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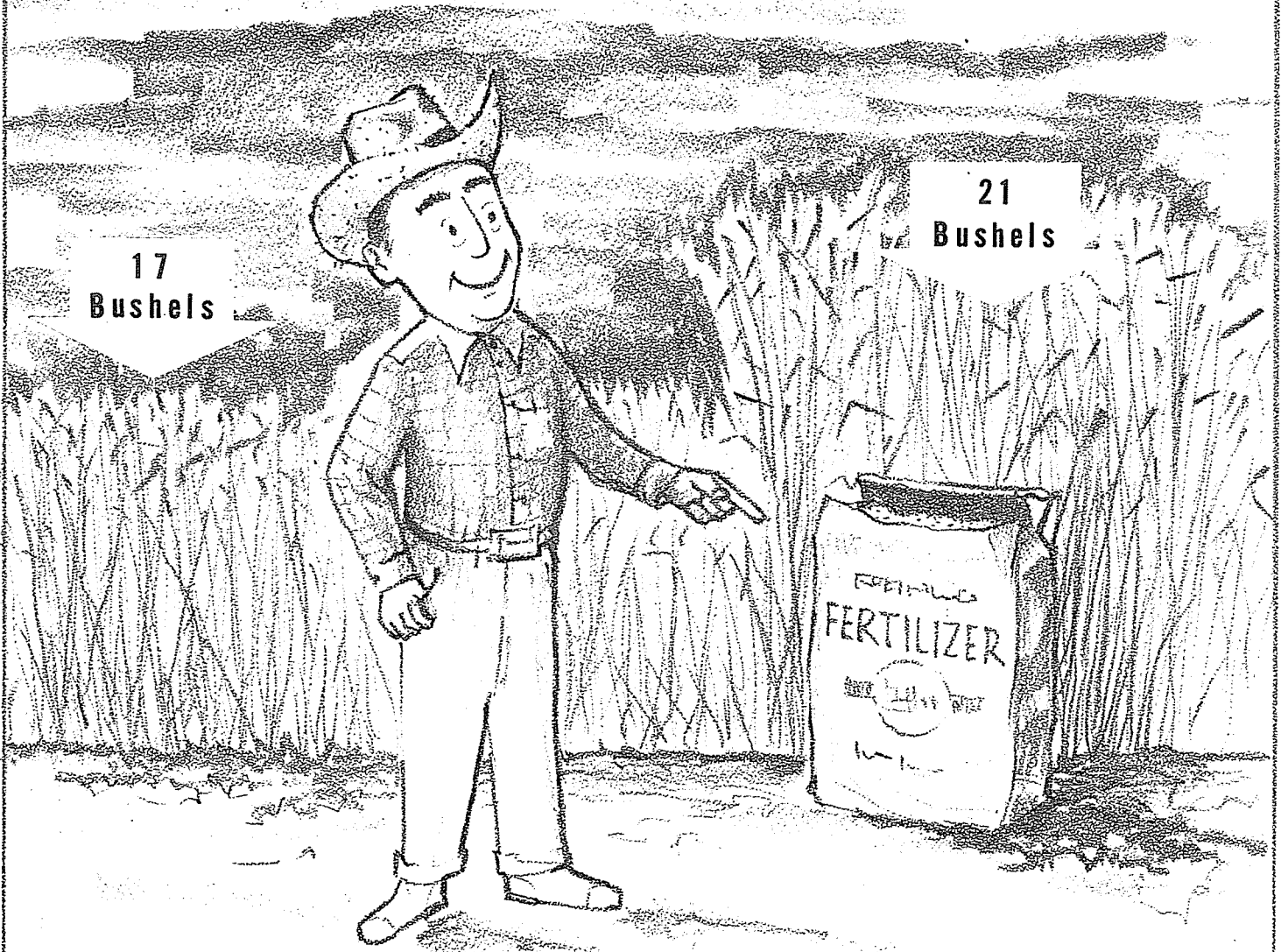
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The 1959 Report

ON TEST-DEMONSTRATION FARMS
IN NORTH DAKOTA

SAVE



April 1, 1960

Department of Agricultural Economics
North Dakota Agricultural Experiment Station
and North Dakota Extension Service

THE 1959 REPORT ON THE TEST DEMONSTRATION
PROGRAM IN NORTH DAKOTA

by

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INTRODUCTION

A cooperative Tennessee Valley Authority and North Dakota Agricultural College fertilizer test-demonstration project was organized in 1957. This program has been continued through three cropping seasons. The objectives of the program are:

- (1) To introduce TVA experimental fertilizers in farm fertilizer programs in the state,
- (2) To determine cooperative farmers' acceptance of these fertilizer materials,
- (3) To demonstrate and test the effects of recommended fertilizer treatments on individual crops yields and over-all farm income,
- (4) To promote agricultural developments in North Dakota through improved use of fertilizers in combination with other recommended farm and home practices.

The North Dakota Agricultural Experiment Station and Extension Service cooperate in the conduct of this program within the state. The Agricultural Economics Department has a state project (S-3-5) devoted to an economic evaluation of a recommended and balanced fertilizer program as it applies to the over all-farm. The project supervisor is an Agricultural Economist who assumes responsibility for general development and conduct of the program. He is responsible for (1) supervision of all farm records and accounts needed, and (2) making analyses of the results obtained. Also, an Extension Soils Agent helps to develop crop and fertilizer use plans for each cooperating farm,

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requisitioning required fertilizer materials, supervising fertilizer applications, and in obtaining yield results from fertilizer use by establishing and checking check strips. Extension agents in the participating counties assist the project supervisors in carrying out the program within their respective counties. Other station and extension personnel are available for counsel and advice as needed.

Twenty six farmers located in six different counties were active cooperators throughout the 1959 season. The participating counties were selected on the basis of location within the three major soils association areas in the state. Barnes and Ramsey counties are in the Aastad-Hamerly-Barnes Soils Association, Morton and Stark counties are in the Morton Bainville Soils Association, and McLean and Williams are in the Williams-Zahl Soils Association. Irrigation proposals and developments within the state prompted the inclusion of two irrigation farmers as cooperators in this study. These farms are located on the Buford-Trenton Irrigation Project in Williams County. All other cooperators are dryland farmers located within the six counties previously listed.

This project demands contributions and cooperation from many individuals. The test-demonstration farmers have been very cooperative in applying fertilizers in accordance with recommendations, leaving check strips and making harvest yield check. They also have provided all records requested from them. County extension agents have cooperatively supported the program within their counties. Agricultural Experiment Station and State Extension Service personnel have been helpful in supporting the program and contributing counsel and services. Assistance provided by the Tennessee Valley Authority has been essential to the conduct of this program. The project supervisors are grateful for the excellent cooperation received from everyone involved in this project.

LOCATION AND NUMBER OF TEST-DEMONSTRATION FARMS IN NORTH DAKOTA

In 1959, this project was continued within the same counties and with the same group of farm cooperators as in 1958. One cooperator in Stark County dropped out of the program in 1959 because he put his entire farm into the soilbank. This left a distribution of cooperators as shown in table 1.

TABLE 1. NUMBER OF TEST-DEMONSTRATION FARMS BY COUNTIES, 1959.

COUNTY	ACTIVE COOPERATORS DURING 1958	COOPERATORS DROPPING OUT AFTER 1958	ACTIVE COOPERATORS DURING 1959
Barnes	3	0	3
Ramsey	6	0	6
Morton	4	0	4
Stark	5	1	4
McLean	5	0	5
Williams	4	0	4
TOTAL	27	1	26

In addition to the current program, some consideration has been given to adding two counties in the Red River Valley. However, budget allocations for the Tennessee Valley Authority restricted the amount of fertilizer material which could be provided for test-demonstration purposes. Since the resulting fertilizer allocation was not sufficient to supply total demands of farmers already in the program, no new cooperators were added. The location of the counties and cooperators within each county are shown in Figure I.

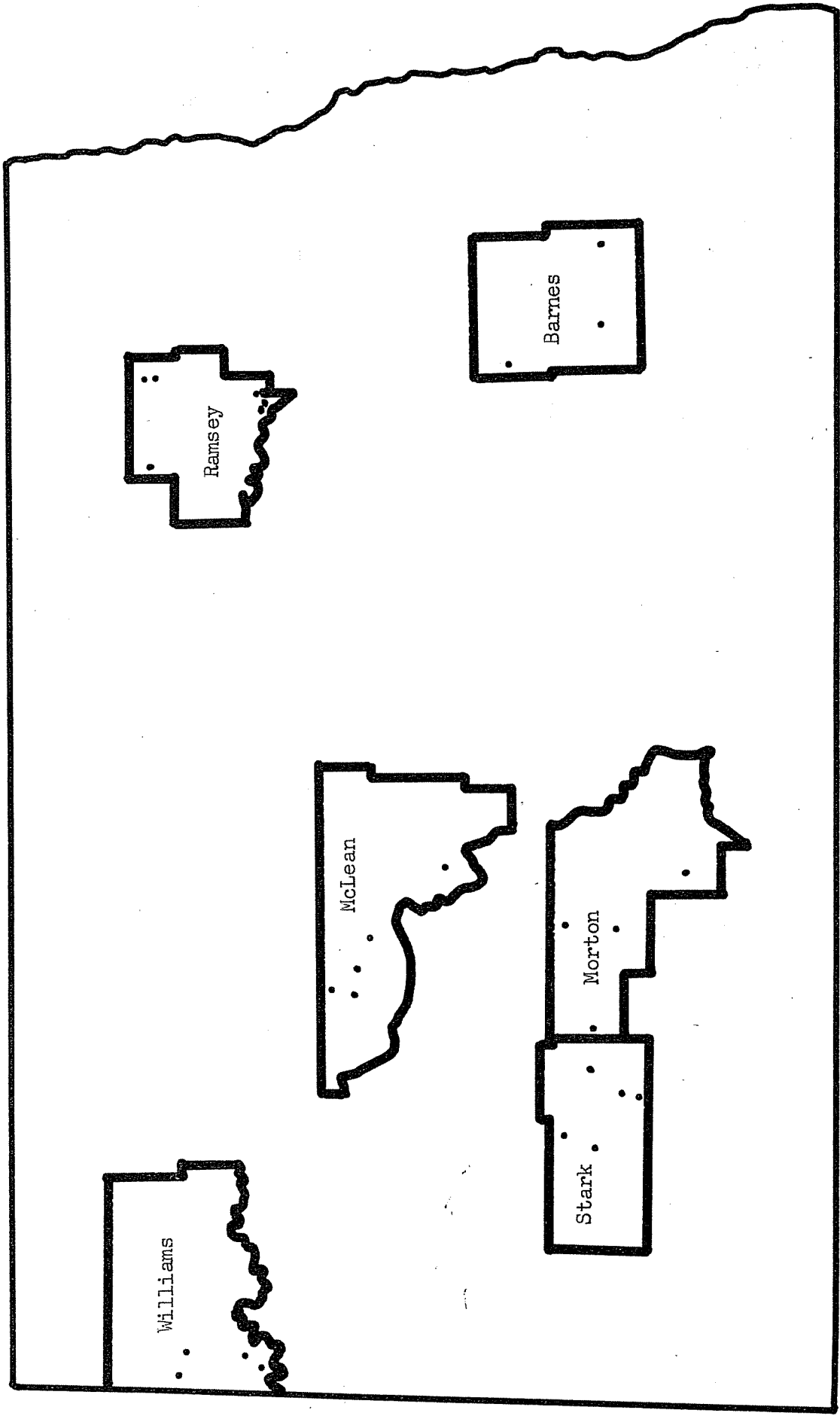


Figure 1. Location of Test - Demonstration Farms.

SIZE, TYPE AND TENURE OF FARM COOPERATORS

The size of cooperating farms ranged from 250 to 2800 acres. The average farm size increased about 65 acres from 1958 to 1959 because a few cooperators increased the size of their units. The distribution of farms by size is shown in Table 2. The two smallest farms in Williams County are irrigated units.

TABLE 2. SIZE OF TEST-DEMONSTRATION FARMS, 1959.

COUNTY	TOTAL ACREAGE				TOTAL
	250-640	641-960	961-1280	1281-over	
Barnes	1	1	-	1	3
Ramsey	4	-	2	-	6
Morton	1	-	-	3	4
Stark	-	1	1	2	4
McLean	1	1	2	1	5
Williams	2	-	-	2	4
Total	9	3	5	9	26

Fourteen of the cooperators own all the land they operate, seven are part owners, and five rent all their land. Small grains are grown on all cooperating farms and most cooperators have livestock enterprises along with their cropping program. Only three cooperators are strictly cash-grain farmers.

The 26 cooperators in the test-demonstration program operated a total of 31,770 acres of farm land. Approximately sixty-two percent of this acreage is tillable as indicated in Table 3.

TABLE 3. PROPORTION OF LAND OWNED, RENTED AND TILLABLE ACREAGE ON TEST-DEMONSTRATION FARMS, 1959.

	Acres	Percent of Farmland
Farmland Owned	22,445	70.6 %
Farmland Rented	9,325	29.4
Total Farmland	31,770	
Tillable Acreage	19,794	62.3 %

Wheat is the leading cash crop on the test-demonstration farms. Twenty-eight percent of the total cropland was devoted to wheat production in 1959 (Table 4). Research and farmer experience have also proven that wheat gives the

TABLE 4. DISTRIBUTION OF CROP ACREAGES AND USE OF FERTILIZER ON TEST-DEMONSTRATION FARMS IN 1959.

Crop	Acreage Grown	Percentage of Total Cropland	Acreage Fertilized	Percentage of Crop Fertilized
Wheat and Durum	5,537	28.0	4,809	86.9
Barley	3,280	16.6	2,234	68.1
Corn	1,567	7.9	254	16.2
Oats	1,103	5.6	345	31.3
Flax	890	4.5		
Alfalfa	874	4.4	57	6.5
Pasture and Grass	585	3.0		
Alfalfa and Brome	193	1.0		
Rye	145	.7		
Sugar Beets	85	.4	85	100.0
Millet	50	.3		
Sweet Clover	30	.1		
Sudan Grass	20	.1		
Soybeans	20	.1	20	100.0
Total Crop	14,379	72.7	7,804	54.3
Summer Fallow	3,962	20.0	0	0
Soil Bank	1,453	7.3	0	0
Total Cropland	19,794	100.0	7,804	39.4

highest net returns from fertilizer investments in the state. Measuring crop yield responses on the test demonstration farms during the past three seasons has resulted in average net returns as follows: all wheat, 112 per cent; all barley, 34 per cent; and all oats, eight per cent. These experiences and results indicate that the optimum sequence for investing fertilizer dollars is wheat, barley, etc. The profitable use of fertilizer on lower value crops such as oats is somewhat questionable in many areas of the state. Consequently, wheat has received the major emphasis in the fertilization program on these test-demonstration farms. Table 4 shows that 4,809 acres of wheat were fertilized in 1959.

AMOUNT OF FERTILIZER MATERIAL USED

A total of 277.03 tons of Tennessee Valley Authority fertilizer material were used in the North Dakota test-demonstration program during the 1959 cropping season. One carload of ammonium phosphate nitrate (30-10-0) was shipped into Ramsey County during the fall of 1958 and used for fall applications of nitrogen. The balance of the fertilizer materials were shipped in and applied during spring planting. The distribution of TVA fertilizer materials by type and counties is shown in Table 5.

TABLE 5. AMOUNT OF TVA FERTILIZER MATERIALS USED ON TEST-DEMONSTRATION FARMS IN 1959.

County	Tons of 0-63-0	Tons of 0-54-0	Tons of 20-52-0	Tons of 30-10-0	Tons of 20-20-0	Total Tons of all Material
Barnes	--	--	25.52	17.00	11.60	54.12
Ramsey	--	3.64	34.48	40.10	--	78.22
Morton	--	9.92	12.76	10.43	--	33.11
Stark	--	9.08	11.92	11.50	--	32.50
McLean	--	10.40	10.56	10.27	--	31.23
Williams	9.72	4.20	21.08	12.85	--	47.85
Total	9.72	37.24	116.32	102.15	11.60	277.03

The test demonstration farmers purchased about 77 tons of commercial fertilizer materials in addition to the materials purchased from the Tennessee Valley Authority. Over half of the commercial fertilizer purchased was concentrated super phosphate material. The demand for other sources of phosphate resulted from problems encountered in applying the 0-54-0 material provided by TVA. Some of the cooperators experienced so much difficulty with this material in 1958 that they were reluctant to try it again. Hence, they ordered their phosphate fertilizers from local sources. Others ordered 0-54-0 for 1959 but its physical condition was so poor that they were unable to apply it. Many of these cooperators had to buy other materials to replace the 0-54-0 they had received. A summary of the materials purchased locally is presented in Table 6.

TABLE 6. COMMERCIAL FERTILIZER MATERIALS PURCHASED LOCALLY BY TEST-DEMONSTRATION FARMS IN 1959.

Fertilizer Material	Tons Purchased
0-45-0	38.40
11-48-0	3.80
13-39-0	.50
16-48-0	3.30
16-20-0	.75
19-19-0	12.00
23-23-0	1.00
24-20-0	4.88
33.5-0-0	9.40
Total Tons of Dry Material	74.03
Anhydrous Ammonia	3.20

RECORDS REQUIRED AND ANALYTICAL STUDIES

Every test demonstration cooperator leaves unfertilized check strips in a representative number of the fields which are fertilized. These check strips demonstrate the effects of fertilizer on the crop. The cooperators harvest these check strips separately and weigh and test the grain to determine yield and quality differences on fertilized versus unfertilized portions of the field.

Complete farm records are kept by each cooperator. These records are made available to the project supervisor who analyzes the economic effects of fertilizer use as it applies to the farm business. Also, these records reflect other efficiencies and/or inefficiencies within the various farm units.

A review of 1958 farm record books indicated that about 13 per cent of the net income on the cooperators' farms could be attributed to crop yield increases due to fertilizer applications. In Barnes County, this figure was as high as 19 per cent. For individual operators it varied from a minus eight per cent to a high of 21 per cent of the total net farm income.

FERTILIZER RESPONSES IN 1959

The test-demonstration farm cooperators fertilized 7,388 acres of small grains (wheat, barley and oats) during the 1959 season. Of this 7,388 acres, harvest checks were made on 4,370 acres to determine yield responses due to fertilizer applications. The returns to fertilizer were not as high as had been experienced in the previous season. However, the 4,370 acres which were checked at harvest time produced a 40 per cent net return over the fertilizer costs. In 1958, this return was 100 per cent.

All six counties in which the cooperators are located experienced less favorable moisture conditions in 1959 than during the previous season. Morton and Williams counties were extremely dry. McLean and Stark counties also were very dry but a few of the cooperators received some timely rain showers which helped their crops. Ramsey and Barnes counties had less than average rainfall but their crop yields were relatively higher than in other counties where TVA demonstration farms were located.

On the basis of acreage which was checked for yield responses at harvest time, the results varied considerably from county to county. The results also showed large variations among crops as presented in Table 7.

Table 7 shows that the highest average fertilizer responses were obtained in Morton County. However, all harvest yield comparisons in Morton County were made on one farm. This one farmer had most of his crops seeded on fallowed land and received slightly more moisture than the other three cooperators in the county. The extreme dryness on these other three farms resulted in a small portion only of their crops being harvested. Consequently, only about 20 per cent of the fields which were fertilized on the test-demonstration farms in the county were checked at harvest time and these had very high fertilizer responses.

When total fertilized acreage on test-demonstration farms in Morton County is considered instead of the one farm only, the 112 per cent profit cited in Table 7 is changed to a three per cent loss. In other words, the gains on one farm almost paid for the losses on the other three.

TABLE 7. FERTILIZER COSTS, TOTAL RETURNS AND PROFITS FROM FERTILIZER INVESTMENT ON 4,370 ACRES OF SMALL GRAINS CHECKED AT HARVEST TIME BY COUNTIES AND FOR THE STATE IN 1959.

	Barnes	Ramsey	Morton	Stark	McLean	Williams	State
Wheat on Fallow (1313 Acres)	Fert. Cost/Acre \$ 3.27 Tot. Added Ret/A. 13.81 Per cent Profit 322 %	\$ 2.49 7.90 217 %	\$ 2.84 13.44 373 %	\$ 2.88 9.27 222 %	\$ 2.37 7.56 319 %	\$ 3.09 -0.08 -103 %	\$ 2.65 8.21 210 %
Wheat on non fallow (1154 Acres)	Fert. Cost/Acre \$ 5.68 Tot. Added Ret/A. 12.59 Per cent Profit 122 %	\$ 6.09 10.38 70 %	\$ 4.85 .00 -100 %	\$ 6.10 .78 -87 %	\$ 5.27 -0.13 -102 %	\$ 5.06 6.03 19 %	\$ 5.59 6.91 24 %
Barley on Fallow (138 Acres)	Fert. Cost/Acre \$ 4.04 Tot. Added Ret/A. 17.06 Per cent Profit 322 %	- - -	- - -	- - -	\$ 2.32 8.27 356 %	- - -	\$ 2.65 9.99 277 %
Barley on non Fallow (1612 Acres)	Fert. Cost/Acre \$ 5.68 Tot. Added Ret/A. 6.94 Per cent Profit 22 %	\$ 6.09 5.19 -15 %	- - -	\$ 5.68 3.52 -38 %	\$ 4.95 1.99 -40 %	\$ 4.89 3.47 -29 %	\$ 5.69 5.10 -10 %
Oats on non Fallow (153 Acres)	Fert. Cost/Acre \$ 6.04 Tot. Added Ret/A. 9.10 Per cent Profit 51 %	\$ 6.25 3.22 -48 %	- - -	\$ 7.23 2.60 -64 %	- - -	\$ 5.86 2.65 -55 %	\$ 6.28 5.02 -20 %
All Crops (4,370 Acres)	Fert. Cost/Acre \$ 5.46 Tot. Added Ret/A. 9.70 Per cent Profit 78 %	\$ 4.96 6.70 35 %	\$ 3.68 7.82 112 %	\$ 4.96 4.37 -12 %	\$ 3.45 5.15 49 %	\$ 4.44 3.79 -15 %	\$ 4.67 6.59 41 %

When considering the total acreage fertilized in each county, Barnes County cooperators received the highest income, or 78 per cent profit, from their fertilizer investment. Although McLean County had a relatively dry season, much of their fertilized acreage was on fallowed land so their fertilizer investment returned a 49 per cent profit which was the next highest return. The comparable return for Ramsey was 35 per cent profit. Stark and Williams counties experienced 12 and 15 per cent losses respectively.

Sixty per cent of the fertilized fields were checked for yield responses at harvest time. These fields produced a total average net return of 41 per cent on the fertilizer investment. When returns are calculated on the total fertilized acreage in all six counties, the average net return was reduced to 31 per cent. The results in Morton County were largely responsible for this reduction.

The fertilizer results have been presented so far in terms of dollar gains and losses. They also may be stated in terms of bushel increases. Tables 8 and 9 show the average yields and average yield increases resulting from fertilizer treatments. Most of these responses are less than in 1958. The yields and fertilizer responses on the individual fields and individual cooperators are listed by counties in appendix tables 1 through 6.

TABLE 8. YIELD RESPONSES TO FERTILIZER TREATMENTS ON FALLOWED LAND ON TEST-DEMONSTRATION FARMS, 1959^a.

Crop	Number of Samples	Fertilized Yield Bushels/Acre	Check Yield Bushels/Acre	Increase Bushels/Acre
Wheat and Durum	41	21.1	17.4	3.7
Barley	6	35.2	23.1	12.1

^a Average fertilizer treatment was 2 pounds of N and 26 pounds P₂O₅ per acre.

TABLE 9. YIELD RESPONSES TO FERTILIZER TREATMENTS ON NONFALLOWED LAND ON TEST-DEMONSTRATION FARMS, 1959^a

Crop	Number of Samples	Fertilized Yield Bushels/Acre	Check Yield Bushels/Acre	Increase Yield Bushels/Acre
Wheat and Durum	24	19.1	15.5	3.6
Barley	41	28.9	23.3	5.6
Oats	4	45.3	36.6	8.7

^aAverage fertilizer treatment was 24 pounds of N and 29 pounds of P₂O₅ per acre.

THREE YEARS OF EXPERIENCE

This project has been conducted throughout three cropping seasons in the state. During this period, 18,718 acres of small grains have been fertilized on the cooperating farms and almost 60 percent of this acreage has had unfertilized check strips left through the fields facilitating harvest yield comparisons. Crop yield responses have been checked on 10,768 acres. The fertilizer response on these acres have produced an average additional return of \$ 3.35 per acre.

In addition to small grains, 1,597 acres of other crops such as corn, sugar beets, alfalfa, rye, speltz, etc., have been fertilized. Some of these crops have responded quite well to fertilizer applications, However, these are minor crops in this area and we do not have sufficient yield comparisons to evaluate the fertilizer responses obtained on these test-demonstration farms.

Small grain yield responses to fertilizer treatments have varied greatly during the three year period. Some fields have not responded to fertilizer treatments, whereas other fields have given double and even triple yields from fertilizer applications. The average results for each county are numerated in appendix tables 7 through 13.

In 1957 the test-demonstration farm cooperators made yield comparisons on 2,204 acres of small grain crops. The yield increases due to fertilizer treatments

increased the net income by an average of \$3.43 per acre. The 1958 cropping season was abnormally favorable throughout most of the state and the crop yield responses to fertilizer treatments were proportionately high. The average net return on 4,451 acres checked in 1958 was \$ 4.68 per acre. The 1959 season produced smaller crops and also smaller fertilizer responses in all six counties. About 4,113 acres were checked for yield increases in 1959 and this acreage produced an added average net return of \$ 1.86 per acre.

The three year summaries in appendix table 13 also reflect the comparative profitability of using fertilizer on various crops. Wheat seeded on fallowed land and fertilized with recommended levels of phosphate gave the highest average net return to fertilizer of 193 per cent. Barley grown on fallowed land was the next highest with 148 per cent net returns. The crops grown on fallowed land produce the highest percentage returns to fertilizer because phosphate is the major plant nutrient needed. Accordingly, fertilizer costs are relatively low. Wheat seeded on nonfallowed land gave an average net return of \$ 3.33 per acre as compared with \$ 3.74 per acre for barley on fallow. This indicates a possibility for increasing the income per acre when acreage is a limiting factor. Even though the percentage return to fertilizer isn't as high on nonfallow as fallowed land, the returns per acre are quite comparable in the above example.

A few farm cooperators have fertilized oats seeded on nonfallow and 366 acres have yielded a ten per cent net return on the fertilizer investment during the three year period. The 10,768 acres of small grains which have been checked during this period have produced an average added net return of \$ 3.35 per acre or a 74 per cent return on investment. In other words, for every \$ 100 invested in fertilizer an average of \$ 174 was returned in the fall.

USES MADE OF TEST-DEMONSTRATION FARMS

The primary objective of the test demonstration is to determine the economic effects of a recommended fertilizer program. The crop yield comparisons obtained from the fertilized portions of fields and the unfertilized check strips are also used to demonstrate the effects of recommended fertilizer treatments on individual fields and crops.

Many local farmers stop and examine the fields and check strip demonstrations on these farms during the growing season. Others inquire about the actual results obtained on these fields. County Extension Agents and local elevator men brought numerous visitors out to inspect crop responses. County Extension Agents included test-demonstration farms as stops in county farm tours. Extension Agents have used the results obtained on these farms in numerous news stories, radio and television programs.

The following is an enumeration of fertilizer check strip demonstrations on the cooperating farms in 1959.

<u>Kind of Fertilizer Demonstration</u>	<u>Number of Demonstrations</u>
Small grains grown on fallow	70
Small grains grown on nonfallow	90
Corn	4
Alfalfa	2
Sugar beets	2

No exact records were kept on how extensively these demonstrations were used in the extension program within each county. However, an estimation follows on uses made of the program.

Number of people who visited fertilized check strips (Including tour groups and individual visits)	<u>800</u>
Number of tour groups who saw fertilizer check strips	<u>5</u>

Number of news articles mentioning one or more of these 30
demonstrations

Number of radio and television programs in which reference 36
was made to test-demonstrations

Information obtained from these test-demonstration farms has been used in a variety of educational activities. Some of the information has been used in teaching farm management classes. For example, farm management classes from the college have visited two of the test-demonstration farms on farm management field trips. Some of these fertilizer results have been used as a basis for an article published in the North Dakota Farm Research Bulletin and other articles are being prepared. Also, the test-demonstration farms have served as an illustration in a current extension endeavor to show "why some farmers make more money than others".

APPENDIX TABLE 1. CROP YIELD RESULTS ON TVA TEST DEMONSTRATION FARMS IN BARNES COUNTY, 1959.

Cooperator	Field No.	1958 Crop	1959 Crop	Soils Test	Nutrients per acre	Yield Bu/Acre		
						Fert.	Check	Difference
Lyle Guscette	29-3	Fallow	Wheat		0+27+0	30.6	23.7	6.9
	21-3	Corn	Wheat	VL	25+31+0	41.7	35.7	6.0
	24-2	Corn	Wheat	VL	25+31+0	36.7	25.0	11.7
	24-4	Fallow	Wheat		11+29+0	27.1	19.5	7.6
	29-1	Wheat	Barley	VL	25+31+0	39.2	30.0	9.2
	24-3	Barley	Barley	VL	25+31+0	37.7	24.5	13.2
	24-4	Fallow	Barley		11+29+0	31.8	10.2	21.6
	28-2+3	Wheat	Barley		25+31+0	46.2	38.5	7.7
Ray Stangler	4	Corn	Wheat	VL	25+25+0	20.0	13.3	6.7
	9	Corn	Wheat		25+31+0	21.3	16.5	4.8
	13	Flax	Wheat		25+31+0	25.6	16.7	8.9
	3	Flax	Barley		25+31+0	34.7	19.0	15.7
	14	Oats	Barley	M	23+26+0	47.8	41.3	6.5
	10	Barley	Oats	L	25+31+0	69.5	52.0	17.5
	12	Alfalfa	Alfalfa		0+80+0	1470 lb.	950 lb.	520 lb.
Riedman Brothers	4	Corn	Wheat	M L-M	25+31+0 or 24+24+0	22.1	15.4	6.7
	1+2	Flax	Barley	VL-VL	25+31+0	28.7	23.3	5.4
	6	Oats	Barley	VL	25+31+0	29.2	16.2	13.0
	8	Corn	Barley	VL	25+31+0	38.3	38.2	0.1
	10	Barley	Barley	L-M	23+26+0	34.1	39.1	-5.0
	12	Wheat	Barley	M	21+21+0	51.3	34.3	17.0
	13	Barley	Barley	H	8+21+0	31.0	29.2	1.8
	17	Flax	Barley	VL-VL	25+25+0	19.6	15.1	4.5
	18	Barley	Wheat	VL-VL	25+25+0	20.4	15.1	5.3

APPENDIX TABLE 2. CROP YIELD RESULTS ON TVA TEST-DEMONSTRATION FARMS IN RAMSEY COUNTY, 1959.

Cooperator	Field No.	1958 Crop	1959 Crop	Soils Test	Nutrients per acre	Yield Bu/Acre		
						Fert.	Check	Difference
E.B. & D. Calderwood	12	Wheat	Oats		28+32+0	41.3	35.0	6.3
	13	Wheat	Barley	M	28+32+0	35.8	25.6	10.2
	16	Barley	Barley	M	28+32+0	34.7	26.5	8.2
	11	Wheat	Wheat		28+32+0	13.6	8.3	5.3
	14	Corn	Wheat	H	28+32+0	29.3	22.9	6.4
	2		Barley		28+32+0	17.7	12.4	5.3
Willis Calderwood	1	Wheat	Durum	H	28+32+0	22.	16.8	5.2
	6	Barley	Barley		28+32+0	23.0	14.3	8.7
	2	Barley	Barley	L	28+32+0	37.5	26.2	11.3
L. B. Currie	8,9,&10	Fallow	Wheat	L-M	0+27+0	26.6	21.3	5.3
	1	Fallow	Wheat	M-M	0+22+0	33.7	30.7	3.0
Orville Larson	13	Barley	Barley	L-L	32+33+0	34.3	25.3	9.0
	10	Barley	Barley	VL-VL	27+31+0	35.8	26.3	9.5
	7	Wheat	Barley	M-VL	25+31+0	26.8	27.1	-.3
	3	Barley	Barley	VL+VL	30+39+0	25.5	25.	.5
				M+VL				
	5	Flax	Oats	L+M	26+27+0	32.5	26.5	6.0
				VL+VL				
9A+11		Fallow	Durum	VL+M	9+23+0	34.8	32.1	2.7
	12	Wheat	Durum	M+M	23+21+0	16.4	12.8	3.6
				M+H				
Lawrence Stensland	14	Wheat	Barley	M M-VL	20+25+0	37.2	33.0	4.2
	4+5	Wheat	Barley	VL-M	8+21+0	38.1	32.3	5.8
	15	Wheat	Barley		8+21+0	48.0	42.0	6.0
	12+13	Fallow	Durum	M-M	7+18+0	23.4	18.1	5.3
	3	Fallow	Durum	M-M	7+18+0	29.9	24.0	5.9
LeRoy Stensland	5	Fallow	Durum		7+18+0	24.8	24.8	0
	7	Fallow	Durum		7+18+0	28.7	24.1	4.6
	6	Wheat	Barley	M	20+25+0	29.0	22.0	7.0
	9	Barley	Barley	M	20+25+0	23.8	20.3	3.5

APPENDIX TABLE 3. CROP YIELD RESULTS ON TVA TEST-DEMONSTRATION FARMS IN MORTON COUNTY, 1959.

Cooperator	Field No.	1958 Crop	1959 Crop	Soils Test	Nutrients per acre	Yield Bu/Acre		
						Fert.	Check	Difference
Alfred Underdahl	2	Fallow	Wheat		0+35+0	12.0	10.4	1.6
	8	Fallow	Wheat		0+35+0	13.3	10.9	2.4
	13	Fallow	Wheat		0+35+0	13.6	9.7	3.9
	25	Fallow	Wheat	VL	0+27+0	32.4	16.4	16.0
	28	Fallow	Wheat		0+27+0	29.5	16.0	13.5
	38	Sweet Clover	Oats		20+25+0	CUT FOR HAY		
	16	Fallow	Barley		0+27+0	CUT FOR HAY		

The above fields received hail on July 3.

Ole Wang	5	Fallow	Wheat	VL H	5.5+24+0	15.9	14.5	1.4
	18	Corn	Wheat	VL M	20+25+0	4.7	4.7	0

Due to severe drouth, all other fields on nonfallow treated with 20+25+0 were not harvested. The 0-54-0 was in such bad shape it could not be used.

Erich Wilkens No harvest due to severe drouth.

Sig Peterson No wheat was harvested due to extreme drouth. It was noticeable that fertilized grain made better growth in spite of drouth but the unfertilized strips stayed green longer.

APPENDIX TABLE 4. CROP YIELD RESULTS ON TVA TEST DEMONSTRATION FARMS IN STARK COUNTY, 1959

Cooperator	Field No.	1958 Crop	1959 Crop	Soils Test	Nutrients per acre	Yield Bu/Acre		
						Fert.	Check	Difference
Joseph Link	6	Fallow	Wheat		0+32+0	19.8	15.3	4.5
	16	Fallow	Wheat		0+32+0	13.9	7.1	6.8
	20	Fallow	Wheat		0+32+0	NO CHECK		
	*22	Fallow	Wheat		0+32+0	4.6	4.9	- .3
	23	Fallow	Wheat		0+32+0	12.1	10.0	2.1
	27	Fallow	Wheat		0+32+0	18.1	12.4	5.7
	30	Fallow	Wheat		0+32+0	15.4	7.3	8.1
	17	Wheat	Wheat	VL	25+31+0	NO CHECK, CUT FOR HAY		
	8	Corn	Barley		25+31+0	NO CHECK		
	24	Wheat	Barley		25+31+0	18.3	18.0	0.3
	29	Barley	Barley		25+31+0	15.5	6.5	9.0
	32	Barley	Barley		25+31+0	14.9	8.2	6.7
	11	Corn	Oats			NO CHECK, CUT FOR HAY		

*Joe said this was an unfair check

Clarence & Daniel
Wahlers

*7	Corn	Wheat		30+37+0	17.2	15.3	1.9
9	Corn	Wheat		30+37+0	18.7	13.5	5.2
13	Corn	Wheat		30+37+0	23.1	18.1	5.0
17	Corn	Wheat		30+37+0	12.8	10.1	2.7
20	Corn	Wheat		30+37+0	19.1	15.3	3.8
5	Wheat	Oats	VL	30+37+0	37.8	32.8	5.0

*An error was made while applying fertilizer. 12+31+0 was applied to the check strip also. Yield difference is due to additional 18+6+0.

Richard Dohrmann	14	Corn	Wheat		23+26+0	11.9	14.1	- 2.2
	35	Corn	Wheat		23+26+0	13.1	14.5	- 1.4
	17	Corn	Barley		23+26+0	13.5	10.2	3.3

Mr. Dohrmann applied 0-54-0 on wheat on fallowed land but the physical condition of the fertilizer was so bad that it could not be spread evenly enough to get a fair check on yield responses.

APPENDIX TABLE 5. CROP YIELD RESULTS ON TVA TEST DEMONSTRATION FARMS IN MC LEAN COUNTY, 1959.

Cooperator	Field No.	1958 Crop	1959 Crop	Soils Test	Nutrients per acre	Yield Bu/Acre		
						Fert.	Check	Difference
Melvin Bjornholt	7-C	Fallow	Wheat		0+23+0	23.5	21.1	2.4
	7-G	Fallow	Wheat		0+23+0	24.9	22.9	2.0
	1-C	Fallow	Wheat	M	0+23+0	28.5	24.9	3.6
	1-K	Fallow	Wheat		0+23+0	34.4	30.5	3.9
	7-E	Corn	Durum		25+31+0	12.8	16.0	-3.2*
	6-E	Corn	Durum		25+31+0	17.5	14.0	3.5
	6-C	Fallow	Barley		0+23+0	35.8	22.5	13.3
	13-B	Fallow	Barley		0+23+0	32.0	24.2	7.8
	1-H	Wheat	Barley	VL	25+31+0	26.2	23.7	2.5
	1-J	Wheat	Barley	M	20+25+0	45.3	32.7	12.6

*This was an unfair check because the unfertilized check strip was situated so that it received more moisture from snow caught in near-by shelterbelts.

Alfred Cole	5	Fallow	Wheat		0+27+0	21.9	21.1	.8
	20	Fallow	Wheat		0+27+0	21.6	23.3	-1.7
	22	Fallow	Wheat		0+27+0	15.8	15.3	.5
	34	Fallow	Wheat		0+27+0	21.2	26.7	-5.5
	9	Wheat	Barley		20-25-0	22.2	21.7	0.5
	32	Wheat	Barley		20+25+0	18.8	15.0	3.8
	37	Fallow	Barley		0+27+0	41.5	29.2	12.3*

*The unfertilized check strip was green when it was cut along with the rest of the field.

Denver Rosberg	4-A	Rye	Wheat		20+25+0	13.2	10.9	2.3
	16-1	Wheat	Wheat	VL	20+25+0	11.2	14.0	-2.8
	16-H	Fallow	Wheat		0+27+0	18.4	12.0	6.4
	16-F ₂	Fallow	Wheat		0+27+0	15.2	14.8	.4
	21-A	Fallow	Wheat		0+27+0	20.5	17.7	2.8
	21-C	Wheat	Barley		20+25+0	20.8	19.6	1.2
	21-F	Fallow	Barley		0+27+0	37.0	26.5	10.5
	21-G	Wheat	Barley		20+25+0	17.0	15.3	1.7
	30-G	Barley	Barley	VL	20+25+0	12.8	14.5	-1.7

Norlan Rue	6-A	Fallow	Durum	VL	0+27+0	21.4	15.5	5.9
	1-A	Fallow	Durum	VL	0+27+0	20.0	18.9	1.1
	15-B	Fallow	Durum	VL	0+27+0	27.2	17.9	9.3
	6-D	Fallow	Wheat	VL	0+27+0	18.7	15.4	3.3
	16-E	Fallow	Wheat		0+27+0	23.3	14.0	9.3
	16-B	Fallow	Barley		0+27+0	33.3	26.0	7.3
	15-C	Wheat	Barley		20+25+0	16.2	12.2	4.0
	1-E	Wheat	Barley		20+25+0	23.5	19.0	4.5
	16-C	Wheat	Barley		20+25+0	17.0	15.7	1.3

Karl Vangness (Unable to get any accurate harvest comparisons because he had only 0-54-0 and it spread so unevenly.)

APPENDIX TABLE 6. CROP YIELD RESULTS ON TVA TEST DEMONSTRATION FARMS IN WILLIAMS COUNTY, 1959

Cooperator	Field No.	1958 Crop	1959 Crop	Soils Test	Nutrients per acre	Yield Bu/Acre		
						Fert.	Check	Difference
Paul Motzko	1	Barley	Winter Wheat	M	22+30+0	26.5	26.6	-0.1
	2	Wheat	Durum		16+42+0	29.0	28.7	0.3
	3	Corn	Barley		16+42+0	88.4	79.2	9.2
	10	Winter Wheat	Barley		16+42+0	56.8	56.4	0.4
	9	Corn	Oats		16+42+0	88.1	83.0	5.1
	7	Sugar Beets	Durum		16+42+0	65.5	50.1	15.4
	13	Wheat	Durum		16+42+0	31.1	27.4	3.7
	12	Alfalfa	Alfalfa		0+75+0	2543	1b.2093 lb.	450 lb*

*Second cutting of alfalfa. 3 cuttings are taken per year

Raymond Russell	3	Sugar Beets	Durum		10+26+0	38.1	32.2	5.9
	5	Sugar Beets	Durum		10+26+0	56.8	45.3	11.5

Zapara Brothers	3	Fallow	Wheat	H	9+24+0	13.5	13.7	-.2
	3	Fallow	Wheat	H	0+28+0	12.0	13.7	-1.7
	3	Fallow	Wheat	H	16+42+0	12.5	13.7	-1.2
	7	Corn	Wheat		10+ 3+0	15.2	15.5	-.3
	7	Corn	Wheat		30+10+0	16.0	15.5	.5
	7	Corn	Wheat		16+42+0	12.8	15.5	-2.7
	11	Fallow	Wheat	VL	10+26+0	10.1	9.7	.4
	11	Fallow	Wheat	VL	6+16+0	11.3	9.7	1.6
	13	Fallow	Wheat		9+23+0	10.0	10.7	-.7
	19	Fallow	Wheat	L	2+16+0	15.2	15.1	.1
Ardean Aafedt	30	Wheat	Wheat	H	24+ 8+0	29.1	27.5	1.6
	16	Winter Wheat	Barley	VL	7+18+0	16.0	14.0	2.0

Ardean Aafedt Bought 0-54-0 to apply on his wheat crop but the material had such poor physical qualities that he was unable to use it.

APPENDIX TABLE 7. Three Year Summary of Fertilizer Results in Barnes County.

Year	Acres	Fertilized Yield ^{1/}	Yield Response Per Acre ^{1/}	Cost of Fert./Acre	Gross Returns From Fert. per Acre	Net Returns From Fert. per Acre
WHEAT ON FALLOWED LAND						
1957	38	47.3 Bu.	7.8 Bu.	\$ 2.70	\$ 15.60	\$ 12.90
1958	81	53.6	4.4	2.26	8.12	5.86
1959	84	28.8	7.3	3.27	13.81	10.54
3 yr. Ave.	203 ^{2/}	42.2	6.2	2.76	11.87	9.11
WHEAT ON NON-FALLOWED LAND						
1957	135	47.2 Bu.	9.1 Bu.	\$ 6.19	\$ 18.19	\$ 12.00
1958	273	36.1	6.9	6.04	12.69	6.65
1959	340	23.9	6.6	5.68	12.59	6.91
3 yr. Ave.	748 ^{2/}	32.6	7.2	5.90	13.64	7.74
BARLEY ON FALLOWED LAND						
1957	14	47.8 Bu.	9.8 Bu.	\$ 2.70	\$ 8.23	\$ 5.53
1958	75	62.5	5.5	2.07	4.35	2.28
1959	27	31.8	21.6	4.04	17.06	13.02
3 yr. Ave.	116 ^{2/}	53.6	9.8	2.61	7.78	5.17
BARLEY ON NON-FALLOWED LAND						
1957	186	40.1 Bu.	14.8 Bu.	\$ 6.20	\$ 12.41	\$ 6.21
1958	450	51.1	14.5	5.50	11.44	5.94
1959	543	36.4	8.6	5.68	6.94	1.26
3 yr. Ave.	1179 ^{2/}	42.6	11.8	5.69	9.52	3.83
OATS ON NON-FALLOWED LAND						
1957	72	82.4 Bu.	17.9 Bu.	\$ 6.14	\$ 8.43	\$ 2.29
1958	53	107.0	18.7	5.91	7.66	1.75
1959	50	69.5	17.5	6.04	9.10	3.06
3 yr. Ave.	175 ^{2/}	86.2	18.0	6.04	8.39	2.35
ALL SMALL GRAINS CHECKED						
1957	445			\$ 5.78	\$ 13.66	\$ 7.88
1958	932			5.12	10.73	5.61
1959	1044			5.46	9.70	4.24
3 yr. Ave.	2421 ^{2/}			5.39	10.82	5.43

^{1/} The yield and response obtained from the harvest samples are assumed to be representative of the field in which they were obtained.

^{2/} Total acreage for three year period.

APPENDIX TABLE 8. THREE YEAR SUMMARIES OF FERTILIZER RESULTS IN RAMSEY COUNTY.

Year	Acre	Fertilized Yield ^{1/}	Yield Response To Fert. ^{1/}	Cost of Fert./Acre	Gross Return From Fert. per acre	Net Return From Fert. per acre
<u>WHEAT ON FALLOWED LAND</u>						
1957	127	29.2 Bu.	-.1 Bu.	\$ 2.70	\$ -.28	\$ -2.98
1958	215	44.1	4.6	2.29	8.37	6.08
1959	154	31.4	3.7	2.12	7.09	5.97
3 yr.Ave.	4962/	36.4	3.1	2.34	5.75	3.41
<u>WHEAT ON NON FALLOWED LAND</u>						
1957	45	34.3 Bu.	8.8 Bu.	\$ 4.16	\$ 17.60	\$ 13.44
1958	95	35.1	4.5	5.96	8.41	2.45
1959	115	23.8	6.0	6.52	11.43	4.91
3 yr.Ave.	2552/	31.1	6.0	5.90	11.40	5.50
<u>DURUM ON FALLOWED LAND</u>						
1957	237	31.7 Bu.	2.9 Bu.	\$ 2.70	\$ 5.75	\$ 3.05
1958	142	47.4	1.1	2.12	2.13	.01
1959	268	30.4	3.9	2.70	8.36	5.66
3 yr.Ave.	6472/	34.6	2.9	2.57	6.03	3.46
<u>DURUM ON NON FALLOWED LAND</u>						
1957	136	29.4 Bu.	3.6 Bu.	\$ 5.90	\$ 7.19	\$ 1.29
1958	166	35.4	4.5	5.78	8.87	3.10
1959	81	18.5	4.2	5.49	8.89	3.40
3 yr.Ave.	3832/	29.7	4.1	5.76	8.28	2.52
<u>BARLEY ON FALLOWED LAND</u>						
1958	20	65.2 Bu.	8.5 Bu.	\$ 2.53	\$ 6.72	\$ 4.19
<u>BARLEY ON NON FALLOWED LAND</u>						
1957	377	31.4 Bu.	7.1 Bu.	\$ 6.16	\$ 5.99	\$ -.17
1958	441	50.7	14.2	5.40	11.24	5.84
1959	647	31.1	6.6	6.09	5.19	-.90
3 yr.Ave.	14652/	37.1	9.0	5.89	7.21	1.32
<u>OATS ON NON FALLOWED LAND</u>						
1959	73	37.9 Bu.	6.2 Bu.	\$ 6.25	\$ 3.22	\$ -3.03
<u>ALL SMALL GRAINS CHECKED</u>						
1957	922			\$ 4.66	\$ 5.81	\$ 1.15
1958	1079			4.40	8.77	4.37
1959	1338			4.96	6.70	1.74
3 yr.Ave.	33392/			4.70	7.12	2.42

^{1/} The yield and response obtained from the harvest samples are assumed to be representative of the field in which they were obtained.

^{2/} Total acreage for three year period.

APPENDIX TABLE 9. THREE YEAR SUMMARY OF FERTILIZER RESULTS IN MORTON COUNTY

Year	Acres	Fertilized Yield <u>1/</u>	Yield Response Per Acre <u>1/</u>	Cost of Fert./Acre	Gross Returns From Fert. per acre	Net Returns From Fert. per acre
<u>WHEAT ON FALLOWED LAND</u>						
1957	211	30.6 Bu.	3.2 Bu.	\$ 2.70	\$ 6.36	\$ 3.66
1958	406	30.6	5.0	2.90	7.41	4.51
1959	110	20.3	7.1	2.84	13.44	10.60
3 yr.Ave.	7272/	29.0	4.8	2.83	8.02	5.19
<u>WHEAT ON NON FALLOWED LAND</u>						
1957	217	24.4 Bu.	6.0 Bu.	\$ 6.24	\$ 11.90	\$ 5.66
1958	210	27.2	5.8	5.43	10.65	5.22
1959	79	4.7	.0	4.85	0.00	-4.85
3 yr.Ave.	506 <u>2/</u>	22.5	4.9	5.68	9.52	3.84
<u>BARLEY ON FALLOWED LAND</u>						
1957	42	61.5 Bu.	2.2 Bu.	\$ 2.70	\$ 1.81	\$ -.89
<u>BARLEY ON NON FALLOWED LAND</u>						
1957	22	53.8 Bu.	1.6 Bu.	\$ 5.86	\$ 1.34	\$ - 4.52
1958	18	38.3	5.0	4.75	3.95	- .80
2 yr.Ave.	40 <u>2/</u>	46.8	3.1	5.36	2.51	- 2.85
<u>OATS ON FALLOWED LAND</u>						
1957	40	60.0 Bu.	5.0 Bu.	\$ 2.70	\$ 2.35	\$ -.35
<u>OATS ON NON FALLOWED LAND</u>						
1957	23	66.6 Bu.	5.0 Bu.	\$ 6.24	\$ 2.23	\$ -4.01
<u>ALL SMALL GRAINS CHECKED</u>						
1957	555			\$ 4.35	\$ 7.52	\$ 3.17
1958	634			3.79	8.39	4.60
1959	189			3.68	7.82	4.14
3 yr.Ave.	1378 <u>2/</u>			4.00	7.96	3.96

1/ The yield and response obtained from the harvest samples are assumed to be representative of the field in which they were obtained.

2/ Total acreage for three year period.

APPENDIX TABLE 10. THREE YEAR SUMMARY OF FERTILIZER RESULTS IN STARK COUNTY.

Year	Acres	Fertilized Yield <u>1/</u>	Yield Response Per Acre <u>1/</u>	Cost of Fert./Acre	Gross Returns from fert. per acre	Net Returns from fert. per acre
<u>WHEAT ON FALLOWED LAND</u>						
1957	140	25.6 Bu.	3.7 Bu.	\$ 1.87	\$ 7.50	\$ 5.63
1958	226	34.4	6.4	3.14	11.78	8.64
1959	163	13.7	4.9	2.88	9.27	6.39
3 yr.Ave.	529 2/	25.7	5.2	2.72	9.87	7.15
<u>WHEAT ON NON FALLOWED LAND</u>						
1957	54	33.7 Bu.	5.6 Bu.	\$ 6.24	\$ 11.15	\$ 4.91
1958	235	27.2	4.2	5.66	7.82	2.16
1959	186	14.0	.4	6.10	.78	-5.32
3 yr.Ave.	475 2/	22.8	2.9	5.90	5.45	-.45
<u>BARLEY ON FALLOWED LAND</u>						
1957	17	34.7 Bu.	5.2 Bu.	\$ 2.70	\$ 4.42	\$ 1.72
<u>BARLEY ON NON FALLOWED LAND</u>						
1957	20	32.0 Bu.	3.0 Bu.	\$ 2.94	\$ 2.55	\$ -.39
1958	100	48.3	7.8	5.83	6.12	.29
1959	113	14.8	4.5	5.68	3.52	-2.16
3 yr.Ave.	233 2/	30.7	5.8	5.51	4.55	-.96
<u>OATS ON NON FALLOWED LAND</u>						
1957	51	62.1 Bu.	21.5 Bu.	\$ 6.39	\$ 9.45	\$ 3.06
1958	24	61.8	20.1	5.92	8.25	2.33
1959	20	37.8	5.0	7.23	2.60	-4.63
3 yr.Ave.	95 2/	56.9	17.6	6.45	7.70	1.25
<u>ALL SMALL GRAINS CHECKED</u>						
1957	203			\$ 4.22	\$ 9.19	\$ 4.97
1958	587			4.80	9.15	4.35
1959	481			4.96	4.37	-.59
3 yr.Ave.	1271 2/			4.77	7.34	2.57

1/ The yield and response obtained from the harvest samples are assumed to be representative of the field in which they were obtained.

2/ Total acreage for three year period.

APPENDIX TABLE 11. TWO YEAR SUMMARY OF FERTILIZER RESULTS IN McLEAN COUNTY.

Year	Acres	Fertilized Yield <u>1/</u>	Yield Response Per acre <u>1/</u>	Cost of Fert./Acre	Gross Returns From Fert./Acre	Net Returns From Fert./Acre
<u>WHEAT ON FALLOWED LAND</u>						
1958	500	35.6 Bu.	5.7 Bu.	\$ 2.63	\$10.49	\$ 7.86
1959	285	21.8	3.2	2.35	5.99	3.64
2 yr.Ave.	785 <u>2/</u>	30.6	4.8	2.53	8.86	6.33
<u>WHEAT ON NON FALLOWED LAND</u>						
1958	70	23.6 Bu.	3.5 Bu.	\$ 6.40	\$ 6.47	\$.07
1959	65	12.1	-.4	4.85	-.85	-5.70
2 yr.Ave.	135 <u>2/</u>	17.7	1.6	5.65	2.94	-2.71
<u>DURUM ON FALLOWED LAND</u>						
1958	62	31.3 Bu.	6.7 Bu.	\$ 2.43	\$ 13.09	\$ 10.66
1959	109	22.9	5.5	2.43	11.68	9.25
2 yr.Ave.	171 <u>2/</u>	25.9	5.9	2.43	12.19	9.76
<u>DURUM ON NON FALLOWED LAND</u>						
1958	31	26.8 Bu.	1.8 Bu.	\$ 4.53	\$ 3.42	\$-1.11
1959	35	15.4	.6	6.04	1.22	-4.82
2 yr. Ave.	66 <u>2/</u>	20.7	1.1	5.34	2.25	-3.09
<u>BARLEY ON FALLOWED LAND</u>						
1958	63	55.2 Bu.	4.2 Bu.	\$ 2.59	\$ 3.30	\$.71
1959	111	36.3	10.5	2.32	8.27	5.95
2 yr.Ave.	174 <u>2/</u>	43.2	8.2	2.41	6.47	4.06
<u>BARLEY ON NON FALLOWED LAND</u>						
1958	175	46.8 Bu.	9.2 Bu.	\$ 6.14	\$ 7.26	\$ 1.12
1959	244	20.7	2.5	4.95	1.99	-2.96
2 yr.Ave.	419 <u>2/</u>	31.6	5.3	5.45	4.19	-1.26
<u>ALL SMALL GRAINS CHECKED</u>						
1958	901			\$ 3.65	\$ 8.98	\$ 5.33
1959	850			3.45	5.15	1.70
2 yr.Ave.	1751 <u>2/</u>			3.55	7.12	3.57

1/ The yield and response obtained from the harvest samples are assumed to be representative of the field in which they were obtained.

2/ Total acres during two year period.

APENDIX TABLE 12. TWO YEAR SUMMARY OF FERTILIZER RESULTS IN WILLIAMS COUNTY.

Year	Acres	Fertilized Yield <u>1/</u>	Yield Response Per Acre <u>1/</u>	Fert. Cost Per Acre	Gross Returns from fert./ acre	Net Return from fert. acre
<u>WHEAT ON FALLOWED ON DRYLAND</u>						
1958	320	21.0 Bu.	3.0 Bu.	\$ 3.05	\$ 5.09	\$ 2.04
1959	140	11.9	-.1	3.09	-.08	-3.17
2 yr.Ave.	460 <u>2/</u>	18.3	2.0	3.06	3.52	.46
<u>WHEAT ON NON FALLOWED DRYLAND</u>						
1959	53	12.8 Bu.	-2.7 Bu.	\$ 5.86	\$ -5.13	\$ -10.99
<u>BARLEY ON NON FALLOWED DRYLAND</u>						
1959	19	16.0 Bu.	2.0 Bu.	\$ 2.53	\$ 1.58	\$ -.95
<u>ALL SMALL GRAINS CHECKED ON DRYLAND</u>						
1958	320			\$ 3.05	\$ 5.09	\$ 2.04
1959	212			3.73	-1.19	-4.92
2 yr.Ave.	532 <u>2/</u>			3.32	2.59	-.73
<u>DURUM ON IRRIGATED NON FALLOW</u>						
1958	67	68.8 Bu.	9.2 Bu.	\$ 5.31	\$ 18.03	\$ 12.72
1959	132	41.0	6.1	5.12	12.91	7.79
2 yr.Ave.	199 <u>2/</u>	50.4	7.2	5.18	14.63	9.45
<u>WHEAT ON IRRIGATED NON FALLOW</u>						
1958	71	41.4 Bu.	5.2 Bu.	\$ 4.74	\$ 9.64	\$ 4.90
1959	35	29.1	1.6	3.12	3.04	-.08
2 yr.Ave.	106 <u>2/</u>	37.3	4.0	4.20	7.44	3.24
<u>WINTER WHEAT ON IRRIGATED NON FALLOW</u>						
1958	20	59.3 Bu.	11.7 Bu.	\$ 6.35	\$ 19.89	\$ 13.54
1959	34	26.5	-.1	5.56	-.17	-5.73
2 yr.Ave.	54 <u>2/</u>	38.6	4.3	5.85	7.26	1.41
<u>BARLEY ON IRRIGATED NON FALLOW</u>						
1959	46	74.7 Bu.	5.4 Bu.	\$ 5.86	\$ 4.25	\$ -1.61
<u>OATS ON IRRIGATED NON FALLOW</u>						
1959	10	88.1 Bu.	5.1 Bu.	\$ 5.86	\$ 2.65	\$ -3.21
<u>ALL SMALL GRAIN CHECKED ON IRRIGATION</u>						
1958	158			\$ 5.19	\$ 14.50	\$ 9.31
1959	257			5.07	7.89	2.82
2 yr.Ave.	415 <u>2/</u>			5.12	10.41	5.29

1/ The yield and response obtained from the harvest samples are assumed to be representative of the field in which they were obtained.

2/ Total acreage for two year period.

APPENDIX TABLE 13. THREE YEAR SUMMARY OF FERTILIZER RESULTS ON TVA TEST- DEMONSTRATION FARMS IN NORTH DAKOTA.

Year	Acres	Fertilized Yield ^{1/}	Yield Response Per Acre ^{1/}	Cost of Fert./Acre	Gross Returns from Fert./Acre	Net Returns from Fert., Acre
<u>WHEAT ON FALLOWED LAND</u>						
1957	517	30.1 Bu.	2.9 Bu.	\$ 2.47	\$ 5.72	\$ 3.25
1958	1748	33.5	4.9	2.77	8.58	5.81
1959	936	20.9	3.9	2.66	7.41	4.75
3 yr.Ave.	3201 ^{2/}	29.3	4.3	2.69	7.77	5.08
<u>WHEAT ON NON FALLOWED LAND</u>						
1957	450	34.1 Bu.	7.1 Bu.	\$ 6.02	\$ 14.27	\$ 8.25
1958	883	30.4	5.4	5.81	9.96	4.15
1959	837	18.3	3.4	5.76	6.46	.70
3 yr.Ave.	2170 ^{2/}	26.5	5.0	5.83	9.50	3.67
<u>DURUM ON FALLOWED LAND</u>						
1957	237	31.7 Bu.	2.9 Bu.	\$ 2.70	\$ 5.75	\$ 3.05
1958	204	42.5	2.8	2.21	5.45	3.24
1959	377	28.2	4.4	2.62	9.31	6.69
3 yr.Ave.	818 ^{2/}	32.8	3.4	2.34	7.32	4.78
<u>DURUM ON NON FALLOWED LAND</u>						
1957	136	29.4 Bu.	3.6 Bu.	\$ 5.90	\$ 7.19	\$ 1.29
1958	197	34.1	4.1	5.58	8.01	2.43
1959	116	17.6	3.1	5.66	6.55	.89
3 yr.Ave.	449 ^{2/}	26.2	3.7	5.70	7.39	1.69
<u>BARLEY ON FALLOWED LAND</u>						
1957	73	49.9 Bu.	3.9 Bu.	\$ 2.70	\$ 3.65	\$.95
1958	158	59.9	5.4	2.34	4.23	1.89
1959	138	35.4	12.7	2.65	9.99	7.34
3 yr.Ave.	369 ^{2/}	48.8	7.8	2.53	6.27	3.74
<u>BARLEY ON NON FALLOWED LAND</u>						
1957	605	34.9 Bu.	9.1 Bu.	\$ 6.05	\$ 7.68	\$ 1.63
1958	1184	49.9	12.9	5.57	10.18	4.61
1959	1566	29.9	6.4	5.69	5.13	-.56
3 yr.Ave.	3355 ^{2/}	38.4	9.3	5.78	7.47	1.67
<u>OATS ON FALLOWED LAND</u>						
1957	40	60.0 Bu.	5.0 Bu.	\$ 2.70	\$ 2.35	\$ -.35
<u>OATS ON NON FALLOWED LAND</u>						
1957	146	72.8 Bu.	17.1 Bu.	\$ 6.24	\$ 7.81	\$ 1.57
1958	77	92.9	19.1	5.91	7.84	1.93
1959	143	48.9	10.0	6.31	5.19	-1.12
3 yr.Ave.	366 ^{2/}	67.7	14.8	6.20	6.79	.59
<u>ALL SMALL GRAINS CHECKED ON DRYLAND</u>						
1957	2204			4.68	8.11	3.43
1958	4451			4.26	8.94	4.68
1959	4113			4.65	6.51	1.86
3 yr.Ave.	10,768 ^{2/}			4.49	7.87	3.35

^{1/} The yield and response obtained from the harvest samples are assumed to be representative of the field in which they were obtained.
^{2/} Total acreage for three year period.