22nd Annual...

SOUTHEAST SOUTH DAKOTA
EXPERIMENT FARM

PROGRESS REPORT 1982

Agricultural Experiment Station
South Dakota State University
Brookings

This twenty-second annual report of the research program at the Southeast South Dakota Experiment Farm has special significance for those engaged in agriculture and the agriculturally related businesses in the ten county area of Southeast South Dakota. The results shown are not necessarily complete or conclusive. Interpretations given are tentative because additional data resulting from continuation of these experiments may result in conclusions different from those based on any one year. Trade names are used in this publication merely to provide specific information. A trade name quoted here does not constitute a guarantee or warranty and does not signify that the product is approved to the exclusion of other comparable products.

South Dakota Agricultural Experiment Station
Brookings, South Dakota 57007

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Introduction . . . . Fred E. Shubeck
Research Manager

There were no hail storms at the Experiment Farm in 1982, but we did experience another unusual weather pattern. It was too wet to plant corn (9.34 inches of rainfall in May), too wet to harvest (2.51 inches above average in early October), and too dry in between. June, July, August and September were all below average in precipitation. Another important weather factor was the cool temperature. The average monthly maximums were consistently below average - as much as 8 to 9 degrees in some months.

These weather conditions will have an important effect on nearly every experiment. For example, the success of a surface applied pre-emergence weedicide spray is virtually controlled by the frequency and the amount of rain in May; cool temperatures and fewer heat units can minimize the potential of late maturing corn hybrids; response to phosphorus and potash fertilizers are influenced by moisture and temperature; date of planting and plant populations are sensitive to moisture distribution and temperature, etc. We can't escape from the effects of weather on our crops and experiments and this should be kept in mind when interpreting 1982 experimental results and in applying them to farm conditions.

Both the north cattle feedlot and the remodeled hog house are in full scale operation. Approximately 400 head of hogs and 300 cattle are on feed trials yearly.

A June Crop Tour and a Field Day in September were held in addition to three other special tours, including one that was prepared for the Regents of Education.

There were 43 educational meetings held in the office and laboratory building. These included extension clubs, adult education meetings, judging schools, 4-H clubs, hail adjustors training meeting and local groups.

Investigations with emergency and late planted crops were continued together with some new and unusual crops. Research results with these crops after hail storms at the Southeast Experiment Farm gave valuable experience and information for the farmers north of Sioux Falls after their severe hail storm last summer.

Table 1. Temperatures at Southeast Experiment Farm

Month	1982 Av. Temperature (F)[1] Maximum	Minimum	30 Year Average Maximum	Minimum	Departure From 30 Year Average Maximum	Minimum
January	16.4	-6.7	25.2	3.8	-8.8	-10.5
February	29.4	9.1	32.0	10.4	-2.6	- 1.3
March	40.5	23.9	43.4	22.1	-2.0	+ 1.8
April	57.8	32.7	61.4	35.5	-3.6	- 2.8
May	70.4	51.4	73.3	47.3	-2.9	+ 4.1
June	72.6	51.9	82.5	57.0	-9.9	- 5.1
July	84.8	62.2	87.6	62.1	-2.8	+ 0.1
August	82.0	58.0	85.0	59.5	-3.5	- 1.5
September	72.5	49.1	75.9	49.1	-3.4	0.0
October	60.7	36.8	65.1	40.2	-4.4	- 3.4
November	40.2	21.5	46.2	24.2	-6.0	- 2.7
December	33.5	14.5	31.2	11.3	+2.3	+ 3.2

[1]Computed from daily observations

Table 2. Precipitation at the Southeast Experiment Farm

Month	Precipitation 1982 (inches)	30 year Average (inches)	Departure from 30-year Ave. (inches)
January	.83	.49	+ .34
February	.36	1.06	- .70
March	.71	1.38	- .67
April	1.16	2.26	-1.10
May	9.34	3.37	+5.97
June	1.69	3.89	-2.20
July	3.01	3.27	- .26
August	2.66	3.02	- .36
September	1.27	2.55	-1.28
October	4.18	1.67	+2.51
November	2.71	1.04	+1.67
December	1.85	.74	+1.11
Totals	29.77	24.74	+5.03

RATES OF NITROGEN AND DATES OF PLANTING CORN

F. Shubeck, B. Lawrensen and D. DuBois

SOUTHEAST FARM 82-1

Objectives of Experiment

1. Will planting dates influence response to fertilizer?
2. What is the optimum rate of nitrogen fertilizer for a soil with a medium amount of organic matter when the same amount of nitrogen is applied each year for several years?
3. Will optimum rates of nitrogen application be influenced by drought?
4. Will high nitrogen rates influence disease or insect damage?
5. Will soil temperatures serve as a dependable guide to determine an optimum date to plant corn?

Methods and Procedures

October 28, 1981	- Plowed total plot area
April 22, 1982	- Eradicane plus aatrex 4L was sprayed over all and tandem disked immediately to incorporate.
April 23	- Field cultivated diagonally
April 26	- Spread all fertilizer in low and high rates for first planting date, field cultivated
April 27	- Planted first planting date; Variety - Keltgen KS112 Insecticide - Dyfonate 20G
May 10	- Spread fertilizer for second planting date, field cultivated and planted.
May 18	- Fertilized, field cultivated and planted 3rd planting date.
June 7	- Fertilized, field cultivated and planted 4th planting date.
June 16	- Cultivated first and second planting dates.
June 18	- Cultivated third planting date.
June 28	- Cultivated all plots.
July 16	- Cultivated 4th planting date.
October 15	- Combined all plots.

Table 3. Effect of Fertilizer and Planting Dates on Yield of Corn (High Nitrogen Rates)

Broadcast Fertilizer Treatment	Planting Dates				
N + P + K	April 27	May 10	May 18	June 7	Average
0 + 0 + 0	80	76	85	72	78.3
0 +11 + 58	79	71	67	66	70.8
80 +11 + 58	98	81	77	80	84.0
160 +11 + 58	87	83	54	71	73.8
240 +11 + 58	81	76	72	75	76.0
Average	85.0	77.4	71.0	72.8	

Discussion and Interpretation of Table 3

80 pounds of nitrogen applied each year appeared to be sufficient for maximum yields with most planting dates in 1982.

Table 4. Effect of Fertilizer and Planting Dates on Yield of Corn (Low Nitrogen Rates)

Broadcast Fertilizer Treatment	Planting Dates				
N + P + K	April 27	May 10	May 18	June 7	Average
0 + 0 + 0	72	65	61	60	64.5
20 +11 + 58	77	68	70	75	72.5
40 +11 + 58	87	83	70	80	80.0
60 +11 + 58	99	96	76	77	87.0
80 +11 + 58	106	98	90	79	93.3
Average	88.2	82.0	73.4	74.2	

Discussion and Interpretation of Table 4

The earliest planting date had the highest average yield in 1982, a year when every month in the growing season had a maximum temperature well below average.

PLANT POPULATIONS FOR CORN

F. Shubeck, B. Lawrensen, and D. DuBois

SOUTHEAST FARM 82-2

S.E. FARM REPORT

Objectives of Experiment

1. Will a drought tolerant hybrid help reduce the expected loss when the planting rate turns out to be too high for the rainfall?
2. Will a prolific hybrid planted at moderate populations be able to take full advantage of unexpected improved growing conditions?
3. "Shortie" wheats have done very well in limited rainfall areas. How about "shortie" corn?
4. Can the population problem be solved by using a single ear hybrid that has a strong ability to increase ear size if conditions are better than expected?
5. Or is it best to use the biggest, tallest, latest corn that can be matured in most seasons?

Methods and Procedures

October 29, 1981	- Fall plowed
April 12, 1982	- Broadcast 160+60+40 (oxide) per acre and disked in.
April 22, 1982	- Sprayed Eradicane + aatrex 4L and disked.
May 4, 1982	- Field cultivated
May 11, 1982	- Planted all varieties and plant populations.
	- Insecticide - Dyfonate 20G
June 16, 1982	- Cultivated all plots.
June 21, 1982	- Finished thinning to desired populations.
June 28, 1982	- Cultivated all plots.
October 13, 1982	- Combined all plots.
November 8, 1982	- Plowed plot area. No fertility added.

Table 5. Hybrids Used With Important Features of Each

Hybrid	Special Characteristics	Days to Maturity
Curry's SC-150	Big tall full season	115
Frundt's 8500A	Multi-ear tendency	110
Pioneer 3709	Heat and drought tolerant	105
Pioneer 3932A	Ability to increase ear size	93
Yield Warranty	"Shortie" about 5-1/2 to 6 ft.	95

Discussion and Interpretation of Table 5

This experiment is centered around hybrids with unique characteristics that hopefully will help reduce the necessity of trying to out-guess the season's weather when selecting plant populations at planting time.

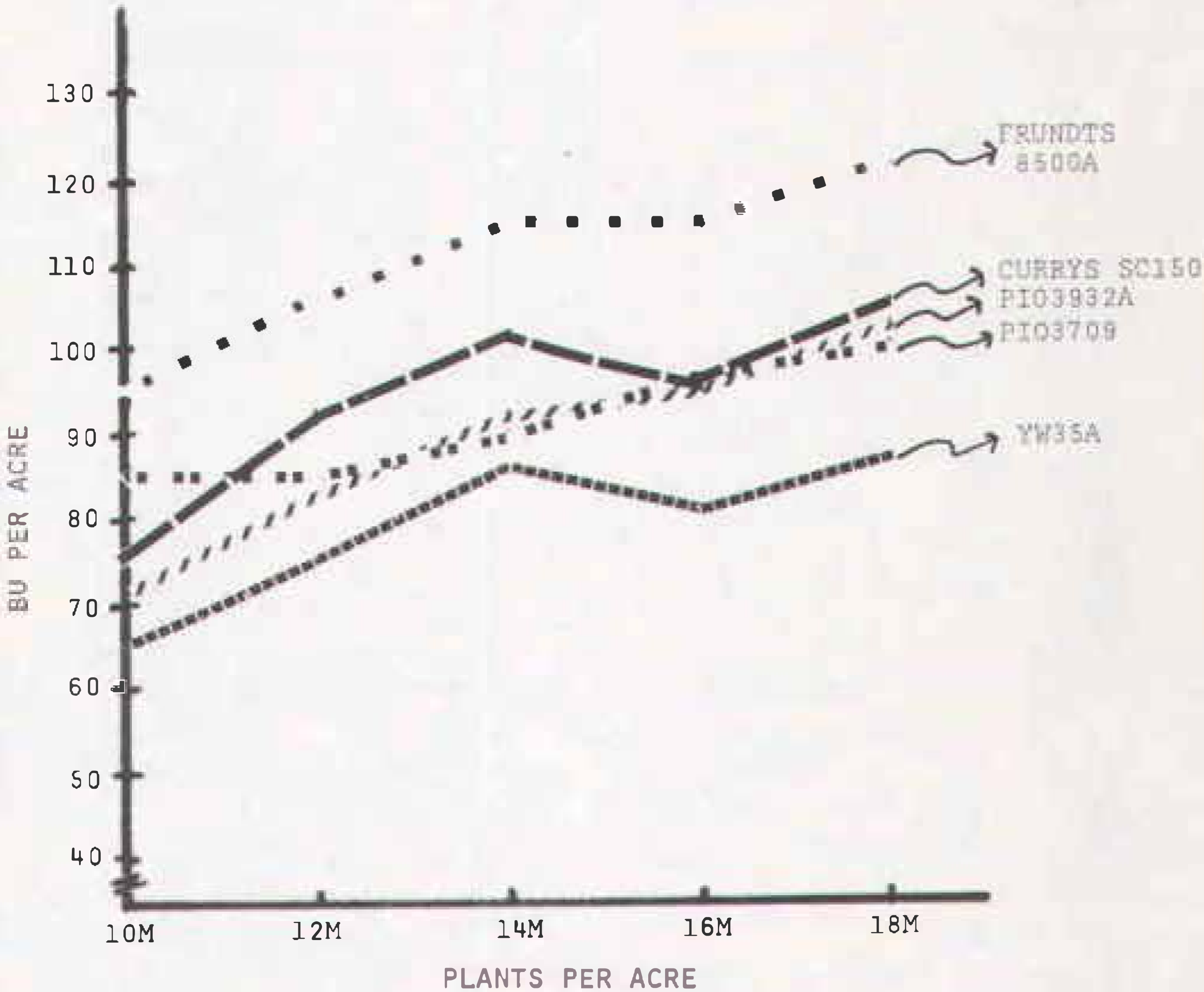
Table 6. Effect of Plant Populations and Hybrids on Corn Yield

Hybrid	10,000	12,000	14,000	16,000	18,000	Average
Pioneer 3709	85	85	91	95	101	91.4
Pioneer 3932A	72	83	92	92	103	88.4
YW 35A	68	75	86	81	88	79.6
Curry SC-150	77	93	103	96	105	94.8
Frundts 8500A	96	108	116	115	123	111.6
Average	79.6	88.8	97.6	95.8	104.0	

Discussion and Interpretation of Table 6

This is the second successive year when 18,000 plants per acre may not have been sufficient for maximum yields. Yields were still advancing for each increase in populations up to the 18,000 level, the highest population in the experiment.

FIGURE 1. EFFECT OF PLANT POPULATIONS AND HYBRIDS ON CORN YIELD S.E. FARM 1982



Discussion and Interpretation of Figure 1

Frundts 8500A gave the highest yield of all hybrids, but was not quite so successful in compensating for inadequate stands as it was in 1981. In 1981, with different climatic conditions, Frundts 8500A, in a wide range of populations (from 14,000 to 18,000) all produced the same maximum yield. This would suggest a considerable ability of this double ear hybrid to compensate for variations in stand.

Discussion of Figure 1 Continued

In 1982 there were not many stalks with double ears, which would minimize its ability to produce maximum yields with inadequate stands. The hybrid with a big flex range in ear size (P-3932A) was not very successful in compensating for insufficient stands either. The drought tolerant factor in P-3709 was not very important when rainfall was sufficient for over 100 bushels per acre.

When we have cool temperatures and above average rainfall in the planting and harvesting seasons with below average rainfall in between as in 1982, it apparently minimizes the ability of all these hybrids with special characteristics to maintain yields with stands that are above or below the optimum for that year's conditions. With the multi-ear hybrid, when we had good moisture conditions early in the season, perhaps the signal is given for two ears per stalk. When it turns dry in mid-season, the second ear may wither or be retarded in growth even though conditions improve late in the season. This apparently leaves the plant unable to cope with so many changing conditions.

SILAGE REMOVAL

AND SOIL DEPLETION

F. Shubeck, B. Lawrensen and D. DuBois

SOUTHEAST FARM 82-3

Objectives of Experiment

1. By removing all crop residues from the field, but fertilizing adquately, how long can we continue raising corn without a yield decrease?
2. Can we maintain yields where residues were removed by adding manure equal to that generated by the feed produced?

Methods and Procedures

October 9-10, 1981	-	Commercial fertilizer and manure applied to specified plots and plowed down.
April 22, 1982	-	Eradicane + aatrex sprayed over all and tandem disked once.
April 27	-	Field cultivated all plots
May 3	-	Planted all plots Variety - Pioneer 7223 Insecticide - Dyfonate 20G Herbicide - Eradicane + Aatrex 4L
June 16	-	Cultivated all plots
June 29	-	Cultivated all plots
October 14	-	Combined all plots

Table 7. Effect of Commercial Fertilizer and Manure Applications on Corn Yield with Intensive Soil Depletion Management

Removed From Plot	Fertilizer Treatment N + P + K	Tons of Silage/acre	Bu of corn per acre
Corn grain only	0 + 0 + 0	---	74
Corn grain only	10 tons manure/acre	---	104
Corn grain only	0 + 0 + 0	---	70
Corn grain only	100 + 17.6 + 33.2	---	94
Grain and Stover	0 + 0 + 0	11	71
Grain and Stover	10 tons manure/acre	19	103
Grain and Stover	0 + 0 + 0	11	76
Grain and Stover	100 + 17.6 + 33.2	17	96

Discussion and Interpretation of Table 7

Application of both commercial fertilizer and manure increased corn yields above their respective check plots.

In plots where both grain and stover were removed since 1975, corn grain yields were not much different from those plots where corn only was removed. Not much fertility was removed in 1978, and 1980 because of hail storms.

Yields of silage responded positively to both commercial fertility and barnyard manure.

DEPTH OF PLOWING

FOR SOYBEANS

F. Shubeck, B. Lawrensen and D. DuBois

SOUTHEAST FARM 82-4

Objectives of Experiment

1. With the current price of diesel fuel, will it pay to plow deeper than 5 inches?
2. Will the greater breakdown of organic matter and nitrogen release expected from deeper plowing be of much value for a nitrogen fixing crop like soybeans?

Methods and Procedures

June 24, 1982 - Plowed all plots at specificed depths.
Sprayed treflan over all.
Tandem disked and field cultivated.
Planted Hardin soybeans.
July 23 - Cultivated all plots.
October 29 - Combined all plots.

Table 8. Effect of Depth of Plowing on Soybean Yield

Depth of Plowing (inches)	Bu per acre
5	39
8	41
12	39

Discussion and Interpretation of Table 8

From a yield standpoint, there was no object in plowing as deep as 12 inches.

There was no significant difference in yield at the 5% confidence level between the 5 inch depth and 8 inch plowing depth.

In other experiments at the Southeast Farm, tillage shallower than 5 inches was quite successful (see chisel plow experiments and the tillage study initiated by Dr. Chisholm).

SDSU S.E. FARM REPORT

DATE OF PLANTING EARLY, MEDIUM AND LATE MATURING CORN HYBRIDS

F. Shubeck, B. Lawrensen and D. DuBois

SOUTHEAST FARM 82-5

Objectives of Experiment

1. How late can an early, medium or late maturing hybrid be planted without decreased yield?
2. If planting is delayed by weather, when should a short or mid-season hybrid be substituted for a full season number?
3. Is there a yield advantage for planting an early maturing hybrid early? or late?

Methods and Procedures

April 12, 1982	- Broadcast 80 + 30 + 20 on soybean stubble and disked in.
April 27	- Sprayed Eradicane and disked in.
April 28	- First planting date for all three varieties: P-3388, P-3932A, and P-3709.
May 11	- Second planting date.
June 3	- Third planting date.
June 10	- Fourth planting date.
June 16	- Cultivated first and second planting dates.
June 21	- Sprayed Banvel (1/2 pint/acre) on all plots.
June 28	- Cultivated all plots
July 16	- Cultivated 4th planting date.
October 25	- Combined all plots

Table 9. Effect of Planting Dates and Hybrids on Yield of Corn

Planting Dates	Hybrids			
	Pioneer 3932A	Pioneer 3709	Pioneer 3388	Average
April 28	101	115	124	113.3
May 11	101	116	118	111.6
June 3	96	97	97	96.6
June 10	94	107	92	97.7
Average	98.0	108.8	107.9	

Discussion and Interpretation of Table 9

Pioneer 3932A is an early hybrid (93 day) with a reported large potential flex-range in ear size. Pioneer 3709 is an early mid-season number (104 day) with some degree of drought tolerance. Pioneer 3388 is a full season hybrid (115-117 day).

Planting was delayed in Southeast South Dakota this year due to excessive rainfall in May (9.34 inches). In some areas, planting was delayed more than a month. The question soon developed, "When should I return my full season seed and get some earlier numbers?" or "How long can I afford to wait to plant corn before switching to soybeans?" This experiment was designed especially to answer these questions and we were fortunate to have two good years of data on hand. These are some very important management decisions as results from 1982 indicate.

In 1982, the full season hybrid showed a steady decline in yield with every delay in planting. It also yielded more than the earlier maturing hybrids when all of them were planted early (April 28).

When planting was delayed to May 11, the mid-season hybrid (P-3709) yielded about the same as the full season number (P-3388), both of them yielded more than the early hybrid.

By planting June 3 and June 10, the early hybrid was able to produce about as much corn (figured at 15-1/2% moisture) as later maturing numbers. Even though the differences in yield between the three hybrids were not very great at these two later planting date, the differences in ear moisture at harvest and the probability of maturing should be considered when selecting varieties if planting dates are delayed to this extent.

For a grain farmer with no livestock, the exact planting date to replace corn with soybeans is not quite so clear. There are several available hybrids with maturities earlier than 93 days (the one we used). These earlier hybrids would mature with planting dates later than June 10, but it's safe to assume that yields would decrease proportionately. Note that the yield of Hardin soybeans planted June 24 in Depth of Plowing Experiment was about 40 bushels per acre this year. Hardin is a Group II soybean, but 3 days earlier than the mid-season Corsoy.

With the yields, conditions and prices of 1982, it looks like soybeans would be a higher paying, more dependable cash crop when planting dates were delayed somewhere past the first 10-12 days in June.

Table 10. Effect of Planting Dates and Hybrids on Kernel Moisture at Harvest

Planting Dates	Hybrids			
	Pioneer 3932A	Pioneer 3709	Pioneer 3388	Average
April 28	16.8	17.4	24.9	19.7
May 11	16.9	21.2	23.5	20.5
June 3	25.3	26.9	29.2	27.1
June 10	25.5	30.3	33.6	29.8

Discussion and Interpretation of Table 10

From the standpoint of yield, percent moisture at harvest and potential drying costs, it appears that an early hybrid (approximately 93 day) is the most dependable one to plant if planting dates are delayed until June.

The early and mid-season hybrids were able to reach physiological maturity at harvest (October 25) when planted as late as June 10.

CHISEL PLOW FOR CORN AND SOYBEANS

F. Shubeck, L. Lawrensen and D. DuBois

SOUTHEAST FARM 82-6

Objectives of Experiment

1. How much tillage is necessary for optimum yields?
2. Will fall tillage increase soil moisture storage?
3. Can yields with chisel plowing be maintained equal to that from moldboard plowing?
4. Which is the best type of chisel point to use - sweeps or twists?

Methods and Procedures

September 25, 1981	- Performed all fall tillage treatments in specified plots on soybean ground.
October 20, 1981	- Performed all fall tillage treatments in specified plots on corn ground.
April 29, 1982	- Spring tillage treatments Numbers 1, 2, 3 completed.
June 8	- All remaining spring tillage completed. - Planted corn plots Variety F-3732 Herbicide - Lasso II banded + Bladex 4L sprayed over all. Fertilizer - 100 lbs/A of 8-32-16 as a sideband starter.
June 9	- Planted all soybeans. Variety - Amcor Herbicide - Lasso II banded
June 10	- Broadcast Sencor 50WP at 0.5 lbs/acre over all bean plots
June 28	- Cultivated all corn plots.
July 7	- Cultivated all bean plots.
July 14	- Top dressed all specified plots with 100 lbs N per acre.
July 23	- Cultivated all bean plots.
October 18	- Combined all corn plots.
October 28	- Combined all bean plots.

Table 11. Effect of Tillage Treatments on Yield of Corn
(Corn after soybeans)

	Tillage Treatments In Fall	In Spring	Bu corn/ acre
1.	-----------------------	Disk-drag	105
2.	-----------------------	Sweeps-drag	110
3.	-----------------------	Plow-disk-drag	102
4.	Plow (moldboard)	Disk-drag	103
5.	Chisel plow with twists	Disk-drag	107
6.	Chisel plow with twists	Disk-drag	107
7.	Chisel plow with twists	Sweeps-drag	106
8.	Chisel plow with sweeps	Sweeps-drag	104
9.	-----------------------	Disk-drag	106
10.	Chisel plow with twists*	Sweeps-drag	101

* Treatment 10 was unfertilized. All other plots received 100 lbs per acre of 8-32-16 (oxide) as a sideband starter. In addition, 100 lbs of nitrogen per acre was applied as a top-dressing when corn was about waist high.

Discussion and Interpretation of Table 11

Moldboard plowing either in the fall or in the spring, did not increase yields over reduced tillage methods.

Tillage with disk or chisel plow performed only in the spring on soybean ground was quite successful in maintaining corn yields.

Table 12. Effect of Tillage Treatments on Yield of Soybeans
(Soybeans after Corn)

	Tillage Treatments In Fall	In Spring	Bu. of Soybeans/acre
1.	-------------------	Disk-disk-drag	37
2.	-------------------	Chop-sweeps-disk-drag	40
3.	-------------------	Disk-moldboard plow-disk-drag	41
4.	Disk-moldboard plow	Disk-drag	37
5.	Disk-twists	Disk-drag	38
6.	Chop-twists	Disk-drag	38
7.	Chop-twists	Sweeps-drag	39
8.	Chop-sweeps	Sweeps-drag	37
9.	Disk	Disk-drag	37
10.	Chop-twists*	Sweeps-drag	34

* Treatment 10 was unfertilized. All other plots received 100 lbs of 8-32-16 (oxide) as a sideband starter.

Discussion and Interpretation of Table 12

Yield differences due to different tillage methods or time of performance were very small.

There was a small but consistent increase in soybean yield due to the fertilizer treatment.

TILLAGE TREATMENTS WITH

DRYLAND CORN-SOYBEAN ROTATION

F. Shubeck, T. Chisholm, B. Lawrensen
D. DuBois and-G. Williamson

SOUTHEAST-FARM 82-7

Experimental Plan

Shallow Tillage Treatments
- Plow - Spring moldboard plow, disk twice and drag
- Chisel - Spring chisel plow, spring disk twice and drag
- Disk - Spring disk twice and drag
- Roto - Shallow spring roto-till

Deep tillage treatment
- S treatment - spring subsoil
- N treatment - not subsoiled

Soil: Well drained loam

Cropping Sequence: Corn-Soybeans

Methods and Procedures

1. All specified plots subsoiled before any other tillage operations, June 10, 1982.
2. Fertilizer applied broadcast for both corn and beans - 110 lbs per acre of 8-32-16 (oxide) - June 10.
3. Nitrogen was broadcast at 100 lbs of N/acre for corn.
4. Four pounds of Eradicane and 1-1/2 pounds of Bladex 4L was sprayed over all for corn.
5. Treflan was applied for soybeans and disked or roto-tilled immediately - June 10.
6. Planted corn and soybeans June 10.
   Varieties - Corn Pioneer 3732
   Soybeans NK 2596
7. Corn combined, October 28.
8. Beans combined, November 1.

Table 13. Effect of Different Tillage Treatments on Yield of Corn

	Plow		Chisel		Disk		Roto	
	S	N	S	N	S	N	S	N
Rep I	106	90	97	98	100	96	94	122
Rep II	104	14	107	95	98	03	105	112
Rep III	99	91	87	103	107	103	102	109
Rep IV	95	98	103	105	103	117	112	104
Average	101	98	99	100	102	105	103	112
Tillage Ave	97		100		103		107	

S = Subsoiled - 101 Bushels of Corn Average
N = Not subsoiled - 104 Bushesl of Corn Average

Discussion and Interpretation of Table 13

Shallow tillage treatments in soybean ground preparing for corn (disking and roto-tilling) appeared to yield a little more than the deeper tillage with moldboard plow and chisel plow. These results are similar to those of 1981.

No increase in yield was obtained from the deep subsoiling treatment.

Table 14. Effect of Different Tillage Treatments on Yield of Soybeans.

	Plow		Chisel		Disk		Roto	
	S	N	S	N	S	N	S	N
Rep I	50	52	36	47	52	48	48	54
Rep II	41	41	43	41	44	52	47	45
Rep III	47	41	47	39	45	36	46	48
Rep IV	52	43	43	48	41	51	43	45
Average	48	44	42	44	46	47	46	48
Tillage Ave	46		43		46		47	

S- Subsoiled - 46 bushels of soybeans average
N- Not subsoiled - 46 bushels of soybeans average

Discussion and Interpretation of Table 14

The apparent differences in soybean yields due to tillage methods were not significant at the 5% confidence level.

Subsoiling did not increase yield of soybeans. This was a medium textured well-drained upland soil with no heavy claypan.

Discussion of Table 14 Continued

Shallow tillages with disk and roto-tiller gave about the same yields as deeper tillage with moldboard plow and chisel plow.

Table 15. Effect of Tillage Methods on Growth Rate of Corn and Soybeans

Tillage Method	Height of corn in cm. 3rd week in July	Height of soybeans in cm. 3rd week in July
Moldboard plow	58	18
Roto-tilled	64	15
Disk	68	17
Chisel plow	52	15

Discussion and Interpretation of Table 15

With corn, roto-tilling and disking appearing to get corn off to a little faster start similar to results in 1981.

Height differences in soybeans due to tillage methods were very small at this stage. This experiment was planted late (June 10) because of unusually wet conditions.

Table 16. Effect of Tillage Methods on Soil Composition

	Bulk Density Under Corn		Bulk Density Under Beans	
	0-20 cm.	20-40 cm.	0-20 cm.	20-40 cm.
Moldboard Plow	0.98	1.32	1.20	1.13
Roto-till	1.36	1.54	1.18	1.46
Disk	1.39	1.39	1.40	1.25
Chisel Plow	1.31	1.38	1.34	1.44

Discussion and Interpretation of Table 16

Soil bulk density is determined by comparing the weight of a given volume of dry soil to the weight of an equal volume of water. A density of 1.2 means that the dry soil weights 1.2 times more than an equal volume of water. Soil densities greater than 1.4 will slow down root growth and rate of water infiltration.

Soil compaction is not a very serious problem at this location with any of the tillage methods. There were differences between some of the treatments, however. At the 0-20 cm depth under corn moldboard plowing had the lowest soil bulk density of any tillage method.

Discussion of Table 16 Continued

At the 0-20 cm depth under beans, moldboard plowing and roto-tilled soil had lower bulk densities than the other two methods.

Soil compaction at 20 to 40 cm (approximately 7.9 to 15.7 inches) is probably not influenced to the same extent as the shallower depths.

Table 17. Effect of Tillage Methods on % of Soil Water by Volume Under Corn

Tillage Method	Soil Depth	7/1	7/8	7/15	7/22	7/29	8/5	8/12	8/19	8/26	9/2	9/8
		On Corn Ground After Soybeans										
Chisel	15-30	29	30	31	31	30	27	25	24	25	28	27
plow	30-45	31	31	31	31	31	30	28	26	25	27	25
Moldboard	15-30	31	31	32	31	27	24	22	23	25	28	26
plow	30-45	32	33	33	33	32	28	25	25	26	29	28
Disk	15-30	31	31	32	31	28	25	23	22	25	27	25
"	30-45	33	33	33	34	32	29	25	24	27	29	26
Roto-Till	15-30	31	30	31	31	26	23	22	22	26	30	26
" "	30-45	30	30	32	32	30	23	22	22	26	29	26
		On Soybean Ground After Corn										
Chisel	15-30	30	30	30	29	26	21	20	19	20	22	21
plow	30-45	28	28	28	27	25	21	20	19	19	20	19
Moldboard	15-30	30	29	30	29	26	22	20	18	19	20	19
plow	30-45	29	27	28	27	26	23	19	18	17	16	16
Disk	15-30	31	30	30	30	28	25	23	22	24	25	23
"	30-45	30	30	30	30	29	27	23	21	21	22	20
Roto-Till	15-30	31	31	32	32	30	25	22	21	23	26	23
" "	30-45	30	30	30	30	29	25	22	21	21	23	21

Discussion and Interpretation of Table 17

Soil moisture determinations were made on several different dates, and depths with a neutron probe. Moisture at the 0-15 cm depth was not measured with the probe because it is not accurate at this shallow depth. Eight different depths were measured, but only the 15-30 and 30-45 cm depths were reported because this is where the greatest differences in soil mositure accumulations due to tillage would be expected. (15-30 cm depth = 6-12 inches).

Soil moisture that accumulated at the 15-30 cm depth between June 10 (date of tillage operations) and July 22 (before rapid losses from evapotranspiration began) would indicate the relative effectiveness of different tillage methods for increasing soil moisture storage. However, June and July were not months of heavy precipitation. June was 2.20 inches below normal. Under these conditions, there were no major differences in soil moisture storage due to tillage treatments consequently no great differences in yields would be expected due to variations in soil moisture.

July 22 marked the beginning of rapid soil moisture declines due to heavy evapotranspiration losses. After August 19, there were some increases in soil moisture storage.

CONTINUOUS SOYBEANS

B. Lawrensen, F. Shubeck and D. DuBois

SOUTHEAST FARM 82-8

S.E. FARM REPORT

Objectives of Experiment

1. What are the possibilities of growing continuous soybeans for increasing soil nitrogen and at the same time produce an excellent cash crop? Approximately one pound of nitrogen is returned to the soil for each bushel of soybeans raised.
2. Will disease and insects gradually build up in the soil and reduce yields?
3. Is it possible to build up nitrogen reserves from symbiotic soybean nitrogen?

Methods and Procedures

April 28, 1982	- Broadcast fertilizer by hand on specified plots. Tandem disked immediately.
April 30	- Sprayed all soybean plots with treflan and disked.
May 3	- Planted all corn plots Variety - Pioneer 7223 Insecticide - Dyfonate 20G
May 7	- Sprayed Lasso 4EC pre-emergence on corn plots.
June 8	- Field cultivated bean plots and planted.
June 10	- Broadcast sprayed all bean plots with Sencor 50 W.P.
June 17	- Cultivated all corn plots.
June 28	- Cultivated all corn plots; cultivated all bean plots.
June 30	- Sprayed all corn plots with 1/4 pint Banvel plus 1/2 pint 2, 4D Ester.
November 1	- Combined all plots.

Table 18. Effect of Cropping Sequence on Yields of Soybeans and Corn

Cropping Sequence	Fertilizer	Bushels of corn per acre	Bushels of beans per acre
Continuous beans	Check	---	35
Continuous beans	Fertilized*	---	38
Rotation corn and beans	Check	97	39
Rotation corn and beans	Fertilized*	108	42

* Both continuous and rotation soybeans were fertilized with 75 lbs of 8-32-16 (oxide per acre broadcast. Corn was fertilized with 80 + 30 + 20 (oxide) broadcast.

Discussion and Interpretation of Table 18

There was a small but consistent increase in yield of soybeans when rotated with corn compared to continuous beans.

A consistent increase in soybean yield was obtained from use of commercial fertilizer.

8-32-16 broadcast

MOST PROFITABLE ROTATION

B. Lawrensen, F. Shubeck and D. DuBois

SOUTHEAST FARM 82-9

S.E. FARM REPORT

Objectives of Experiment

1. How much will commercial fertilizer increase net profits?
2. Is it more profitable to add nitrogen from a commercial fertilizer source or grow a legume in a rotation?
3. Which cropping sequence will bring the greatest net return?
4. Will previous crops have much effect on available moisture at spring planting time?

Methods and Procedures

October 23, 1981	- Rotary chopped all corn and grain sorghum plots.
October 27, 1981	- Plowed all designated plots.
April 15-16, 1982	- Tandem disked and spike tooth harrowed all plots.
April 19	- Drilled all oats plots. Variety - Ogle
April 20	- Alfalfa and sweet clover seeded with John Deere press drill and cultipacked to firm seedbed.
April 30	- Sprayed soybean plots with Treflan + Sencor and disked.
June 7	- Sprayed all oats plots with Bronate at 1 pint/acre except those plots underseeded with alfalfa and sweet clover.
June 7	- Planted all corn plots. Variety - Pioneer 3732 Insecticide - Dyfonate 20G
June 7	- Sprayed all bean plots with Treflan at 1.5 pints per acre, and field cultivated. Planted all bean plots. Variety - NK 2596
June 7	- Sprayed Sencor 50 WP at 0.50 lbs active ingredient per acre.
June 10	- Planted all grain sorghum plots. Variety - DeKalb 38 Herbicide - Ramrod 20G Insecticide - Furadan 10G
June 28	- Cultivated all corn plots (1st).
July 1	- Cultivated grain sorghum (1st).
July 7	- Cultivated soybean plots (1st).
July 15	- Topdressed 70 lbs nitrogen per acre and 55 lbs N/acre in all specified corn and grain sorghum plots.

Methods and Procedures Continued

July 16	- Cultivated all corn plots.
July 23	- Cultivated all bean and grain sorghum plots.
July 28	- Combined Oats.
October 14	- Combined Corn.
October 29	- Combined Beans.
November 1	- Combined Grain Sorghum.

Table 19. Effect of Cropping Sequence and Fertilizer on Crop Yield, 1982

Cropping Sequence	Crop Receiving Fertilizer	Fertilizer lbs/A N + P + K	N Side Dress lbs/A	Oats Bu/A	1st Year Corn Bu/A	2nd Year Corn Bu/A	Soy-beans Bu/A	Sor-ghum Bu/A	Hay Tons/A
1 Continuous corn	----	0 + 0 + 0	--	--	68.0	--	--	--	--
1 Continuous corn	Corn	6 +11 +10	70	--	104.0	--	--	--	--
2 Corn-oats	----	0 + 0 + 0	--	57.0	71.0	--	--	--	--
2 Corn-oats	Corn	6 +11 +10	70	--	95.0	--	--	--	--
	Oats	30 + 7 + 0	--	84.0	--	--	--	--	--
3 Corn-corn-oats+alf-alf hay	----	0 + 0 + 0	--	92.0	87.0	87.0	--	--	1.2
3 Corn-corn-oats+alf-alf hay	Corn	6 +11 +10	--	--	97.0	--	--	--	--
	Corn	6 +11 +10	70	--	--	103.0	--	--	--
	Oats	15 +26 + 0	--	121.0	--	--	--	--	--
	Alf resid.	0 + 0 + 0	--	--	--	--	--	--	1.5
4 Oats + sweet clover-corn	----	0 + 0 + 0	--	54.0	82.0	--	--	--	--
4 Oats + sweet clover-corn	Oats	30 + 7 + 0	--	81.0	--	--	--	--	--
	Corn	6 +11 +10	--	--	98.0	--	--	--	--
5 Corn-soybeans-oats	----	0 + 0 + 0	--	68.0	89.0	--	36.0	--	--
5 Corn-soybeans-oats	Corn	6 +11 +10	70	--	102.0	--	--	--	--
	Soybeans	6 +11 +10	--	--	--	--	41.0	--	--
	Oats	30 + 7 + 0	--	85.0	--	--	--	--	--
6 Corn-oats-soybeans	----	0 + 0 + 0	--	49.0	92.0	--	34.0	--	--
6 Corn-oats-soybeans	Corn	6 +11 +10	55	--	104.0	--	--	--	--
	Oats	20 + 7 + 0	--	89.0	--	--	--	--	--
	Soybeans	6 +11 +10	--	--	--	--	39.0	--	--
7 Continuous grain sorghum	----	0 + 0 + 0	--	--	--	--	--	32.0	--
7 Continuous grain sorghum	Sorghum	6 + 11+10	--	--	--	--	--	63.0	--

Discussion and Interpretation of Table 19

There was a large increase in corn yield due to commercial fertilizer in the continuous corn sequence.

Where corn and oats were grown with no fertilizer added, the yield of corn was 71 bushels per acre. By planting sweet clover with the oats and no fertilizer added, the following corn yield was increased by 11 bushels per acre. When alfalfa was planted with the oats (no fertilizer added) and left for one year of hay, the following corn yield was increased by 16 bushels per acre. When corn followed soybeans with no fertilizer added, corn yields were increased by 21 bushels per acre over corn yields in the corn-oats sequence. Perhaps we have been underestimating soybeans as a soil improving crop.

These soil fertility improving practices were very effective for increasing oats yields, also, except for the oats plus sweet clover-corn sequence; but, here corn followed the legume rather than oats.

Soybean yields were increased by fertilizer a little more this year than the long time average increase for this experiment.

Grain sorghum yields were less than corn, but there was a substantial increase in sorghum yields due to fertilizer. Sorghum stands were less than optimum due to excessive moisture conditions in some of the plots.

Unfertilized second year corn after alfalfa yielded more than unfertilized continuous corn, suggesting a residual nitrogen carryover in the second year after alfalfa.

S.E. FARM REPORT

SOYBEAN VARIETY AND ROW SPACING STUDY

F. Shubeck, B. Lawrensen and D. DuBois

SOUTHEAST FARM 82-10

Objectives of Experiment

1. Will is pay to narrow rows from 30 inches down to 7 inches?
2. What can we expect from intermediate row spacings between 30" and 7", like 20" or skip row allowing room for tractor wheels and a cultivator?
3. Is planting soybeans with a small grain press drill a good practice?
4. Will soybeans with a different type of growth habit respond differently - like branching type (Corsoy); a thin line (Wells); or a semi-dwarf (Gnome)?

Methods and Procedures

October 26, 1981	- Area fall plowed.
June 4, 1982	- Total area sprayed with Treflan at 1.5 pints per acre and tandem disked immediately.
June 4	- Planted all soybeans. Varieties - Gnome, Corsoy 79 and Wells II Row Spacing - 30", 20", 7" and skip row Herbicides - Treflan PPI and Sencor 50 WP pre-emergence.
July 7	- Cultivated all row spacings except 7".
July 23	- Cultivated 30" row spacing.
October 29	- Combined all plots.

Table 20. Comparison of Row Spacings and Varieties on Yield of Soybeans

Variety	Row Spacing in inches	Plants Per Acre	Bu. of Soybeans/acre
Wells II	7	149,000	45
Wells II	20	186,000	54
Wells II	30	96,000	43
Wells II	15" Skip Row	96,000	51
Corsoy 79	7	199,000	48
Corsoy 79	20	248,000	59
Corsoy 79	30	137,000	48
Corsoy 79	15" Skip Row	197,000	55
Gnome	7	139,000	48
Gnome	20	199,000	54
Gnome	30	91,000	43
Gnome	15" Skip Row	143,000	49

Discussion and Interpretation of Table 20

Stand counts were down in a few plots. We were aiming for a minimum of 150,000 plants per acre. This would be the equivalent of approximately 12 plants per foot in 40 inch rows. All plots were planted with the same tool bar planter. Adjustments were attempted to compensate for different seed size.

Yields were very good in some plots - 54 and 59 bushels per acre and several averaged in the upper 40's. Under the high yield environment in 1982, perhaps Gnome would have yield better with more plants per acre. Corsoy 79 did very well, also, with all row spacings.

In a previous study that was carried on for several years, Corsoy yields were very similar over a rather wide range in plants per acre. However, the yield potential was never as high as 59 bushels per acre during the study.

It looks as though this experiment should be carried on for several years with a wider range of climatic conditions before the row spacing and variety affects can be determined.

S.E. FARM REPORT

BROADCAST VS DRILL SEEDING FOR OATS

B. Lawrensen, F. Shubeck and D. DuBois

SOUTHEAST FARM 82-11

Objectives of Experiment

1. Will seeding oats with a press drill be better than broadcasting seed at a little higher rate than the drill method?
2. Will there be much difference in stands and tillering between the two methods if seeding rates are similar?

Methods and Procedures

April 14, 1982	- Tandem disked corn stalks.
April 20	- Broadcast 40+15+0 fertilizer.
April 20	- Tandem disked and spike tooth dragged. Planted all plots Variety - Ogle
June 7	- Sprayed all plots with Bronate at 1 pint per acre.
July 7	- Combined all plots.

Table 21. Effect of Seeding Methods and Rates on Oats Yield

Seeding Method	Seeding Rate Bu/Acre	Bushels yield per acre
Drill	2	89
Drill	3	92
Drill	4	89
Broadcast	2	85
Broadcast	3	80
Broadcast	4	85

Discussion and Interpretation of Table 21

The drilling method yielded more than broadcasting this year. Part of this difference could be attributed to the poor seedbed and poorer stands with the broadcast method.

In other years when moisture conditions were more favorable and we were able to work up excellent seedbed, differences in yield between the two seeding methods were smaller.

In 1982, different seeding rates had a rather small influence on yield except for 3 bu. broadcast treatment which was influenced by a poor seedbed. June temperatures were cool, moisture in May totaled 9.34 inches and stooling was very prevalent. Consequently lower rates of seeding would do relatively better than in a year with little or no stooling.

F_2 GENERATION

SEED CORN DEMONSTRATION

B. Lawrensen, F. Shubeck and D. DuBois

SOUTHEAST FARM 82-12

Objectives of Experiment

1. How much loss in corn yield will occur when seed from first generation hybrids is saved and planted?
2. Will there be any yield differences if the seed saved from the first generation hybrid is from a single cross?
3. With the present low price for corn grain and the high price for hybrid seed, will the expected yield decrease due to planting second generation seed (F_2) be enough to justify paying the current seed corn prices?

Methods and Procedures

April 12, 1982	- Broadcast 80+30+20 (oxide) and tandem disked.
April 27	- Sprayed Eradicane over plot area then tandem disked.and field cultivated.
June 1	- Field cultivated plot area. Planted original F_1 hybrid seed 1. Pioneer 3732 (single cross) 2. Pioneer 3709 (modified single) 3. Pioneer 3716 (3-way cross) 4. Pioneer 3498 (double cross)
June 1	- Planted F_2 self-pollinated seed. This is seed taken from self-pollinated original F_1 plants. This would correspond to saving seed from a large field all planted to the same hybrid with no chance of other pollen blowing in.
June 1	- Planted F_2 seed from original F_1 plants that were not self-pollinated. This would correspond to saving seed from a field with alternating strips of different hybrids.
June 28	- Cultivated all plots (1st).
July 8	- Cultivated all plots (2nd).
August 20	- Sprayed 2,4D ester at 1.5 pints per acre on all plots.
October 27	- Combined all plots.

Table 22. Effect on Corn Yield from Planting Seed Saved From First Generation Hybrids

Original seed (F_1)	Source of Seed that was planted	Plants per acre	Bu. per acre
Single Cross	First generation hybrid seed	15,640	122
P-3732	2nd generation self-pollinated	12,903	76
104 day	2nd generation cross-pollinated	14,076	72
Modified	First generation hybrid seed	17,000	118
Single Cross	2nd generation self-pollinated	15,640	73
P-3709	2nd generation cross-pollinated	12,903	80
105 day			
3-way cross	First generation hybrid seed	19,160	112
P-3716	2nd generation self-pollinated	14,467	68
105 day	2nd generation cross-pollinated	12,903	80
4-way cross	First generation hybrid seed	17,791	112
P-3498	2nd generation self-pollinated	17,400	64
110 day	2nd generation cross-pollinated	15,836	80

Discussion and Interpretation of Table 22

First generation hybrid seed (F_1) was purchased from a seed corn dealer. The 2nd generation (F_2) self-pollinated seed was selected from self-pollinated plants of each respective type (single cross, modified single, 3-way and 4-way). This would be comparable to selecting seed in a large field that had all been planted with first generation hybrid seed of the same type. The second generation cross-pollinated seed was saved from F_1 plants that had other hybrids growing in close proximity.

There was a large decrease in yield when second genration seed was planted. Part of this decrease can be attributed to reduced stands from using ungraded seed in a plate type tool bar planter. This will be changed next year.

The yield from first generation single cross seed (P-3732) was more than from first generation 3-way and 4-way plots even though the number of plants per acre were less. The first generation modified single cross yield was just a little less than that from the true single cross seed.

Comparisons between second generation selfed and second generation cross-pollinated seed was an attempt to see if an infusion of dissimilar genetic material from pollen of different hybrids growing close by the F_1 plants would lessen the expected yield decline in subsequent generations. It did help, but not enough.

A COMPARISON OF SEVERAL SOIL TESTING LABORATORY FERTILIZER RECOMMENDATIONS

R. Gelderman, P. Fixen, J. Gerwing and B. Lawrensen

PLANT SCIENCE 82-13

Many soil test laboratory services are available to South Dakota farmers. Although accurate figures are not available, it is estimated 20-30 percent of the soil samples taken in South Dakota are tested by commercial laboratories. Most of the remainder of the samples are tested by the state's land grant college laboratory located at South Dakota State University at Brookings. Some samples are tested by bordering state universities.

The purpose of a soil testing laboratory is to evaluate the nutrient status of a soil and provide a fertilizer recommendation to meet the nutrient needs of the crop. This recommendation must also be economical. It must be profitable to fertilize the crop.

Variations in fertilizer recommendations between laboratories have been known for some time. These variations are a concern to many. These differences may be due to at least two factors: (1) a difference in analysis results, or (2) a difference in philosophy of recommendation.

The objectives of this experiment were to make comparisons of soil test recommendations from several laboratories. The effect of the recommendations on yield and fertilizer costs per acre are also to be evaluated.

Methods and Procedures

The experiment was conducted at the Southeast Experiment Farm just to the east of the office building. The soil at this site was an Egan silty clay loam. Egan soils are well drained silty clay loams that formed in silty drift over glacial till. This was the second year for the continuous corn experiment. Each plot is in exactly the same place as the previous year. A yield goal of 120 bushels/acre corn was set for the experiment.

Soil samples were taken from the experiment site in the fall of 1981. A composite soil sample was taken from each lab treatment area, mixed, dried and sent to the appropriate laboratory. None of the labs, including the SDSU lab, were aware that these samples were to be used as the basis for a comparative study. The samples were sub-divided into 0-6", 6-24", and 24-36" samples to evaluate nitrate-nitrogen. All fertilizer recommended by each lab was assumed to be needed and applied.

The fertilizer was broadcast and worked into the soil before planting. Laboratories were simply labeled A, B, C, etc. Fertilizer and lime costs were estimated averages paid by farmers in the spring of 1981. They were set on a per pound basis as follows:

Nitrogen = $0.24 per lb N
Phosphorus = $0.27 per lb P_2O_5
Potassium = $0.12 per lb K_2O
Sulfur = $0.33 per lb S
Zinc = $0.97 per lb Zn
Lime = $28/ton* (not including transportation
*Tons of effective calcium carbonate equivalent (ECCE)

These values were used to calculate fertilizer/lime costs per acre; although, these values did not include application costs per acre.

The treatments were arranged in a randomized complete block design with four replications. The plots were harvested by hand with ten whole ears taken for moisture. The variety used was Pioneer 7223. It was planted May 18. Tillage consisted of fall plowing and a spring disking and field cultivation. Weed control consisted of Eradicane-Atrazine pre-plant incorporated.

Results

In general, the analysis results from the labs were similar between labs (table 23). Lab C and D both measured considerably more nitrate-nitrogen than the other labs. Recommendations varied considerably on amounts of phosphorus, micronutrients and lime recommended (Table 24). Nitrogen rates were similar across labs except for lab C, which recommended only 20 lb N/A. This was one of the labs who measured higher amounts of available nitrogen.

Fertilizer/lime costs varied from a low of $12.90/acre to a high of $86.80/acre. Most of the differences are due to the lime cost per acre.

Yields did not meet the 120 bu/A yield goal. In general, yields were variable throughout the plot (C.V. = 15.1%, Table 25) because of variable plant population. Poor planting conditions reduced stands and a poor seedbed reduced germination. In addition, a strong wind in late July broke over many stalks throughout the plot area. As a result, harvest stands were down to 15,500. If stand was not limiting, 1982 weather conditions were ideal for a much higher yield.

Yield differences between individual treatments can be seen in Table 25. The only statistical difference between treatment yields is between the check, 90 bu, and Lab C, 118 bu. Again, this large difference is due to the variability that occurred in the plot area.

The check plot plants were yellow in color with poor vitality throughout the season. This appeared to be classic nitrogen deficiency. No visual differences were noted among the other treatments.

There appears to be no reason why yields for treatment C are above the others. Fertility treatments on these plots the past two years have not been unusually different from the other treatments. Although Lab C recommended little nitrogen in 1982 (20 lb/A) it did measure considerable available nitrogen in the top 3' of soil (Table 23).

The plots will be continued for several years in continuous corn. With additional years' data, it is hoped a clearer evaluation of laboratory fertility programs can be made.

Table 23. Soil Tests from 1982 S. E. Farm Lab Comparison Study

Measurement	SDSU	A	B	C	D
Nitrate-N lb/A-3'	58	42	120	130	----
O.M. %	2.7	3.0	2.7	3.6	3.1
Phosphorus lb/A	34	34	38	38**	40
Potassium lb/A	780	480	770	682	752
pH	6.6	6.3	6.5	6.4	6.5
Salts mmho/cm	0.3	----	----	0.10	----
Zinc ppm	1.50	1.4	2.0	2.86	1.4
Iron ppm	26.2	68.0	92	69.7	----
Manganese ppm	38.3	34.8	57	49.6	----
Copper ppm	2.2	1.7	2.2	2.10	----
Sulfur (SO_4) ppm	167*	6	5	3.3	7
Boron ppm	----	0.8	1.5	0.70	----
Magnesium ppm	960	669	741	590	----
Calcium ppm	2778	1906	1950	1977	----
Sodium ppm	----	15	----	----	----
CEC meq/100g	----	19.7	18.3	----	----

* Included subsoil
** Mechlich Test

Table 24. Suggested Fertilizer Recommendations for 120 bu/A Corn

Fertilizer	SDSU	LAB A	LAB B	LAB C	LAB D
Nitrogen lb/A	95	90	110	20	110
Phosphorus lb/A P_2O_5	20	60	70	30	45
Potassium lb/A K_2O	0	30	20	0	0
Sulfur lb/A	0	10	15	0	0
Zinc lb/A	0	0	1.5	0	0
Lime* lb/A	0	3000	1800	0	2100
Fert. Cost/A	$33.20	$86.70	$85.22	$12.90	$67.95

*Effective calcium carbonate equivalent.

Table 25. Influence of Laboratory Fertility programs on Yields, 1982

Laboratory:	SDSU	A	B	C	D	Check
			bu/A			
	95+ab*	97+ab	99ab	118+b	106+ab	80a

*Yields followed with the same letter are not significantly different at the 0.06 level.

Sig. of F = 0.08

C.V. = 15.1%

+ Only 3 replications harvested because of poor stands.

S.E. FARM REPORT

1982 PERFORMANCE TRIALS OF SMALL GRAINS, GRAIN SORGHUM, SOYBEANS AND CORN AT THE SOUTHEAST EXPERIMENT FARM

J. J. Bonnemann

PLANT SCIENCE 82-14

Performance Trials with corn, grain sorghum, soybeans and small grains (oats, barley, spring wheat and durum) were seeded at the Southeast Experiment Farm for 1982 harvest.

The small grains were seeded on April 14, 1982. Yields were about average for all crops except barley, which had a mean yield of 67 B/A. Durum and spring wheat also produced quite acceptable yields, the mean yield of each trial being 35.6 and 35.4 B/A, respectively. The most commonly grown small grain of the area, oats, was down in yield averaging only 51.3 B/A for the 28 entries grown. Test weights were varied depending upon the stage of growth during the extended period without precipitation in mid-summer. Data included in this report are bushels per acre, test weight, height and lodging, if applicable.

Eighty-seven proprietary corn hybrids were grown in the 1982 Corn Performance Trials. The corn was seeded in 2-row plots, 17.5 feet long, 36 inches apart, on May 7, 1982. Two seeding rates were intended; with final counts being 15,984 and 19,696 plants per acre in mid-August.

The absence of a killing frost delayed the start of harvest as later maturity entries were too wet to combine at the usual time. The first killing frost was recorded on October 16 and then only seriously damaged the upper leaves. Rain and/or snow was commonplace from then on, and the condition of the plots soon deteriorated. The heavy snowfall on October 20-21 caused severe loding or stalk breakage. Continued rains and high velocity winds caused further damage and ear loss. The variability in the plots was quite apparent and the wet field conditions prevented machine harvest. To salvage any information it was decided to hand harvest the plots on November 24. It was apparent for many entries that the better the weight, the greater the lodging that had occurred. As the season had progressed the potential for average to excellent yields became apparent, but, the very wet fall conditions induced much variability and the results must be viewed with that in mind. The trials results are presented in Table 27.

Additional information will be found in the upcoming circular, 1982 Corn Performance Trials.

Standard public varieties and proprietary entries of soybeans are grown at three locations in the area; Elk Point, Centerville and Crooks. The proprietary entries, varieties or blends, are the choice of the participating companies and a nominal fee is charged to partially offset trial costs. The sites at Elk Point and Centerville also included entries from USDA and State breeding programs in Regional Trials. These trials determine the potential for new public releases. Groups grown were Group II and III maturity range.

The wet conditions throughout May prevented soybean seeding until early June. The beans were seeded on the following dates: Crooks, June 1; Centerville, June 3; and Elk Point, June 7. All plots were seeded in paired rows, 16 feet long. All plots were harvested with an ALMACO small-plot combine during the last week of October. Harvest dates were: Crooks, October 27; Centerville, October 28; and Elk Point, October 29 and November 1.

Lodging was a serious problem at Crooks and Elk Point, both from late July severe rainstorms and the heavy wet snow of October 20-21. Some lodging occurred in the later maturing entries at Centerville. The earlier maturity entries at Centerville may have suffered somewhat from the extended moisture-free period during mid-summer.

The mean yield for the Crooks soybean trial as 45.8 B/A. Mean trial yields were 43.9 and 44.2 B/A at Centerville and Elk Point, respectively.

Many soybean entries did very well, both proprietary and public lines. Later Group I and earlier Group II soybeans are generally most adapted to the Sioux Falls area. Group II soybeans are most adapted to the Centerville area while Group II and possibly Group III are adapted in the southeast corner of the state near Elk Point. Caution must be exercised in looking at the data and assuming the Group III lines are most desireable. The Group III lines have done well the last few years but one must also temper that with the realization that hard, killing frosts have been later, thus permitting the later Group III varieties to mature and produce good yields of decent quality. An earlier frost for a year or so could cause serious losses for those using later group beans. Semi-dwarf lines have done well even though not being grown in the narrower row spacings.

The yields and other agronomic data from the trials are shown in Table 28, 29 and 30 for Crooks, Centerville and Elk Point, respectively. Results of all soybean trials are available in Plant Science Pamphlet #68, 1982 Soybean Performance Trials.

The Southeast Farm grain sorghum trial included 35 entries. The trial was seeded on June 7, and harvested on October 7. The row spacing was 36 inches. Recommended herbicides and insecticides were used at seeding time for weed and insect control.

Yields were very good, considering the cooler temperatures that generally prevailed. Yields ranged from just over 6100 down to 4425 pounds per acre in 1982. Heading and flowering were delayed at least 10 days. The lateness carried through the year and kernel moisture was quite high at harvest. However, most entries had achieved physiological maturity and the quality of the dried crop was excellent, the mean test weight being 58 lb/bu.

The results appear in Table 31 of this publication and all trial results will appear in the upcoming circular, 1982 Grain Sorghum Performance Trials.

Table 26. 1982 Standard Variety Small Grain Trials, Southeast Farm, Centerville

Entry	1979	1981	1982	3-yr	Test wt.	Height inches	Percent Lodging
OATS							
Porter	----	----	93.2	----	35	42	50
Otana	94.0	89.1	79.7	87.6	34	45	29
Benson	95.8	78.0	78.7	84.2	30	45	53
Dal	87.2	70.6	77.7	78.5	28	44	29
Marathon	90.9	76.9	77.2	81.7	32	44	31
Moore	104.3	86.2	71.3	87.3	35	48	25
Wright	93.4	72.2	70.9	78.8	37	42	36
Preston	----	65.0	68.3	----	30	50	25
Bates	103.6	86.3	65.8	85.2	37	47	17
Noble	101.8	76.0	65.2	81.0	37	45	30
Arrowhead 335M Blend	----	----	57.0	----	35	41	12
Ogle	111.1	90.9	56.9	86.3	33	41	8
Lancer	105.6	77.8	56.2	79.9	35	39	15
Larry	102.5	72.7	56.0	77.1	35	34	36
Burnett	87.5	73.4	55.1	72.0	36	44	20
Lang	94.6	80.5	54.3	79.5	31	36	28
Arrowhead 135E Blend	----	----	52.8	----	34	42	35
Nodaway 70	107.0	54.4	51.3	74.2	36	41	40
Chief	104.3	73.1	51.0	76.1	34	42	7
Lyon	98.3	85.7	47.7	77.2	35	46	25
Otee	95.8	75.9	39.9	70.5	33	36	10
Means			61.3		34	42	27
LSD (.05)			6.9		C.V. - % = 8.0		
BARLEY							
M-36	----	----	73.4	----	51	39	
Glenn	41.7	52.2	73.3	55.7	48	36	
Clark	----	45.3	70.1	----	51	38	
Bumper	----	62.7	68.7	----	49	39	
Azure	----	----	68.5	----	50	38	
Firlbecks III	44.3	34.5	67.5	48.8	51	39	
Primus II	35.5	48.9	67.2	50.5	50	40	
Klages	----	26.8	63.9	----	48	39	
Larker	47.4	54.7	63.0	55.0	51	39	
Morex	41.8	64.4	61.8	56.0	49	40	
Means			67.7		50	39	
LSD (.05)			8.3		C.V. - % = 7.3		

Table 26 Continued; 1982 Standard Variety Small Grain Trials, Southeast Farm, Centerville

Entry	Yields, B/A				Test wt.	Height inches	Percent Lodging
	1979	1981	1982	3-yr			
SPRING WHEATS							
Marshall	30.0	45.7	43.4	39.7	59	35	5
Centa		47.8	39.8	----	60	38	2
Coteau	30.2	45.5	39.6	38.4	57	45	10
Alex	----	48.7	39.5	----	56	44	0
Butte	39.3	47.9	38.7	42.0	60	37	10
Pioneer Brand PR2360	----	----	38.1	----	58	34	5
Aim	36.9	49.5	37.1	41.2	57	34	5
Len	35.1	45.7	36.8	39.2	56	36	0
906R	----	----	36.1	----	56	32	0
Pioneer Brand PR2369	----	----	35.4	----	59	34	0
James	35.1	47.2	35.3	39.2	57	38	5
Oslo	----	46.6	34.8	----	57	31	0
Olaf	32.3	44.2	34.6	37.0	57	36	0
Chris	31.1	44.4	34.5	36.7	58	44	20
Eureka	34.0	40.6	34.1	36.2	55	42	8
Era	30.2	45.9	33.4	36.5	56	34	5
Walera	----	44.4	31.9	----	52	34	10
Solar	32.2	44.3	31.7	36.1	54	34	8
Probrand 715	----	40.5	31.6	----	51	39	15
Angus	33.5	51.1	29.1	37.9	58	35	0
Lew	----	37.1	28.7	----	57	45	10
Probrand 711	----	43.3	28.0	----	57	34	3
Pondera	---	43.8	26.3	----	56	36	9
Means			35.4		57	37	5
LSD (.05)			4.9		C.V. - % = 9.8		
DURUM							
Crosby		40.3	42.6		57	45	
Ward		38.2	37.2		56	44	
Rugby		36.4	36.9		56	44	
Cando		42.1	36.6		53	34	
D 771			32.1		51	33	
Vic		43.9	31.9		55	44	
Edmore		42.4	31.8		54	44	
Means			35.6		55	41	
LSD (.05)			4.2		C.V. - % = 8.2		

Table 27. 1982 Corn Performance Trial, Area E. Southeast Farm, Beresford, SD

Brand and Hybrid	Mat. and Cross		Yield B/A	Pct Stalk Lodged	Percent Moisture	Performance Score Rating
O's Gold 5500A	L	2X	157.8	86.7	25.3	39
Cargill 921	M	2X	155.7	83.9	21.9	25
Disco DS5433	M	2X	147.0	26.9	20.9	1
Migro HP 555	L	2X	146.8	69.9	25.8	35
DeKalb XL-55A	M	2X	146.5	80.5	22.0	47
Lynks LX4225	M	2X	145.3	74.4	20.7	34
Western KW-70	L	2X	144.6	55.3	25.1	15
Cenex	L	2X	143.3	68.5	24.9	41
Pride 6692	L	2X	141.9	57.8	21.8	18
Trojan T1100	L	2X	140.8	22.8	22.4	2
Curtis 601	M	2X	140.4	72.5	25.1	54
Paymaster 8201	L	2X	138.2	68.7	24.4	49
Kaltenburg KX77	L	2X	138.6	53.5	23.6	23
Migro HP-401	M	2X	136.8	55.3	19.8	20
Tall Corn SX113	L	2X	136.5	22.0	21.7	3
Lynks LX4315A	L	2X	135.5	47.7	21.4	11
DeKalb EX6261	L	2X	134.8	53.5	24.2	31
Keltgen KS115	L	2X	133.0	60.2	25.7	52
Fontanelle 435	M	2X	132.9	44.9	21.7	16
Paymaster 4790	M	2X	132.8	31.3	22.6	5
Wilson 1600A	M	2X	132.3	51.7	22.4	29
Keltgen KS114	L	2X	131.8	52.3	21.7	30
Fontanelle 580	L	2X	131.1	36.6	24.9	14
Northrup King PX9527	L	2X	130.7	36.8	22.5	8
AgriGold AG-6688	M	2X	130.7	54.8	22.3	42
P-A-G SX333	L	2X	130.3	58.4	23.8	50
Western KX-66	L	2X	130.1	33.0	22.3	7
Crows 444	M	2X	130.0	44.7	24.2	26

Table 27 Continued; 1982 Corn Performance, Southeast Farm, Beresford, SD

Brand and Hybrid	Mat. and Cross	Yield B/A	Pct Stalk Lodged	Percent Moisture	Performance Score Rating
Funks G-4522	LM 2X	129.7	52.3	25.5	48
Curry SC-1424	M 2X	128.9	26.4	19.5	4
Curry SC-1452	M 2X	128.3	50.6	22.0	38
SDAES Check 1	L 2X	128.3	46.4	23.4	33
Wilson 1600	M 2X	128.0	30.4	21.3	6
Curry SC-1490	M 2X	127.7	64.0	23.9	63
Curtis 602	M 2X	125.8	54.1	25.0	55
Cenex 2114	L 2X	125.5	34.0	21.3	12
Asgrow RX610	M 2X	125.3	54.2	19.3	46
Tall Corn SX108	M 2X	124.3	53.1	22.3	51
DeKalb XL-72AA	L 2X	124.2	67.1	23.4	70
DeKalb EX4345	M 2X	124.2	43.2	23.1	37
Kaltenburg KX73	L 2X	124.2	32.5	22.0	17
McCurdy 6475	M 2X	123.6	38.3	21.6	24
O'Gold 6882	L 2X	123.5	34.4	22.3	22
Keltgen KX116	L 2X	123.2	46.9	27.9	57
Kaltenburg KX67	M 2X	122.8	35.6	19.4	19
Kaltenburg KX61	M 2X	122.6	43.0	19.1	28
Tall Corn SX110	M 2X	121.6	73.2	20.4	74
Lynks LX4232	M 2X	120.6	30.4	19.1	10
P-A-G SX397	M 2X	120.4	91.4	19.0	83
Trojan T1000	M 2X	120.1	42.0	18.5	32
Curtis 530	M 2X	120.0	52.9	21.6	58
Funks G-4438	L 2X	119.3	59.8	20.6	66
Northrup King PX74	L 2X	119.1	87.6	25.1	86
Funks G-4435	LM 2X	119.0	22.6	23.0	13
Migro HP-470	M 2X	118.8	21.1	22.4	9
AgriGold AG-6659	M 2X	118.0	52.9	23.9	67
SDAES Check 9	M 2X	116.8	57.7	18.8	65

Table 27 Continued; 1982 Corn Performance, Southeast Farm, Beresford, SD

Brand and Hybrid	Mat. and Cross		Yield	Pct Stalk Lodged	Percent Moisture	Performance Score Rating
Pioneer 3707	M	2X	116.3	91.5	18.5	85
Lynks LX4210	M	2X	115.8	50.0	20.2	59
Cargill 862	L	2X	115.3	55.8	17.6	62
McCurdy 6262	L	2X	114.6	32.9	23.2	44
Curry SC-1455	M	2X	113.7	33.7	21.9	45
Paymaster 2990	M	2X	113.5	46.4	19.1	56
Cargill 872	M	2X	112.4	61.1	20.8	76
SDAES Check 2	L	2X	111.9	62.8	18.8	75
Migro HP-360	M	2X	111.9	41.4	19.2	53
Funks G-4342	M	2X	111.4	57.3	17.9	69
Pioneer 3732	M	2X	111.4	23.0	17.9	21
Western KX-59	M	2X	111.1	31.1	18.8	36
Cargill 924	M	2X	110.9	54.7	19.6	71
Wilson 1100b	E	2X	110.4	24.4	20.1	27
Northrup King PX9415	M	2X	109.8	28.9	20.0	40
McCurdy 81-42	L	2X	109.8	56.0	22.4	77
Wilson 1500	M	2X	109.1	85.4	19.2	87
McCurdy 6555	L	2X	108.3	26.5	21.6	43
Pride 5523	M	2X	107.3	42.5	18.8	61
Disco DS5519	E	2X	104.1	41.2	18.0	64
AgriGold AG-6656	M	2X	101.7	62.6	21.1	84
AgriGold AG-6699	L	2X	101.2	45.7	27.0	80
Keltgen KS112	L	2X	100.2	26.5	22.0	60
Northrup King PX9454	M	2X	97.9	31.4	20.0	68
Asgrow RX777	L	2X	97.3	46.1	24.0	81

Table 27 Continued; 1982 Corn Performance, Southeast Farm, Beresford, SD

Brand and Hybrid	Mat. and Cross	Yield B/A	Pct Stalk Lodged	Percent Moisture	Performance Score Rating
Interstate 932	M 2X	96.0	47.4	17.5	78
Pioneer 3377	L 2X	95.3	45.5	22.6	82
Tall Corn SX109	M 2X	94.2	35.8	19.7	73
Pride 6611	L 2X	92.6	30.4	19.4	72
Interstate 784	E 4X	88.0	42.4	16.5	79
Means		122.3	49.1	21.5	

LSD (.05) 25.7 C.V. - % = 10.6

Table 28. 1982 Soybean Performance Trial, Tom Wintersteen, Cooperator, Sioux Falls, SD

Identification of Entries[1]		Maturity Group[2a]	Field Data: Maturity Date (mo.-day)	Field Data: Height & Lodging	Field Data: 100 seed wgt. (grams)	Yield in Bu/Acre 1981	Yield in Bu/Acre 1982	Yield in Bu/Acre 1981-82
Public Varieties								
Evans		0	9-23	3	15.8	44.8	40.4	42.6
Swift		0	9-25		15.4	49.6	43.2	46.4
Hodgson 78		I	9-30		16.8	53.4	45.4	49.4
Weber		I	10-2		13.7	58.0	45.3	51.6
Lakota		I	10-3		16.2	57.8	43.5	50.6
Hardin		I	10-3		14.9	61.7	48.9	55.3
Nebsoy		II	10-6		17.5	56.5	44.4	50.2
Vickery		II	10-6		15.5	56.9	46.3	51.6
Wells II		II	10-6		16.1	52.9	45.3	49.1
Harcor		II	10-7		15.1	56.6	44.6	50.6
Corsoy 79		II	10-7		15.3	57.1	49.2	53.1
BSR 201		II	10-7		17.1	52.5	47.0	49.7
Beeson 80		II	10-10		18.4	46.0	44.3	45.1
Century		II	10-11		17.5	58.2	49.6	53.9
Gnome (S-D)		II	10-12		15.4	52.9	42.6	47.7
Amcor		II	10-12		15.5	55.3	38.3	46.8
Platte		II	10-12		16.0		44.0	
Will		III	10-14		16.5	47.2	43.3	45.2
Proprietary								
Brand	**Entry**	**2b**						
Lincoln	LS71110	I	10-3		17.9		50.0	
Arrowhead	2211	II	10-3		16.3		47.9	
Cenex	8212	I	10-3		16.3		47.4	
Cenex	8017	II	10-4		15.4	59.6	54.1	56.8
Hy-Vigor	Rowtunda	II	10-6		18.1	56.5	44.3	50.4
Pfizer Genetics	CX155	II	10-6		15.6	55.8	44.3	50.0

Table 28 Continued; 1982 Soybeans, Sioux Falls, SD

Identification of Entries[1]		Maturity Group[2a]	Field Data: Maturity Date (mo.-day)	Field Data: Height & Lodging	Field Data: 100 seed wgt. (grams)	Yield in Bu/Acre 1981	Yield in Bu/Acre 1982	Yield in Bu/Acre 1981-82
Public Varieties								
Proprietary Brand	**Entry**	**2b**						
Cenex	7461 (B)	II	10-7		15.7	55.2	49.0	52.1
Arrowhead	2244	II	10-7		17.1		48.9	
Hy-Vigor	901 (B)	II	10-7		15.5		45.7	
Mustang	Exp II	II	10-8		15.6		47.0	
Dairyland	DSR 207	II	10-8		17.5	55.4	44.3	49.8
Stine	2210	II	10-9		16.6		50.3	
Lincoln	LS7225	II	10-9		15.7		46.2	
Dairyland	DSR 212	II	10-10		18.8		47.2	
Mustang	M-1220	II	10-11		14.8	58.8	46.6	52.7
Dairyland	DSR 232	II	10-12		16.4	57.4	43.8	51.1
Dairyland	DSR 227	II	10-13		15.3		46.0	
Dairyland	DSR 303	III	10-14		16.4		37.7	
	Means				16.35		45.8	
					LSD (.05)		4.5	
					C.V.-%		7.0	

1 - Listed in order of 1982 maturity
2a- Maturity group from USDA classification; 0 & I = early; II = mid-season; III = late at Sioux Falls
2b- Information supplied by the company
3 - The entire area was flattened by a heavy downpour and high velocity winds in late July; 6-8 inches of snow in mid-October flattened the trial again - no data taken.

B = Blend S-D = Semi-Dwarf

Table 29. 1982 Soybean Performance Trial, Southeast Experiment Farm, Centerville, SD

Identification of Entries[1]		Maturity Group[2a]	1982 Field Data: Maturity Date (mo.-day)	Plant Height (inches)	100 seed wgt. (grams)	Lodging[3] (1-5)	Average Yield in Bushels/Acre: 1977	1979	1981	1982	1979-82	1981-82
Public-Varieties												
Hodgson 78		I	9-23	31	15.8	1.00		49.3	38.7	33.8	40.3	35.7
Lakota		I	9-24	34	15.1	1.50				42.1		
Weber		I	9-26	29	13.1	1.00		53.9	41.3	42.0	45.7	41.6
Hardin		I	9-27	33	14.5	1.00			40.7	43.4		42.0
Vickery		II	9-28	35	15.9	1.00		46.0	39.7	40.5	42.1	40.1
Corsoy 79		II	9-29	34	15.0	1.25		53.1	38.9	44.1	45.3	41.5
Harcor		II	9-30	34	15.1	1.25	57.7	52.6	41.1	41.6	45.1	41.3
Wells II		II	9-30	32	16.5	1.00		54.3	38.2	41.4	44.6	39.8
Nebsoy		II	10-1	31	17.9	1.00		56.2	38.6	43.9	46.2	41.2
Beeson 80		II	10-2	30	21.0	1.00		59.1	34.7	44.8	46.2	39.7
BSR 201		II	10-2	29	16.5	1.00			35.3	41.8		38.5
Century		II	10-3	30	19.5	1.00		56.1	42.2	48.8	49.0	45.5
Amcor		II	10-3	37	17.5	1.00		62.2	41.3	44.6	49.4	42.9
Gnome (S-D)		II	10-4	22	18.1	1.00			39.9	43.4		41.6
Platte		II	10-4	32	15.9	1.00				39.8		
Hobbit (S-D)		III	10-8	24	16.6	1.00			38.7	50.4		44.5
Will		III	10-8	32	19.4	1.00		54.7	36.0	49.5	46.7	42.7
Mead		III	10-8	28	17.2	1.00			43.4	47.6		45.5
Sprite (S-D)		III	10-9	24	17.5	1.00			42.7	48.8		46.7
Pella		III	10-9	33	21.9	1.00			44.7	48.7		46.7
Brand	**Proprietary Entry**	[2b]										
SoyGro	L4503	I	9-22	25	18.4	1.00				37.5		
SoyGro	L4404	I	9-23	31	17.7	1.00			36.3	41.3		38.8
Northrup King	S1346	I	9-23	26	19.3	1.00				39.8		

Table 29 Continued; 1982 Soybeans, Centerville, SD

Identification of Entries[1]			1982 Field Data				Average Yield in Bushels/Acre					
			Maturity Date	Plant Height	100 seed wgt.	Lodging[3]	1977	1979	1981	1982	1979-82	1981-82
Public Varieties		Maturity Group[2a]	(mo.-day)	(inches)	(grams)							
Brand	Proprietary Entry	2b										
Arrowhead	2211	II	9-23	32	17.3	1.00				39.7		
SoyGro	L4504	I	9-23	27	17.7	1.00				39.0		
Cenex	8212	I	9-24	31	16.6	1.00				39.9		
Northrup King	S1884	II	9-25	32	17.6	1.00				39.0		
Kaltenburg	KB212	II	9-25	30	15.7	1.00				38.7		
Stine	2100A	II	9-26	33	18.4	1.00				42.6		
Pride	B203	II	9-27	31	16.0	1.00				46.0		
Agripro	AP200	II	9-27	35	16.5	1.00		52.7	39.5	41.1	44.4	40.3
Cenex	8017	II	9-27	32	16.1	1.00			36.0	39.8		37.9
NAPB	EX3016	II	9-28	35	18.5	1.00				40.6		
Arrowhead	2244	II	9-29	31	16.4	1.00				46.2		
SRF	205	II	9-29	34	16.7	1.00				44.4		
Fontanelle	42X	II	9-29	34	16.9	1.50				41.6		
Schettler	D180B (B)	II	9-30	32	18.0	1.00				39.6		
Pride	B216	II	9-30	32	16.5	1.00	54.9	57.3	47.2	45.6	50.0	46.4
Agrigold	AG-2510	II	9-30	33	16.6	1.25				44.2		
Hy-Vigor	905 (B)	II	9-30	33	17.2	1.00		53.0	42.9	42.1	46.0	42.5
Cenex	7461 (B)	II	9-30	32	16.7	1.25			41.0	41.3		41.1
Fontanelle	4444	II	9-30	32	18.2	1.00				38.2		
SOI	226	II	10-1	32	16.7	1.00				54.0		
Northrup King	S1492	II	10-1	31	18.9	1.00				50.5		
McCurdy	204B (B)	II	10-1	31	17.5	1.00				46.3		
Schettler	D195B (B)	II	10-1	31	16.0	1.00				44.6		
SoyGro	L4303	II	10-1	28	18.6	1.00			42.9	43.9		43.4
McCurdy	101+ (B)	II	10-1	34	15.9	1.00			37.7	42.5		40.1

Table 29 Continued: 1982 Soybeans, Centerville, SD

1982 Field Data

Identification of Entries[1]			Maturity Date	Plant Height	100 seed wgt.	Lodging[3]	Average Yield in Bushels/Acre 1977	1979	1981	1982	1979-82	1981-82
Public Varieties		Maturity Group[2a]	(mo.-day)	(inches)	(grams)							
Brand	Entry	2b										
McCurdy	102+ (B)	II	10-1	35	16.0	1.00			40.1	42.0		41.0
Pine Grove	P2191	II	10-1	30	20.1	1.00				40.9		
SRF	250	II	10-2	30	16.5	1.00			43.7	47.0		45.3
Mustang	M-1220	II	10-2	33	18.8	1.00			36.8	46.0		41.4
AgriGold	AG-2505 (B)	II	10-2	29	19.8	1.00				45.8		
Kaltenburg	KB231	II	10-2	33	17.0	1.00				45.5		
Agripro	AP240	II	10-2	30	18.1	1.00				43.7		
Dairyland	DSR 212	II	10-2	30	19.9	1.00				41.8		
Northrup King	S2596	II	10-3	27	18.2	1.00				47.0		
AgriGold	Ag-Royal	II	10-3	33	19.2	1.00				45.5		
Pine Grove	P2240	II	10-3	31	16.3	1.00				44.3		
Hofler	Gem	II	10-3	33	17.0	1.00				44.1		
Dairyland	DSR 227	II	10-3	36	16.9	1.00				43.3		
Curry	CBS-300B (B)	II	10-3	32	20.5	1.00		59.2	43.1	42.8	48.4	42.9
Crommert	Regina	II	10-3	30	18.7	1.00				42.5		
Curry	CBS-290B (B)	II	10-3	32	17.4	1.00				42.4		
Pine Grove	P2400	II	10-3	31	17.8	1.00				42.0		
Hy-Vigor	909 (B)	II	10-3	31	21.6	1.00				41.3		
SOI	201-1	II	10-4	31	19.0	1.00				48.1		
Pride	B242	II	10-4	34	17.9	1.00				46.9		
Pfizer Genetics	CX290	II	10-4	35	19.7	1.00			41.7	45.7		43.7
SOI	205-1	II	10-4	34	15.8	1.00				44.1		
Pine Grove	P2260	II	10-4	31	16.5	1.00				44.0		
Dairyland	DSR 232	II	10-4	34	21.4	1.00			43.2	42.2		42.7
Agripro	AP230	II	10-4	29	21.4	1.00				40.3		

Table 29 Continued; 1982 Soybeans, Centerville, SD

1982 Field Data

Identification of Entries[1]			Maturity Date	Plant Height	100 seed wgt.	Lodging[3]	Average Yield in Bushels/Acre 1977	1979	1981	1982	1979-82	1981-82
Public Varieties		Maturity Group[2a]	(mo.-day)	(inches)	(grams)							
Brand	Entry	2b										
Curry	CBS-280B (B)	II	10-5	32	16.3	1.00				45.5		
Fontanelle	4545	II	10-5	34	17.0	1.00				42.7		
Schettler	TC204A	II	10-6	33	15.8	1.00				48.9		
Dairyland	DSR 321	III	10-6	39	18.2	1.00				45.9		
Mustang	M-1330	III	10-7	32	19.0	1.00				48.2		
Fontanelle	4747	II	10-7	32	19.0	1.00		59.8	41.6	47.5	49.6	44.5
Dairyland	DSR 303	III	10-7	34	18.3	1.00				45.00		
Means				32	17.6	1.08				43.9		

LSD (.05) 7.4

C.V. - % 12.1

1 - Listed in order of 1982 maturity

2a - Maturity group from USDA classification: I = early; II = mid-season; III = late at Centerville

2b - Information supplied by the company

3 - 1 = almost all plants erect
2 = all plants leaning slightly with a few plants down
3 = all plants leaning moderately (45°) or 25-50% of the plant down
4 = all plants leaning considerably, or 50-80% of the plants down
5 = almost all plants down

B = Blend S-D = semi-dwarf

Table 30. 1982 Soybean Performance Trial, Ed Curry, Cooperator, Elk Point, SD

Identification of Entries[1]		Maturity Group[2a]	Maturity Date (mo.-day)	Plant Height (inches)	100 seed wgt. (grams)	Lodging[3]	Average Yield In Bushels/Acre 1979	1980	1981	1982	1979-82	1981-82
Public Varieties												
Weber		I	9-28	33	13.6	4			45.1	35.8		40.4
Hodgson 78		I	9-29	33	17.2	4			49.7	38.7		44.2
Corsoy 79		II	10-2	38	15.8	4	36.3	36.0	55.4	49.7	44.3	52.6
Vickery		II	10-3	39	16.2	3			54.9	43.3		49.1
Wells II		II	10-3	36	16.9	3	39.5	34.7	53.3	39.2	41.7	46.2
Harcor		II	10-4	40	16.8	4	44.4	37.0	54.7	41.2	44.3	47.9
BSR 201		II	10-5	39	16.1	4			55.7	40.8		48.2
Nebsoy		II	10-5	34	16.7	3	38.5	36.8	52.0	42.0	42.3	47.0
Beeson 80		II	10-5	35	20.6	3	45.1	38.8	52.3	40.7	44.2	46.5
Century		II	10-7	36	20.4	3	42.3	37.7	53.2	45.3	44.6	49.2
Gnome (S-D)		II	10-8	28	14.8	2		25.4	44.6	46.2		45.4
Platte		II	10-8	36	16.2	4				35.0		
Amcor		II	10-9	45	16.8	4		33.8	54.4	42.1		48.2
Will		III	10-11	36	16.2	2	50.3	33.7	50.0	46.8	45.2	48.4
Hobbit (S-D)		III	10-12	30	14.9	2		36.1	51.9	45.5		48.7
Sprite (S-D)		III	10-12	27	16.3	1		30.7	53.3	45.2		49.2
Mead		III	10-12	35	15.9	1		33.7	56.6	50.7		53.6
Pella		III	10-13	40	20.0	2	55.6	36.9	57.0	48.3	49.4	52.6
Williams 79		III	10-14	40	16.9	2		34.8	52.2	46.8		49.5
Williams 82		III	10-14	38	17.5	2				48.1		
Cumberland		III	10-15	41	17.9	3	45.2	32.3	50.3	48.8	44.1	49.5
Elk (S-D)		III	10-15	30	15.4	3	46.4	31.8	42.4	47.9	42.1	45.1
Union		IV	10-18	47	19.7	2	42.3	32.7	46.4	47.3	42.2	46.8
Brand	**Proprietary Entry**	**2b**										
SoyGro	L4504	I	9-28	31	18.7	4				43.4		
Asgrow	A1937	I	9-28	36	16.1	3			54.3	40.9		47.8
SoyGro	L4503	I	9-29	32	17.9	4				46.1		

Table 30 Continued, 1982 Soybeans, Elk Point, SD

Identification of Entries[1]		Maturity Group[2a]	1982 Field Data: Maturity Date (mo.-day)	Plant Height (inches)	100 seed wgt. (grams)	Lodging[3]	Average Yield in Bushels/Acre: 1979	1980	1981	1982	1979-82	1981-82
Public Varieties												
Brand	Proprietary Entry	2b										
Arrowhead	2211	II	9-29	38	16.3	3				33.2		
SoyGro	L4404	I	9-30	36	18.9	4				41.0		
Northrup King	S1884	II	10-1	34	15.0	3				51.7		
Migro	HP 20-20	II	10-1	38	18.2	4		35.8	50.8	37.8		44.3
Arrowhead	2244	II	10-2	37	16.5	3				46.6		
Schettler	B1806 (B)	II	10-2	37	16.5	3				42.3		
Agropro	AP200	II	10-2	39	17.1	4		37.6	55.7	44.0		49.8
Northrup King	S1492	II	10-3	35	14.9	2				46.1		
Asgrow	A2575	II	10-3	41	17.2	3	42.0	37.7	54.0	44.3	44.5	49.1
SRF	205	II	10-3	33	16.3	4				40.5		
Hy-Vigor	Pillar	II	10-3	31	17.3	3				38.9		
AgriGold	AG-2510	II	10-4	39	15.9	3				46.0		
Pfizer Genetics	2ER-81 (B)	II	10-4	40	17.0	3				45.7		
Schettler	D195B (B)	II	10-4	33	15.6	3				44.2		
Pine Grove	P2191	II	10-4	34	18.6	4				44.0		
Latham	600	II	10-4	42	17.3	4				42.1		
SOI	205-1	II	10-4	36	15.4	4				41.6		
SOI	226	II	10-5	36	17.4	3				55.7		
Latham	650	II	10-5	36	16.2	3				47.7		
DeSoy	433E	II	10-5	38	18.4	3				44.7		
Crommert	Regina	II	10-5	34	15.7	4				44.5		
Lincoln	LS7225	II	10-5	33	15.9	4				43.1		
Latham	500	II	10-5	36	16.6	3				42.8		
Kruger	K2000	II	10-5	39	19.4	3			58.6	42.7		50.6

Table 30 Continued, 1982 Soybeans, Elk Point, SD

Identification of Entries[1]			1982 Field Data				Average Yield in Bushels/Acre					
			Maturity Date	Plant Height	100 seed wgt.	Lodging[3]	1979	1980	1981	1982	1979-82	1981-82
Public Varieties		Maturity Group[2a]	(mo.-day)	(inches)	(grams)							
Brand	Entry	2b										
SoyGro	L4303	II	10-5	36	18.8	4			53.4	42.1		47.7
Migro	HP2530	II	10-5	36	12.5	4		38.0	54.8	41.4		48.1
AgriGold	AG-2505 (B)	II	10-5	33	17.1	3				40.8		
McCurdy	102+	II	10-5	36	15.7	4		37.7	55.0	40.3		47.6
Agripro	AP240	II	10-6	36	15.3	3				46.6		
Agripro	AP230	II	10-6	34	19.9	2			52.0	44.6		48.3
Fontanelle	4545	II	10-6	38	15.5	4				41.5		
Asgrow	A2680	II	10-6	36	15.9	4			52.0	38.6		45.3
Pine Grove	P2400	II	10-6	34	17.5	4				37.4		
DeSoy	750 (B)	II	10-7	38	16.7	3			54.8	47.3		51.0
AgriGold	AG-Royal	II	10-7	42	16.4	4				46.0		
Dairyland	DSR 227	II	10-7	42	16.0	3			45.0	45.5		45.2
Pine Grove	P2260	II	10-7	38	15.6	4				45.7		
SRF	250	II	10-7	34	14.2	2	42.3	38.3	47.1	43.8	42.9	45.4
Curry	CBS-280B (B)	II	10-7	39	15.6	4				43.7		
Agripro	EX73053	II	10-7	39	16.8	2				43.6		
SOI	201-1	II	10-7	33	17.5	3				42.4		
Asgrow	A2858	II	10-7	36	20.9	4		37.9	55.6	41.7		48.6
Northrup King	S2596]	II	10-7	34	16.9	3				41.4		
Schettler	TC204A	II	10-7	35	15.2	4				40.8		
Curry	CBS-300B (B)	II	10-7	34	17.2	3			55.1	39.2		47.1
Pride	B242	II	10-8	40	18.2	2				45.8		
Curry	CBS-290B (B)	II	10-8	39	17.4	4				35.2		
Stine	2050	II	10-9	36	15.9	4				45.4		

Table 30 Continued; 1982 Soybeans, Elk Point, SD

Identification of Entries[1]			1982 Field Data: Maturity Date	Plant Height	100 seed wgt.	Lodging[3]	Average Yield in Bushels/Acre: 1979	1980	1981	1982	1979-82	1981-82
Public Varieties		Maturity Group[2a]	(mo.-day)	(inches)	(grams)							
Brand	Entry	2b										
Dairyland	DSR 232	II	10-10	42	17.1	3			45.2	49.3		47.2
Dairyland	DSR 303	III	10-11	41	16.1	3				48.5		
Kruger	K2197	II	10-11	46	17.9	3				46.4		
Pride	PK352 (B)	III	10-11	38	15.8	3			54.3	45.3		49.8
Kruger	KB306 (B)	III	10-12	39	17.9	3				46.8		
DeSoy	800 (B)	II	10-12	39	19.1	2			59.8	44.8		52.3
DeSoy	808 (B)	III	10-12	40	16.7	4				42.8		
Dairyland	DSR 320	III	10-13	42	15.7	2				42.0		
Fontanelle	5454	II	10-13	42	16.1	3				49.4		
McCurdy	375B (B)	III	10-13	35	15.0	3				49.3		
Asgrow	A3127	III	10-13	33	15.1	1	51.0	42.8	54.9	47.1	48.9	51.0
Fontanelle	5656	II	10-13	45	17.5	3			54.5	46.1		50.3
McCurdy	109+ (B)	III	10-13	46	17.2	2		40.2	50.4	45.9		48.1
Kruger	KB304 (B)	III	10-13	41	15.9	2				45.1		
DeSoy	875 (B)	III	10-14	40	15.4	4			59.1	46.8		52.9
Mustang	M-1330	III	10-15	35	14.4	3				48.5		
Dairyland	DSR 352	III	10-15	36	15.5	3				45.9		
Kruger	KB335 (B)	III	10-15	42	14.3	3				45.9		
Means				37	16.8	3.11				44.2		
									LSD (.05)	6.9		
									C.V. - %	9.7		

B = Blend S-D = semi-dwarf

1 - Listed in order of 1982 maturity

2a - Maturity group from USDA classification; I & II, earl to mid-season III, full season to late; IV, late at Elk Point

2b - Information supplies by the company

3 - 1 = almost all plants erect
 2 = all plants leaning slightly with a few plants down
 3 = all plants leaning moderately (45°) or 25-50% of the plant down
 4 = all plants leaning considerably, or 50-80% of the plants down
 5 = almost all plants down

Table 31. 1982 Grain Sorghum Performance Trial, Area E, Southeast Experiment Farm. Centerville, Clay County, South Dakota

Brand and Hybrid	Date Headed	Height Inches	Percent Moisture 9/22/82	Test Wt. lb/B	Yield, Pounds Per Acre 1982	1978-82	1979-82	1980-82	1981-82
Cenex 228T	8/3	51	26.8	59	6115		5070	4740	5805
Kaltenburg KS1001	8/3	50	33.8	59	5960				
Migro TEK 1011R	8/5	48	31.7	59	5955				
Funk's G-1460	8/6	50	33.6	60	5890				
O's Gold GS709	8/7	58	35.+	58	5860				
AgriGold AG-255	8/8	57	34.5	59	5860				
Western WS-212	8/9	55	35.+	59	5825				5785
Warner W-655T	8/9	58	35.+	59	5820				6220
Northrup King NK2244	8/9	49	32.8	58	5740				
Cargill 30	8/6	57	33.7	59	5715		4855	4385	5310
DeKalb DK-38	8/3	60	50.9	59	5680				6290
Cenex 310T	8/8	56	35.+	56	5675		5375	4845	5580
Asgrow Dorado E	8/3	52	24.3	52	5665		4985	4590	5850
Asgrow Corral	8/8	58	35.+	60	5615	5070	5320	4830	5665
PAG 4433	8/4	54	28.0	57	5610		4735	4470	5235
PAG Exp 91008	8/11	55	35.+	59	5590				5675
AgriGold AG-235	8/2	41	35.+	59	5515				
DeKalb DK-42	8/8	49	35.+	57	5475			4690	5470
Funk's G-1560	8/12	47	35.+	57	5465				
Golden Acres T-E Y44R	8/4	48	30.5	58	5410				5515
Kaltenburg KS2001	8/9	58	35.+	58	5370				
Northrup King X7911	8/4	49	28.1	59	5365				
Migro TEK 1021R	8/10	49	35.+	58	5360				5720
Migro TEK 1055R	8/9	55	35.+	58	5340				
Cargill 22	8/3	51	25.6	57	5325				
O's Gold GS492	8/3	51	26.9	59	5300				
O's Gold GS707	8/6	61	35.+	59	5230				

Table 31 Continued, 1982 Grain Sorghum, Centerville, SD

Brand and Hybrid	Date Headed	Height Inches	Percent Moisture 9/22/82	Test Wt. lb/B	1982	1978-82	1979-82	1980-82	1981-82
Northrup King NK2030	8/8	46	32.5	56	5225		4810	3755	5585
Migro TEK 14R	8/10	56	34.8	59	5195				5645
Golden Acres T-E Y45G	8/8	55	35.+	58	5145				
Dekalb DK-58	8/12	55	35.+	59	5510				
Northrup King NK2018	8/2	49	27.2	60	5015				
Cargill 40	8/11	53	35.+	59	5005				
Warner W-684R	8/9	56	35.+	59	4935				
Kaltenburg KS901	8/2	41	32.2	59	4425				
Means		52	32.6	58	5480				

LSD (.05) 820   C.V. - % = 9.2

RESIDUAL INFLUENCE OF LARGE MANURE ADDITIONS ON SOIL PROPERTIES AND CORN GROWTH

P. Fixen and R. Gelderman

PLANT SCIENCE 82-15

S.E. FARM REPORT

This study was initiated in 1974 to study the effects of application of large quantities of manure on crops, soil, or runoff water. This report contains information on the residual effects of the manure applications made in 1974 and 1975.

Objectives

1. Determine the influence of past large manure applications on soil test levels.
2. Determine the influence of past large manure applications on the grain yield and leaf composition of corn.

Materials and Methods

The experiment is located on an Egan silty clay loam. Egan soils are relatively well drained soils that have developed from a silty cap over glacial till.

The study is in a completely randomized design with four replications. Treatments consisted of a check plus four levels of a low salt manure and four levels of a high salt manure. Only the low salt treatments are reported here. No fertilizer has been applied to these plots since the initial manure treatments were made.

Curry SC 1505 was planted on May 6, 1982. Dyfonate 20G was banded at planting and Atrazine and oil was applied post-emergence for weed control.

Soil samples were taken in early July, ear leaf samples at silk initiation and yields were determined by combining the three center rows of each plots.

Results

Soil test results are reported in Table 32. Manure additions increased soil organic matter, soil nitrate, available P, available K, EC, and available Zn. Soil pH dropped slightly in the top three or four depth increments. These data indicate that the effects of large manure additions on soil properties persist for a number of years after application. This indicates that maximum benefit from manure additions will occur only if manure is spread over as many fields as possible on the farm

rather than continually applying it to the same field.

Table 33 shows that the manure additions were still exhibiting a depressing effect on grain yield in 1982. It should be emphasized that these manure rates are extremely large and are expressed in terms of tons dry matter per acre. Barnyard manure usually contains no more than 20% dry matter; therefore, the lowest rate in the experiment (40 T/A) is at least equivalent to 200 tons/A of wet barnyard manure applied over a 2-year period. The yield depression may be due to the elevated salt concentration in a significant portion of the root profile. Plant analysis indicates elevated ear leaf concentrations of P, K and decreased concentrations of Mn and Cu, however, both of these are still in the sufficiency range.

Table 32. Influence of Past Large Manure Additions on Soil Test Levels, S.E. Farm 1982.

APPLIED MANURE[1/] TONS DM/A	DEPTH IN	ORGANIC MATTER %	NO_3-N LBS/A	AVAIL P --PPM--	AVAIL K --PPM--	pH	1:1 EC MMHOS/CM	Zn --PPM--	Fe --PPM--	Mn --PPM--	Cu --PPM--
0	0-4	3.2	10	26	364	7.1	1.3	1.3	23	40	2.7
	4-8	3.0	5	19	339	7.0	0.6				
	8-12	2.2	6	3	178	7.3	0.7				
	12-16	1.8	12	2	159	7.4	0.8				
	16-20	1.4	17	3	173	7.6	1.1				
	20-24	1.1	26	3	153	7.6	1.4				
40	0-4	3.5	26	86	784	6.8	0.7	2.8	24	41	2.8
	4-8	3.5	36	83	790	6.7	0.8				
	8-12	2.4	50	14	305	6.8	0.8				
	12-16	1.7	67	4	175	7.1	1.1				
	16-20	1.4	69	6	164	7.3	1.2				
	20-24	1.2	74	2	148	7.5	1.6				
89	0-4	3.7	25	111	1095	6.9	0.9	3.2	25	42	2.7
	4-8	3.6	31	94	1035	6.7	0.7				
	8-12	2.2	45	10	536	6.8	0.8				
	12-16	1.7	63	4	285	7.0	0.7				
	16-20	1.3	81	4	161	7.4	1.5				
	20-24	1.0	89	3	143	7.6	2.0				
125	0-4	3.9	40	168	1418	6.7	0.9	5.0	26	41	2.6
	4-8	3.9	91	152	1365	6.4	1.3				
	8-12	2.7	106	36	1013	6.5	1.5				
	12-16	2.0	110	13	536	6.6	1.8				
	16-20	1.7	113	12	284	7.0	2.2				
	20-24	1.2	126	4	216	7.3	2.5				
161	0-4	4.1	44	206	1785	6.7	1.1	6.1	26	40	2.8
	4-8	3.9	63	185	1323	6.5	1.0				
	8-12	2.6	89	41	1170	6.5	1.1				
	12-16	2.0	97	13	595	6.8	1.3				
	16-20	1.9	100	31	396	7.1	1.6				
	20-24	1.2	108	4	180	7.4	2.1				

1/ Approximately 1/2 Applied in 1974 and 1/2 in 1975

Table 33. Influence of Past Heavy Manure Additions on Corn Grain Yield and the Ear Leaf Concentrations of Several Elements, S.E. Farm, SOuth Dakota, 1982.

APPLIED[1/] MANURE	Grain		Earleaf Concentration									
	YIELD	H_2O	N	P	K	S	Ca	Mg	Zn	Fe	Mn	Cu
TONS DM/A	BU/A	%	%						PPM			
0	108	23	3.20	.323	2.29	.165	.644	.295	19.9	17.6	55	8.4
40	102	21	3.18	.376	2.57	.136	.733	.281	18.9	16.4	53	6.4
89	100	21	3.21	.403	2.63	.142	.669	.263	15.6	16.8	43	6.5
125	85	21	3.19	.451	2.78	.136	.594	.272	19.5	16.8	48	5.1
161	84	20	3.18	.439	2.72	.136	.669	.294	16.6	16.8	38	5.1

1/ Approximately 1/2 Applied in 1974 and 1/2 Applied in 1975.

RESIDUAL PHOSPHORUS - CORN YIELD RESPONSE

P. Fixen, R. Gelderman, B. Lawrensen
P. Carson, R. Nettleton, and D. Sorensen

PLANT SCIENCE 82-16

S.E. FARM REPORT

Objectives

1. To determine the effect of residual fertilizer phosphorus on corn yields.

2. To monitor changes in the P soil test as phosphorus is removed through crop yields.

Materials and Methods

1. The experiment is located on an Egan silty clay loam (Udic haplustoll) south of the office building at the Southeast Experiment Farm. Egan soils are deep, friable, well drained silty clay loams developed in a silty cap over glacial till.
2. This experiment was established in 1964 to study the effect of various rates of phosphorus (P) fertilizer on the yield of corn. From 1964-1967 five rates of P (0, 10, 20, 40 and 160 lbs per acre) were broadcast and plowed down annually. Each of the phosphorus treatments was divided into thirds, with one-third receiving about 10 lbs of P as a starter fertilizer from 1964 through 1967, one-third receiving 10 lbs of Zn per acre in 1964 and 1965 plus 10 lbs of P as a starter, and one-third receiving no additional fertilizer. In the spring of 1978 an additional 13 lbs of P was applied to the plots which received zinc in the 1960's.
3. This land has been in various crops since 1967, such as soybeans, sorghum, oats, and alfalfa. The soil on the experimental area was sampled in the spring of 1973, after the first cutting of alfalfa in 1977, and in the spring of 1980. The results of these tests for available phosphorus are graphed in Figure 2.
4. The study was planted to Curry SC 1505 on May 4, 1982, Eradicane was used for weed control. Nitrogen was applied at 100 lbs/A.

Results and Discussion

Soil test P levels for 1973 through 1980 are graphed in Figure 2. The graph shows that the amount of soil test decline increased as soil test level increased. This is also shown in Figure 3 which is a graph of the slopes of the lines in Figure 2. The rate of decline appears to be linearly related to soil test P level with an annual decline of about 8% of the soil test level.

Corn grain yields in 1982 are reported in Table 34. Yields were late and some treatments lost completely due to a severe late season infestation of Pennsylvania smartweed. No yield response to P apparently occurred here, although, the weed infestation may have masked any potential response. The study will again be planted to corn in 1983 to re-evaluate the P response.

Table 34. Influence of Residual P on Corn Grain Yield on an Egan SiCl, S. E. Farm 1982.

Soil Test Level[1]	SUBPLOT A	B	C	AVG
Lbs/A	- - - - - -Bu/A 15.5% - - - - - - -			
13	96	96	99	97
19	102	97	107	103
23	93	98	90	94
37	87	92	99	93
77	--	84[2]	--	--
Avg.	95	93	99	97

1/ Based on 1980 Sampling and Resulting From Application of 0, 40, 80, 160 or 320 lbs P/A During 1964-1967.

2/ Based on 2 Reps only, others lost to Smartweed.

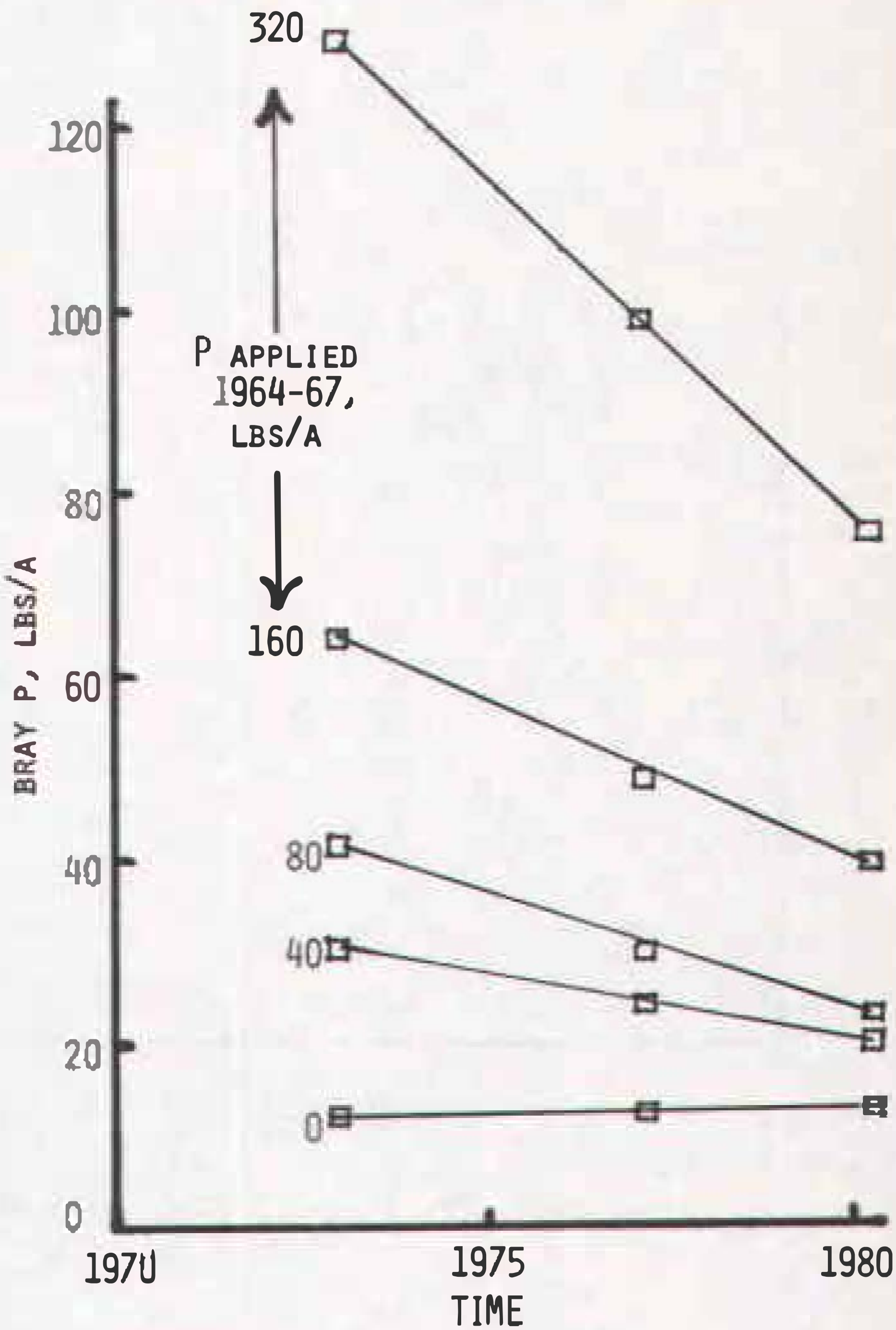


FIGURE 2. SOIL PHOSPHORUS DEPLETION IN AN EGAN SILTY CLAY LOAM, SOUTHEASTERN SOUTH DAKOTA

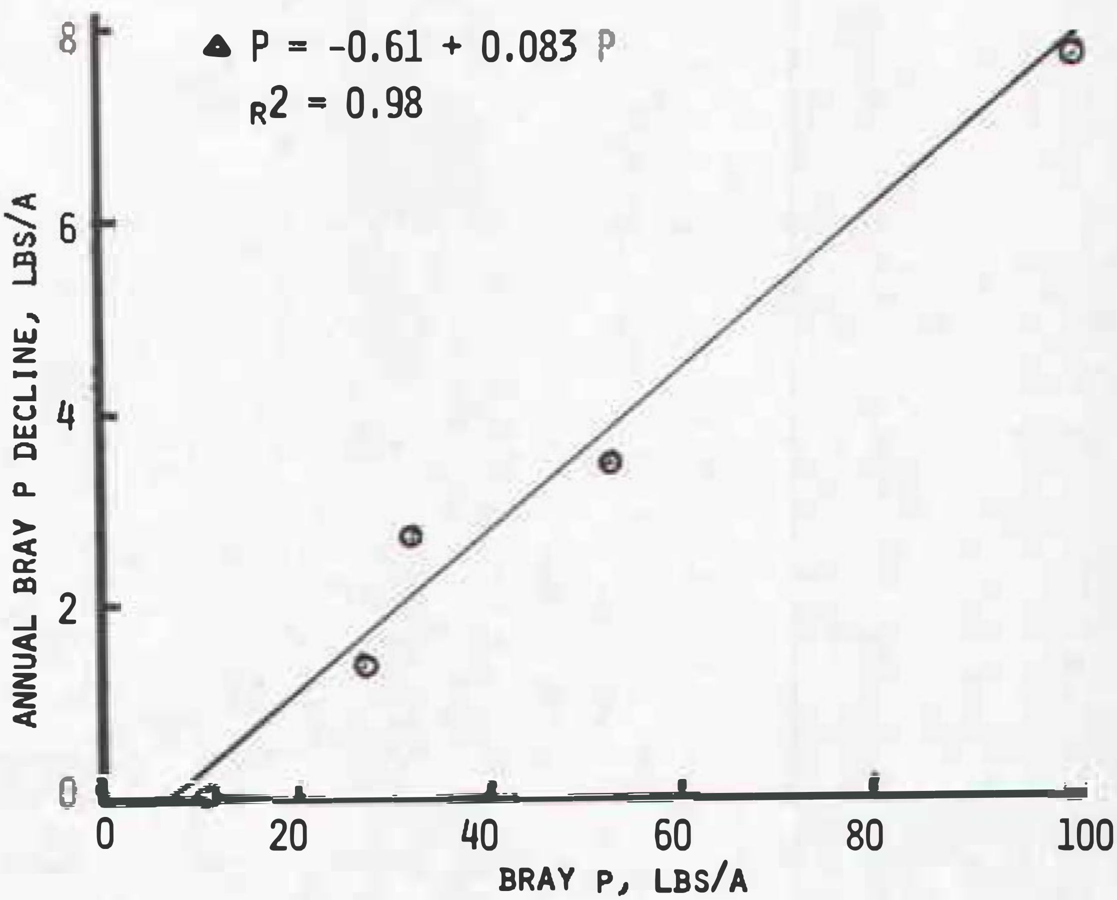


FIGURE 3. INFLUENCE OF SOIL TEST LEVEL ON RATE OF SOIL TEST LEVEL DECLINE OVER TIME IN AN EGAN SICL.

S.E. FARM REPORT

RESIDUAL POTASSIUM STUDY

P. Fixen, R. Gelderman, B. Lawrensen and P. Carson

PLANT SCIENCE 82-17

This study was initiated in 1965. No yield data was taken from 1970 to 1980. Yields were again taken in 1981 and 1982. The objective of this study was to determine the residual potassium effect on corn yields.

Method

The experiment was located east of the office building on an Egan silty clay loam. Egan soils are relatively well drained silty clay loams that developed from a silty cap over glacial till.

The experimental design consisted of three separate treatments: (a) no potash (K_2O) applied, (b) 2000 lb/A K_2O applied, and (c) 60 lb/A K_2O applied. These rates were applied over a four year period starting in 1965. Treatment (b) was broadcast and treatment (c) was band applied. Each treatment was repeated eight times.

Pioneer 7223 was planted on May 3, 1982. Dyfonate 20G was banded at planting time and Eradicane and Atrazine were used for weed control. Severe lodging occurred in this study in 1982 as it did in 1981.

Results

Average yields of 8 replications are reported in Table 35 for 1982, 1981, and 1965-1969. Soil test K levels are also reported based on the 1979 sampling. No apparent yield response has occurred due to added K in this study. This was expected since the available K level of this soil is very high.

Table 35. Corn yield and soil test levels in the Residual Potassium Study, S.E. Farm, 1982

Treatment	Soil K	Grain Yield 1982	1981	1965-1969
lbs K/A	lbs/A	bu/A 15.5% H_2O		
0	606	79	115	105
2000[1/]	860	76	117	98
60[2/]	725	76	114	106

1/ Broadcast at 500 lbs/A/year for 4 years, 1965-1968.
2/ Band applied at 15 lbs/A/year for 4 years.

EFFECTS OF APPLIED NITROGEN ON NITRATE ACCUMULATION IN THE SOIL PROFILE AND ON CORN GRAIN YIELD

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S.E. FARM REPORT

PLANT SCIENCE 82-18

Objectives

1. Study and record the effects of rates of nitrogen addition on the accumulation and movement of NO_3-N in the soil profile.
2. Determine the effect of large amounts of nitrogen fertilizer on the pH of the soil.
3. Measure the effects of the treatments on the nitrogen concentration in the leaves.
4. Determine effects of the treatments on nitrogen concentration in the entire plant at maturity.
5. Determine effects of residual and applied N on corn grain yield.

Materials and Methods

1. This experiment is located on a Viborg silty clay loam on the southeast corner of the Southeast Experiment Farm. Viborg soils are deep, friable, moderately well-drained, silty clay loam soils developed in a silty cap over glacial till. The water table fluctuates from 3-7 feet in this area.
2. Two experiments are involved in this study, one involving a number of low rate N applications and the other a sequence of high N applications. The experiments are adjacent and related. The high rate experiment began in 1969. The low rate experiment began in 1975.
3. Soil samples in the heavy rates of application were taken to a depth of 6 feet each year since 1969, except in 1979 when they were taken to a depth of 4 feet because of wet soil conditions. The NO_3-N is reported to a depth of 4 feet in 1980. The samples are only being taken to a depth of 4 feet in the low rate experiment.
4. The samples were dried as soon as possible after taking, in a forced air oven at a temperature not to exceed 115° F.
5. Nitrate-nitrogen was determined by the n-phenol-disulphonic acid method until 1973. Since then the nitrate electrode method has been used.

6. The longer duration experiment with high rates of nitrogen is in its fourteenth year. The N has been applied as ammonium nitrate and all plots except the 0-0-0 treatment have received 25 lbs P_2O_5/A and 70 lbs K_2O/A each year.
7. In 1982, grain yields and moisture were measured by combining the three center rows of each plots.

Results and Discussion

The influence of applied N on soil nitrate levels in the fall of 1981 is reported in Tables 36 and 37. The treatments shown in Table 36 have been applied for 13 years while those in Table 37 have been applied for 6 years. Therefore, the 80 lb/A treatment in Table 37 has resulted in a lower level of soil nitrates than the 80 lb/A treatment in Table 36. The sums at the bottom of Table 36 indicate that a very large amount of nitrate has accumulated in these plots. Nearly 1000 lbs/A exist in the top four feet of the 240 lb treatment. This is sufficient N to probably grow 6 or 7 good corn crops.

Figure 4 shows the nitrate distribution for the high rates study in the fall of 1981. At this sampling date, the 0-6 inch increment tested low in nitrate regardless of treatment. This differs from the distribution a year earlier when there was over 100 lbs. NO_3-N/A in the top 6 inches of the 240 lb. rate. The two high rates reached a maximum nitrate level at about 18", but kept nitrate elevated over the check to at least 6 feet.

Grain yield response to N is shown in Table 38 and Figure 5. The graph shows that approximately 150 lbs/A of soil nitrate N to 2 feet plus fertilizer N was sufficient to produce maximum yield at the site, which was 98 bu/A. Also there appears to be a sharp decline in grain yield when going from the low rates 80 to the high rates 80. Although not as dramatic, a similar drop occurred in 1981. The cause of the lower yields with the high set of rates is not at this time obvious. This decline appears to be due to something other than soil nitrate levels since the difference in nitrate levels between 80 lb. treatments is not sufficient to cause the precipitous drop in yield observed.

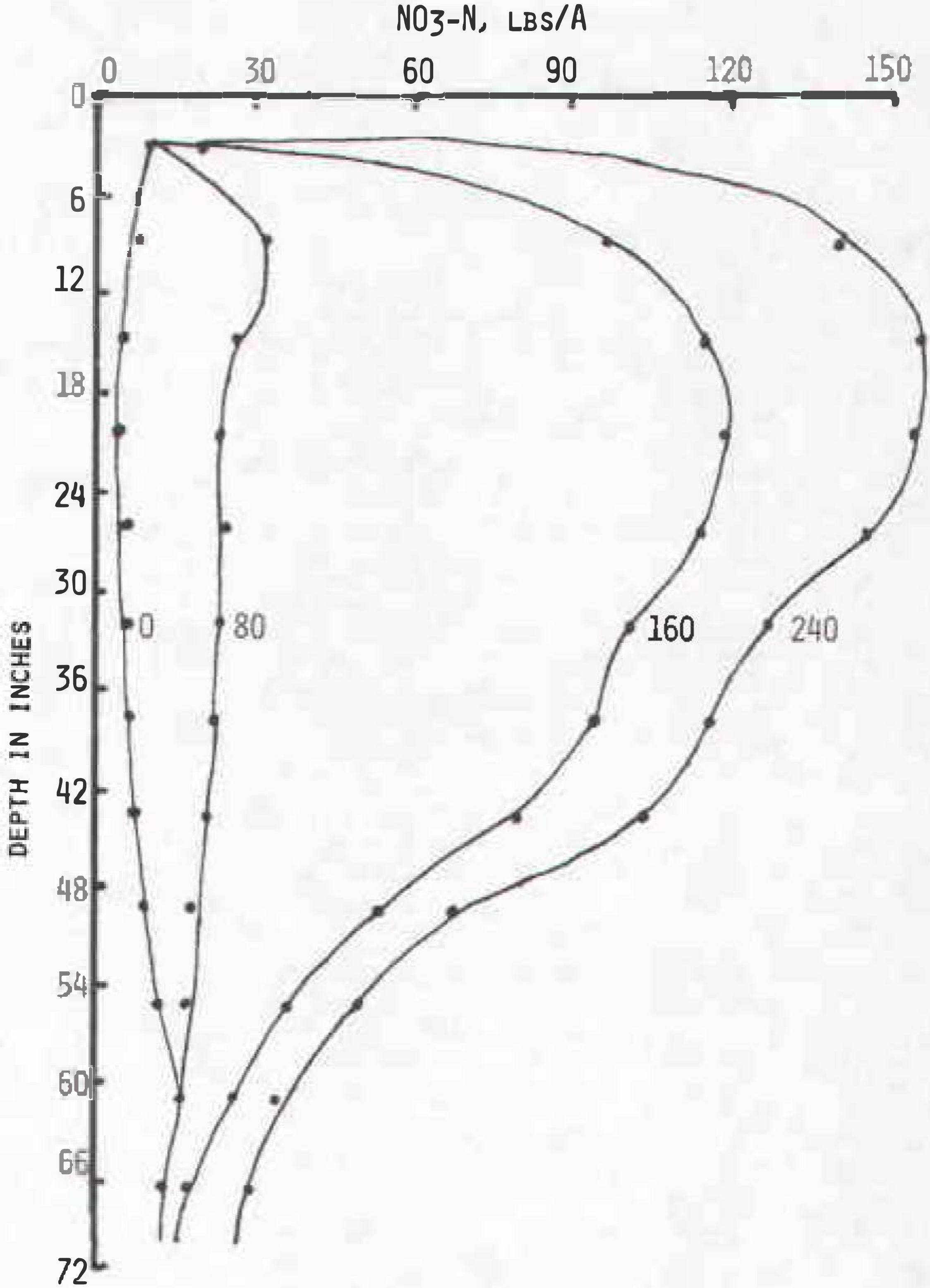

FIGURE 4. INFLUENCE OF APPLIED N ON NITRATE DISTRIBUTION IN THE SOIL PROFILE AFTER 13 YEARS, SOUTHEAST FARM, FALL 1981.

Table 36. The Influence of Applied Nitrogen over a 13 year Period on the Amount of Nitrate Present in the Soil Profile in the Fall of 1981.

Depth Increment (inches)	N applied annually, lbs/A*			
	0	80	160	240
0-6	10	12	13	20
6-12	9	32	96	140
12-18	5	27	115	156
18-24	4	24	118	155
24-30	6	25	115	146
30-36	7	24	101	127
36-42	7	23	95	116
42-48	8	22	90	103
48-54	10	19	54	68
54-60	13	18	37	50
60-66	17	16	27	35
66-72	14	14	18	30
0-24	28	95	342	471
0-48	56	189	733	963
0-72	110	256	869	1146

* Treatments have been applied for the past 13 years (1968-1981). All plots also received 25 lbs P_2O_5/A and 70 lbs K_2O/A annually.

Table 37. The influence of applied N over a 6 year period on the amount of nitrate present in the soil profile in the Fall of 1981.

Depth Increment	N applied annually, lbs/A*				
	0	20	40	60	80
inches	lbs/A				
0-6	8	8	9	9	11
6-12	10	8	11	16	25
12-18	5	4	4	18	29
18-24	4	4	4	9	13
24-30	3	3	5	7	9
30-36	4	4	5	7	7
36-42	4	4	5	8	7
42-48	4	4	5	8	6
0-24	27	24	28	52	78
0-48	42	39	48	82	107

* Treatments have been applied for the past 6 years (1975-1981). All plots except the 0-N treatment also received 25 lbs P_2O_5/A and 70 lbs K_2O/A.

Table 38. Influence of Applied Nitrogen and Residual Nitrate on Yield of Corn Grain at the Southeast Farm, 1982.

Nitrogen Treatment1/		Soil Nitrate2/		Grain3/
		0-2 ft.	0-4 ft.	
		lbs/A		bu/A
1	0	27	42	65
2	20	24	39	68
3	40	28	48	83
4	60	52	82	96
5	80	78	107	98
6	80	95	189	81
7	160	342	733	83
8	240	471	963	76

1/ Treatments 1-5 were applied from 1975-1982.
Treatments 6-8 were applied from 1968-1982.

2/ Samples taken Fall, 1981.

3/ At 15.5% moisture, May 10 planting date.

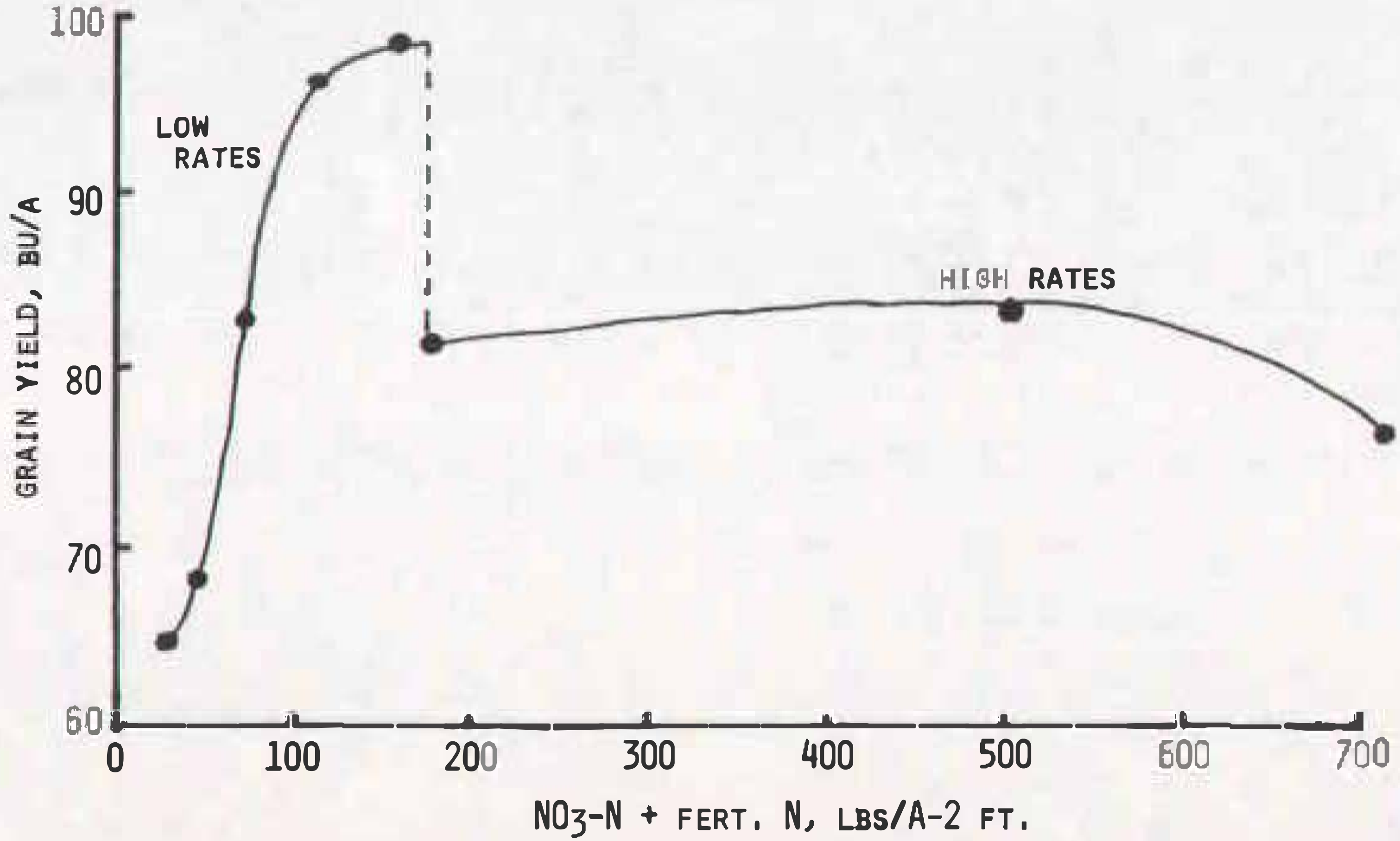

FIGURE 5. YIELD RESPONSE TO N AT S. E. FARM, 1982

SOYBEAN CULTIVAR RESPONSE TO INFECTION BY BACTERIAL BLIGHT (*PSEUDOMONAS SYRINGAE*)

Michael W. Ferguson

PLANT SCIENCE 82-19

S.E. FARM REPORT

Bacterial blight caused by *Pseudomonas syringae*, is the single most common foliar disease of soybean in South Dakota. Attempts in other states to relate yield loss to infection by this organism have met with varying success. Some researchers have shown yield losses of over 10%, while others have been unable to show any significant losses due to Bacterial blight. Because of this variation and because of the predominance of this disease in South Dakota, it is important to know what, if any, differences occur among cultivars in response to this disease, under South Dakota conditions.

The purpose of this experiment was to test variety response to infection by Bacterial blight, especially with regards to total plot yield and 100 seed weight.

Materials and Methods

The soybeans were planted on June 7th at the rate of 150,000 plants per acre. Preplant herbicide consisted of a Treflan-Sencor combination. Commercial soybean inoculate was applied during planting at the recommended rates of the manufacturer. The plots consisted of 4 rows each, 20 feet long spaced on 36" centers, arranged in a split-plot design. Midseason, the row lengths were reduced to 15 feet. The two center (inside) rows of each four row plot were harvested on November 2.

The plants were sprayed with a solution of bacteria (10^8 cells/ml) in tap water, at the V-4 to V-6 stage of reproductive growth (4 to 6 nodes beginning with the unifoliate). The inoculum was prepared by growing the bacteria overnight on nutrient broth-yeast extract agar. The next day the cells were washed off of the petri plates and diluted to the appropriate dilution with tap water. Application was made with a hand sprayer; the plants were sprayed until run off.

Results and Discussion

In this test there were no significant differences in either total plot yield or hundred seed weight due to infection by the Bacterial blight organism. We could not determine whether low disease levels were due to cultivar resistance, ineffective inoculation, or to an environment unfavorable for disease spread.

S.E. FARM REPORT

SEED TREATMENT OF BIN RUN SEED

Michael W. Ferguson

PLANT SCIENCE 82-20

With increasing production costs, more thought is being given to methods of reducing farm expenses. One such way, is the use of bin-run seed from the previous years soybean crop. This practice presents the farmers with several problems. Late harvested seed is often cracked and germinates poorly. These seeds often run the possibility of being infected by disease and show lack of vigor. The purpose of this experiment was to determine the effects of various fungicidal seed-treatments on bin-run versus certified soybean seed, particularly on final stand counts and on yield.

Materials and Methods

Bin-run Wells II soybean seed was obtained from a bin at the Southeast Experiment Station farm. These beans showed approximately 30% cracked or damaged seed. Certified Wells II soybean seed was obtained from South Dakota Foundation Seed. The beans were treated using the chemicals and rated (Table 39) as recommended by the manufacturer. The seeds were used within seven days of treatment. Planting took place on June 7th and the rate of 150,000 plants per acre. Only whole round seeds of the bin-run Wells II were planted. Stand counts were made on 6/24/82 and 7/29/82 and the plants harvested on November 2, 1982.

Results and Discussion

The stand counts and yield data are presented in Table 39 and 40 respectively. There was a significant reduction in stand counts of the bin-run seed over those of the certified control. There was no significant change in stand counts, total yield or hundred seed weight as a result of chemical seed treatment.

There was a slight reduction in stand counts due to the use of the seed treatments. This is difficult to explain, but may be related to method of application or the rates. I do not feel that this is related to the chemical themselves.

It is interesting that although the populations of the bin-run seed were severely reduced, there was no differences in yield between the bin-run and certified seed. This demonstrates the ability of the soybean to produce more yield (compensates) when population numbers are reduced. This should be taken into consideration when deciding whether to treat seed.

Chemical treatment of soybean seed is a relatively new practice. In some state treatments have been effective in controlling diseases in known problem fields (eg. Phytophthora root rot). Further testing will be necessary before recommendations for seed treatments can be made for South Dakota conditions.

Table 39. Stand Counts of Cracked and Uncracked Wells II Seed in Response to Different Chemical Treatments.

Chemical[1]	Rate (oz/100 lbs of seed)	Plants/Acre
Water Control	4.0	115,098 a[2]
Captan	2.0	103,203 ab
Apron 350	1.5	94,623 ab
Apron 2E	1.5	93,516 ab
Vitavax	4.0	87,155 ab
Apron 2E plus Captan	1.5+2.0	78,023 b

(1) The fungicide was applied as a dilute solution. The seeds were placed in a motorized, rolling drum and the fungicide applied. The seeds were rolled until thoroughly wetted, removed and dried at room temperature.

(2) Means of plant populations per treatment. Means with the same letter are not significantly different.

Table 40. Stand Counts, Total Yield, and Hundred Seed Weight as a Function of Condition of Wells II soybean seed.

Condition	Plants/Acre[1]	Total Yield[2] (Bu/A)	Hundred Seed Wt.[3] (Grams)
Bin-run	74,470	45.5	17.204
Certified	117,989**	46.6	17.267

(1) ** Indicates significant at 0.01 level.

(2) Total yield not significantly different.

(3) Hundred seed weight no significantly different.

S.E. FARM REPORT

APPLICATION OF FOLIAR FUNGICIDES TO CONTROL LATE SEASON SOYBEAN DISEASES AFFECTING SEED QUALITY AND YIELD

Michael W. Ferguson

PLANT SCIENCE 82-21

Foliar applications of fungicides in other soybean growing areas have been (shown to be) effective in controlling mid to late season diseases that affect seed quality and yield. Yield losses due to foliar soybean diseases such as Septoria Brown Spot in South Dakota are largely unknown.

The purpose of this experiment was two-fold. The first objective was to test the efficacy of several commercially available fungicides on late season fungi that may be affecting seed quality or yield. The second objective was to determine the yield loss due to the presence of the disease Septoria Brown Spot on several soybean cultivars.

Materials and Methods

The soybeans were planted on June 7th at the rate of 150,000 plants per acre. Preplant herbicide consisted of a Treflan-Sencor combination. Commercial soybean inoculate was applied during planting at the recommended rates of the manufacturer. Each treatment consisted of four rows each, 20 feet long spaced on 36" centers, arranged in a split-split-plot design. The main plot treatments were varieties, the sub-plots were the chemical treatments and the sub-sub-plot treatments were the timing of the chemicals. Midseason, the row length was reduced to 15 feet. The two center rows of each four row plot were harvested on November 2.

The chemicals and rates tested are listed in Table 41. Chemicals were applied with a 60" hand held boom and spray nozzle propelled with 25 lb/psi CO_2. The timing of chemical application was coordinated with the reproduction stages of the plant. These were at either the R_2 R_3, R_3 R_5, or R_2 R_3 R_5. The R_2 stage is full flower, R_3 is early pod (1/4" long pods) and the R_5 stage is where beans can be felt in the pods. Plots receiving the R_2 R_3 timing would receive two applications of fungicide one at full flower and one at the early pod stage. The other timings were applied as noted.

The plants were inoculated with spores of the Brown Spot fungus (Septoria glycines) at the V-4 to V-6 stage (4 to 6 nodes beginning with the unifoliate node). The inoculum consisted of 10^5 spores per ml in tap water with 0.5% gelatin. The spores were applied with commercial hand sprayer and the plants were sprayed until run-off.

Results and Discussion

Because of the low humidity at time of inoculation with the Brown Spot spores, there was no appreciable infection of the cultivars sprayed. No data were taken on this aspect of the experiment.

Data were taken on both total plot yield and 100 seed weight. While fungicide application did not affect total yield, there were significant differences in 100 seed weight. Differences were significant due to both the timing of the application (Table 42) and the treatment (chemical) (Table 43). There were also variety x timing interactions (Table 44).

The variety x timing interaction indicates that Wells II responded differently at the R_3 R_5 stage than did the other cultivars. This may be due to the more upright morphology of the plant, with less canopy than that of either Corsoy 79 or Hardin.

Although total yield did not increase significantly due to application of foliar fungicides, 100 seed weight did. Hundred seed weight may be a more sensitive indicator of the fungicide effects and thus offers some encouragement. High disease pressure may be necessary to see large yield differences. In southern states, application of foliar fungicides are contingent on weather conditions and disease pressure. Further research at this station will help to develop the same sort of formula for spraying under South Dakota conditions.

Table 41. Fungicide and Rates applied at different timing.

Treatment[1/2/]	Rate [3/] (lb a.i./acre)
Dithane M45	1.6
Dithane M45 plus Benlate 50W	1.6 + 0.25
Benlate 50W	0.25
Water	--

(1) Each treatment rate was applied at the R_2 R_3 (two applications), R_3 R_5 (two applications) and the R_2 R_3 R_5 (three applications) stages of reproductive growth.
(2) Triton CS-7 spreader-binder was added to each treatment (including water) at the rate of one pint/100 gallons of water.
(3) Pounds active ingredient per acre.

Table 42. Hundred Seed Weight Response to Timing of Fungicide Application

Timing	Mean Hundred Seed Wt.[1] (grams)
R_2 R_3 R_5	16.337 a
R_3 R_5	16.012 b
R_2 R_3	15.877 b

(1) Means with the same letter are not significantly different at the 0.05 level.

Table 43. Hundred Seed Weight Response to Type of Fungicide Applied

Fungicide	Hundred Seed Wt. (grams)
Dithane M45 + Benlate 50W	16.386 a
Benlate 50W	16.294 a
Dithane M45	15.931 b
Water	15.692 b

(1) Means with the same letter are not significantly different at the 0.05 level.

Table 44. The effect of Timing of Fungicide Sprays on 100 seed Weight (grams) of Three Soybean Varieties.

Timing	Variety: Corsoy 79	Hardin	Wells II	Avg.Timing Effect
	Timing x variety means			
R_2 R_3	15.61	15.31	16.71	15.88
R_2 R_3 R_5	16.36	15.57	17.09	16.38
R_3 R_5	15.76	15.15	17.13	16.01
Average Variety Effect	15.91	15.34	16.97	

LSD (0.05) Interaction = 0.28

S.E. FARM REPORT

RAINFALL EFFECT ON THREE EXPERIMENTAL POSTEMERGENCE GRASS HERBICIDES

W. E. Arnold, B. C. Laube

PLANT SCIENCE 82-22

Research plots were established to study the effect of simulated rainfall on control of grass and volunteer corn in soybeans with CGA 82725, Fluazifop butyl, and Dowco 453 at the Southeast South Dakota Research and Extension Center at Beresford. CGA 82725 (0.5 lb/A) plus Herbimax (0.1% V/V), Fluazifop butyl (0.25 lb/A) plus Herbimax (0.1% V/V), and Dowco 453 (0.09 lb/A) plus Crop Oil Concentrate were applied during the third trifoliate stage of soybean growth. Four replications were arranged in a randomized complete block desing. "Hodgson 78" soybeans were planted in 30" rows on June 12. Herbicide treatments were applied using a bicycle sprayer (3 mph, 32 psi, 10' swath, and 20 gpa). Rainfall was simulated at 0, 0.5, 1, 2, 4, 8, and 24 hours after herbicide application and one rainfall treatment prior to herbicide application. The amount of rainfall was 0.65". Weed control was evaluated October 5. Yields were taken October 17. The results are shown in Table 45. Visual evaluations of yellow foxtail control were significantly higher with Fluazifop butyl when rainfall was delayed until 8 hours after application. Volunteer corn control reached maximum with a 2 hour delay period. Yellow foxtail control with Dowco 453 reached maximum with a 2 hour delay period. Rainfall did not significantly affect volunteer corn control. The control of yellow foxtail and volunteer corn with CGA 82725 was not affected by rainfall. Soybean yields were greater in treated plots than in the untreated check, but significant yield differences did not occur between herbicide treatments.

Table 45. Effect of rainfall on three experimental herbicides

Herbicide Treatment	Rainfall Delay (hours)	% Weed Control Yeft*	% Weed Control VoCo**	Yield Bu/A
Weedy Check	--	0	0	20.9
Fluazifop butyl + Herbimax	prior	84	99	39.7
	0	23	62	26.7
	0.5	42	96	35.3
	1	25	53	34.6
	2	47	98	34.1
	4	60	98	37.2
	8	85	99	42.8
	24	83	99	35.4
CGA 82725 + Herbimax	prior	97	99	42.3
	0	97	99	39.6
	0.5	98	99	44.1
	1	94	98	42.7
	2	95	99	36.0
	4	97	99	40.6
	8	98	99	41.8
	24	98	99	41.1
Dowco 453 + Crop Oil Concentrate	prior	81	94	45.1
	0	55	78	42.2
	0.5	54	79	39.7
	1	58	79	35.4
	2	87	85	44.0
	4	87	98	40.7
	8	97	99	44.5
	24	96	99	34.8
LSD (.05)		29	25	10.7

* Yeft = Yellow Foxtail

** VoCo = Volunteer Corn

S.E. FARM REPORT

COMMON COCKLEBUR CONTROL IN SOYBEANS

R. L. Smith and W. E. Arnold

PLANT SCIENCE 82-23

Acifluorfen-Na (Blazer[R], Tackle[R]) and bentazon (Basagran[R]) are two herbicides commonly used to control various broadleaf weeds in soybeans, including common cocklebur. An experiment was conducted at the Southeast South Dakota Research and Extension Center at Beresford to determine the effectiveness of acifluorfen-Na and bentazon on common cocklebur. The herbicides were applied alone and in various tank-mix combinations as post-emergence treatments.

The soil is a well-drained silty clay loam (sand 9.0%, silt 59.0%, clay 32.0%) with 2.70% organic matter and a pH of 6.2. 'Hodgson 78' soybeans were planted in 30-inch rows on June 11, 1982. Plot size was 7.5 by 25 feet with four replications. A five by five factorial arrangement of treatments was utilized in a randomized complete block design. The treatments were applied July 7 when the soybeans were in the 1- to 2-trifoliate leaf stage. Common cocklebur was in the 3- to 4-leaf stage (2- to 3-inches). Air temperature was 75°F and the relative humidity was 70% at application. Spray volume was 20 gpa at 35 psi. Common cocklebur control visual evaluations were made on July 17 and August 19. Soybeans were harvested October 18 from a 165 ft^2 area/plot.

All rate combinations of the two chemicals at 0.50 lb/A or higher provided acceptable common cocklebur control. The lowest yield occurred in the untreated check and the largest yield was present in the plot with the highest rate of both acifluorfen and bentazon.

Table 46. Common Cocklebur Control in Soybeans

Acifluorfen Rate (lb/A)	Bentazon Rate (lb/A)	7-17-82 % common cocklebur control	8-19-82 % common cocklebur control	Yield bu/A
0	0	0	0	13.5
0	0.25	47	25	26.9
0	0.50	78	75	34.6
0	0.75	90	89	35.9
0	1.00	95	91	33.0
0.25	0	35	23	25.7
0.25	0.25	66	48	29.3
0.25	0.50	82	83	32.8
0.25	0.75	97	95	32.7
0.25	1.00	95	97	34.8
0.50	0	57	36	24.8
0.50	0.25	82	69	31.0
0.50	0.50	91	90	34.8
0.50	0.75	97	93	32.6
0.50	1.00	98	97	35.8
0.75	0	66	51	26.6
0.75	0.25	86	81	33.0
0.75	0.50	91	80	32.1
0.75	0.75	97	94	36.4
0.75	1.00	99	96	33.5
1.00	0	77	61	33.8
1.00	0.25	90	79	33.9
1.00	0.50	94	90	33.9
1.00	0.75	98	96	35.6
1.00	1.00	98	99	36.9
LSD (.05) =		10.9	12.9	5.5

S.E. FARM REPORT

EVALUATION OF SEVERAL HERBICIDE INCORPORATION SYSTEMS IN SOYBEANS

M. A. Wrucke and W. E. Arnold

PLANT SCIENCE 82-24

Reducing spring tillage operations can reduce soil erosion, increase soil moisture, and save both time and equipment. With reduced tillage, many questions are asked regarding the use of pre-plant incorporated herbicides. Different implements were used in several combinations to determine their effect on herbicide performance. Presented are the results from one year of this experiment.

Methods

Incorporation systems were replicated three times in a randomized complete block design. Trifluralin (0.75 lb/A) plus metribuzin (0.38 lb/A) was applied to each of the plots after the appropriate pre-spraying tillage was done. Incorporation was then done either once or twice with the various implements. Herbicides were applied in 20 gpa and 40 psi. 'Hodgson 78' soybeans were planted in 30-inch rows at 60 lb/A on June 11, 1982. Total rainfall for the first and second weeks after application were 1.09 and 0.01 inches, respectively. The soil is a silty clay loam with 3.8% organic matter, pH of 6.5 and is well drained.

Tillage prior to herbicide application was done either with a chisel plow or twist shanks, a combination disk (9 inch blade spacing, 24 inch spherical notched blades), or conventional tillage (moldboard plow followed by two diskings). Herbicide incorporation was done with a combination disk, a finishing disk (8 inch blade spacing, 18 inch spherical blades), or a field cultivator with 6 inch sweeps. Visual weed control ratings were taken on August 19 and soybean yield was determined on October 18 by combining 675 sq. ft./plot and expressing yield in bu/a.

Table 47. Evaluation of Several Herbicide Incorporation Systems in Soybeans (M. A. Wrucke and W. E. Arnold).

Incorporation System	% Weed Control				Yield
	Yeft	Rrpw	Colq	Kocz	(bu/A)
Combination Disk - Spray - Combination Disk	97	99	97	99	37
Combination Disk - Spray - Finishing Disk	96	99	96	98	38
Combination Disk - Spray - Field Cultivator	97	99	98	99	39
Spray - Combination Disk - Combination Disk	97	98	99	99	38
Spray - Finishing Disk - Finishing Disk	97	98	98	99	41
Spray - Field Cultivator - Field Cultivator	95	97	99	99	39
Chisel Plow - Spray - Combination Disk	96	97	98	98	38
Chisel Plow - Spray - Finishing Disk	96	98	98	99	37
Chisel Plow - Spray - Field Cultivator	97	98	97	99	39
Conventional Till - Spray - Combination Disk - Combination Disk	94	95	96	96	39
Conventional Till - Spray - Finishing Disk - Finishing Disk	98	97	99	99	40
Conventional Till - Spray - Field Cultivator - Field Cultivator	98	98	98	99	38
Conventional Till - Spray - Combination Disk	91	98	99	99	37
Conventional Till - Spray - Finishing Disk	97	96	97	99	39
Conventional Till - Spray - Field Cultivator	95	99	99	99	37

Yeft - Yellow foxtail   Colq - Common lambsquarter   Rrpw - Red Root Pig Weed
Kocz - Kochia

Results

No significant differences were detected in weed control ratings and yields for any of the incorporation systems. Very little weed pressure was present in this experiment. Many weeds were actively growing at the time of herbicide application and incorporation. The incorporation operations destroyed this early growth, thus, reducing weed pressure in the experiment. The herbicides were applied to moist soil and an additional 1.09 inches of rainfall was received within one week of application. This relatively high moisture probably increased the activity of the herbicides and provided for the good weed control. This is the result of only one year's data and it is expected that results may vary considerably in other years.

S.E. FARM REPORT

PERFORMANCE OF HERBICIDES IN CORN AND SOYBEANS

W. E. Arnold and L. J. Wrage

PLANT SCIENCE 82-25

Herbicide demonstration plots provide side-by-side comparison of herbicide treatments. Treatments include herbicides presently labeled and those which may be approved in the near future. Demonstration plots are the final step in the herbicide evaluation program. Rates and application methods for each are based on results obtained in previous year' screening tests.

Methods

Preplant and preemergence treatments were applied June 11. A plot sprayer delivering 20 gpa water and 40 psi pressure was used. Preplant incorporated treatments were incorporated immediately with two tandem diskings set to cut 5-6 inches deep. Shallow preplant incorporated treatments were incorporated with one pass of the disk set at 3 inches deep. The disk was a light-weight, finishing model with small blades.

The crop was planted June 11. Preemergence treatments were applied immediately after planting.

Each herbicide treatment was applied across two seedbed tillage systems. Half of each plot was fall plowed and half a disked seedbed. The previous crop was corn.

Total rainfall the first seven days after application was .99 inches and .10 inches during the second week. Annual grass specie included green and yellow foxtail. Major broadleaved specie were rough pigweed, lambsquarters, and tall water hemp.

Results

The performance of treatments is presented in the following tables. Evaluations are based on two visual estimates taken July 29 for each weed group. A 2-year average for early season weed control is included for those treatments in the test each year.

Table 48. 1982 Corn Herbicide Demonstration, Southeast Research Farm

		Percent Weed Control							
		1982				2 Year Average			
		Disked		Plowed		Disked		Plowed	
Treatment	lb/A act	Gr	Bdlf	Gr	Bdlf	Gr	Bdlf	Gr	Bdlf
PREPLANT INCORPORATED									
Check	--	0	0	0	0	0	0	0	0
Eradicane	4	84	80	92	90	90	86	94	92
Eradicane+atrazine	4+1	84	85	94	95	88	90	94	96
Eradicane+Bladex	4+1-1/2	87	82	92	92	89	88	94	94
Eradicane+Bladex+atrazine	4+1-1/2+1/2	86	86	94	96	86	88	94	96
Sutan+	4	85	40	91	76	82	56	90	72
Sutan+ +atrazine	4+1	82	88	92	95	82	90	90	94
Sutan+ +Bladex	4+1-1/2	88	84	89	92	86	88	88	91
Sutan+ +Bladex+atrazine	4+1-1/2+1/2	86	90	92	96	86	92	92	96
SHALLOW PREPLANT INCORPORATED									
atrazine	2-1/2	59	91	70	98	66	90	74	96
Lasso	3	46	50	86	87	55	60	84	85
Dual	2-1/2	64	30	86	74	66	48	83	76
Lasso+atrazine	2-1/2+1	58	78	82	95	--	--	--	--
Lasso+Bladex	2-1/2+1-1/2	62	68	77	84	--	--	--	--
Dual+atrazine	2+1	70	72	78	88	--	--	--	--
Dual+Bladex	2+1-1/2	62	55	74	72	--	--	--	--
PREEMERGENCE									
Check	--	0	0	0	0	0	0	0	0
atrazine	2-1/2	40	82	58	86	42	84	68	90
Bladex	3	20	32	70	45	32	36	78	60
Lasso	3	45	55	83	50	61	60	87	68
Dual	2-1/2	55	40	81	38	62	44	85	60
Prowl	2	52	48	68	64	60	58	76	74
propachlor	5	82	22	86	35	76	32	90	54
Mon-097	2-1/2	88	89	90	91	86	87	94	90
atrazine+Bladex	1+2	40	75	59	75	--	--	--	--
Lasso+atrazine	2+1	50	78	80	75	60	80	85	86
Lasso+Bladex	2+1-1/2	66	55	62	58	70	66	78	75
Dual+atrazine	2+1	65	48	50	71	67	62	70	84
Dual+Bladex	2+1-1/2	58	35	64	54	66	52	78	74
Prowl+atrazine	1-1/2+1	55	55	50	60	68	71	72	77
Prowl+Bladex	1-1/2+1-1/2	45	30	42	45	--	--	--	--
propachlor+atrazine	4+1	76	62	94	93	73	74	93	93
propachlor+Bladex	4+1-1/2	79	60	93	88	80	58	94	88

Table 48 Continued, 1982 Corn Herbicide Demonstration

Treatment	lb/A act	Percent Weed Control: 1982 Disked Gr	1982 Disked Bdlf	1982 Plowed Gr	1982 Plowed Bdlf	[illegible] Year Average Disked Gr	[illegible] Year Average Disked Bdlf	[illegible] Year Average Plowed Gr	[illegible] Year Average Plowed Bdlf
PREEMERGENCE (Continued)									
Lasso+Bladex+atrazine	2+1-1/2+1/2	68	82	85	94	73	84	88	94
Dual+Bladex+atrazine	2+1-1/2+1/2	58	75	84	93	66	79	88	94
Lasso+Bladex+Sencor	2+1-1/2+1/4	64	86	80	89	68	85	84	92
Lasso+atrazine+Sencor	2+1+1/4	67	89	72	92	66	87	80	94
Dual+Bladex+Sencor	2+1-1/2+1/4	64	78	70	89	65	81	78	92
Dual+atrazine+Sencor	2+1+1/4	65	82	75	85	66	87	84	91
Lasso+Bladex+atrazine+Sencor	2+1+1/2+1/4	72	88	79	91	--	--	--	--
EARLY POSTEMERGENCE									
Prowl+atrazine (2 lf)	1-1/2+1	72	92	83	94	74	94	88	96
Prowl+Bladex (2 lf)	1-1/2+1-1/2	81	90	78	94	84	91	86	94
atrazine+oil	1-1/2+1 gal	74	92	68	93	66	92	77	95
Bladex 80W+WA	1-1/2+1/2%	62	88	58	91	52	74	64	85
D356+Bladex 80W	1/2+1-1/2	62	91	79	90	--	--	--	--
PREEMERGENCE & POSTEMERGENCE									
propachlor&Banvel (5 lf)	4&1/2	82	90	93	97	78	90	92	94
propachlor&Banvel	4&1/4	78	85	92	97	74	85	91	96
propachlor&2,4-D amine	4&1/2	78	80	92	94	69	84	90	92
propachlor&Basagran	4&1	76	58	91	76	68	65	90	77

Table 49. 1982 Soybean Herbicide Demonstration, Southeast Research Farm

Treatment	lb/A act	Percent Weed Control 1982 Disked Gr	Bdlf	Plowed Gr	Bdlf	2 Year Average Disked Gr	Bdlf	Plowed Gr	Bdlf
PREPLANT INCORPORATED									
Check	--	0	0	0	0	0	0	0	0
Treflan	3/4	86	72	88	74	86	65	92	84
Basalin	1	86	65	89	60	84	66	92	76
Prowl	1-1/4	80	65	84	58	83	70	89	72
Vernam	2-1/2	78	32	84	32	78	50	88	58
Treflan+Amiben	3/4+2	88	60	90	50	85	70	92	72
Treflan+Sen/Lex	3/4+3/8	90	72	90	72	84	76	92	84
Treflan+Amiben+Sen/Lex	3/4+2+1/4	88	80	91	77	84	80	94	88
Vernam+Treflan	2+3/4	90	81	82	81	--	--	--	--
SHALLOW PREPLANT INCORPORATED									
Lasso	3	80	45	74	50	76	52	83	68
Dual	2-1/2	81	22	76	30	80	32	84	54
Treflan+Modown	3/4+1-1/2	86	38	82	38	86	59	88	62
PREPLANT INCORPORATED & PREEMERGENCE									
Treflan+Sen/Lex&Sen/Lex	3/4+1/4&3/8	92	94	92	96	88	90	94	94
Treflan&Sen/Lex	3/4&1/2	89	88	88	90	89	89	92	93
Treflan&Modown	3/4&2	86	91	85	88	86	90	76	92
Treflan&Amiben	3/4&2	90	93	92	92	90	92	96	96
Treflan&Lorox	3/4&1	89	58	90	58	80	68	92	76
PREEMERGENCE									
Treflan+Surflan	1/2+1/2	30	5	40	5	40	8	62	35
Amiben	3	86	84	86	82	72	64	88	80
Lasso	3	86	87	85	87	74	78	89	86
Dual	2-1/2	76	50	78	52	67	50	84	62
Lasso+Sen/Lex	2+1/2	77	90	75	92	74	86	82	92
Dual+Sen/Lex	2+1/2	70	82	80	86	70	84	84	88
Lasso+Amiben	2+2	89	92	87	94	72	80	89	92
Dual+Amiben	2+2	90	90	88	92	74	79	88	90
Lasso+Modown (harrow)	2+1-1/2	70	62	72	58	59	74	80	72
Dual+Modown (harrow)	2-1/2+1-1/2	70	62	74	52	62	73	82	68
Lasso+Lorox	2+1	66	78	69	76	56	70	78	78
Dual+Lorox	2+1	65	45	68	45	51	54	77	61

Table 49 Continued, 1982 Soybean Herbicide Demonstration

Treatment	lb/A act	Percent Weed Control							
		1982				[illegible] Year Average			
		Disked		Plowed		Disked		Plowed	
		Gr	Bdlf	Gr	Bdlf	Gr	Bdlf	Gr	Bdlf
PREEMERGENCE CONTINUED									
Lasso+Furloe	2+2	58	65	66	66	51	58	76	74
Lasso+Premerge	2+4-1/2	45	70	68	70	50	64	73	75
Lasso+Lorox+Sen/Lex	2+1+1/4	40	82	62	78	54	85	76	86
Lasso+Amiben+Sen/Lex	2+2+1/4	89	94	90	96	87	92	94	96
Lasso+Modown	2+1-1/2	68	82	76	85	67	82	84	90
Dual+Modown	2+1-1/2	79	79	76	82	--	--	--	--
PREEMERGENCE & POSTEMERGENCE									
Lasso&Basagran	2&1	62	84	76	82	--	--	--	--
Lasso&Blazer	2&1/2	74	90	79	92	64	87	82	90
Lasso&Dynap	2&2-1/2	52	88	74	88	56	83	81	89
Lasso&Tackle	2&1/2	65	89	86	91	66	89	88	92
Lasso&Tackle+Basagran	2&1/2+1/4	62	88	82	88	60	86	86	91

THE INFLUENCE OF TEN YEARS OF REDUCED TILLAGE ON WEED AND SOIL FACTORS

M. A. Wrucke and W. E. Arnold

S.E. FARM REPORT

PLANT SCIENCE 82-26

Reduced tillage and no-till systems are rapidly gaining acceptance among farmers. With changes in tillage, differences in weed pressure and species distribution may be detected. Also, changes in several soil properties have been seen in other states with different tillage systems. The purpose of this experiment was to determine the influence of ten years of continuous reduced tillage systems in southeastern South Dakota on several weed and soil factors.

Methods

Two adjacent sites were established in 1972; one planted to corn, the other to soybeans, with a corn-soybean rotation maintained on both. Herbicide treatments were changed over the years to maximize weed control. Tillage systems were consistently maintained throughout the 10 year period. The no-till systems were established with no tillage other than that provided by a fluted coulter mounted on the planter. The minimum tillage system consisted of one disking in both fall and spring. The fourth tillage system was conventional tillage with fall plowing. The fifth system was originally a no-till system, but was changed to a winter cover crop system in 1977. These plots were fall plowed and planted to rye (Secale cerale) to provide winter cover. The rye was chemically destroyed before planting the crop. In the summer of the tenth year, weed dry weight samples were taken from all plots, separated by species and dry weights were taken. Soil samples were taken to a depth of 4 feet and analyzed for several soil factors in 1979.

Results

Total weed yield was highest in the no-till systems with an average weed yield of 4400 lb/A. Of this grass weeds accounted for 2800 lb/A and broadleaf weeds 1600 lb/A. Conventional tillage produced the lowest total weed yield at 1200 lb/A. Grass weed yield decreased as tillage increased. Green foxtail, field sandbur, barnyardgrass, and foxtail barley were the predominant grasses found in the no-till systems. Significantly lower levels of these grasses were found with conventional tillage. Field sandbur was found predominately in plots which had no spring tillage. Broadleaf weed yield varied greatly among tillage systems. Pennsylvania smartweed and redroot pigweed were predominate in the no-till systems; common cocklebur yield was the greatest in minimum till and conventional

till systems. Little difference in perennial weed distribution was found among tillage systems.

Soil samples were analyzed to determine percent organic matter, pH, soluble salts, nitrates, phosphorus, potassium, and bulk density. No differences were found among tillage systems for any soil property below 12 inches. Organic matter phosphorus, and potassium were concentrated in the upper 3 inches of no-till and minimum till systems. Distribution of these same properties was more uniform throughout the upper 12 inches of the conventional tillage system. Bulk density was greatest in the upper 6 inches of the reduced tillage systems compared to conventional tillage. No differences were found among tillage systems for other soil factors.

Table 50. 1981 Weed Yield (lb/A)

	No-Till 1	No-Till 2	Min. Till	Conv. Till	Cover Crop
Green Foxtail	1873	1336	342	235	526
Barnyardgrass	125	273	120	91	28
Field Sandbur	275	619	562	7	771
Foxtail Barley	89	0	22	0	0
Pennsylvania Smartweed	528	1947	17	217	153
Common Cocklebur	78	3	297	384	0
Redroot Pigweed	18	145	0	6	7
Common milkweed	0	6	56	19	1
Prostrate Pigweed	7	0	5	53	40
Canada Thistle	0	0	15	0	0

Table 51. 5-Year Average Crop Yield (Bu/A)

	No-Till 1	No-Till 2	Min. Till	Conv. Till	Cover Crop
Soybeans					
1972-1976	24	22	20	24	22
1977-1981	27	23	30	25	30
Corn					
1972-1976	49	50	54	71	32
1977-1981	42	80	89	144	81

Table 52. Comparison of Soil Properties Found With Several Tillage Systems at Four Depths in 1979*

SOIL PROPERTY AND TILLAGE TREATMENT	DEPTH (In)			
	0-3	4-6	7-9	10-12
Organic Matter				
No-Till 1	3.18a	2.51a	2.38a	1.81b
Min. Till	2.80bc	2.53a	2.48a	2.08ab
No-Till 2	2.95b	2.49a	2.39a	1.85b
Conv. Till	2.55d	2.51a	2.68a	2.00ab
Cover Crop	2.66cd	2.58a	2.54a	2.25a
Phosphorus (lb/A)				
No-Till 1	27.38ab	7.88b	7.88c	4.63a
Min. Till	35.63a	14.50b	14.75ab	9.00a
No-Till 2	32.50a	13.63b	10.38bc	6.50a
Conv. Till	19.38b	22.63a	18.25a	7.00a
Cover Crop	19.88b	10.00b	11.00bc	8.00a
pH				
No-Till 1	6.76a	6.43a	6.51a	6.61a
Min. Till	6.50a	6.34a	6.24c	6.46a
No. Till 2	6.49a	6.24a	6.36abc	6.63a
Conv. Till	6.45a	6.25a	6.30bc	6.46a
Cover Crop	6.61a	6.40a	6.45ab	6.50a
Salts (mmhos/l)				
No-Till 1	.431a	.346a	.323a	.310a
Min. Till	.354a	.311a	.315a	.315a
No-Till 2	.441a	.383a	.320a	.325a
Conv. Till	.358a	.293a	.344a	.288a
Cover Crop	.380a	.320a	.320a	.310a
Potassium (lb/A)				
No-Till 1	951.38a	476.63b	411.76b	400.63a
Min. Till	858.63a	461.25b	406.88b	410.50a
No-Till 2	908.88a	502.88ab	406.00b	404.50a
Conv. Till	559.38b	596.13a	516.63a	392.75a
Cover Crop	645.13b	522.38ab	537.88a	507.13a
Nitrates (lb/A)				
No-Till 1	0.00a	0.00a	0.00a	0.00a
Min. Till	0.45a	0.70a	1.06a	0.00a
No-Till 2	5.78a	3.83a	2.70a	1.67a
Conv. Till	2.14a	3.76a	3.92a	1.69a
Cover Crop	0.00a	0.00a	0.54a	0.00a
Bulk Density (gm/cc)				
No-Till 1	1.28a	1.44a	1.35a	1.29a
Min. Till	1.20b	1.43a	1.34a	1.27a
No-Till 2	1.30a	1.40a	1.34a	1.28a
Conv. Till	1.30a	1.32b	1.34a	1.30a
Cover Crop	1.28a	1.33b	1.31a	1.27a

*Means within columns for each soil property followed by the same letter do not differ at $p=0.05$.

S.E. FARM REPORT

LATE PLANTING OF SOYBEANS

Roland Hanson

SOUTHEAST FARM 82-27

Objective of Experiment

1. Will an early maturing soybean, Group 0, outperform a full season soybean, Group 1 and 2, when planted the last week in June?
2. Is it economically feasible to plant a Group 0 soybean of earlier maturity but smaller yield, rather than a Group 1 or Group 2 full season soybean with better yield potential but greater risk of early frost damage?

Methods and Procedures

The area planted was fall plowed alfalfa ground. It was field cultivated twice in the spring to kill any new alfalfa growth. Treflan was applied June 25 at 1 quart per acre and disked twice in opposite directions to incorporate the herbicide. The ground was field cultivated again just prior to planting. The beans were planted June 26, 1982 and cultivated once. Plots were harvested October 26, 1982, with a pull type Dearborn combine.

Table 53. Performance of Different Maturity Soybean Varieties When Planted Late in the Season.

Variety	Yield
Clay - Group 0	25 Bu.
Evans - Group 0	28 Bu.
McCall - Group 0	30 Bu.
Hardin - Group 1	37 Bu.
Corsoy - Group 2	38 Bu.

Discussion and Interpretation of Table 53

The question is frequently asked after a hail storm, "Should I replant an early, a midseason or a full season soybean?" The planting date in this experiment was delayed until the last of June to help answer this question. The above information shows the full season beans outyielded the earliest variety by as much as 13 bu/A, a substantial difference. However, if the frost that occurred on September 17, 1982, had been more severe, the Hardin and Corsoy 79 beans would have been completely killed and little or no crop harvested. On the other hand, the early varieties were turning yellow and losing their leaves before the frost and a crop could have been harvested.

S.E. FARM REPORT

SDSU

OBSERVATION OF EMERGENCY AND SPECIALTY CROPS

Roland Hanson and Fred Shubeck

SOUTHEAST FARM 82-28

Objectives

1. To determine the adaptability of some new crops for this area.
2. To determine the latest practical planting dates for these specialty and emergency crops.
3. Determine economic potential for these crops.

Methods and Procedures

Previous crop was alfalfa, plowed in the fall. These were two field cultivations in the spring to control volunteer alfalfa. No herbicides were used. The first planting date was June 6, and the second planting date was July 28. A John Deere press drill was used for the larger seed crops and a grass seed attachment on the drill for the small seed crops.

Experimental Crops:

1. Field Peas - used for forage - peas for human feed and bird seed.
2. Tyfon - a cross of Chinese Cabbage and a turnip, used for forage.
3. Annual Canary Grass - for bird seed and hay.
4. Oriental Mustard - human use.
5. Buckwheat - human food - export to Japan.
6. Bin-run corn - emergency forage crop.
7. Mini-milo (sorghum) - emergency forage crop and for grain if planted early enough.

Table 54. Yields of Emergency and Specialty Crops

	Planting Dates	
Crop	June 6	July 28
Buckwheat	90 lbs/acre	163 lbs/acre
Mustard	54 lbs/acre	(None-immature & covered with snow)
Tyfon	Too many weeds - not harvested	None planted
Annual Canary	Not enough forage to harvest	None planted
Field Peas	No seed harvested	2.4 tons forage/acre
Bin-run Corn	None planted	3.0 tons forage/acre
Mini-milo	None planted	2.4 tons silage/acre

Discussion and Interpretation of Table 54

This was not a very good year for late planted emergency crops. June, July, August and September all had below average

Discussion of Table 54 Continued

rainfall. On the last planting date, seed was planted in a dry seedbed with no significant rainfall until the first week in August. These results illustrate the high risk of late planting in a dry seedbed. Under these conditions some of the crops were able to produce reasonably good forage yields, but production of grain or seed was severely restricted. Buckwheat, corn and mini-milo were killed September 17 by frost. Tyfon, field peas and mustard kept on growing until the snow storm on October 10. These three crops were harvested after the snow melted on October 28.

Emergency and specialty crops offer some possibilities for double cropping and for late planting after a hail storm, but only if moisture is adequate.

Table 55. Feed analysis of Corn Silage Planted at Normal Date Compared to Immature Late Planted Corn Silage*

	Corn Silage From Normal Planting Date		Forage from Immature Late Planted Corn	
	% of total wt with water	% on dry matter basis	% of total wt with water included	% on dry matter basis
Moisture	63.2	0.0	61.9	0.0
Crude Protein	3.28	8.92	2.88	15.90
Calcium	0.06	0.16	0.07	0.39
Phosphorus	0.06	0.17	0.06	0.35
Crude fiber	8.86	24.10	5.86	31.40
Ether-extract	0.87	2.34	0.24	1.31
Ash	1.80	4.89	1.73	9.50
Nitrogen free extract	22.00	59.80	7.58	41.90

* Analysis by SDSU Feed Lab.

Discussion and Interpretation of Table 55

Bin run corn was planted with a grain drill on July 28. At 2 bushels per acre. The purpose was to see how successful this method would be for seeding on emergency corn crop for livestock feed. The analyses are reported on a dry matter basis and also as a % of total weight with the water included.

The immature corn reached a height of 4-1/2 feet. It had more moisture at the time of sampling than the normal silage, but when calculated on a dry matter basis, crude protein, calcium and phosphorus were fairly high.

Late planted bin-run corn, planted with a grain drill as an emergency crop at high plant populations, shows some promise as a feed crop even though no ears are formed.

SUNFLOWER MEAL IN DIETS OF GROWING-FINISHING PIGS

George W. Libal, Richard C. Wahlstrom
and Roland Hanson

ANIMAL AND RANGE SCIENCES 82-29

Sunflower meal, a by-product of the sunflower oil industry, has become increasingly available as a livestock supplement in recent years. Although lower in protein and lysine than soybean meal, an economic advantage for sunflower meal may exist on a cost per unit of lysine or protein basis. Using synthetic lysine and sunflower meal as feed ingredients, diets can be formulated which are equal in protein and lysine to corn-soybean meal diets. The study reported herein was designed to evaluate substituting sunflower meal for soybean meal in growing-finishing pig diets.

Experimental Procedure

One hundred sixty pigs weighing approximately 55 lb were allotted to five dietary treatments replicated four times. Allotment was on the basis of sex and weight with four barrows and four gilts assigned to each pen. The pigs were purchased from one source and allotment was made after about a 2-week adjustment period. The experiment was conducted at the Cornbelt Research and Extension Center near Beresford, South Dakota, during the months of December through March. The pigs were housed in a recently remodeled confinement building which had 50% slatted floors with a scraper system for removing wastes. Supplemental heat and exhaust fans provided a modified environment for the pigs. Feed was supplied ad libitum. Pigs were weighed every 2 weeks and feed changes were made at 135 to 140 pounds. The experiment was terminated when individual pens weighed approximately 220 lb on regular weekly weigh days. Feed was mixed at the SDSU Feed Processing Unit and transported to Beresford as complete feed. Sunflower meal (approximately 33% protein, 1.27% lysine and 22% fiber) was obtained from the Cargill Feed Company plant at Riverside, North Dakota. Protein sources added to the corn-based diets formed the five treatments. They and the resulting protein and lysine levels were as follows:

Treatment		55-135 lb Protein	55-135 lb Lysine	135-220 lb Protein	135-220 lb Lysine
1	Soybean meal	15	.72	13.2	.58
2	Sunflower meal + lysine	15	.72	13.2	.58
3	Sunflower meal (lb for lb substitution) + lysine	13.1	.72	11.8	.58
4	Sunflower meal and soybean meal (equal parts)	15	.63	13.2	.52
5	Sunflower meal and soybean meal (equal parts) + lysine	15	.72	13.2	.58

Table 56 shows the composition of the experimental diets for both the growing and finishing periods.

Table 56. Composition of Experimental Diets (%)

Ingredient	Treatment 1	2	3	4	5
			Growing		
Ground corn	79.3	71.2	78.9	76.1	76.0
Soybean meal, 44%	18.0	--	--	10.6	10.6
Sunflower meal, 33%	--	26.0	18.0	10.6	10.6
Dicalcium phosphate	1.3	1.15	1.3	1.3	1.29
Limestone	.7	.7	.7	.7	.7
Trace mineral salt	.3	.3	.3	.3	.3
Vitamin-antibiotic premix[a]	.4	.4	.4	.4	.4
Lysine hydrochloride	--	.25	.37	--	.11
Protein, %	15.0	15.0	13.1	15.0	15.0
Lysine, %	.72	.72	.72	.63	.72
			Finishing		
Ground corn	84.7	78.5	84.4	82.4	82.32
Soybean meal, 44%	12.7	--	--	7.5	7.5
Sunflower meal, 33%	--	18.5	12.7	7.5	7.5
Dicalcium phosphate	1.2	1.2	1.24	1.2	1.2
Limestone	.7	.7	.7	.7	.7
Trace mineral salt	.3	.3	.3	.3	.3
Vitamin-antibiotic premix	.4	.4	.4	.4	.4
Lysine hydrochloride	--	.2	.26	--	.08
Protein, %	13.2	13.2	11.8	13.2	13.2
Lysine, %	.58	.59	.58	.52	.58

[a] Supplied per pound of diet: vitamin A, 1500 IU; vitamin D, 150 IU; vitamin E, 3 IU; vitamin K, 1.2 mg; riboflavin, 1.5 mg; pantothenic acid, 6.0 mg; niacin, 9.6 mg; choline, 30 mg; vitamin B_{12}, 6 mcg; selenium, 54 mcg; and aureomycin, 20 mg (to 135 lb) and 12.5 mg (135 to 220 lb).

Results

The results of the growing-finishing trial are shown in Table 57. During the grower period (55 to 135 lb), pigs receiving the corn-soybean diet gained significantly faster than pigs receiving diets which contained sunflower meal either as the sole source of protein or in combination with soybean meal. Feed intake was not different among treatments. Differences were observed in efficiency of gain. Pigs receiving the soybean meal supplemented diet were more efficient than pigs receiving either the all sunflower meal supplemented diets or the lower lysine combination sunflower meal-soybean meal supplemented diet. However, they were not statistically more efficient than pigs receiving the sunflower meal-soybean meal diet which had been supplemented with lysine. The all sunflower meal supplement diets resulted in less efficient gains than diets which were a combination of sunflower meal and soybean meal.

Table 57. Pig Performance Due to Dietary Protein Supplementation

Diet	1	2	3	4	5
Protein supplement[a]	SBM	SFM + L	SFM +L	SFM + SBM	SFM + SBM + L
			Lb for lb	Equal parts	Equal parts
Level of substitution[b]		Equal Protein	Lower protein	Equal protein	Equal protein
		Equal lysine	Equal lysine	Lower lysine	Equal lysine
Initial wt, lb	55.4	55.2	55.1	55.2	55.3
Middle wt, lb	139.6[f]	131.3[g]	131.8[g]	132.7[g]	134.0[g]
Final wt, lb	220.8	217.4	216.5	218.7	218.0
Grower Period					
Avg daily gain, lb	1.64[f]	1.48[g]	1.49[g]	1.51[g]	1.53[g]
Avg daily feed, lb	4.44	4.63	4.57	4.42	4.43
Feed/gain	2.78[c]	3.13[d]	3.07[d]	2.93[e]	2.90[ce]
Finishing Period					
Avg daily gain, lb	1.68	1.64	1.64	1.68	1.61
Avg daily feed, lb	6.08	6.13	6.33	6.00	5.98
Feed/gain	3.80	3.74	3.90	3.58	3.73
Overall					
Avg daily gain, lb	1.66[c]	1.56[d]	1.57[d]	1.59[d]	1.57[d]
Avg daily feed, lb	5.10	5.38	5.45	5.20	5.21
Feed/gain	3.18[f]	3.44[h]	3.49[h]	3.25[fg]	3.32[g]

Table 57. Continued

[a]SBM = soybean meal, SFM = sunflower meal and L = lysine.
[b]All comparisons are to diet 1, the soybean meal supplement diet.
[c,d,e] Means with unlike superscripts differ (P .05).
[f,g,h] Means with unlike superscripts differ (P .01).

No statistical differences in gain, feed intake or feed/gain due to dietary treatments were observed during the finishing period (135 to 220 lb). However, the differences in growth and feed efficiency observed during the grower period were still present, essentially unchanged, when the growing and finishing periods were combined. Pigs receiving the soybean supplemented diet grew significantly faster than pigs receiving any other diet and also had the most desirable feed efficiency. Pigs receiving sunflower meal as the only protein source were statistically poorer in feed conversion than pigs which were provided another protein supplement source. Additions of lysine to the diets to make them equal to the soybean supplemented diet in both lysine and protein did not improve performance of pigs fed diets supplemented with sunflower mea. This would indicate that energy may have been the limiting factor in these diets rather than the amino acid, lysine.

Summary

In a growing-finishing trial, 160 pigs were used to evaluate the effect of substituting sunflower meal for soybean meal in a corn diet. Synthetic lysine was used to increase the lysine content in several of the sunflower diets to equal the lysine content of the soybean diet. During the grower period, 55 to 135 lb, pigs which received sunflower meal as the sources of 100% or 50% of the supplemental protein gained more slowly and less efficiently than those receiving the corn-soybean meal diet. Pigs which received an equal mixture of sunflower meal and soybean meal gained more efficiently than those receiving only sunflower meal as the protein source. No differences in gain or feed efficiency were seen during the finishing period (135 to 220 lb). The differences which were observed during the growing period still existed when the growing-finishing periods were combined. The addition of lysine to the sunflower diets to make them equal in lysine and protein to the soybean meal diet did not improve pig performance to the level of pigs receiving the soybean meal diet.

S.E. FARM REPORT

PEN SPACE AND ANTIBIOTIC EFFECTS ON PERFORMANCE OF GROWING-FINISHING PIGS

George W. Libal, Richard C. Wahlstrom
and Roland Hanson

ANIMAL AND RANGE SCIENCES 82-30

The detrimental effects of crowding weaned pigs and the advantage of inclusion of an antibiotic in the diets fed from 4 weeks of age to 40 lb has been documented (SWINE 81-8) as a part of a North Central Regional project by the Swine Confinement Management Committee. It is of interest to know if the same responses to crowding and presence of antibiotics can be observed with growing-finishing pigs. This study, also part of a regional study, was designed to evaluate the possible effect of antibiotics and pen space on growing-finishing pigs and the interaction of these two factors.

Procedure

One hundred twenty pigs averaging approximately 44 lbs. were allotted based on sex and weight to two replications of the four management treatments. There were 15 pigs per pen consisting of nine gilts and six barrows. Pen size was altered to provide either 3.5 or 5.0 sq ft per pig during the growing period and 6.0 or 8.0 sq ft per pig during the finishing period. Antibiotic treatments were tylosin at either 0 or 40 and 20 g per ton during the growing and finishing periods, respectively. The resulting treatments from this 2 x 2 factorial arrangement were:

	40-125 lbs.		125-215 lbs.	
	Grams tylosin per ton	Sq ft pen space	Grams tylosin per ton	sq ft pen space
Treatment 1	40	3.5	20	6.0
Treatment 2	40	5.0	20	8.0
Treatment 3	0	3.5	0	6.0
Treatment 4	0	5.0	0	8.0

Pigs were purchased from one source and the experiment was conducted at the Cornbelt Research and Extension Center near Beresford, South Dakota. The pigs were housed in an environment modified confinement building with 50% slatted floors. The trial was conducted during the months of June-October. Feed was mixed at the South Dakota State University Feed Processing Unit at Brookings and transported to Beresford as complete feed. Standard diets containing 16% and 14% protein were fed during the growing and finishing periods, respectively.

Results

The results of the experiment are shown in Table 58 which shows the combined effects of pen space and antibiotics and in Table 59 which shows the influence of the main effects of pen space and antibiotics on pig performance. These data will be combined with other states' data to obtain the full response of pigs to these management practices.

Table 58. Combined Effects of Pen Space and Antibiotics On Growing-Finishing Pig Performance

Antibiotic[a]	+	+	-	-
Pen Space[b]	3.5-6.0	5.0-8.0	3.5-6.0	5.0-8.0
Initial weight, lb	44.4	44.1	44.4	44.5
Mid-weight, lb	125.1	129.0	123.1	127.9
Final weight, lb	215.4	216.3	215.6	216.0
Growing Period				
Average daily gain, lb	1.37	1.52	1.41	1.49
Average daily feed, lb	3.65	3.76	3.66	3.88
Feed/gain	2.68	2.49	2.61	2.60
Finishing Period				
Average daily gain, lb	1.47	1.65	1.40	1.57
Average daily feed, lb	5.44	6.43	5.48	5.59
Feed/gain	3.70	3.96	3.91	3.55
Overall				
Average daily gain, lb	1.42	1.58	1.40	1.53
Average daily feed, lb	4.57	4.92	4.65	4.73
Feed/gain	3.22	3.13	3.31	3.09

[a]Tylosin included at 0 or 40 and 20 g per ton during the growing and finishing periods, respectively.

[b]Pen space was either 3.5 or 5.0 sq ft per pig during the growing period and either 6.0 or 8.0 sq ft per pig during the finishing period.

Table 59. Summary Of Effects of Pen Space and Antibiotics on Growing-Finishing Pig Performance

	Antibiotic[a]		Pen space (sq ft)[b]	
	+	-	3.5-6.0	5.0-8.0
Growing Period				
Average daily gain, lb	1.44	1.45	1.39	1.50
Average daily feed, lb	3.70	3.77	3.65	3.82
Feed/gain	2.58	2.60	2.64	2.54
Finishing Period				
Average daily gain, lb	1.56	1.49	1.44	1.61
Average daily feed, lb	5.93	5.53	5.46	6.01
Feed/gain	3.83	3.73	3.81	3.76
Overall				
Average daily gain, lb	1.50	1.47	1.41	1.55
Average daily feed, lb	4.47	4.69	4.61	4.83
Feed/gain	3.17	3.20	3.26	3.11

[a] Tylosin included at 0 or 40 and 20 g per ton during the growing and finishing periods, respectively.

[b] Pen space was changed at approximately 125 lb to reflect the space needs of the growing pig.

Due to only two replications of the treatments at the South Dakota station, no significant treatment effects were found. However, as one observes the data, there are some numerical differences which merit consideration. When data from the other stations are combined with these data, it seems feasible that statistical significance will be observed if the magnituve of differences remains the same.

Essentially no differences were seen due to the inclusion of tylosin in the growing-finishing diets. Average daily gain, average daily feed and feed required per unit of gain were very similar for both periods. This lack of response to antibiotics is usually observed with pigs grown under adequate management practices and without serious disease problems.

Limiting pen space affected gain and efficiency of gain during both the growing and finishing periods. It appears that 3.5 sq ft per pig during the growing period (40 lb to 125 lb) and 6.0 sq ft per pig during the finishing period (125 to 215 lb) were inadequate to support maximum growth or efficiency of growth.

Since no depression of performance was observed due to lack of antibiotic in the diet, no interaction between antibiotic and pen space was observed.

Summary

One hundred twenty pigs weighing approximately 44 lb were allotted to four management treatments consisting of a combination of 0 or 40 and 20 g tylosin per ton and pen space per pig of 3.5 or 5.0 sq ft and 6.0 or 8.0 sq ft, respectively, during the growing and finishing periods. No differences were seen in pig performance due to the presence of antibiotics in the diet. However, depressed gains and poorer feed efficiency were observed when pigs were restricted to 3.5 and 6.0 sq ft per pig during the growing and finishing periods, respectively.

THE EFFECT OF GROWTH PROMOTING IMPLANTS ON FEEDLOT PERFORMANCE BY GELBVIEH BULLS

L. B. Bruce, D. H. Gee, R. Hanson and F. Shubeck

ANIMAL AND RANGE SCIENCES 82-31

S.E. FARM REPORT

Summary

Ninety-two Gelbvieh bulls were randomly allocated into four treatment groups of 23 bulls each. The bulls were weighed, implanted with either Ralgro, Synovex-S, Synovex-H or not implanted (control group) and placed on an 82% high moisture corn ration for 212 days. Feedlot performance data were collected for the four groups. Bulls implanted with Synovex-H had the highest average daily gains. Overall implanted groups were slightly higher in average daily gain than the nonimplanted control group. Feed consumed per lb of body weight gained indicated little differences with Synovex-S and Synovex-H being slightly better than Ralgro or control groups. It appears that there may be some benefit from implanting bulls in both average daily gain and feed efficiency, but the response will not be as great as for heifers or steers.

Introduction

The effects of growth promoting implants on feedlot steers and heifers are well documented. These implants improve the rate of growth and postweaning feed efficiency of steers and heifers. Information concerning the value of implanting feedlot bulls is less well known. This knowledge will become more important in the future as more efficient ways of raising feedlot cattle are used. Feeding bulls is one of these ways. As feeding bulls becomes more popular, information on the effects of implanting will become more important. This research was designed to provide some insight into implanting bulls.

The objective of this research was to determine the effect on feedlot performance of implanting various growth promotants in young bulls. Responses to these various implants by bulls were compared to a control group of bulls to determine the differences in feedlot performance. These comparisons provide information to help determine the most effective methods of bull feeding.

Procedures

Ninety-two Gelbvieh bulls were purchased at Highmore, South Dakota and trucked to the Southeast South Dakota Cornbelt Agricultural Research Center at Beresford, South Dakota. The ninety-two Gelbvieh bulls were randomly allotted into four treatment groups of 23 bulls each. The bulls were weighed, (average 524 lb) implanted and placed in feedlot pens. The four treatment groups were (A) control (no implants), (B) implanted with Synovex-S, (C) implanted with Synovex-H and (D) implanted with Ralgro. All bulls were fed the ration presented in Table 60 consisting of (dry matter) basis 15% corn silage, 82% high moisture corn and 3% protein supplement (35% crude protein, 400 g/ton monensin and 180 g/ton of tylosin). On the 16th of December 1981 the trial began. The bulls were initially fed a ration on a dry matter basis (DMB) of 32% high moisture corn, 60% corn silage and 8% supplement for 1 week. At the beginning of week 2 the ration was changed to 52% high moisture corn, 40% corn silage and 8% supplement. In week 3 the ration was increased to include 72% high moisture corn, 23% corn silage and 5% supplement. At week 4 bulls were consuming the final ration of 82% high moisture corn, 15% corn silage and 3% protein supplement. The trial was concluded on July 29, 1982, when the bulls were marketed.

Feedlot performance for the period was monitored by monthly weighings of individual bulls and measurement of pen feed consumption. Carcass data were taken upon slaughter and will be reported later.

Bulls were managed specifically to minimize aggressive behavior. The bulls were purchased from one herd and when randomly allotted into the four groups, bulls from various groups were then never allowed to mix. This prevents much of the undesirable behavior often exhibited by feedlot bulls.

Results

Average daily gains and feed efficiency data are presented in Table 61. In general, the results show increased performance by the implanted groups over the control group in average daily gain but no clear cut trend in feed efficiency. The highest average daily gains were achieved by the bulls implanted with Synovex-H. The other implants did not result in average daily gains that were different than for the control group. The pounds of dry feed consumed per pound of body weight gained showed little difference between all groups. None of the measurers of feed efficiency were greatly different, with Ralgro groups tending to be the least efficient and the Synovex-H the most. From this trial the implantation of bulls with Synovex-H appeared best and implantation with any of the three studies would probably be beneficial. Response to implanting bulls did not appear to be as strong or consistent as responses of steers and heifers.

Table 60. Proximate Analysis of Feedlot Ration Used on a Dry Matter Basis

Item	% in Ration
Dry Matter	66.1
Crude Protein	11.3
Crude Fiber	6.5
Ether extract	3.7
Ash	3.0
Nitrogen free extract	75.5

Table 61. Feedlot Performance of Bulls By Treatment (December 16, 1981 - July 19, 1982 - 202 Days)

		Implants		
Item	Control	Ralgro	Synovex-H	Synovex-S
No. of animals	23	23	23	23
Inital wt, lb	507	534	543	524
Final wt, lb	1120	1156	1203	1173
Weight gain, lb	613	622	660	649
Avg daily gain, lb	2.8	2.9	3.0	2.9
Avg daily intake, lb DMB	19.6	19.9	20.5	20.3
Feed/gain, lb	6.7	6.8	6.6	6.6

S.E. FARM REPORT

THE EFFECT OF SYNOVEX-S IMPLANTS ON FEEDLOT PERFORMANCE OF ANGUS BULLS AND EARLY FEEDLOT PERIOD CASTRATED ANGUS BULLS

L. B. Bruce, D. H. Gee, R. Hanson and F. Shubeck

ANIMAL AND RANGE SCIENCES 82-32

Summary

One hundred Angus bulls were randomly allocated into four treatment groups of 25 head each. Two of these groups were implanted with Synovex-S (and reimplanted 100 days later) and the treatment period of 190 days began. The bulls were fed a ration of high moisture corn and corn silage that provided an energy level capable fo supporting a 2.75 lb average daily gain.

One group each of the unimplanted and implanted bulls was castrated after the first 30 days of the feedlot trials and then the trial continued for an additional 160 days. The best overall average daily gain for the trial period was obtained by the bulls implanted with Synovex-S followed by the unimplanted bulls. Both groups of bulls were equally feed efficient and more efficient than the steers as a group and the implanted steers were more efficient than the nonimplanted steers. Bulls, implanted or not, outperformed steers in both average daily gain and feed efficiency.

Bulls and steers were marketed at similar weights and sold on a carcass weight basis, with bulls bringing $88 per hundredweight and steers $107. Because of price differences, the best scheme would be to feed implanted steers, even though bulls perform better in the feedlot.

Introduction

As feed and other costs of feedlot operations increase, any method for improving the profit-making potential should be explored. One technique that is cost effective for improving feedlot animal performance is implanting with growth promotants. Another technique for improving feedlot performance that is becoming well documented is that of feeding male feedlot cattle as intact males rather than as castrates. These bulls have better feedlot performance than steers. Little is known about the various combinations of steers, bulls and implants. This research was designed to provide some insight into these combinations and their importance to feedlot performance.

The objective of this research was to determine the effect on feedlot performance of implanting bulls and steers with Synovex-S, and comparing steers to bulls. Profit or loss upon

marketing was also studied. Responses to these treatments in terms of feedlot performance provide information to help determine the most effective method of feeding bulls or steers and revenue in dollars upon sale assists in determining the best management scheme for profit.

Procedures

One hundred Angus bulls were purchased in South Dakota and trucked to the Southeast Experiment and Extension Farm near Beresford, South Dakota. They were then randomly allotted into four treatment groups of 25 bulls each. The bulls were weighed, average of 625 lb, two of the four groups implanted with Synovex-S (and reimplanted 100 days later) and placed in feedlot pens. They were introduced to their ration (table 62) of corn and silage and high moisture corn with a 5% soybean meal protein supplement containing monensin and tylosin. The ration provided energy levels for average daily gains of approximately 2.75 lb per head per day. After 30 days, two of the four groups (one implanted and one not) were castrated making the following four groups: (a) nonimplanted intact bulls (b) implanted intact bulls (c) nonimplanted steers and (d) implanted steers. These animals were then fed for another 160 days to market weight. They were sold on a carcass weight basis on June 24, 1982.

Table 62. Proximate analysis of average feedlot ration used and net energy for gain per lb of ration on dry matter basis

Item	Percent Ration
Dry Matter	44.5
Crude Protein	10.0
Crude Fiber	10.0
Ether Extract	3.1
Ash	4.4
Nitrogen feed Extract	72.7
Net Energy for Gain (Mcal/lb)	.55

Feedlot performance data for the period were obtained by monthly weighing of the individual feedlot animals and daily weighing of consumed ration. Carcass data were collected upon slaughter and will be reported at a later date. The bulls in this study were managed together specifically to minimize aggressive behavior. When they were randomly allotted to the four treatment groups, bulls from the various groups were never allowed to mix. This prevents much of the undesirable behavior often exhibited by feedlot bulls.

Results and Discussion

Feedlot performance data and average price received for 100 lb of carcass weight are presented in Table 63. In general, bulls, whether implanted or not, outperformed steer implanted or not in feedlot performance. In terms of dollars per head received when marketed, steers outperformed bulls.

Table 63. Feedlot Performance and Carcass Price of Bulls and Steers by Treatment (Dec. 16, 1981-June 24, 1982 190 days)

	Steers		Bulls	
	No implant	Synovex-S	No implant	Synovex-S
Number of animals	25	25	25	25
Initial wt, lb	624	614	617	646
Final wt, lb	1077	1120	1134	1180
Weight gain, lb	453	506	517	534
Avg daily gain, lb	2.4	2.7	2.7	2.8
Avg daily intake, lb, DMB	17.6	17.6	17.6	18.6
Feed/gain, lb	7.4	6.6	6.5	6.5
$/100 lb carcass	107.00	107.00	88.00	88.00

Synovex-S implanted bulls gained slightly better than the nonimplanted bulls but were similar in feed efficiency. Implanted steers were significantly better than nonimplanted steers for average daily gain and feed efficiency. As a group, bulls (both implanted and nonimplanted) were better in average daily gain and feed efficiency than the steers. The Synovex-S implanted steers had very similar feedlot performance data compared to the nonimplanted bulls and slightly poorer feedlot performances than the implanted bulls. The most dramatic difference in feedlot performance when considering individual groups was between nonimplanted steers and the other three groups. In terms of dollars per 100 lb carcass weight, steers far outperformed bulls, with average steer prices of $107 and average bull prices of $88. Although all bulls in this study graded choice, they still brought only breaker bull prices.

Bulls outperformed steers in the feedlot. With certain management steps, bulls can be easily handled in the feedlot and undesirable behavioral aspects minimized. The feedlot performance advantage does not outweigh the disadvantage in prices at the market. At the present time because of prices, the best recommendation that can be made to livestock feeders is to feed implanted steers.

S.E. FARM REPORT

THE EFFECT OF SYNOVEX-S IMPLANTS ON CARCASS CHARACTERISTICS OF ANGUS BULLS AND EARLY FEEDLOT PERIOD CASTRATED ANGUS BULLS

R. C. Johnson, D. H. Gee, L. B. Bruce and R. Hanson

ANIMAL AND RANGE SCIENCES 82-33

Summary

One hundred Angus bulls were randomly allocated into four treatment groups of 25 head each. Two of the groups were implanted with Synovex-S (and reimplanted 100 days later). One group of the unimplanted and one group of the implanted bulls was castrated after the first 30 days of the feedlot trial.

Effect of the Synovex-S implant on the carcass traits were dependent upon the sex condition of the cattle. Decreased fat deposition in the form of external fat and marbling was observed in the implanted steers. Bulls responded to the implant by increasing fat deposition externally, internally and intramuscularly (marbling).

Intact male carcasses were trimmer, heavier muscled and did yield a higher percentage of boneless trimmed retail cuts than steer carcasses. However, the steer carcasses received more desirable quality grades. The implanted groups were more similar to each other than the nonimplanted groups. The use of Synovex-S narrowed the differences in carcass traits between the intact males and steers.

Introduction

Several alternatives are available for producers to increase the amount of beef produced and, at the same time, increase the efficiency of production. The most common method is the use of growth promoting implants, which have been linked to increased average daily gain and feed utilization. These implants have also been shown to decrease the deposition of external fat and marbling in feedlot steers.

Research data has also indicated that the production of beef by young bulls may be another possible solution to more efficient beef production. In addition to the improvement in the feedlot performance, some carcass characteristics are enhanced by the sex condition. Bulls are noted for yielding leaner, heavier muscled, higher cutability carcasses. However, carcass quality has slowed the acceptability of bullock beef.

The objective of this study was to determine the effect of Synovex-S on the carcass traits of bulls and steers.

Procedure

One hundred Angus bulls were randomly allocated into four treatment groups of 25 head each. Two of these groups were implanted with Synovex-S (and reimplanted 100 days later). One group of the unimplanted and one group of the implanted bulls was castrated after the first 30 days of the feedlot trial. All cattle were on feed for a total of 190 days. Specific details of the handling procedures during the feedlot period and the actual feedlot performance are presented in a previous paper, (The Effect of Synovex-S Implants on Feedlot Performance of Angus Bulls and Early Feedlot Period Castrated Angus Bulls, L. B. Bruce, D. H. Gee and R. Hanson). (82-32)

At the conclusion of the feeding trial the cattle were slaughtered at a commercial packing company. The quality and yield grade factors were evaluated with the assistance of a USDA grader. A portion of the wholesale rib from each carcass was transported to the SDSU Meat Lab and used to provide samples for taste panel evaluation, Warner-Bratzler shear and proximate analysis.

Results and Discussion

Table 64 presents mean carcass traits and shows the distribution of the USDA yield and quality grades.

Rib eye area advantage observed in the implanted steers when compared to the nonimplanted steers was primarily due to carcass weight. When rib eye area was expressed as square inches per 100 lb carcass, no difference was seen between the two groups of steers (1.70 vs 1.71). Fat deposition as indicated by both external fat thickness and marbling level was reduced in the steers due to Synovex-S. Reduction in fat deposition, externally and as marbling is reflected in the increased occurrence of the more desirable yield grades (YG-1 and YG-2), the decrease in the number of YG-4, and the decrease in the number of carcasses grading choice.

Table 64. Carcass Traits and Grade of Bulls and Steers By Treatment

Item	Steers		Bulls	
	No Implant	Synovex-S	No Implant	Synovex-S
No. of animals	25	25	25	25
Carcass wt, lb	649	673	693	714
Rib eye area,				
sq. in.	11.04	11.56	12.71	12.63
sq. in./100	1.70	1.72	1.83	1.77
Fat thickness, in.	.47	.41	.38	.42
Kidney fat, %	2.9	2.9	1.9	3.3
Yield grade	3.19	2.97	2.39	2.87
Distribution				
YG-1	--	1	7	2
YG-2	9	10	16	16
YG-3	13	13	2	6
YG-4	3	1	--	1
Marbling level	Avg Small	High Slight	Avg Slight	High Slight
Quality grade	Low Choice	High Good	Avg Good	High Good
Distribution				
Choice	23	16	2	14
Good	2	9	21	10
Standard	--	--	2	1

Synovex-S reduced muscle development and increased fat deposition in the Angus bulls. Rib eye area per 100 lb carcass was slightly less for the implanted bulls when compared to the nonimplanted bulls (1.77 vs 1.83). In addition, external fat thickness and marbling level were increased due to the implant. The additional fat deposition resulted in increased incidence of YG-3 and YG-4 carcasses, fewer YG-1 carcasses and more choice carcasses.

Carcass price was based entirely on the sex condition of the cattle at the time of slaughter, with no adjustment made for yield or quality grade. Although more acceptable quality grades are generally achieved by steers, the use of Synovex-S on bulls yielded carcasses with quality grades comparable to steers. Implanted bulls still possess an advantage over implanted steers in their ability to produce higher cutability carcasses. These data would suggest that the use of Synovex-S on medium framed Angus bulls will produce carcasses that are very acceptable for the packer.

S.E. FARM REPORT

THE EFFECT OF GROWTH PROMOTING IMPLANTS ON CARCASS CHARACTERISTICS OF GELBVIEH BULLS

R. C. Johnson, D. H. Gee, L. B. Bruce and R. Hanson

ANIMAL AND RANGE SCIENCES 82-34

Ninety-two Gelbvieh bulls were randomly allocated into four treatment groups, implanted with either Synovex-S, Synovex-H, Ralgro or not implanted, and fed for 212 days. Carcass data was collected following slaughter. No major differences were noted between any of the groups due to treatment. Bulls implanted with Synovex-H had slightly less rib eye area per 100 lb carcass when compared to the other groups. The large framed, late maturing Gelbvieh bulls produced extremely lean, heavy muscled, high cutability carcasses. The USDA quality grades were marginal on acceptability from both a packer and consumer standpoint.

Introduction

The average consumer is interested in buying quality beef with a minimum of bone and fat at a reasonable cost. The production of meat by young bulls has been shown to be a simple method of achieving lean beef; however, quality characteristics are marginal. Growth promoting implants have been used on steers and heifers since the 1950's to improve feed efficiency and reduce fat deposition. Larger framed, later maturing breeds have been introduced in the United States that have the capability of producing lean, high cutting carcasses.

The objective of this study was to measure the effects of various growth promotants currently available on the carcass characteristics of young Gelbvieh bulls.

Procedure

Ninety-two Gelbvieh bulls were randomly allotted into four treatment groups of 23 bulls each. The four treatment groups were (A) control (no implants), (B) implanted with Synovex-S, (C) implanted with Synovex-H and (D) implanted with Ralgro. Specific details for the handling procedures during the feedlot period and the actual feedlot performance are presented in a previous paper (The Effect of Growth Promoting Implants on Feedlot Performance of Gelbvieh Bulls, L. B. Bruce, D. H. Gee and R. Hanson). (82-31)

At the conclusion of the feeding trial the cattle were slaughtered at a commercial packing company. The quality and yield grade factors were evaluated with the assistance of a USDA

grade. A portion of the wholesale rib from each carcass was transported to the SDSU Meat Lab and used to provide samples for taste panel evaluation, Warner-Bratzler shear and proximate analysis.

Results and Discussion

Mean carcass traits and the distribution of the four treatment groups across the USDA yield and quality grades are presented in Table 6.5. In general, the results show no definite alterations in the carcass traits due to any implant.

Muscle development as indicated by rib eye area per 100 lb of carcass was slightly less for the Synovex-H implanted bulls when compared to the other groups. Decreased muscle development per 100 lb of carcass was the major reason for the difference in yield grade between the Synovex-H group and the other three treatments. There were no differences among the other cutability factors due to treatment.

No differences were observed in marbling level or final quality grade due to treatment. Furthermore, the implants only slightly decreased the incidence of the Standard Quality grade carcasses and did not increase the number of Choice Quality grade carcasses.

The large framed, late maturing Gelbvieh bulls produced extremely lean, heavy muscled carcasses that would yield a high percentage of boneless trimmed retail cuts. Quality grades received by these carcasses are at or just below the minimum standards considered acceptable by the average consumer.

Table 65. Carcass Traits and Grades By Treatment

Item	Control	Implants Synovex-S	Synovex-H	Ralgro
No. of animals	23	23	23	23
Carcass wt, lb	692	708	746	696
Rib eye area, sq. in.	13.59	13.78	13.67	13.72
Sq in./100 lb	1.96	1.94	1.83	1.97
Fat thickness, in.	.14	.15	.17	.18
Kidney fat, %	1.5	1.4	1.7	1.4
Yield grade distribution	1.45	1.44	1.73	1.47
YG-1	22	19	18	22
YG-2	1	4	5	1
YG-3	--	--	--	--
YG-4	--	--	--	--
Marbling level	Low Slight	Low Slight	Low Slight	Low Slight
Quality grade	Low Good	Low Good	Low Good	Low Good
Distribution				
Choice	4	3	2	1
Good	10	17	15	20
Standard	9	3	6	2

CORN ROOTWORMS

D. D. Walgenbech

PLANT SCIENCE 82-35

Field damage and populations of corn rootworms were higher in 1982 than during the last 6 years. Most continuous corn fields can be expected to have moderate to high populations of rootworms in the 1983 season. Several insecticidal failures were noted with Furadan where the compound failed to perform in rotation with organophosphates.

A study was initiated to compare yield relationships with root damage ratings and with averaged field yield as determined by the farmer. The amount of physiological yield loss varied in the fields studied (table 66) Sinai, to a slight loss at the Onida site. Harvestable yield loss approached 60 bushels per acre at the Fairview site (Table 67) and 51 bushels per acre at the Alcester site due to extreme lodging. The high yields even with severe damage was attributed to favorable environmental conditions.

Performance of the insecticides is summarized in Table 68. Counter and Thimet (phorate) showed good performance expressed as percent root protection followed by the remaining compounds in a relatively small range.

Table 66. Corn Rootworn Control

	Yield, Bushels/Acre	
	Location	
Root Rating	Sinai	Onida
1	94 (25)*	160 (21)*
2	92 (32)	153 (32)
3	94 (54)	149 (81)
4	91 (33)	142 (36)
5	99 (27)	146 (23)
6	93 (26)	150 (25)
Plot Average	94 (197)	150 (218)
Field Average	87	160
Precipitaion	16.82	12.67**
Plant Populations	16.200	22.770

* Number of Plants Analyzed.

** 10.0 inches of irrigation applied also.

Table 67. Corn Rootworm Control

Root Rating	Yield, Bushels/Acre — Location: Alcester		Fairview	
4	101	(33)*	108	(37)*
5	101	(44)	109	(28)
6	101	(20)	109	(23)
Plot Average	101	(97)	109	(88)
Field Average	50		50	
Precipitation	17.86		17.29	
Plant Populations	15,750		18.270	

* Number of Plants Analyzed

Table 68. Corn Rootworm Insecticide Evaluations, 1976-1982

Insecticide	1976		1977		1978		1979		1980		1981		1982		1976-82 Avg.	
	# Tests	%[1] R.P.	# Tests	%[1] R.P.	# Tests	%[1] R.P.	# Tests	%[1] R.P.	# Tests	%[1] R.P.	# Tests	%[1] R.P.	# Tests	%[1] R.P.	# Tests	%[1] R.P.
Amaze	15	55	12	91	8	82	6	85	9	69	14	79	11	74	75	76
Counter	21	55	14	83	7	76	7	84	11	69	21	84	11	84	92	76
Thimet	17	49	10	81	7	72	5	78	11	66	18	80	7	81	75	72
Furadan	18	60	12	75	9	68	9	67	12	58	12	71	9	68	81	67
Dyfonate	10	51	10	76	8	69	6	65	11	60	16	74	9	72	70	67
Mocap	19	44	9	79	7	67	5	62	10	60	21	76	7	67	78	65
Lorsban	21	44	9	80	6	73	2	71	11	55	15	64	7	70	71	65

\# Not Marketed

[1] % R.P. - Percent Root Protection = % R.P. = $100 - \frac{\text{(root rating of treatment)}}{\text{root rating of UTC}} - 1$

S.E. FARM REPORT

EUROPEAN CORN BORER CONTROL

D. D. Walgenbach

PLANT SCIENCE 82-36

The first brood European corn borer caused serious yield losses in those fields that were planted before the rains in early May. A 31 bushel per acre yield loss and 3.6 Ton/acre silage loss was documented.

Results for 1982 continued to show excellent first brood control with Furadan, Lorsban or Dyfonate applied at 0.5 lb A/A by ground equipment with the granules directed over the whorl. Ground application of Pydrin also showed excellent control as did the aerial application of Furadan 10G at 1 lb A/A to 0.1 lb A/A of Pyrin.

Table 69. Grain Yield (15.5% water) as influenced by first brood infestation, Beresford (Field 2) 1982

Treatment (lbs AI/A)	Cavities (#/plant)	Grain Yield (Bu/A)	Silage Yield Ton/A
Cypermethrin, 0.1	0.1	166	26.8
Untreated	2.1	135	23.2

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