. Machine labor:	.812 hrs./acre @ $6/hr	Same as 1986
3. Soybeans		
a. Machine operations:	Disc twice, field cultivate, plant, rotary hoe, cultivate twice, combine, haul, chisel without sweep in fall	Same as 1986 except disc once, rotary hoe twice
b. Seeding:	1 bu./acre @ $8.50/bu.	Same as 1986
c. Machine labor:	1.4 hrs./acre @ $6/hr.	1.38 hrs./acre @ $6/hr.
d. Other labor:	Hand weeding: 2.8 hrs./acre @ $4/hr.	Same as 1986
4. Spring Wheat		
a. Machine operations:	Disc, field cultivate, drill, swath, combine, haul, fall chisel	Same as 1986 except field cultivate with harrow attached
b. Seeding:	75 lbs./acre @ $.1083/lb.	Same as 1986
c. Machine labor:	1.38 hrs./acre @ $6/hr.	Same as 1986
5. Set Aside		
a. Machine operations:	Field cultivate, chisel	Same as 1986
b. Machine labor:	.4 hrs./acre @ $6/hr	Same as 1986

ALTERNATIVE ROTATION 1986: Farming Systems Study II

INPUT SECTION	Oats	S.Clover	Soybean	S.Wheat	Set Aside
RECEIPTS:					
Estimated grain yield (units/ac.)	60	1	28	55	0
Estimated selling price or value ($/unit)	$0.88	$0.00	$5.00	$2.37	$0.00
GOVERNMENT PAYMENT:					
Base yield (units/ac.)	53	0	0	27	0
Deficiency payment ($/unit)	$0.66	$0.00	$0.00	$2.10	$0.00
DIRECT COSTS:					
Seed (units/ac.)	1	0	1	75	0
($/unit)	$11.63	$0.00	$8.50	$0.11	$0.00
Fertilizer 1 (units/ac.)	0	0	0	0	0
($/unit)	$0.00	$0.00	$0.00	$0.00	$0.00
Fertilizer 2 (units/ac.)	0	0	0	0	0
($/unit)	$0.00	$0.00	$0.00	$0.00	$0.00
Fertilizer application ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Herbicide 1 (units/ac.)	0	0	0	0	0
($/unit)	$0.00	$0.00	$0.00	$0.00	$0.00
Herbicide 2 (units/ac.)	0	0	0	0	0
($/unit)	$0.00	$0.00	$0.00	$0.00	$0.00
Herbicide application ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Insecticide (units/ac.)	0	0	0	0	0
($/unit)	$0.00	$0.00	$0.00	$0.00	$0.00
Insecticide application ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Crop insurance ($/ac.)	$1.63	$0.00	$4.08	$5.01	$0.00
Storage ($/unit)	$0.11	$0.00	$0.11	$0.11	$0.00
Drying ($/unit)	$0.00	$0.00	$0.00	$0.00	$0.00
Overhead ($/ac.)	$5.00	$4.00	$5.50	$5.00	$0.00
Custom machine hire					
Tillage ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Planting ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Harvesting ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Fuel and lubrication ($/ac.)	$3.51	$2.49	$3.85	$3.91	$0.00
Machinery repair ($/ac.)	$9.26	$2.36	$7.34	$9.01	$0.00
Crop operating loan borrowed (months)	6	6	6	6	0
Interest APR(%)	12.00	12.00	12.00	12.00	0.00
Labor 1 (hrs./ac.)	1.38	0.81	1.40	1.38	0.00
($/hr)	$6.00	$6.00	$6.00	$6.00	$0.00
Labor 2 (hrs./ac.)	0.00	0.00	2.80	0.00	0.00
($/hr.)	$0.00	$0.00	$4.00	$0.00	$0.00
FIXED COSTS:					
Interest, Housing, and Ins. on Machinery	13.93	4.03	14.22	14.44	0.00
Depreciation on machinery & equipment	$15.60	$3.57	$16.47	$15.72	$0.00
Land Cost ($/acre)	$350	$350	$350	$350	$0
Real Estate Tax Percentage	1.50	1.50	1.50	1.50	0.00

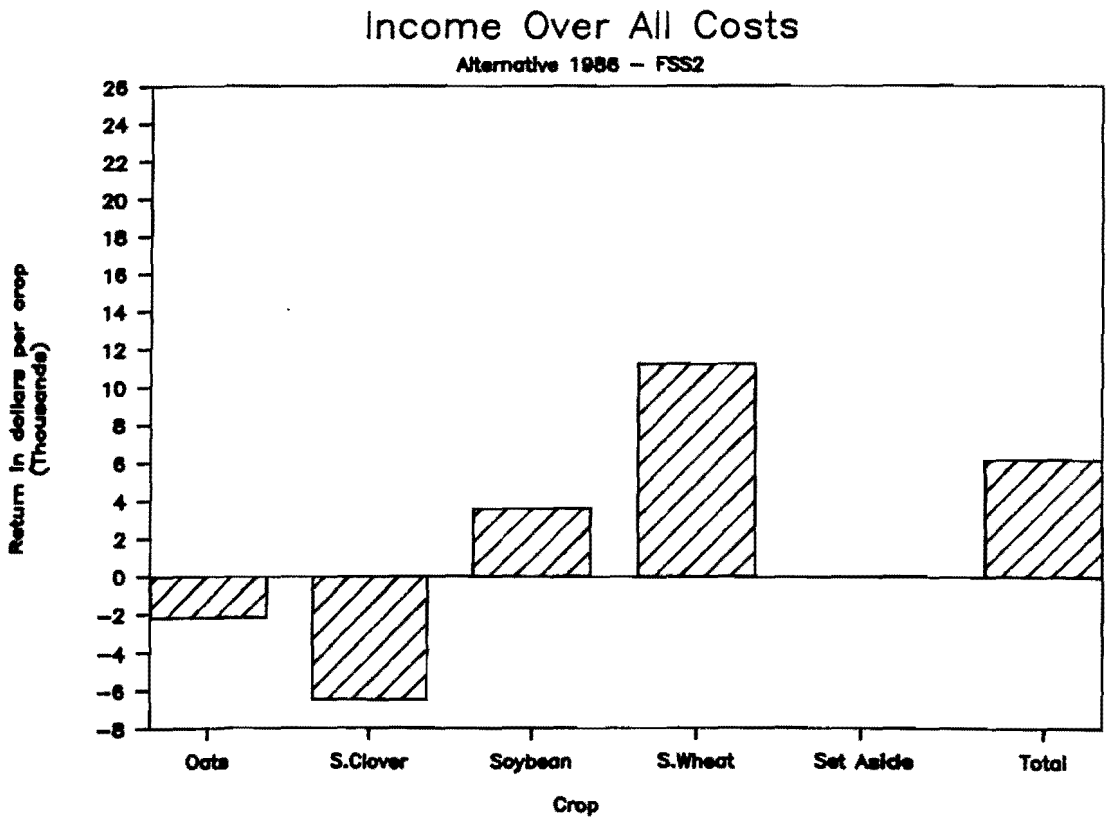
(end of Input Section)

INPUT SUMMARY AND RESULTS--ALTERNATIVE ROTATION 1986: FARMING SYSTEMS STUDY II

	Oats	S. Clover	Soybean	S.Wheat	Set Aside
RECEIPTS:					
Estimated grain yield (units/ac.).....	60	1	28	55	0
Estimated selling price or value ($/unit)...	$0.88	$0.00	$5.00	$2.37	$0.00
GOVERNMENT PAYMENT:					
Base yield (units/ac.).....	53	0	0	27	0
Deficiency payment ($/unit).....	$0.66	$0.00	$0.00	$2.10	$0.00
I. Total income per acre.....	$87.96	$0.00	$137.50	$187.29	$0.00
DIRECT COSTS:					
Seed ($/ac.).....	$11.63	$0.00	$8.50	$8.10	$0.00
Fertilizer ($/ac.).	$0.00	$0.00	$0.00	$0.00	$0.00
Fertilizer application ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Herbicide ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Herbicide application ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Insecticide ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Insecticide application ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Crop insurance ($/ac.).....	$1.63	$0.00	$4.08	$5.01	$0.00
Storage ($/ac.).....	$6.68	$0.00	$3.05	$6.12	$0.00
Drying ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Overhead ($/ac.).....	$5.00	$4.00	$5.50	$5.00	$0.00
Custom machine hire ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Fuel and lubrication ($/ac.).....	$3.51	$2.49	$3.85	$3.91	$0.00
Machinery repair ($/ac.).....	$9.26	$2.36	$7.34	$9.01	$0.00
Interest on non labor direct costs ($/ac)...	$2.23	$0.52	$1.91	$2.20	$0.00
Labor charge($/ac.).....	$8.28	$4.87	$19.60	$8.28	$0.00
II. Total direct (operating) costs.....	$48.22	$14.25	$53.83	$47.63	$0.00
Income over direct costs (I minus II)....	$39.73	($14.25)	$83.67	$139.66	$0.00
Breakeven price per unit (direct costs)..	$0.80	$10.47	$1.96	$0.86	ERR
FIXED COSTS:					
Interest, Housing & Ins. on machinery ($/ac)	$13.93	$4.03	$14.22	$14.44	$0.00
Deprec. on machinery and equipment ($/ac.)..	$15.60	$3.57	$16.47	$15.72	$0.00
Real estate taxes ($/ac.).....	$5.25	$5.25	$5.25	$5.25	$0.00
III. Total fixed costs.....	$34.78	$12.85	$35.94	$35.41	$0.00
IV. Production costs ($/ac., excluding land) (II plus III)	$83.00	$27.10	$89.77	$83.04	$0.00
Production costs ($/unit)...	$1.38	$19.92	$3.26	$1.51	ERR
V. Land charges ($/ac.).....	$21.00	$21.00	$21.00	$21.00	$0.00
VI. Total production and land costs ($/ac.). (IV plus V)	$104.00	$48.10	$110.77	$104.04	$0.00
Production and land costs ($/unit).....	$1.73	$35.36	$4.03	$1.89	ERR
Breakeven yield (units/ac.)..... (at selling price)	118.2	ERR	22.2	43.9	ERR
VII. Income over all costs ($/acre)..... (I minus IV)	($16.05)	($48.10)	$26.73	$83.25	$0.00
Income over all costs ($/unit).....	($0.27)	($35.36)	$0.97	$1.51	ERR

ALTERNATIVE ROTATION 1986: FARMING SYSTEMS STUDY II
SUMMARY DATA FOR REPRESENTATIVE FARM IN NORTHEAST SOUTH DAKOTA.

	Oats	S.Clover	Soybean	S.Wheat	Set Aside	Total
Farm Program Set-aside Requirement (%).....	20	0	0	27.5	0	
Crop Distribution (acres)..	135	135	135	135	0	540
Income Over All Costs..... ($/acre)	($16.05)	($48.10)	$26.73	$83.25	$0.00	
Income Over All Costs..... ($/crop)	($2,166)	($6,493)	$3,608	$11,239	$0	$6,188



ALTERNATE ROTATION NORMAL YEAR: Farming Systems Study II

INPUT SECTION	Oats	S.Clover	Soybean	S.Wheat	Set Aside
RECEIPTS:					
Estimated grain yield (units/ac.)	70	1	28	40	0
Estimated selling price or value ($/unit)	$0.88	$0.00	$5.00	$2.37	$0.00
GOVERNMENT PAYMENT:					
Base yield (units/ac.)	53	0	0	27	0
Deficiency payment ($/unit)	$0.66	$0.00	$0.00	$2.10	$0.00
DIRECT COSTS:					
Seed (units/ac.)	1	0	1	75	0
($/unit)	$11.63	$0.00	$8.50	$0.11	$0.00
Fertilizer 1 (units/ac.)	0	0	0	0	0
($/unit)	$0.00	$0.00	$0.00	$0.00	$0.00
Fertilizer 2 (units/ac.)	0	0	0	0	0
($/unit)	$0.00	$0.00	$0.00	$0.00	$0.00
Fertilizer application ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Herbicide 1 (units/ac.)	0	0	0	0	0
($/unit)	$0.00	$0.00	$0.00	$0.00	$0.00
Herbicide 2 (units/ac.)	0	0	0	0	0
($/unit)	$0.00	$0.00	$0.00	$0.00	$0.00
Herbicide application ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Insecticide (units/ac.)	0	0	0	0	0
($/unit)	$0.00	$0.00	$0.00	$0.00	$0.00
Insecticide application ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Crop insurance ($/ac.)	$1.89	$0.00	$4.08	$3.64	$0.00
Storage ($/unit)	$0.11	$0.00	$0.11	$0.11	$0.00
Drying ($/unit)	$0.00	$0.00	$0.00	$0.00	$0.00
Overhead ($/ac.)	$5.00	$4.00	$5.50	$5.00	$0.00
Custom machine hire					
Tillage ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Planting ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Harvesting ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Fuel and lubrication ($/ac.)	$3.57	$2.49	$3.64	$3.91	$0.00
Machinery repair ($/ac.)	$9.47	$2.36	$7.08	$9.34	$0.00
Crop operating loan borrowed (months)	6	6	6	6	0
Interest APR(%)	12.00	12.00	12.00	12.00	0.00
Labor 1 (hrs./ac.)	1.38	0.82	1.38	1.38	0.00
($/hr)	$6.00	$6.00	$6.00	$6.00	$0.00
Labor 2 (hrs./ac.)	0.00	0.00	2.80	0.00	0.00
($/hr.)	$0.00	$0.00	$4.00	$0.00	$0.00
FIXED COSTS:					
Interest, Housing, and Ins. on Machinery	14.20	4.03	14.22	14.44	0.00
Depreciation on machinery & equipment	$15.89	$3.57	$15.67	$15.85	$0.00
Land Cost ($/acre)	$350	$350	$350	$350	$0
Real Estate Tax Percentage	1.50	1.50	1.50	1.50	0.00

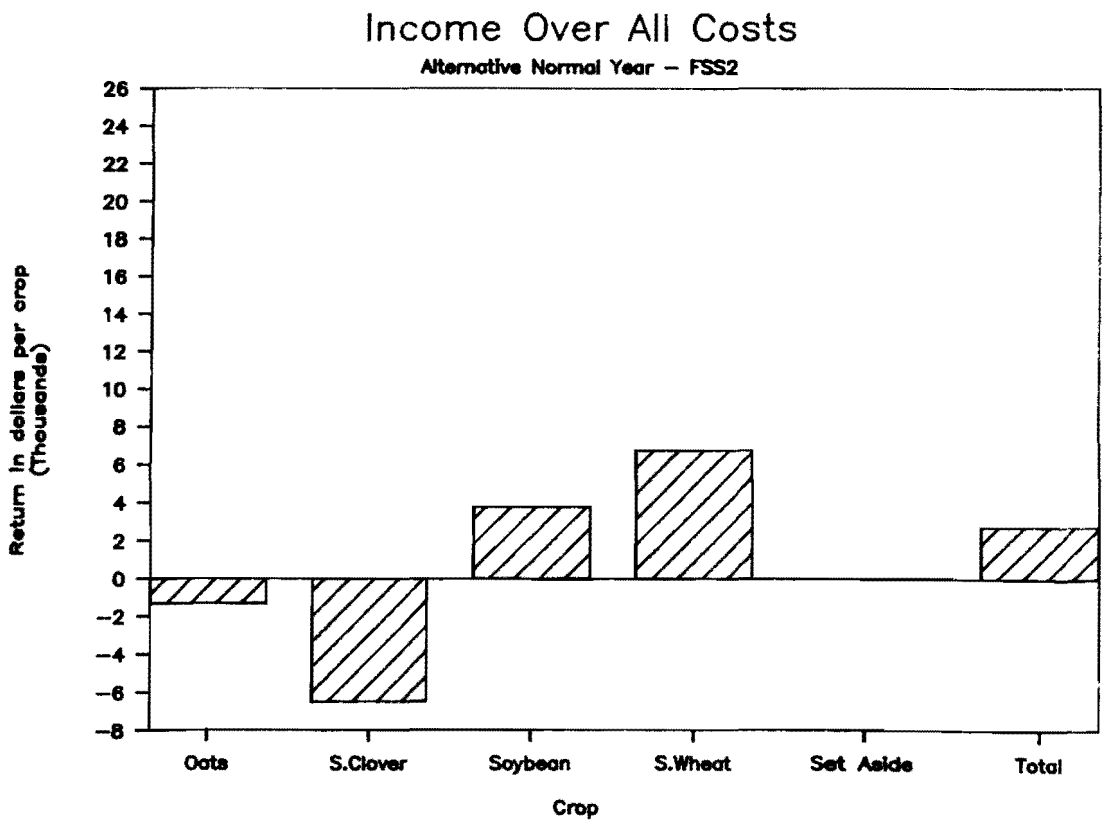
(end of Input Section)

INPUT SUMMARY AND RESULTS-- ALTERNATIVE ROTATION NORMAL YEAR: Farming Systems Study II

	Oats	S. Clover	Soybean	S.Wheat	Set Aside
RECEIPTS:					
Estimated grain yield (units/ac.).....	70	1	28	40	0
Estimated selling price or value ($/unit)...	$0.88	$0.00	$5.00	$2.37	$0.00
GOVERNMENT PAYMENT:					
Base yield (units/ac.).....	53	0	0	27	0
Deficiency payment ($/unit).....	$0.66	$0.00	$0.00	$2.10	$0.00
I. Total income per acre.....	$96.58	$0.00	$137.50	$151.50	$0.00
DIRECT COSTS:					
Seed ($/ac.).....	$11.63	$0.00	$8.50	$8.10	$0.00
Fertilizer ($/ac.).	$0.00	$0.00	$0.00	$0.00	$0.00
Fertilizer application ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Herbicide ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Herbicide application ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Insecticide ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Insecticide application ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Crop insurance ($/ac.).....	$1.89	$0.00	$4.08	$3.64	$0.00
Storage ($/ac.).....	$7.77	$0.00	$3.05	$4.44	$0.00
Drying ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Overhead ($/ac.).....	$5.00	$4.00	$5.50	$5.00	$0.00
Custom machine hire ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Fuel and lubrication ($/ac.).....	$3.57	$2.49	$3.64	$3.91	$0.00
Machinery repair ($/ac.).....	$9.47	$2.36	$7.08	$9.34	$0.00
Interest on non labor direct costs ($/ac)...	$2.33	$0.52	$1.88	$2.04	$0.00
Labor charge($/ac.).....	$8.28	$4.92	$19.50	$8.28	$0.00
II. Total direct (operating) costs.....	$49.94	$14.29	$53.23	$44.75	$0.00
Income over direct costs (I minus II)....	$46.64	($14.29)	$84.27	$106.75	$0.00
Breakeven price per unit (direct costs)..	$0.71	$10.51	$1.94	$1.12	ERR
FIXED COSTS:					
Interest, Housing & Ins. on machinery ($/ac)	$14.20	$4.03	$14.22	$14.44	$0.00
Deprec. on machinery and equipment ($/ac.)..	$15.89	$3.57	$15.67	$15.85	$0.00
Real estate taxes ($/ac.).....	$5.25	$5.25	$5.25	$5.25	$0.00
III. Total fixed costs.....	$35.34	$12.85	$35.14	$35.54	$0.00
IV. Production costs ($/ac., excluding land) (II plus III)	$85.28	$27.14	$88.37	$80.29	$0.00
Production costs ($/unit)...	$1.22	$19.96	$3.21	$2.01	ERR
V. Land charges ($/ac.).....	$21.00	$21.00	$21.00	$21.00	$0.00
VI. Total production and land costs ($/ac.). (IV plus V)	$106.28	$48.14	$109.37	$101.29	$0.00
Production and land costs ($/unit).....	$1.52	$35.40	$3.98	$2.53	ERR
Breakeven yield (units/ac.)..... (at selling price)	120.8	ERR	21.9	42.7	ERR
VII. Income over all costs ($/acre)..... (I minus IV)	($9.70)	($48.14)	$28.13	$50.21	$0.00
Income over all costs ($/unit).....	($0.14)	($35.40)	$1.02	$1.26	ERR

ALTERNATIVE ROTATION NORMAL YEAR: FARMING SYSTEMS STUDY II
SUMMARY DATA FOR REPRESENTATIVE FARM IN NORTHEAST SOUTH DAKOTA.

	Oats	S.Clover	Soybean	S.Wheat	Set Aside	Total
Farm Program Set-aside Requirement (%).....	20	0	0	27.5	0	
Crop Distribution (acres)..	135	135	135	135	0	540
Income Over All Costs..... ($/acre)	($9.70)	($48.14)	$28.13	$50.21	$0.00	
Income Over All Costs..... ($/crop)	($1,310)	($6,499)	$3,797	$6,779	$0	$2,767



ASSUMPTIONS AND EXPLANATIONS
Conventional Rotation: Farming Systems Study II

Crop	1986 Budgets	Normalized Budgets
1. Barley		
a. Machine operations:	Fertilizer spreader, disc, field cultivate, drill, spray Hoelon and Buctril in one pass, swath, combine, haul, fall plow	Same as 1986 except field cultivate w/harrow
b. Seeding:	58 lbs./acre @$.07/lb.	Same as 1986
c. Fertilizer:	70 lbs. N/acre @ $.18/lb.	70 lbs. N/acre @ $.18/lb. 20 lbs. P/acre @ $.18/lb.
d. Herbicide:	Hoelon 3E: 2 pts./acre @ $6.19/pt. Buctril 2E: 1 pts./acre @ $5.46/pt.	Same as 1986
e. Machine labor:	1.91 hrs./acre @ $6/hr.	Same as 1986
2. Soybeans		
a. Machine operations:	Ground floater for Treflan, disc twice, plant, cultivate twice, combine, haul	Same as 1986 except using planter to apply Phosphorus
b. Seeding:	1 bu./acre @ $8.50/bu.	Same as 1986
c. Fertilizer:		20 lbs. P/acre @ $.18/lb.
d. Herbicide:	Treflan 4E: 1.5 pt./acre @ $3.36/pt.	Same as 1986
e. Machine labor:	1.08 hrs./acre @ $6/hr.	Same as 1986
f. Other labor:	Hand weeding: 1.49 hrs./acre @ $4/hr.	Same as 1986
g. Other:	Ground floater for Treflan @ $2.59/acre	Same as 1986
4. Spring Wheat		
a. Machine operations:	Fertilizer spreader, disc, field cultivate, drill, spray Hoelon and Buctril, swath, combine, haul, fall plow	Same as 1986 except field cultivate w/harrow
b. Seeding:	75 lbs./acre @ $.1083/lb.	Same as 1986
c. Fertilizer:	90 lbs. N/acre @ $.18/lb.	90 lbs. N/acre @ $.18/lb. 20 lbs. P/acre @ $.18/lb.
d. Herbicide:	Hoelon 3E: 2 pts./acre @ $6.19/pt. Buctril 2E: 1 pt./acre @ $5.46/pt.	Same as 1986
e. Machine labor:	1.81 hrs./acre @ $6/hr.	Same as 1986
4. Set Aside		
a. Machine operations:	Field cultivate, spray, chisel	Same as 1986
c. Herbicide:	2, 4-D Amine: .6243 pts./acre @ $1.47/pt. Roundup 3L: .312 pt./acre @ $10.36/pt.	Same as 1986
c. Machine labor:	.35 hrs./acre @ $6/hr.	Same as 1986

CONVENTIONAL ROTATION 1986: Farming Systems Study II

INPUT SECTION	Barley	Soybeans	S. Wheat	Other	Set Aside
RECEIPTS:					
Estimated grain yield (units/ac.)	89	29	56	0	0
Estimated selling price or value ($/unit)	$1.40	$5.00	$2.37	$0.00	$0.00
GOVERNMENT PAYMENT:					
Base yield (units/ac.)	41	0	27	0	0
Deficiency payment ($/unit)	$1.11	$0.00	$2.10	$0.00	$0.00
DIRECT COSTS:					
Seed (units/ac.)	58	1	75	0	0
($/unit)	$0.07	$8.50	$0.11	$0.00	$0.00
Fertilizer 1 (units/ac.)	70	0	90	0	0
($/unit)	$0.18	$0.00	$0.18	$0.00	$0.00
Fertilizer 2 (units/ac.)	0	0	0	0	0
($/unit)	$0.00	$0.00	$0.00	$0.00	$0.00
Fertilizer application ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Herbicide 1 (units/ac.)	2	1.5	2	0	0.62
($/unit)	$6.19	$3.36	$6.19	$0.00	$1.47
Herbicide 2 (units/ac.)	1	0	1	0	0.31
($/unit)	$5.46	$0.00	$5.46	$0.00	$10.36
Herbicide application ($/ac.)	$0.00	$2.59	$0.00	$0.00	$0.00
Insecticide (units/ac.)	0	0	0	0	0
($/unit)	$0.00	$0.00	$0.00	$0.00	$0.00
Insecticide application ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Crop insurance ($/ac.)	$4.62	$4.36	$5.13	$0.00	$0.00
Storage ($/unit)	$0.11	$0.11	$0.11	$0.00	$0.00
Drying ($/unit)	$0.00	$0.00	$0.00	$0.00	$0.00
Overhead ($/ac.)	$5.00	$5.50	$5.50	$0.00	$2.50
Custom machine hire					
Tillage ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Planting ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Harvesting ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Fuel and lubrication ($/ac.)	$5.42	$3.04	$5.23	$0.00	$1.12
Machinery repair ($/ac.)	$10.69	$6.56	$10.35	$0.00	$1.00
Crop operating loan borrowed (months)	6	6	6	0	6
Interest APR(%)	12.00	12.00	12.00	0.00	12.00
Labor 1 (hrs./ac.)	1.91	1.08	1.87	0.00	0.35
($/hr)	$6.00	$6.00	$6.00	$0.00	$6.00
Labor 2 (hrs./ac.)	0.00	1.49	0.00	0.00	0.00
($/hr.)	$0.00	$4.00	$0.00	$0.00	$0.00
FIXED COSTS:					
Interest, Housing, and Ins. on Machinery	17.30	10.73	17.00	0.00	1.85
Depreciation on machinery & equipment	$18.67	$13.03	$18.38	$0.00	$1.75
Land Cost ($/acre)	$350	$350	$350	$0	$350
Real Estate Tax Percentage	1.50	1.50	1.50	0.00	1.50

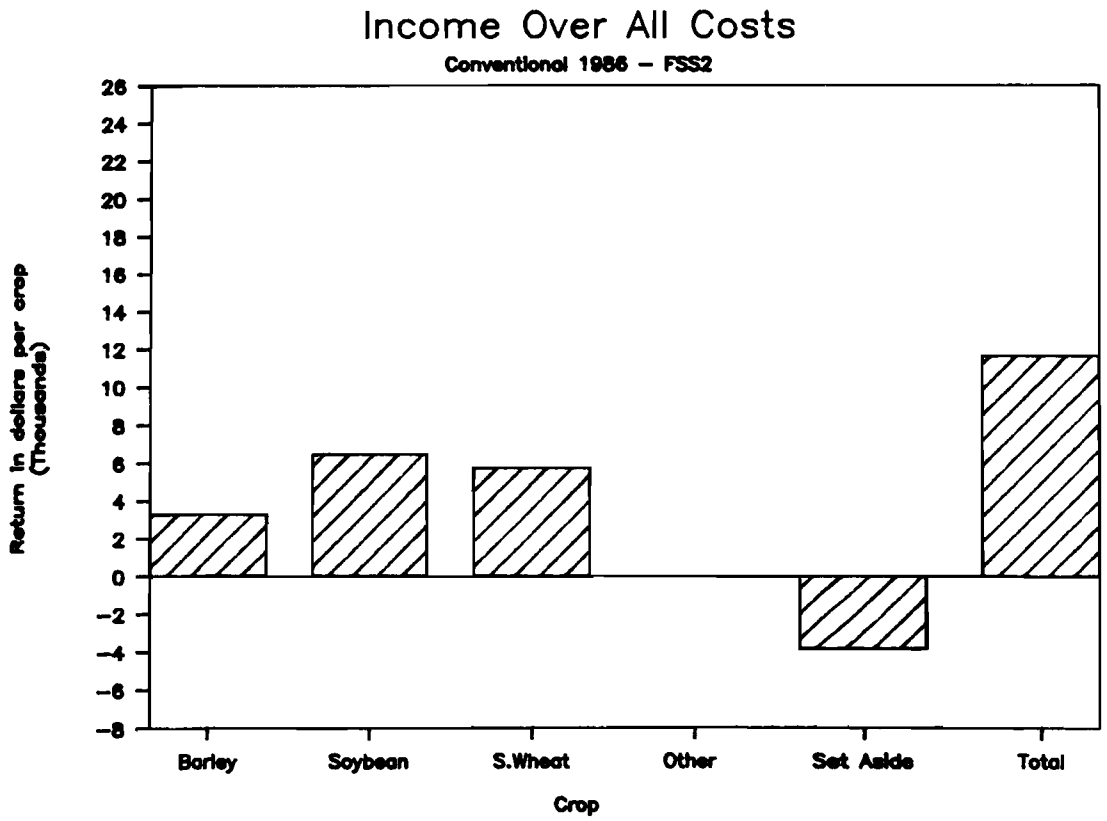
(end of Input Section)

INPUT SUMMARY AND RESULTS--CONVENTIONAL ROTATION 1986: FARMING SYSTEMS STUDY II

	Barley	Soybeans	S. Wheat	Other	Set Aside
RECEIPTS:					
Estimated grain yield (units/ac.).....	89	29	56	0	0
Estimated selling price or value ($/unit)...	$1.40	$5.00	$2.37	$0.00	$0.00
GOVERNMENT PAYMENT:					
Base yield (units/ac.).....	41	0	27	0	0
Deficiency payment ($/unit).....	$1.11	$0.00	$2.10	$0.00	$0.00
I. Total income per acre.....	$169.97	$147.00	$190.37	$0.00	$0.00
DIRECT COSTS:					
Seed ($/ac.).....	$4.06	$8.50	$8.10	$0.00	$0.00
Fertilizer ($/ac.).	$12.60	$0.00	$16.20	$0.00	$0.00
Fertilizer application ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Herbicide ($/ac.).....	$17.84	$5.04	$17.84	$0.00	$4.15
Herbicide application ($/ac.).....	$0.00	$2.59	$0.00	$0.00	$0.00
Insecticide ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Insecticide application ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Crop insurance ($/ac.).....	$4.62	$4.36	$5.13	$0.00	$0.00
Storage ($/ac.).....	$9.87	$3.26	$6.26	$0.00	$0.00
Drying ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Overhead ($/ac.).....	$5.00	$5.50	$5.50	$0.00	$2.50
Custom machine hire ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Fuel and lubrication ($/ac.).....	$5.42	$3.04	$5.23	$0.00	$1.12
Machinery repair ($/ac.).....	$10.69	$6.56	$10.35	$0.00	$1.00
Interest on non labor direct costs ($/ac)...	$4.15	$2.30	$4.42	$0.00	$0.52
Labor charge($/ac.).....	$11.43	$12.44	$11.22	$0.00	$2.10
II. Total direct (operating) costs.....	$85.68	$53.59	$90.25	$0.00	$11.39
Income over direct costs (I minus II)....	$84.29	$93.41	$100.12	$0.00	($11.39)
Breakeven price per unit (direct costs)..	$0.96	$1.82	$1.60	ERR	ERR
FIXED COSTS:					
Interest, Housing & Ins. on machinery ($/ac)	$17.30	$10.73	$17.00	$0.00	$1.85
Deprec. on machinery and equipment ($/ac.)..	$18.67	$13.03	$18.38	$0.00	$1.75
Real estate taxes ($/ac.).....	$5.25	$5.25	$5.25	$0.00	$5.25
III. Total fixed costs.....	$41.22	$29.01	$40.63	$0.00	$8.85
IV. Production costs ($/ac., excluding land) (II plus III)	$126.90	$82.60	$130.88	$0.00	$20.24
Production costs ($/unit)...	$1.43	$2.81	$2.32	ERR	ERR
V. Land charges ($/ac.).....	$21.00	$21.00	$21.00	$0.00	$21.00
VI. Total production and land costs ($/ac.). (IV plus V)	$147.90	$103.60	$151.88	$0.00	$41.24
Production and land costs ($/unit).....	$1.66	$3.52	$2.69	ERR	ERR
Breakeven yield (units/ac.)..... (at selling price)	105.6	20.7	64.1	ERR	ERR
VII. Income over all costs ($/acre)..... (I minus IV)	$22.07	$43.40	$38.49	$0.00	($41.24)
Income over all costs ($/unit).....	$0.25	$1.48	$0.68	ERR	ERR

CONVENTIONAL ROTATION 1986: FARMING SYSTEMS STUDY II
SUMMARY DATA FOR REPRESENTATIVE FARM IN NORTHEAST SOUTH DAKOTA.

	Barley	Soybean	S.Wheat	Other	Set Aside	Total
Farm Program Set-aside Requirement (%).....	20	0	27.5	0	0	
Crop Distribution (acres)..	149	149	149	0	93	540
Income Over All Costs..... ($/acre)	$22.07	$43.40	$38.49	$0.00	($41.24)	
Income Over All Costs..... ($/crop)	$3,289	$6,467	$5,735	$0	($3,835)	$11,655



CONVENTIONAL ROTATION NORMAL YEAR: Farming Systems Study II

INPUT SECTION	Barley	Soybeans	S. Wheat	Other	Set Aside
RECEIPTS:					
Estimated grain yield (units/ac.)	70	30	42	0	0
Estimated selling price or value ($/unit)	$1.40	$5.00	$2.37	$0.00	$0.00
GOVERNMENT PAYMENT:					
Base yield (units/ac.)	41	0	27	0	0
Deficiency payment ($/unit)	$1.11	$0.00	$2.10	$0.00	$0.00
DIRECT COSTS:					
Seed (units/ac.)	58	1	75	0	0
($/unit)	$0.07	$8.50	$0.11	$0.00	$0.00
Fertilizer 1 (units/ac.)	70	0	90	0	0
($/unit)	$0.18	$0.00	$0.18	$0.00	$0.00
Fertilizer 2 (units/ac.)	20	20	20	0	0
($/unit)	$0.18	$0.18	$0.18	$0.00	$0.00
Fertilizer application ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Herbicide 1 (units/ac.)	2	1.5	2	0	0.62
($/unit)	$6.19	$3.36	$6.19	$0.00	$1.47
Herbicide 2 (units/ac.)	1	0	1	0	0.31
($/unit)	$5.46	$0.00	$5.46	$0.00	$10.36
Herbicide application ($/ac.)	$0.00	$2.59	$0.00	$0.00	$0.00
Insecticide (units/ac.)	0	0	0	0	0
($/unit)	$6.00	$0.00	$0.00	$0.00	$0.00
Insecticide application ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Crop insurance ($/ac.)	$3.64	$4.45	$3.82	$0.00	$0.00
Storage ($/unit)	$0.11	$0.11	$0.11	$0.00	$0.00
Drying ($/unit)	$0.00	$0.00	$0.00	$0.00	$0.00
Overhead ($/ac.)	$5.00	$5.50	$5.50	$0.00	$2.50
Custom machine hire					
Tillage ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Planting ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Harvesting ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Fuel and lubrication ($/ac.)	$5.42	$3.04	$5.29	$0.00	$1.12
Machinery repair ($/ac.)	$11.02	$6.56	$10.68	$0.00	$1.00
Crop operating loan borrowed (months)	6	6	6	0	6
Interest APR(%)	12.00	12.00	12.00	0.00	12.00
Labor 1 (hrs./ac.)	1.91	1.08	1.87	0.00	0.35
($/hr)	$6.00	$6.00	$6.00	$0.00	$6.00
Labor 2 (hrs./ac.)	0.00	1.49	0.00	0.00	0.00
($/hr.)	$0.00	$4.00	$0.00	$0.00	$0.00
FIXED COSTS:					
Interest, Housing, and Ins. on Machinery	17.42	10.73	17.12	0.00	1.85
Depreciation on machinery & equipment	$18.70	$13.03	$18.45	$0.00	$1.75
Land Cost ($/acre)	$350	$350	$350	$0	$350
Real Estate Tax Percentage	1.50	1.50	1.50	0.00	1.50

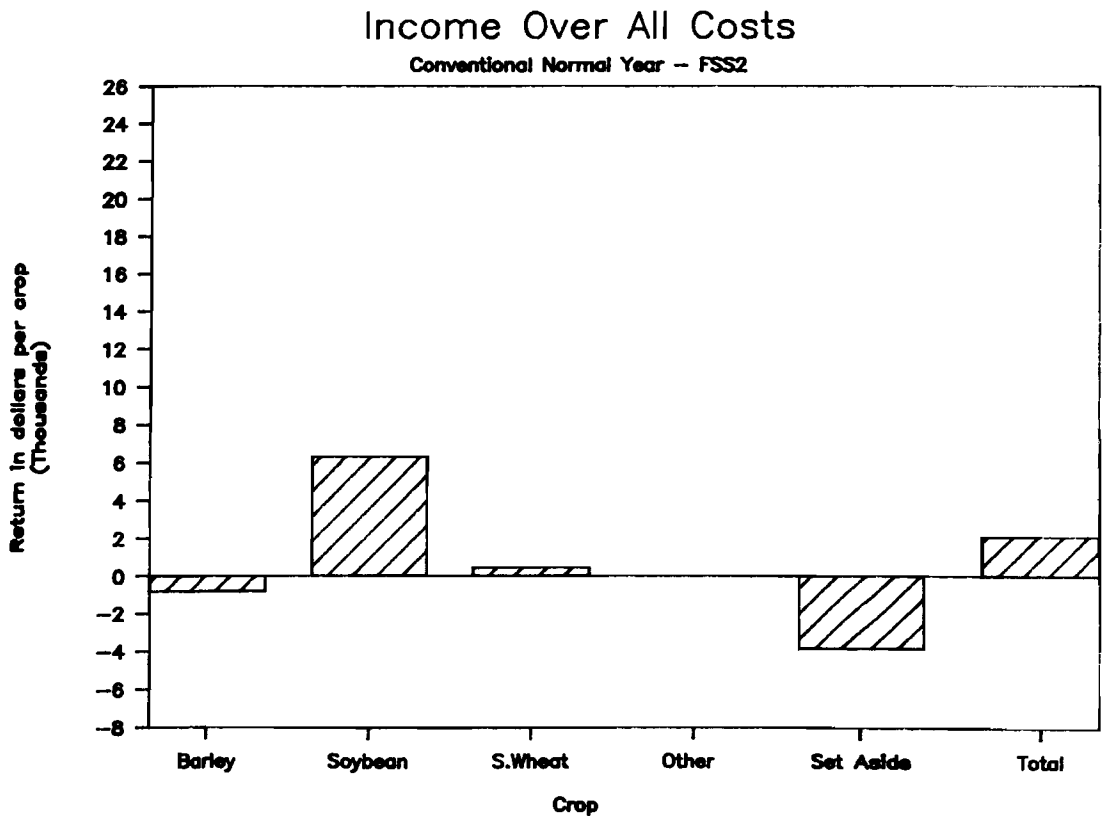
(end of Input Section)

INPUT SUMMARY AND RESULTS--CONVENTIONAL ROTATION NORMAL YEAR: FARMING SYSTEMS STUDY II

	Barley	Soybeans	S. Wheat	Other	Set Aside
RECEIPTS:					
Estimated grain yield (units/ac.).....	70	30	42	0	0
Estimated selling price or value ($/unit)...	$1.40	$5.00	$2.37	$0.00	$0.00
GOVERNMENT PAYMENT:					
Base yield (units/ac.).....	41	0	27	0	0
Deficiency payment ($/unit).....	$1.11	$0.00	$2.10	$0.00	$0.00
I. Total income per acre.....	$143.51	$150.00	$156.24	$0.00	$0.00
DIRECT COSTS:					
Seed ($/ac.).....	$4.06	$8.50	$8.10	$0.00	$0.00
Fertilizer ($/ac.).	$16.20	$3.60	$19.80	$0.00	$0.00
Fertilizer application ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Herbicide ($/ac.).....	$17.84	$5.04	$17.84	$0.00	$4.15
Herbicide application ($/ac.).....	$0.00	$2.59	$0.00	$0.00	$0.00
Insecticide ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Insecticide application ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Crop insurance ($/ac.).....	$3.64	$4.45	$3.82	$0.00	$0.00
Storage ($/ac.).....	$7.77	$3.33	$4.66	$0.00	$0.00
Drying ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Overhead ($/ac.).....	$5.00	$5.50	$5.50	$0.00	$2.50
Custom machine hire ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Fuel and lubrication ($/ac.).....	$5.42	$3.04	$5.29	$0.00	$1.12
Machinery repair ($/ac.).....	$11.02	$6.56	$10.68	$0.00	$1.00
Interest on non labor direct costs ($/ac)...	$4.20	$2.52	$4.48	$0.00	$0.52
Labor charge($/ac.).....	$11.43	$12.44	$11.22	$0.00	$2.10
II. Total direct (operating) costs.....	$86.58	$57.57	$91.39	$0.00	$11.39
Income over direct costs (I minus II)....	$56.93	$92.43	$64.85	$0.00	($11.39)
Breakeven price per unit (direct costs)..	$1.24	$1.92	$2.18	ERR	ERR
FIXED COSTS:					
Interest, Housing & Ins. on machinery ($/ac)	$17.42	$10.73	$17.12	$0.00	$1.85
Deprec. on machinery and equipment ($/ac.)..	$18.70	$13.03	$18.45	$0.00	$1.75
Real estate taxes ($/ac.).....	$5.25	$5.25	$5.25	$0.00	$5.25
III. Total fixed costs.....	$41.37	$29.01	$40.82	$0.00	$8.85
IV. Production costs ($/ac., excluding land) (II plus III)	$127.95	$86.58	$132.21	$0.00	$20.24
Production costs ($/unit)...	$1.83	$2.89	$3.15	ERR	ERR
V. Land charges ($/ac.).....	$21.00	$21.00	$21.00	$0.00	$21.00
VI. Total production and land costs ($/ac.). (IV plus V)	$148.95	$107.58	$153.21	$0.00	$41.24
Production and land costs ($/unit).....	$2.13	$3.59	$3.65	ERR	ERR
Breakeven yield (units/ac.)..... (at selling price)	106.4	21.5	64.6	ERR	ERR
VII. Income over all costs ($/acre)..... (I minus IV)	($5.44)	$42.42	$3.03	$0.00	($41.24)
Income over all costs ($/unit).....	($0.08)	$1.41	$0.07	ERR	ERR

CONVENTIONAL ROTATION NORMAL YEAR: FARMING SYSTEMS STUDY II
SUMMARY DATA FOR REPRESENTATIVE FARM IN NORTHEAST SOUTH DAKOTA.

	Barley	Soybean	S.Wheat	Other	Set Aside	Total
Farm Program Set-aside Requirement (%).....	20	0	27.5	0	0	
Crop Distribution (acres)..	149	149	149	0	93	540
Income Over All Costs..... ($/acre)	($5.44)	$42.42	$3.03	$0.00	($41.24)	
Income Over All Costs..... ($/crop)	($810)	$6,321	$451	$0	($3,835)	$2,126



ASSUMPTIONS AND EXPLANATIONS
Minimum Till Rotation: Farming systems Study II

Crop	1986 Budgets	Normalized Budgets
1. Barley		
a. Machine operations:	Hoe drill (used to incorporate fertilizer), spray Hoelon and Buctril, swath, combine, haul, fall chisel	Same as 1986
b. Seeding:	58 lbs./acre @ $.07/lb.	Same as 1986
c. Fertilizer:	70 lbs. N/acre @ $.18/lb.	70 lbs. N/acre @ $.18/lb. 20 lbs. P/acre @ $.18/lb.
d. Herbicide:	Hoelon 3E: 2 pts./acre @ $6.19/pt. Buctril 2E: 1 pt./acre @ $5.46/pt.	Same as 1986
e. Machine labor:	1.28 hrs./acre @ $6/hr.	Same as 1986
2. Soybeans		
a. Machine operations:	Plant using a ridge till planter, cultivate twice using a conventional cultivator, spray twice (Blazer and Lasso), combine, haul	Same as 1986
b. Seeding:	1 bu./acre @ $8.50/bu.	Same as 1986
c. Fertilizer:		20 lbs. P/acre @ $.18/lb.
d. Herbicide:	Lasso: 2.75 qts./acre @ $5.39/qt. Blazer 2L: 1.5 pts./acre @ $10.16/pt.	Same as 1986
e. Machine labor:	1.11 hrs./acre @ $6/hr.	Same as 1986
f. Other labor:	Hand weeding: 1.3 hrs./acre @ $4/hr.	Same as 1986
3. Spring Wheat		
a. Machine operations:	Hoe drill applying fertilizer, spray Hoelon and Buctril, swath, combine, haul, fall chisel	Same as 1986
b. Seeding:	75 lbs./acre @ $.1083/lb.	Same as 1986
c. Fertilizer:	90 lbs. N/acre @ $.18/lb.	90 lbs. N/acre @ $.18/lb. 20 lbs. P/acre @ $.18/lb.
d. Herbicide:	Hoelon 3E: 2 pts./acre @ $6.19/pt. Buctril 2E: 1 pt./acre @ $5.46/pt.	Same as 1986
e. Machine labor:	1.18 hrs./acre @ $6/hr.	Same as 1986
4. Set Aside		
a. Machine operations:	Field cultivate, spray, chisel	Same as 1986
b. Herbicide:	2, 4-D Amine: .62343 pts./acre @ $1.47/pt. Roundup 3L: .312 pt./acre @ $10.36/pt.	Same as 1986
c. Machine labor:	.35 hrs./acre @ $6/hr.	Same as 1986

MINIMUM TILL ROTATION 1986: Farming Systems Study II

INPUT SECTION	Barley	Soybeans	S. Wheat	Other	Set Aside
RECEIPTS:					
Estimated grain yield (units/ac.)	77	33	56	0	0
Estimated selling price or value ($/unit)	$1.40	$5.00	$2.37	$0.00	$0.00
GOVERNMENT PAYMENT:					
Base yield (units/ac.)	41	0	27	0	0
Deficiency payment ($/unit)	$1.11	$0.00	$2.10	$0.00	$0.00
DIRECT COSTS:					
Seed (units/ac.)	58	1	75	0	0
($/unit)	$0.07	$8.50	$0.11	$0.00	$0.00
Fertilizer 1 (units/ac.)	70	0	90	0	0
($/unit)	$0.18	$0.00	$0.18	$0.00	$0.00
Fertilizer 2 (units/ac.)	0	0	0	0	0
($/unit)	$0.00	$0.00	$0.00	$0.00	$0.00
Fertilizer application ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Herbicide 1 (units/ac.)	2	2.75	2	0	0.62
($/unit)	$6.19	$5.39	$6.19	$0.00	$1.47
Herbicide 2 (units/ac.)	1	1.5	1	0	0.31
($/unit)	$5.46	$10.16	$5.46	$0.00	$10.36
Herbicide application ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Insecticide (units/ac.)	0	0	0	0	0
($/unit)	$0.00	$0.00	$0.00	$0.00	$0.00
Insecticide application ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Crop insurance ($/ac.)	$4.00	$4.94	$5.08	$0.00	$0.00
Storage ($/unit)	$0.11	$0.11	$0.11	$0.00	$0.00
Drying ($/unit)	$0.00	$0.00	$0.00	$0.00	$0.00
Overhead ($/ac.)	$5.00	$5.50	$5.50	$0.00	$2.50
Custom machine hire					
Tillage ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Planting ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Harvesting ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Fuel and lubrication ($/ac.)	$3.45	$3.18	$3.26	$0.00	$1.12
Machinery repair ($/ac.)	$8.68	$8.33	$8.36	$0.00	$1.00
Crop operating loan borrowed (months)	6	6	6	0	6
Interest APR(%)	12.00	12.00	12.00	0.00	12.00
Labor 1 (hrs./ac.)	1.28	1.11	1.18	0.00	0.35
($/hr)	$6.00	$6.00	$6.00	$0.00	$6.00
Labor 2 (hrs./ac.)	0.00	1.30	0.00	0.00	0.00
($/hr.)	$0.00	$4.00	$0.00	$0.00	$0.00
FIXED COSTS:					
Interest, Housing, and Ins. on Machinery	12.91	12.47	12.62	0.00	1.85
Depreciation on machinery & equipment	$14.95	$14.33	$15.04	$0.00	$1.75
Land Cost ($/acre)	$350	$350	$350	$0	$350
Real Estate Tax Percentage	1.50	1.50	1.50	0.00	1.50

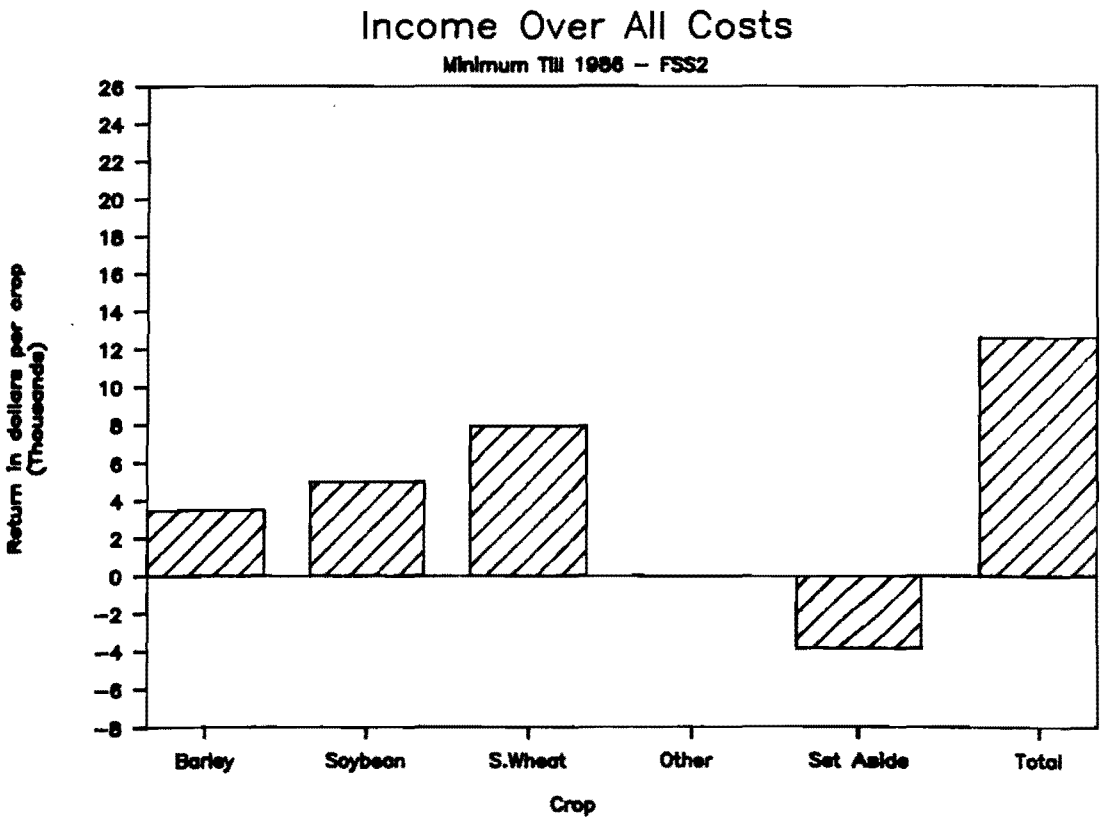
(end of Input Section)

INPUT SUMMARY AND RESULTS--MINIMUM TILL ROTATION 1986: FARMING SYSTEMS STUDY II

	Barley	Soybeans	S. Wheat	Other	Set Aside
RECEIPTS:					
Estimated grain yield (units/ac.).....	77	33	56	0	0
Estimated selling price or value ($/unit)...	$1.40	$5.00	$2.37	$0.00	$0.00
GOVERNMENT PAYMENT:					
Base yield (units/ac.).....	41	0	27	0	0
Deficiency payment ($/unit).....	$1.11	$0.00	$2.10	$0.00	$0.00
I. Total income per acre.....	$153.17	$166.50	$188.95	$0.00	$0.00
DIRECT COSTS:					
Seed ($/ac.).....	$4.06	$8.50	$8.10	$0.00	$0.00
Fertilizer ($/ac.).	$12.60	$0.00	$16.20	$0.00	$0.00
Fertilizer application ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Herbicide ($/ac.).....	$17.84	$30.06	$17.84	$0.00	$4.15
Herbicide application ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Insecticide ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Insecticide application ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Crop insurance ($/ac.).....	$4.00	$4.94	$5.08	$0.00	$0.00
Storage ($/ac.).....	$8.54	$3.70	$6.19	$0.00	$0.00
Drying ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Overhead ($/ac.).....	$5.00	$5.50	$5.50	$0.00	$2.50
Custom machine hire ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Fuel and lubrication ($/ac.).....	$3.45	$3.18	$3.26	$0.00	$1.12
Machinery repair ($/ac.).....	$8.68	$8.33	$8.36	$0.00	$1.00
Interest on non labor direct costs ($/ac)...	$3.80	$3.80	$4.17	$0.00	$0.52
Labor charge($/ac.).....	$7.65	$11.86	$7.08	$0.00	$2.10
II. Total direct (operating) costs.....	$75.61	$79.86	$81.79	$0.00	$11.39
Income over direct costs (I minus II)....	$77.56	$86.64	$107.16	$0.00	($11.39)
Breakeven price per unit (direct costs)..	$0.98	$2.40	$1.47	ERR	ERR
FIXED COSTS:					
Interest, Housing & Ins. on machinery ($/ac)	$12.91	$12.47	$12.62	$0.00	$1.85
Deprec. on machinery and equipment ($/ac.)..	$14.95	$14.33	$15.04	$0.00	$1.75
Real estate taxes ($/ac.).....	$5.25	$5.25	$5.25	$0.00	$5.25
III. Total fixed costs.....	$33.11	$32.05	$32.91	$0.00	$8.85
IV. Production costs ($/ac., excluding land) (II plus III)	$108.72	$111.91	$114.70	$0.00	$20.24
Production costs ($/unit)...	$1.41	$3.36	$2.06	ERR	ERR
V. Land charges ($/ac.).....	$21.00	$21.00	$21.00	$0.00	$21.00
VI. Total production and land costs ($/ac.). (IV plus V)	$129.72	$132.91	$135.70	$0.00	$41.24
Production and land costs ($/unit).....	$1.69	$3.99	$2.43	ERR	ERR
Breakeven yield (units/ac.)..... (at selling price)	92.7	26.6	57.3	ERR	ERR
VII. Income over all costs ($/acre)..... (I minus IV)	$23.45	$33.59	$53.25	$0.00	($41.24)
Income over all costs ($/unit).....	$0.30	$1.01	$0.95	ERR	ERR

MINIMUM TILL ROTATION 1986: FARMING SYSTEMS STUDY II
SUMMARY DATA FOR REPRESENTATIVE FARM IN NORTHEAST SOUTH DAKOTA.

	Barley	Soybean	S.Wheat	Other	Set Aside	Total
Farm Program Set-aside Requirement (%).....	20	0	27.5	0	0	
Crop Distribution (acres)..	149	149	149	0	93	540
Income Over All Costs..... ($/acre)	$23.45	$33.59	$53.25	$0.00	($41.24)	
Income Over All Costs..... ($/crop)	$3,494	$5,004	$7,934	$0	($3,835)	$12,597



MINIMUM TILL ROTATION NORMAL YEAR: Farming Systems Study II

INPUT SECTION	Barley	Soybeans	S. Wheat	Other	Set Aside
RECEIPTS:					
Estimated grain yield (units/ac.)	65	30	42	0	0
Estimated selling price or value ($/unit)	$1.40	$5.00	$2.37	$0.00	$0.00
GOVERNMENT PAYMENT:					
Base yield (units/ac.)	41	0	27	0	0
Deficiency payment ($/unit)	$1.11	$0.00	$2.10	$0.00	$0.00
DIRECT COSTS:					
Seed (units/ac.)	58	1	75	0	0
($/unit)	$0.07	$8.50	$0.11	$0.00	$0.00
Fertilizer 1 (units/ac.)	70	0	90	0	0
($/unit)	$0.18	$0.00	$0.18	$0.00	$0.00
Fertilizer 2 (units/ac.)	20	20	20	0	0
($/unit)	$0.18	$0.18	$0.18	$0.00	$0.00
Fertilizer application ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Herbicide 1 (units/ac.)	2	2.75	2	0	0.62
($/unit)	$6.19	$5.39	$6.19	$0.00	$1.47
Herbicide 2 (units/ac.)	1	1.5	1	0	0.31
($/unit)	$5.46	$10.16	$5.46	$0.00	$10.36
Herbicide application ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Insecticide (units/ac.)	0	0	0	0	0
($/unit)	$0.00	$0.00	$0.00	$0.00	$0.00
Insecticide application ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Crop insurance ($/ac.)	$3.38	$4.45	$3.82	$0.00	$0.00
Storage ($/unit)	$0.11	$0.11	$0.11	$0.00	$0.00
Drying ($/unit)	$0.00	$0.00	$0.00	$0.00	$0.00
Overhead ($/ac.)	$5.00	$5.50	$5.50	$0.00	$2.50
Custom machine hire					
Tillage ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Planting ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Harvesting ($/ac.)	$0.00	$0.00	$0.00	$0.00	$0.00
Fuel and lubrication ($/ac.)	$3.45	$2.91	$3.26	$0.00	$1.12
Machinery repair ($/ac.)	$8.68	$7.98	$8.36	$0.00	$1.00
Crop operating loan borrowed (months)	6	6	6	0	6
Interest APR(%)	12.00	12.00	12.00	0.00	12.00
Labor 1 (hrs./ac.)	1.28	1.11	1.18	0.00	0.35
($/hr)	$6.00	$6.00	$6.00	$0.00	$6.00
Labor 2 (hrs./ac.)	0.00	1.30	0.00	0.00	0.00
($/hr.)	$0.00	$4.00	$0.00	$0.00	$0.00
FIXED COSTS:					
Interest, Housing, and Ins. on Machinery	12.91	11.91	12.62	0.00	1.85
Depreciation on machinery & equipment	$14.95	$13.71	$15.04	$0.00	$1.75
Land Cost ($/acre)	$350	$350	$350	$0	$350
Real Estate Tax Percentage	1.50	1.50	1.50	0.00	1.50

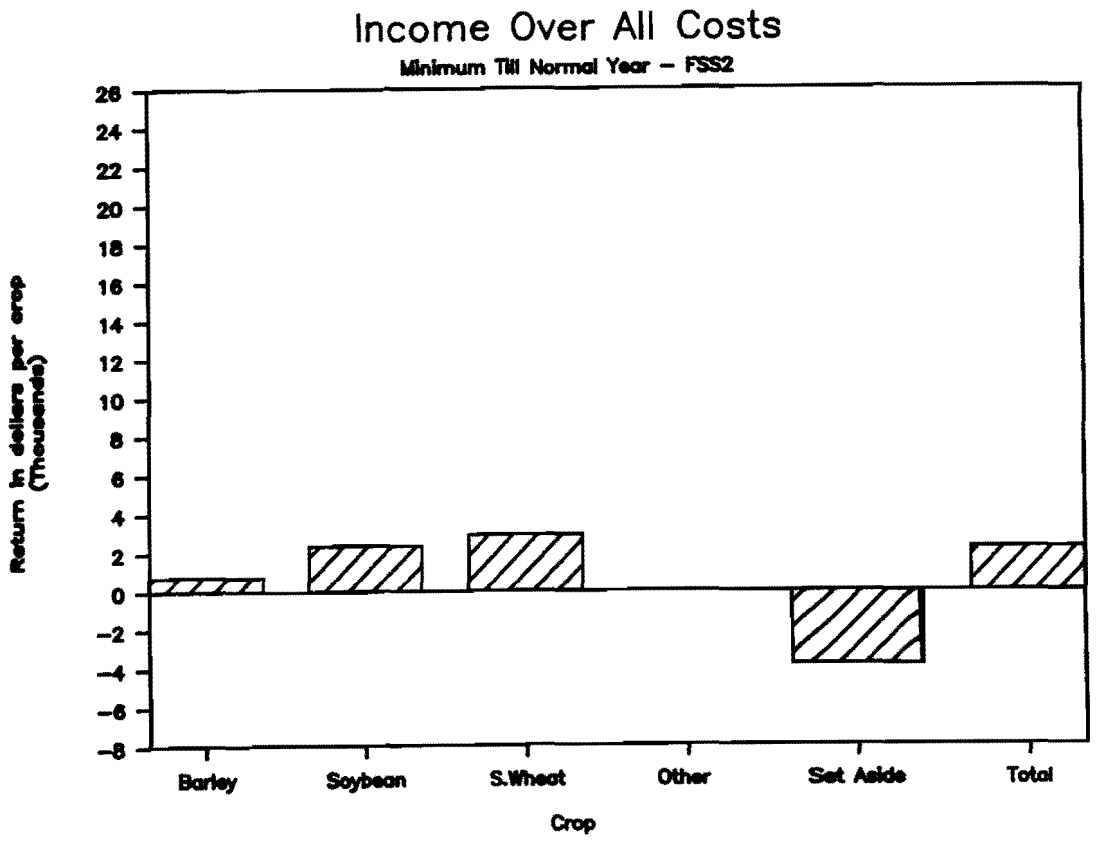
(end of Input Section)

INPUT SUMMARY AND RESULTS--MINMUM TILL ROTATION NORMAL YEAR: Farming Systems Study II

	Barley	Soybeans	S. Wheat	Other	Set Aside
RECEIPTS:					
Estimated grain yield (units/ac.).....	65	30	42	0	0
Estimated selling price or value ($/unit)...	$1.40	$5.00	$2.37	$0.00	$0.00
GOVERNMENT PAYMENT:					
Base yield (units/ac.).....	41	0	27	0	0
Deficiency payment ($/unit).....	$1.11	$0.00	$2.10	$0.00	$0.00
I. Total income per acre.....	$136.51	$150.00	$156.24	$0.00	$0.00
DIRECT COSTS:					
Seed ($/ac.).....	$4.06	$8.50	$8.10	$0.00	$0.00
Fertilizer ($/ac.).	$16.20	$3.60	$19.80	$0.00	$0.00
Fertilizer application ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Herbicide ($/ac.).....	$17.84	$30.06	$17.84	$0.00	$4.15
Herbicide application ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Insecticide ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Insecticide application ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Crop insurance ($/ac.).....	$3.38	$4.45	$3.82	$0.00	$0.00
Storage ($/ac.).....	$7.22	$3.33	$4.66	$0.00	$0.00
Drying ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Overhead ($/ac.).....	$5.00	$5.50	$5.50	$0.00	$2.50
Custom machine hire ($/ac.).....	$0.00	$0.00	$0.00	$0.00	$0.00
Fuel and lubrication ($/ac.).....	$3.45	$2.91	$3.26	$0.00	$1.12
Machinery repair ($/ac.).....	$8.68	$7.98	$8.36	$0.00	$1.00
Interest on non labor direct costs ($/ac)...	$3.90	$3.93	$4.22	$0.00	$0.52
Labor charge($/ac.).....	$7.65	$11.86	$7.08	$0.00	$2.10
II. Total direct (operating) costs.....	$77.37	$82.11	$82.65	$0.00	$11.39
Income over direct costs (I minus II)....	$59.14	$67.89	$73.59	$0.00	($11.39)
Breakeven price per unit (direct costs)..	$1.19	$2.74	$1.97	ERR	ERR
FIXED COSTS:					
Interest, Housing & Ins. on machinery ($/ac)	$12.91	$11.91	$12.62	$0.00	$1.85
Deprec. on machinery and equipment ($/ac.)..	$14.95	$13.71	$15.04	$0.00	$1.75
Real estate taxes ($/ac.).....	$5.25	$5.25	$5.25	$0.00	$5.25
III. Total fixed costs.....	$33.11	$30.87	$32.91	$0.00	$8.85
IV. Production costs ($/ac., excluding land) (II plus III)	$110.48	$112.98	$115.56	$0.00	$20.24
Production costs ($/unit)...	$1.70	$3.77	$2.75	ERR	ERR
V. Land charges ($/ac.).....	$21.00	$21.00	$21.00	$0.00	$21.00
VI. Total production and land costs ($/ac.). (IV plus V)	$131.48	$133.98	$136.56	$0.00	$41.24
Production and land costs ($/unit).....	$2.02	$4.47	$3.25	ERR	ERR
Breakeven yield (units/ac.)..... (at selling price)	93.9	26.8	57.6	ERR	ERR
VII. Income over all costs ($/acre)..... (I minus IV)	$5.03	$16.02	$19.68	$0.00	($41.24)
Income over all costs ($/unit).....	$0.08	$0.53	$0.47	ERR	ERR

MINIMUM TILL ROTATION NORMAL YEAR: FARMING SYSTEMS STUDY II
SUMMARY DATA FOR REPRESENTATIVE FARM IN NORTHEAST SOUTH DAKOTA.

	Barley	Soybean	S.Wheat	Other	Set Aside	Total
Farm Program Set-aside Requirement (%).....	20	0	27.5	0	0	
Crop Distribution (acres)..	149	149	149	0	93	540
Income Over All Costs..... ($/acre)	$5.03	$16.02	$19.68	$0.00	($41.24)	
Income Over All Costs..... ($/crop)	$749	$2,386	$2,933	$0	($3,835)	$2,234



ASSUMPTIONS AND EXPLANATIONS

Continuous No Till Rotation: Farming Systems Study II

Crop	1986 Budgets	Normalized Budgets
1. Winter Wheat		
a. Machine operations:	No till drill applying fertilizer, spray twice, swath, combine, haul	Same as 1986
b. Seeding:	75 lbs./acre @ $.0916/lb.	Same as 1986
c. Fertilizer:	90 lbs. N/acre @ $.18/lb.	90 lbs. N/acre @ $.18/lb. 20 lbs. P/acre @ $.18/lb.
d. Herbicide:	2, 4-D Amine: ½ pt./acre @ $1.47/pt. Roundup 3L: 1 pt./acre @ $10.36/pt.	Same as 1986
e. Machine labor:	1.17 hrs./acre @ $6/hr.	Same as 1986
2. Set Aside		
a. Machine operations:	Spray twice	Same as 1986
b. Herbicide:	2, 4-D Amine: 1.21 pts./acre @ $1.47/pt. Roundup: .606 pts./acre @ $10.36/pt.	Same as 1986
c. Machine labor:	.33 hrs./acre @ $6/hr.	Same as 1986

NO TILL WINTER WHEAT 1986: Farming Systems Study II

INPUT SECTION	W. Wheat	Other	Set Aside
RECEIPTS:			
Estimated grain yield (units/ac.)	51	0	0
Estimated selling price or value ($/unit)	$2.37	$0.00	$0.00
GOVERNMENT PAYMENT:			
Base yield (units/ac.)	27	0	0
Deficiency payment ($/unit)	$2.10	$0.00	$0.00
DIRECT COSTS:			
Seed (units/ac.)	75	0	0
($/unit)	$0.09	$0.00	$0.00
Fertilizer 1 (units/ac.)	90	0	0
($/unit)	$0.18	$0.00	$0.00
Fertilizer 2 (units/ac.)	0	0	0
($/unit)	$0.00	$0.00	$0.00
Fertilizer application ($/ac.)	$0.00	$0.00	$0.00
Herbicide 1 (units/ac.)	1	0	1.21
($/unit)	$10.36	$0.00	$1.47
Herbicide 2 (units/ac.)	0.5	0	0.61
($/unit)	$1.47	$0.00	$10.36
Herbicide application ($/ac.)	$0.00	$0.00	$0.00
Insecticide (units/ac.)	0	0	0
($/unit)	$0.00	$0.00	$0.00
Insecticide application ($/ac.)	$0.00	$0.00	$0.00
Crop insurance ($/ac.)	$2.98	$0.00	$0.00
Storage ($/unit)	$0.11	$0.00	$0.00
Drying ($/unit)	$0.00	$0.00	$0.00
Overhead ($/ac.)	$5.00	$0.00	$2.50
Custom machine hire			
Tillage ($/ac.)	$0.00	$0.00	$0.00
Planting ($/ac.)	$0.00	$0.00	$0.00
Harvesting ($/ac.)	$0.00	$0.00	$0.00
Fuel and lubrication ($/ac.)	$2.66	$0.00	$0.54
Machinery repair ($/ac.)	$8.15	$0.00	$0.70
Crop operating loan borrowed (months)	6	0	6
Interest APR(%)	12.00	0.00	12.00
Labor 1 (hrs./ac.)	1.17	0.00	0.33
($/hr)	$6.00	$0.00	$6.00
Labor 2 (hrs./ac.)	0.00	0.00	0.00
($/hr.)	$0.00	$0.00	$0.00
FIXED COSTS:			
Interest, Housing, and Ins. on Machinery	11.99	0.00	1.12
Depreciation on machinery & equipment	$16.04	$0.00	$1.24
Land Cost ($/acre)	$350	$0	$350
Real Estate Tax Percentage	1.50	0.00	1.50

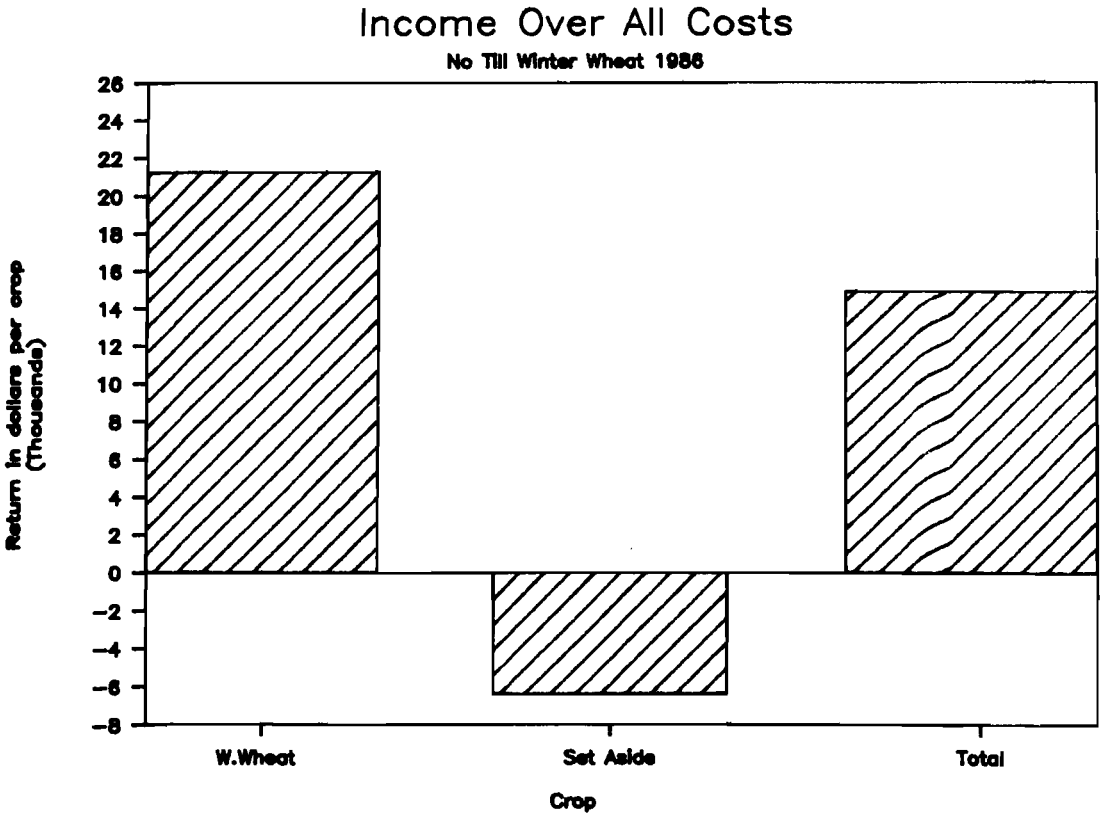
(end of Input Section)

INPUT SUMMARY AND RESULTS--NO TILL WINTER WHEAT 1986: FARMING SYSTEMS

	W.Wheat	Other	Set Aside
RECEIPTS:			
Estimated grain yield (units/ac.).....	51	0	0
Estimated selling price or value ($/unit)...	$2.37	$0.00	$0.00
GOVERNMENT PAYMENT:			
Base yield (units/ac.).....	27	0	0
Deficiency payment ($/unit).....	$2.10	$0.00	$0.00
I. Total income per acre.....	$177.57	$0.00	$0.00
DIRECT COSTS:			
Seed ($/ac.).....	$6.87	$0.00	$0.00
Fertilizer ($/ac.).	$16.20	$0.00	$0.00
Fertilizer application ($/ac.).....	$0.00	$0.00	$0.00
Herbicide ($/ac.).....	$11.10	$0.00	$8.06
Herbicide application ($/ac.).....	$0.00	$0.00	$0.00
Insecticide ($/ac.).....	$0.00	$0.00	$0.00
Insecticide application ($/ac.).....	$0.00	$0.00	$0.00
Crop insurance ($/ac.).....	$2.98	$0.00	$0.00
Storage ($/ac.).....	$5.66	$0.00	$0.00
Drying ($/ac.).....	$0.00	$0.00	$0.00
Overhead ($/ac.).....	$5.00	$0.00	$2.50
Custom machine hire ($/ac.).....	$0.00	$0.00	$0.00
Fuel and lubrication ($/ac.).....	$2.66	$0.00	$0.54
Machinery repair ($/ac.).....	$8.15	$0.00	$0.70
Interest on non labor direct costs ($/ac)...	$3.47	$0.00	$0.70
Labor charge($/ac.).....	$7.02	$0.00	$1.96
II. Total direct (operating) costs.....	$69.11	$0.00	$14.45
Income over direct costs (I minus II)....	$108.46	$0.00	($14.45)
Breakeven price per unit (direct costs)..	$1.36	ERR	ERR
FIXED COSTS:			
Interest, Housing & Ins. on machinery ($/ac)	$11.99	$0.00	$1.12
Deprec. on machinery and equipment ($/ac.)..	$16.04	$0.00	$1.24
Real estate taxes ($/ac.).....	$5.25	$0.00	$5.25
III. Total fixed costs.....	$33.28	$0.00	$7.61
IV. Production costs ($/ac., excluding land) (II plus III)	$102.39	$0.00	$22.06
Production costs ($/unit)...	$2.01	ERR	ERR
V. Land charges ($/ac.).....	$21.00	$0.00	$21.00
VI. Total production and land costs ($/ac.). (IV plus V)	$123.39	$0.00	$43.06
Production and land costs ($/unit).....	$2.42	ERR	ERR
Breakeven yield (units/ac.)..... (at selling price)	52.1	ERR	ERR
VII. Income over all costs ($/acre)..... (I minus IV)	$54.18	$0.00	($43.06)
Income over all costs ($/unit).....	$1.06	ERR	ERR

NO TILL WINTER WHEAT 1986: FARMING SYSTEMS STUDY II
SUMMARY DATA FOR REPRESENTATIVE FARM IN NORTHEAST SOUTH DAKOTA.

	W.Wheat	Set Aside	Total
Farm Program Set-aside Requirement (%).....	27.5	0	
Crop Distribution (acres)..	392	148	540
Income Over All Costs..... ($/acre)	$54.18	($43.06)	
Income Over All Costs..... ($/crop)	$21,239	($6,373)	$14,866



NO TILL WINTER WHEAT NORMAL YEAR: Farming Systems Study II

INPUT SECTION	W. Wheat	Other	Set Aside
RECEIPTS:			
Estimated grain yield (units/ac.)	40	0	0
Estimated selling price or value ($/unit)	$2.37	$0.00	$0.00
GOVERNMENT PAYMENT:			
Base yield (units/ac.)	27	0	0
Deficiency payment ($/unit)	$2.10	$0.00	$0.00
DIRECT COSTS:			
Seed (units/ac.)	75	0	0
($/unit)	$0.09	$0.00	$0.00
Fertilizer 1 (units/ac.)	90	0	0
($/unit)	$0.18	$0.00	$0.00
Fertilizer 2 (units/ac.)	20	0	0
($/unit)	$0.18	$0.00	$0.00
Fertilizer application ($/ac.)	$0.00	$0.00	$0.00
Herbicide 1 (units/ac.)	1	0	1.21
($/unit)	$10.36	$0.00	$1.47
Herbicide 2 (units/ac.)	0.5	0	0.61
($/unit)	$1.47	$0.00	$10.36
Herbicide application ($/ac.)	$0.00	$0.00	$0.00
Insecticide (units/ac.)	0	0	0
($/unit)	$0.00	$0.00	$0.00
Insecticide application ($/ac.)	$0.00	$0.00	$0.00
Crop insurance ($/ac.)	$2.34	$0.00	$0.00
Storage ($/unit)	$0.11	$0.00	$0.00
Drying ($/unit)	$0.00	$0.00	$0.00
Overhead ($/ac.)	$5.00	$0.00	$2.50
Custom machine hire			
Tillage ($/ac.)	$0.00	$0.00	$0.00
Planting ($/ac.)	$0.00	$0.00	$0.00
Harvesting ($/ac.)	$0.00	$0.00	$0.00
Fuel and lubrication ($/ac.)	$2.66	$0.00	$0.54
Machinery repair ($/ac.)	$8.15	$0.00	$0.70
Crop operating loan borrowed (months)	6	0	6
Interest APR(%)	12.00	0.00	12.00
Labor 1 (hrs./ac.)	1.17	0.00	0.33
($/hr)	$6.00	$0.00	$6.00
Labor 2 (hrs./ac.)	0.00	0.00	0.00
($/hr.)	$0.00	$0.00	$0.00
FIXED COSTS:			
Interest, Housing, and Ins. on Machinery	11.99	0.00	1.12
Depreciation on machinery & equipment	$16.04	$0.00	$1.24
Land Cost ($/acre)	$350	$0	$350
Real Estate Tax Percentage	1.50	0.00	1.50

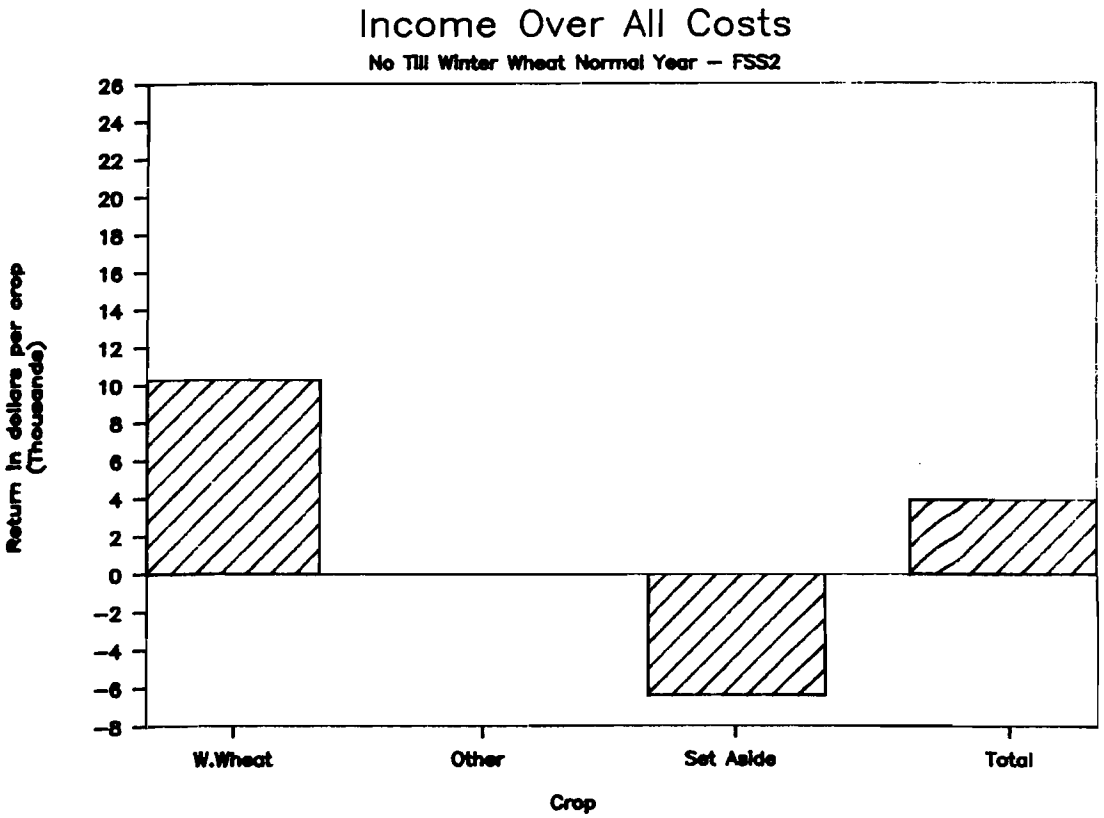
(end of Input Section)

NO TILL WINTER WHEAT NORMAL YEAR: Farming Systems Study II

	W.Wheat	Other	Set Aside
RECEIPTS:			
Estimated grain yield (units/ac.).....	40	0	0
Estimated selling price or value ($/unit)...	$2.37	$0.00	$0.00
GOVERNMENT PAYMENT:			
Base yield (units/ac.).....	27	0	0
Deficiency payment ($/unit).....	$2.10	$0.00	$0.00
I. Total income per acre.....	$151.50	$0.00	$0.00
DIRECT COSTS:			
Seed ($/ac.).....	$6.87	$0.00	$0.00
Fertilizer ($/ac.).	$19.80	$0.00	$0.00
Fertilizer application ($/ac.).....	$0.00	$0.00	$0.00
Herbicide ($/ac.).....	$11.10	$0.00	$8.06
Herbicide application ($/ac.).....	$0.00	$0.00	$0.00
Insecticide ($/ac.).....	$0.00	$0.00	$0.00
Insecticide application ($/ac.).....	$0.00	$0.00	$0.00
Crop insurance ($/ac.).....	$2.34	$0.00	$0.00
Storage ($/ac.).....	$4.44	$0.00	$0.00
Drying ($/ac.).....	$0.00	$0.00	$0.00
Overhead ($/ac.).....	$5.00	$0.00	$2.50
Custom machine hire ($/ac.).....	$0.00	$0.00	$0.00
Fuel and lubrication ($/ac.).....	$2.66	$0.00	$0.54
Machinery repair ($/ac.).....	$8.15	$0.00	$0.70
Interest on non labor direct costs ($/ac)...	$3.57	$0.00	$0.70
Labor charge($/ac.).....	$7.02	$0.00	$1.96
II. Total direct (operating) costs.....	$70.95	$0.00	$14.45
Income over direct costs (I minus II)....	$80.55	$0.00	($14.45)
Breakeven price per unit (direct costs)..	$1.77	ERR	ERR
FIXED COSTS:			
Interest, Housing & Ins. on machinery ($/ac)	$11.99	$0.00	$1.12
Deprec. on machinery and equipment ($/ac.)..	$16.04	$0.00	$1.24
Real estate taxes ($/ac.).....	$5.25	$0.00	$5.25
III. Total fixed costs.....	$33.28	$0.00	$7.61
IV. Production costs ($/ac., excluding land) (II plus III)	$104.23	$0.00	$22.06
Production costs ($/unit)...	$2.61	ERR	ERR
V. Land charges ($/ac.).....	$21.00	$0.00	$21.00
VI. Total production and land costs ($/ac.). (IV plus V)	$125.23	$0.00	$43.06
Production and land costs ($/unit).....	$3.13	ERR	ERR
Breakeven yield (units/ac.)..... (at selling price)	52.8	ERR	ERR
VII. Income over all costs ($/acre)..... (I minus IV)	$26.27	$0.00	($43.06)
Income over all costs ($/unit).....	$0.66	ERR	ERR

NO TILL WINTER WHEAT NORMAL YEAR: FARMING SYSTEMS STUDY II
SUMMARY DATA FOR REPRESENTATIVE FARM IN NORTHEAST SOUTH DAKOTA.

	W.Wheat	Other	Set Aside	Total
Farm Program Set-aside Requirement (%).....	27.5	0	0	
Crop Distribution (acres)..	392	0	148	540
Income Over All Costs..... ($/acre)	$26.27	$0.00	($43.06)	
Income Over All Costs..... ($/crop)	$10,299	$0	($6,373)	$3,926



Annex A

General Procedures for Estimation of Machinery Costs

When estimating production costs, calculation of machine costs proved to be difficult. Most of the machine costs for the crop budgets were taken directly from "Detailed Support Tables for Economics Pamphlet 87-2". The following machine costs were not taken directly but were derived from that source: combining, hauling, baling, bale moving, manure spreading, ridge tillage planting, ridge tillage cultivating, hoe drilling, chiseling with sweeps, and drilling with packer. Machine costs are broken down into four components: (1) fuel and lubrication; (2) machinery repair; (3) taxes, housing, interest, and insurance; and (4) depreciation.

It should be noted that row spacing for our row crop equipment varies between 38 and 40 inches. This is because we used what was available in the detailed support tables, realizing that there is very little cost difference between 38- and 40-inch rows.

In these budgets, machine costs for each crop were assessed to the crop which was grown in the year that each machine operation took place. Machine costs for fall tillage were not assessed to the following year's crop.

Most of the machine costs can easily be found by referring to the "Detailed Support Tables for Economics Pamphlet 87-2". Machine costs that are derived (rather than taken directly) from that source are explained in the following paragraphs.

Combine: To obtain machinery costs for a combine, figures were taken directly from "Detailed Support Tables for Economics Pamphlet 87-2". The total cost for a 6-row self-propelled combine was $26.10. It was then decided that more reasonable costs would be $20/acre for row crops and $18/acre for small grains, based on custom rates reported in Thaden's "Detailed Report of Rates Paid for Custom Work in South Dakota, 1986". Custom rates for combining were

reported in that source to be $14/acre for small grains and $14.50/acre for row crops. To obtain these $18- and $20-costs, a prorated cut was made in each of the four components of machinery costs. The cuts were as follows: [1 - ($20 ÷ $26.10)] = 23% for row crops and [1 - ($18 ÷ $26.10)] = 31% for small grains.

Hauling: To arrive at hauling costs, a 260-bushel gravity box was used. The "Detailed Support Tables for Economics Pamphlet 87-2" lists per hour costs but not per acre costs. To change the per hour costs to per acre costs, some assumptions had to be made. They were: (1) approximately 25,500 bushels were to be hauled to storage each year (25,500 is an estimated average yield of all crops for the conventional rotation on a 640-acre farm); (2) with a 260-bushel gravity box, it would take approximately 98 loads per year (25,500 ÷ 260); (3) it takes approximately 1 hour to haul one load of grain to storage; and (4) the assumed 98 hours of hauling per year is comparable to the 100 hours in the hours of use column from the detailed support tables. After making these assumptions, it should be acceptable to assume that per hour costs from the support tables would be approximately equal to per load costs of a 260-bushel gravity box. Thus, we can think of the per hour costs in the support tables as roughly equal to per acre costs for a crop yielding 260 bu/acre. To adjust this cost to accommodate different yields, simply divide the yield by 260 and multiply this figure times the component costs of the 260-bushel gravity box in the support tables. For example: (80 bushel yield ÷ 260 bu. gravity box) X $2.00/hr. for fuel & lub = $.62/acre. Hauling costs in the crop budgets were based on approximately normal yields, and were generally not adjusted for yield differences.

Manure Spreader: To apply 2 tons of dry matter manure per acre, we used per hour machine costs from the detailed support tables for a 390-bushel spreader with a 60-horse power tractor. The following assumptions were made:

(1) the 390-bushel spreader has the capacity to haul 7 tons of wet manure (70% moisture); (2) it takes 3 tons of wet manure to equal 1 ton of dry manure; (3) one 6-ton load/acre equals 2 tons of dry matter/acre; and (4) two loads per hour is the average field efficiency. With these assumptions, we divided per hour machine costs by 2 to get per acre costs.

Ridge Till Cultivator: Ridge till cultivator costs were developed from conventional cultivator costs. It was assumed that variable costs such as fuel and lubricants, repairs, and labor would be the same as for a conventional cultivator. Fixed costs were calculated using information obtained from Dr. Diane Rickerl in SDSU's Plant Science Department. It was assumed that a conventional cultivator could be converted to a ridge till cultivator by purchasing ridgers for $250 and shields for $600. Fixed costs were calculated using a $3,989 purchase price for a conventional cultivator.

Depreciation was calculated as follows:

$3,989 + $250 + $600 = $4,839 x .2 = $968 remaining farm value

$\frac{\$4,839 - \$968}{10 \text{ years}} = \$387/\text{yr}$

$\frac{\$387/\text{yr.}}{700 \text{ acres/yr.}} = \$.55/\text{acre}$

Taxes, housing, interest, and insurance were calculated as follows:

$\frac{4,839 + \$968}{2} = \$2,904$ average value

$2,904 X (.01 for taxes + .01 for housing
+.07 for interest + .006 for insurance) = $278.78/yr.

$\frac{\$278.78/\text{yr.}}{700 \text{ acres/yr.}} = \$.40/\text{acre}$

	Total Costs					
	Fuel & lub.	Repair	Labor	THII	Depreciation	Total
Tractor	$ .38	$ .22	$1.58	$ .36	$ .25	$2.79
Ridge Till Cultivator		$ .18		$ .40	$ .55	$1.13
	$ .38	$ .40	$1.58	$ .76	$ .80	$3.92

Baling: For harvesting alfalfa, a large round baler with an 80-horse power tractor was assumed to be used. Since yields of alfalfa can vary greatly from year to year, and most of the machinery costs for the alfalfa budgets are baling costs, the most desirable machinery cost assessment is one based on a per bale or per yield basis. Although there is a positive relationship between yield and baling costs, we did not feel there is a 1 to 1 correlation. Using the per hour costs from the detailed support tables, we developed the costs in the following manner.

For 2 to 4.5 tons/acre, which would include the "normalized" budget (3.6 tons/acre), we assumed a field efficiency of 15 bales/hour. From the detailed support tables, we get \$40.63/hr. ÷ 15 bales/hr. = \$2.71/bale. We felt that \$2.71 might be a little low and that \$3.75/bale would be more reasonable. This feeling was due to rates reported in Thaden's "Detailed Report of Rates Paid for Custom Work in South Dakota, 1986", in which there is a \$4.50/bale charge for a large round baler. We used used (\$3.75 ÷ 2.71) = 1.38 as a factor to prorate the machinery component costs. Per bale costs are \$3.75. Bales/acre are (3.6 ton yield x 2,000 lbs) ÷ 1500 lb. bales = 4.8. Cost then equals \$3.75/bale x 4.8 bales/acre = \$18/acre.

For yields over 4.5 tons/acre, which would include the 1986 budget (6.1 tons/acre), we assumed a field efficiency of 20 bales/hour. Thus, \$40.63/hr. ÷ 20 bales/hr. = \$2.03/bale. To keep the costs for the two yield ranges in relation to each other, we adjusted as follows:

[(\$2.71 - \$2.03) ÷ \$2.71] = .25 ; i.e., baling costs are 25% lower for the higher yields. Therefore, 1 - .25 = .75 and .75 x \$3.75 = \$2.81/bale for the higher yields.

Computations are then as follows:

(6.1 tons x 2,000 lbs/ton) ÷ 1,500 lb. bale = 8.1 bales/acre

\$2.81/bale x 8.1 bales/acre = \$22.76/acre

Bale Stacking (bale fork): We did not have machinery cost information for a bale fork, so we estimated costs in the following manner. First, we developed machinery costs for a normal yield using the following assumptions: (1) one can move 10 bales/hour; (2) a 60-horse power tractor is used; (3) the purchase price of a bale fork is $200; and (4) fuel, lubricants, and repair costs for an average yield are approximately the same per acre as for a 25-foot rotary hoe. Labor costs were calculated as follows:

$$\frac{\$6/\text{hr.}}{10 \text{ bales/hr.}} = \$ .60/\text{bale}$$

$.60/bale x 4.8 bales/acre = $2.88/acre

Depreciation was calculated as follows:

$$\frac{\$200 \text{ purchase price} - \$40 \text{ remaining farm value}}{10\text{-year life}} = \$16/\text{year}$$

$16 ÷ 135 acres = $ .12/acre

Taxes, housing, interest, and insurance were calculated as follows:

$$\frac{\$200 + 40}{2} = \$120 \text{ average value.}$$

$120 x (.01 for taxes + .01 for housing + .07 for interest + .006 for insurance) = $11.52/year

$11.52/yr. ÷ 135 acres/yr. = $ .09/acre

All other costs are taken from the detailed support tables.

Total Cost

	Fuel & lub.	Repair	Labor	THII	Depreciation	Total
Tractor	$ .23	$.13	$2.88	$.22	$.15	$3.61
Bale Fork		.13		.09	.12	.34
	$ .23	$.26	$2.88	$.31	$.27	$3.95

For the 1986 budget, we increased the normalized costs by 35%, using the following logic: $\frac{6.1 \text{ tons} - 3.6 \text{ tons}}{3.6 \text{ tons}}$ = a 69% increase. Assume bale costs increase by approximately half of 69%, or 35%. Therefore, for 6.1 tons, the bale fork costs would be $3.95/acre x 1.35 = $5.33/acre.

Ridge Till Planter: We did not have machine costs for a ridge till planter. Ron Thaden, SDSU Extension Farm Management Agent, suggested that a ridge till planter would have the same variable costs as an air planter. Dr. Diane Rickerl suggested that the list price for a 6-row ridge till planter is approximately $12,000. Purchase price is usually 85% of list price; ($12,000 x .85) = $10,200. Fixed costs were calculated in the following manner.

Depreciation:

$$\frac{\$10,200 - \$2,040 \text{ remaining farm value}}{10 \text{ years}} = \$816 \text{ depreciation}$$

$816 depreciation/yr. ÷ 512 acres covered/yr. = $1.59/acre

Taxes, housing, interest and insurance:

$$\frac{\$10,200 + \$2,040}{2} = \$6,120 \text{ average value}$$

$6,120 x (.01 for taxes + .01 for housing +.07 for interest + .006 for insurance) = $587.52/yr.

$587.52/yr. - 512 acres covered/yr = $1.15/acre

Total Costs

	Fuel & lub.	Repair	Labor	THII	Depreciation	Total
70 HP Tractor	$ .36	.20	.84	.34	.24	$1.98
6-38" Planter		.80		1.15	1.59	3.54
	$ .36	$1.00	$.84	$1.49	$1.83	$5.52

Minimum Till Planter: We did not have machinery costs for a minimum till planter, but Dr. Jim Smolik of the SDSU Plant Science Department suggested that a ridge till planter could be used for minimum till rotations. Therefore, we used the ridge till planter costs for the minimum till budget.

Minimum Till Cultivator: We assumed that mimimum till cultivator costs are the same as conventional cultivator costs.

Annex B

General Procedures for Estimation of Other Budget Items

The following paragraphs contain explanations of procedures for estimating various crop budget components other than machinery costs.

Seed Expenses: Seeding rates for the 1986 budgets were taken from the "1986 Annual Progress Report, Northeast Research Station, Watertown ...". Seeding rates for the normalized budgets were based on recommendations of Dr. James Smolik of the Plant Science Department. Seed prices were taken from the following sources: (1) Dr. Herbert Allen's Budgets for Minimum Tillage Operations ...; (2) Dr. Allen's "Budget Generator Price Vector 2"; (3) Expected Production Costs for Major Crops in South Dakota, EMC 864; and (4) quotations from seed dealers.

Yield Estimates: Yields used in the 1986 budgets were taken from the "1986 Annual Progress Report ...". For the normalized budgets, the following sources were used to synthesize estimates used: (1) "1986 Annual Progress Report ..."; (2) Expected Production Costs for Major Crops ...; (3) Dr. Allen's "Budget Generator" for Area 1 of South Dakota; (4) a "Summary of Costs and Returns for Crops in Northeastern South Dakota" prepared in 1986 by Ron Thaden; (5) a 1986 handout by Ron Thaden on "Expected Production Costs for Farming Systems Studys I and II"; and (6) "best judgments" by various faculty members in the SDSU Plant Science and Economics Departments.

Fertilizer: Fertilizer rates for the 1986 budgets were taken from the "1986 Annual Progress Report ...". Fertilizer rates for the normalized budgets were also taken from that report, except 20 pounds of phosphate were added to all of the crop budgets in order to eliminate soil fertility depletion and allow crops to maintain their long-run yield potential. Fertilizer prices were obtained from SDSU Extension Soils Specialist James Gerwing. Prices used were as follows: (1) nitrogen, $.18/lb.; (2) phosphate (dry), $.18.lb.; and (3)

potassium (dry), $.13/lb.

Herbicide: Recommendations regarding what herbicides to use were obtained from the "1986 Annual Progress Report ..." and from Dr. James Smolik of the SDSU Plant Science Department. Application rates and prices for herbicides were taken from the "1986 Annual Progress Report ..." and from SDSU Extension Extra 8012, "Herbicide Price List, January 1987".

Grain Storage Costs: Grain storage costs were taken from SDSU Extension Extra 5007, "Permanent Grain Storage: Construction and Leasing". Six 18-ft. diameter, round metal bins, each with 4,200-bu. capacity, were assumed to be used. According to Extension Extra 5007, the annual fixed cost/bu. for such bins would be $.111/bu.

Overhead: Overhead costs were taken directly from Expected Production Costs for Major Crops in South Dakota. Since this source did not have a budget for set aside acres, we assumed an overhead cost of $2.50/acre for those acres.

Grain Dryer: Costs for drying corn were taken from a handout entitled "Summary of Grain Dryer Performance and Economic Factors of Dryer Operation". Test results for this summary were conducted by the Prairie Agriculture Machinery Institute of Humboldt, Saskatchewan, Canada. An automatic batch, crossflow, propane dryer was assumed for the drying. Total costs came to $.1821/bu. However, after referring to Ron Thaden's "Detailed Report of Rates Paid for Custom Work in South Dakota, 1986", it was decided that $.15/bu. would be more reasonable. It should be pointed out that a labor cost of $.0041/bu. is included in the $.15/bu. drying cost.

Interest: The annual interest rate charged on all direct costs except labor was 12%. We assumed that operating cost money is tied up for an average of 6 months out of each year.

Labor: Labor for persons operating machines was taken from "Detailed Support Tables for Economics Pamphlet 87-2", by Dobbs, Thaden and Peckham. A $6/hr. rate was used. Soybean budgets also required a hand-weeding labor charge. The "1986 Annual Progress Report ..." lists hours of hand weeding required per acre for each of the soybean budgets. A $4/hr. wage rate was applied to that hand weeding in calculating costs.

Land Value: The land value for these budgets was derived using Dr. Larry Janssen's SDSU Economics Newsletter No. 241. Farmland prices for the "mostly cropland" category in the northeast area of South Dakota decreased by 11% between 1985 and 1986 ($437/acre to $389/acre). It was assumed that farmland prices would decrease another 10% between 1986 and 1987. Therefore, a farmland price of $350/acre was assumed.

Farm Size: Based upon agricultural statistics for counties in the vicinity of Watertown, South Dakota, SDSU Economics Department Graduate Research Assistant Mark Leddy has specified a "typical" farm for the Watertown area with the following acreage characteristics:

Cropland	= 540 acres
Pasture	= 60 acres
Wasteland	= 20 acres
Farmstead	= 20 acres
TOTAL	= 640 acres

Real Estate and Land Charge: A 1.5% real estate tax charge and a 6% land charge were used in all of the crop budgets.

Crop Insurance: For both 1986 and normalized budgets, crop insurnace assumptions and calculations were based on information received from Mr. Ray Gall at the Federal Crop Insurance Corporation in Huron, S.D. In all budgets, a level II (65%) coverage level, the medium price election, and Codington County non-irrigated land were assumed. The following information was obtained and used for calculations.

Crop	Medium Price election	Premium Coefficient
Corn	$1.50	17.8%
Soybeans	$4.00	5.7%
Spring Wheat	$2.00	7.0%
Winter Wheat	$2.00	4.5%
Barley	$1.25	6.4%
Oats	$ .80	5.2%

Crop insurance costs are calculated by doing the following:

(Yield) x (65% coverage level) x (price election) x (premium coefficient) = Cost per acre

Annex C

Assumptions for Maintenance Costs on Set Aside Acres

Set aside acres have certain maintenance costs. Land charges, real estate taxes, and interest on non labor direct costs were charged at the same rate for set aside acres as for other crops in the farming systems studied. Other maintenance costs, however, such as machinery and herbicide costs, required special considerations for set aside acres. The following paragraphs explain how such costs were estimated.

Alternative Rotation: For the "alternative" rotations, machinery maintenance costs consisted of field cultivating and chiseling. We assumed that there would be no herbicides used on the "alternative" rotation acres.

Conventional, Ridge Till, and Minimum Till Rotations: Conventional, ridge till, and minimum till rotations were each assumed to have the same machinery and herbicide costs. Initial assumptions for machines used for these budgets included a field cultivator, a chisel, and a sprayer. The initial assumptions for herbicides used included 2,4-D @ 1 pt/acre and Roundup @ .5 pt/acre. These initial assumptions for machinery and herbicides resulted in a cost of $19.22/acre for these items. It was then decided that these machine and herbicide costs would vary from year to year and that sometimes one tillage pass might be dropped or herbicide application rates might be lower. Because of this, $12/acre was assumed to be a more reasonable charge for these combined operations. To handle this adjustment, a prorated cut of .3756 $[1 - (12 \div 19.22)]$ was made in the initially estimated machinery and herbicide costs.

Continuous No Till Winter Wheat Rotation: For the continuous no till winter wheat system, it was assumed that no tillage would be done on set aside acres. However, these acres were assumed to be sprayed twice with a slightly higher rate of 2,4-D and Roundup. The herbicide application rate was such that direct costs, excluding overhead, would be approximately $12/acre.

REFERENCES

Allen, Herbert R. n.d. "Budget Generator" for Area 1 of South Dakota. Unpublished. Brookings, S.D.

_____. n.d. "Budget Generator Price Vector 2." Unpublished. Brookings, S.D.

_____. 1984. Budgets for Minimum Tillage Operations in South Dakota. SDSU Economics Pamphlet 84-2. Brookings, S.D.

Dobbs, Thomas, Ron Thaden, and Dale Peckham. 1987. Machine Cost Estimates for Custom Rate Considerations (and also "Detailed Support Tables"). SDSU Economics Pamphlet 87-2. Brookings, S.D.

Janssen, Larry. 1986. "Continued Declines in South Dakota Farmland Prices." SDSU Economics Newsletter No. 241. Brookings, S.D.

Pflueger, Burton L. 1985. Expected Production Costs for Major Crops in South Dakota. SDSU Extension Mimeo Circular 864. Brookings, S.D.

Plant Science Department. 1987. "1986 Annual Progress Report, Northeast Research Station, Watertown, South Dakota." SDSU Plant Science Pamphlet No. 100. Brookings, S.D.

Prairie Agricultural Machinery Institute. n.d. "Summary of Grain Dryer Performance and Economic Factors of Dryer Operation." Humboldt, Saskatchewan, Canada.

Thaden, Ron. 1987. "Detailed Report of Rates for Custom Work in South Dakota, 1986." SDSU Extension Extra 5011. Brookings, S.D.

_____. 1986. "Expected Production Costs for Farming Systems Studies I and II." Unpublished. Brookings, S.D.

_____. 1986. "Summary of Costs and Returns for Crops in Northeastern South Dakota." Unpublished. Brookings, S.D.

_____, and Burton Pflueger. 1986. "Permanent Grain Storage: Construction and Leasing." SDSU Extension Extra 5007. Brookings, S.D.

Wrage, Leon J., and Paul O. Johnson. 1987. "Herbicide Price List." SDSU Extension Extra 8012. Brookings, S.D.