GRICULTURAL ECONOMICS REPORT NO. 35

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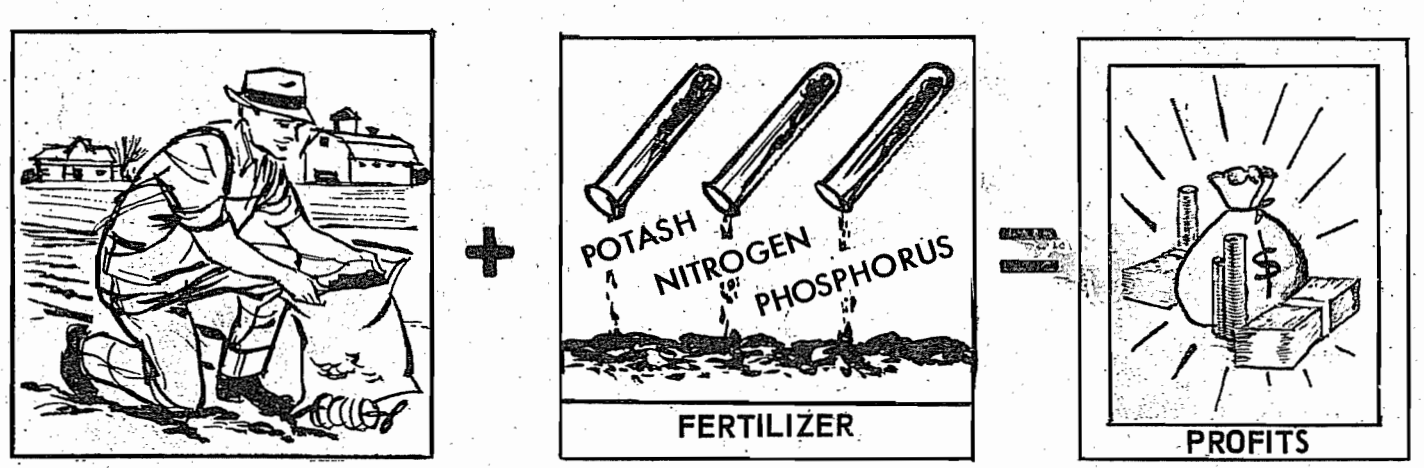
the 1963 REPORT

ON TEST-DEMONSTRATION FARMS IN NORTH DAKOTA



SOIL TESTING

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FOREWORD

This publication is the seventh annual report of fertilizer test-demonstration work in North Dakota. This work has been made possible by cooperation of the Tennessee Valley Authority. They provide a grant to the North Dakota Agricultural Experiment Station to help support this work and also make experimental fertilizer materials available at a reduced price for educational and demonstrational work.

North Dakota Farmers Cooperating in 1963

Cooperator	Address	Cooperator	Address
Anderson Brothers	Hillsboro	Knight Farm	Casselton
Bruce Anderson	Bowbells	John Larson	Lemmon, S. D.
Daryl Anderson	Reeder	J. P. Lorenzen	Mohall
Howard Anderson	Willow City	Earl Nelson	Gascoyne
Harold Bergman	Bottineau	C. L. O'Keefe	Lansford
Harry Benshoof	Flaxton	George Ott	Reeder
Floyd Bryan, Jr.	Bowbells	Ralph Peterson	Harwood
Henry Busch	Portal	Paul Pratt	Gardner
Morten Clausen	Norma	Randolph Brothers	Lansford
Gene Davison	Haynes	Lorry Rotvold	Halstad, Minn.
Alvin Dill	Regent	Marce Schaefer	Glenburn
Fred Ehlers	Hettinger	Henry Schlichtmann	Hillsboro
Arnold Funk	Bowbells	Delmar Schulz	Davenport
Art Grove	Hillsboro	Donald Schumacher	Scranton
Orlin Gunderson	Buxton	Walter Stzegura	Gascoyne
Harold Hanson	New England	Dave Witteman	Mohall
Ervin Haux	Kindred	George Witteman Co.	Mohall
Frank Kalisiak	Scranton	Raymond Wothe	Reeder
Roy Kern	Scranton	Henry Zahn, Jr.	New England
Kermit Kjonaas	Maxbass		

ACKNOWLEDGEMENTS

The authors thank the farm cooperators and the county extension agents in Adams, Bottineau, Bowman, Burke, Cass, Hettinger, Renville and Traill counties for their help. Without their assistance, the information contained in this publication could not have been obtained.

TABLE OF CONTENTS

THE 1963 REPORT ON THE FERTILIZER TEST-DEMONSTRATION PROGRAM IN NORTH DAKOTA

Herman W. Delvo[1] and Virgil Weiser[2]

The Tennessee Valley Authority and the North Dakota State University of Agriculture and Applied Sciences cooperate in the conduct of a test-demonstration program in North Dakota. The broad objectives of this program are:

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

The North Dakota Agricultural Experiment Station and the North Dakota Extension Service cooperate in conducting this program within the state. The Agricultural Economics Department conducts its share of the program under Station Project S-3-5 which has as its main objective an economic evaluation of a recommended and balanced fertilizer program as it applies to the over-all farm. The responsibilities of various cooperating personnel are explained in the 1960 report (Agricultural Economics Report Number 18).

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[1]Assistant in Agricultural Economics, North Dakota State University

[2]Extension Soils Agent, North Dakota State University

The test-demonstration program has been operative in North Dakota for seven years, 1957 thru 1963. During this period, the average annual profitability of fertilizer application has varied from a low of minus 2 per cent in 1961 to a high of 117 per cent in 1962. The average annual per cent profit figures are shown graphically in figure 1.

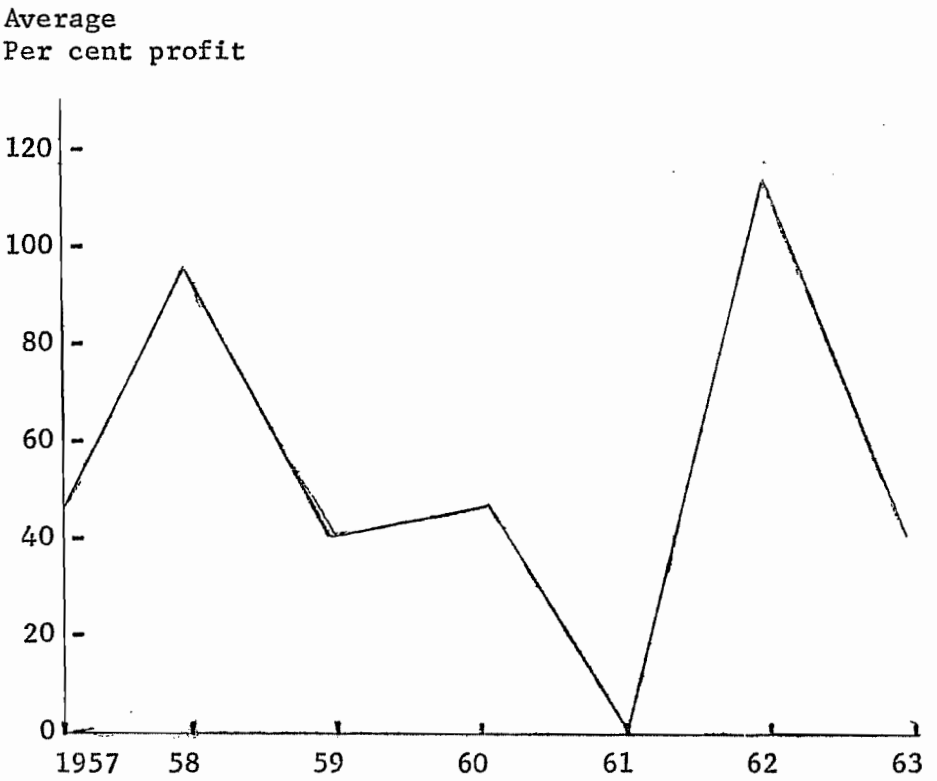

Figure 1. Average Annual Profitability of Fertilizer on Test-Demonstration Farms in North Dakota, 1957-1963.

The average profitability for the entire seven year period was 56 per cent.[3] In other words, for each $100 invested in fertilizer an average return of 156 was received. However, in only two of the seven years was the profit above the average. In these two years North Dakota experienced exceptional crop yields as indicated in figure 2.

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[3] Simple average.

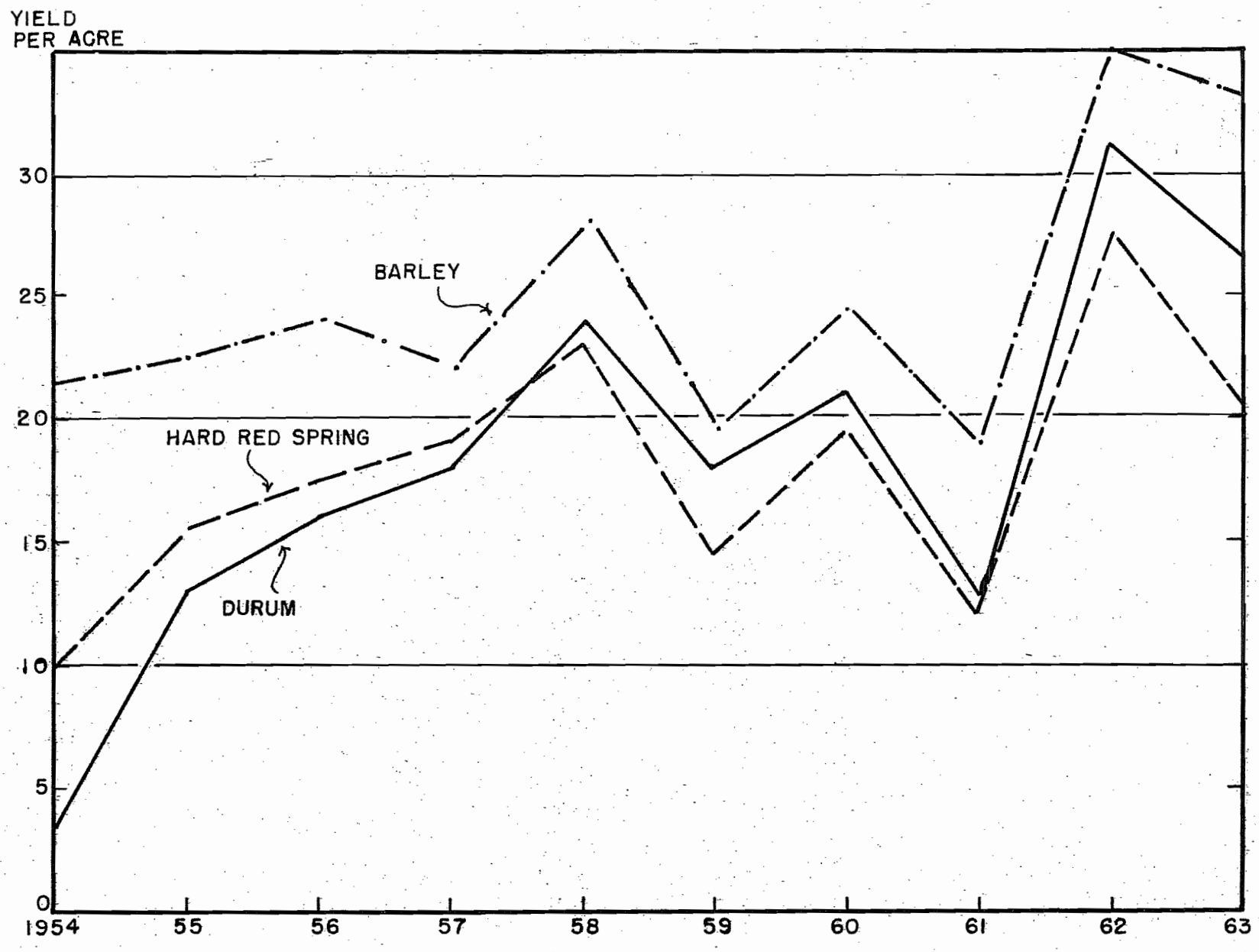

Figure 2. Average Yield Per Acre in North Dakota for HRS Wheat, Durum and Barley, 1954-1963. Source: Annual Summaries, USDA Statistical Reporting Service and Department of Agricultural Economics, North Dakota State University of Agriculture and Applied Science.

The profitability of fertilizer use is directly affected by three factors. These factors cannot be controlled by the farmer, but he must take them into account when using fertilizer. These factors are: (1) Yield response from fertilizer, (2) Fertilizer cost per acre, and (3) Price per bushel of the commodity produced.

Variations in the profitability of fertilizer responses are affected little by fertilizer costs per acre. The cost of fertilizer has remained fairly constant and the number of pounds applied per acre is governed by soil type and native fertility and soil moisture at planting time.

The other two factors, yield increase per acre and price per bushel, exert considerable influence on the profitability of fertilizer responses. These two factors are highly interrelated. Generally, when yield increases are low the supply of the product is short and prices increase. When yield increases are high the supply of the product is large and prices decline. Due to this interaction, a small increase in yield might result in a large profit, while a large increase in yield might result in a small profit.

The yield increase per acre is affected by many factors, such as:

1. Soil type and native fertility.
2. Soil moisture at planting time.
3. Amount and distribution of rainfall during the growing season.
4. Temperature and wind speed. Especially warm southerly winds.
5. Natural hazards: Hail, diseases, insects, and wildlife.

The first two factors, soil type and native fertility and soil moisture at planting time, are considered when recommending fertilizer treatments. In some areas of North Dakota the amount of rainfall in conjunction with reserves of native fertility is such that crop yield do not respond appreciably to the application of phosphate fertilizer.[4] Soil moisture at planting time is especially

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[4] The 1962 Report on Test-Demonstration Farms in North Dakota, Agricultural Economics Report No. 31, North Dakota State University of Agriculture and Applied Science, Fargo, North Dakota, May 1963.

especially critical. If moisture reserves are low, the crop might germinate but if it doesn't receive adequate moisture during the season, yields will be low or there might not be a crop. However, if soil moisutre is good at planting time the possibility of average yields and yield increases due to fertilizer is greatly enhanced.

The other three factors which affect increases in yield are completely unpredictable. However, their influence on yield increases is evident at harvest time as shown in figure 3. From 1957 to 1960 the average yield increases for HRS wheat and durum on fallowed land were combined. Since 1961 the average yield increases for the two crops have been calculated separately. Not only do yield increases vary from year to year, but different crops respond differently as indicated by the HRS wheat and durum yield increases from 1961 to 1963. Responses will also vary within a field. For example, one cooperator made three checks in one field in 1963 and had yield increases of 4.5, 6.9 and 9.6 bushels per acre.

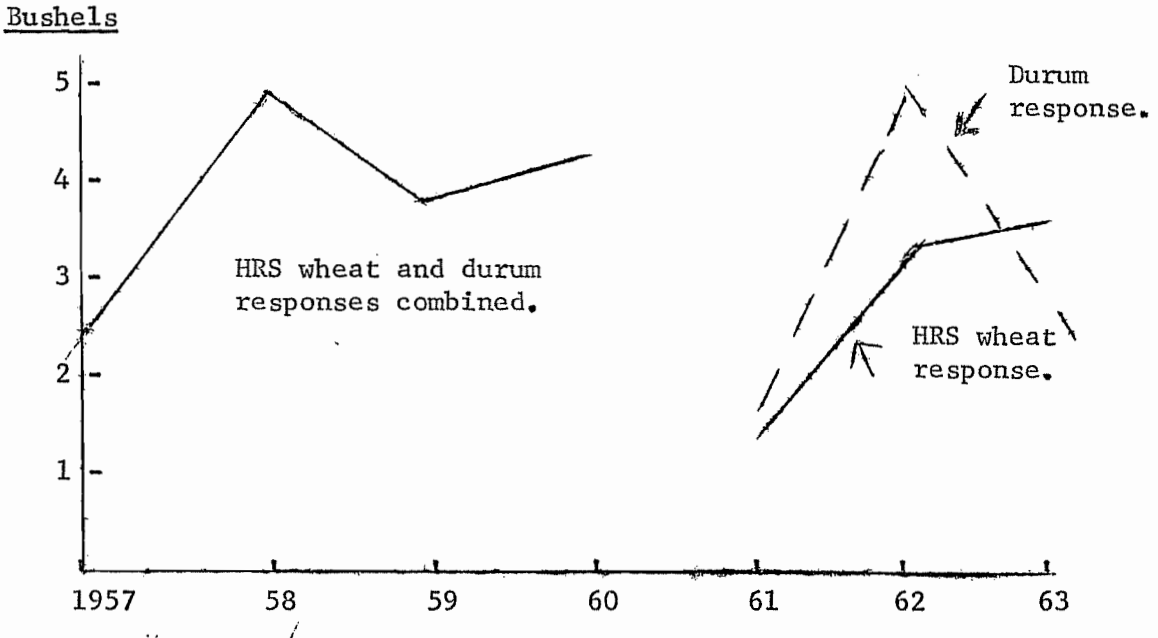

Figure 3. Yield Increases Per Acre for HRS Wheat and Durum on Fallowed Land on Test-Demonstration Farms in North Dakota, 1957-1963.

Fertilizer cost per acre is affected by the cost of the fertilizer material and the number of pounds of fertilizer applied per acre. The average cost per ton of fertilizer has varied little over the years as illustrated in figure 4.

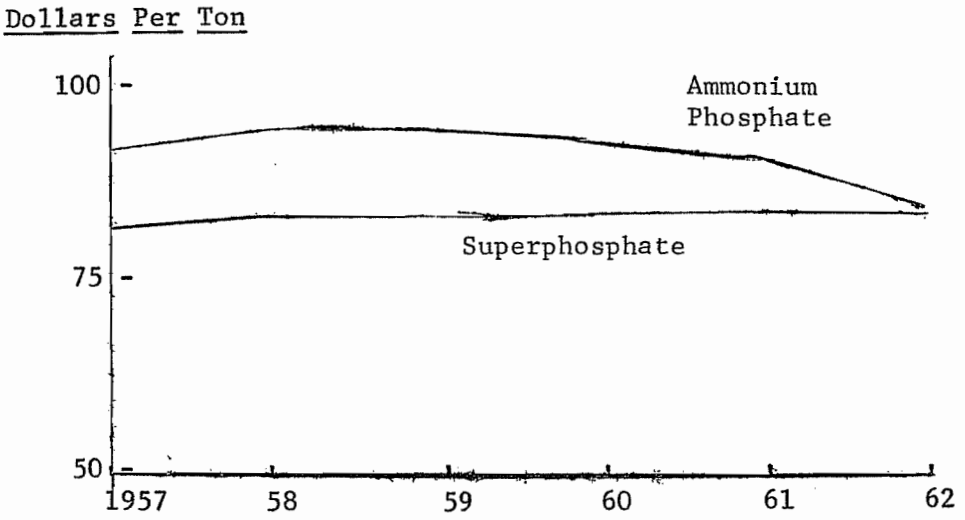

Figure 4. Average Cost Per Ton of Ammonium Phosphate and Superphosphate in North Dakota, 1957-1963. Source: Price Trends in North Dakota, USDA Statistical Reporting Service and Department of Agricultural Economics, North Dakota State University of Agriculture and Applied Science, January 1964.

Superphosphate has increased from $78.00 per ton in 1957 to $81.70 per ton in 1962. Ammonium phosphate has declined from a high of $90.00 per ton in 1958 to $82.00 per ton in 1962. Therefore, it is not the cost of the fertilizer materials but rather the number of pounds of fertilizer applied per acre that affect the fertilizer cost per acre.

The price per bushel of grains varies considerably from year to year. The variation in price is caused by the supply of and the demand for the product as affected by both natural conditions and economic provisions included in government farm programs.

During the last 10 years HRS wheat and barley prices have varied slightly; however, durum prices have fluctuated considerably. These prices are shown graphically in figure 5. The high prices received for durum in 1954 and 1961

resulted from short supplies caused by rust and drought, respectively. When growing conditions were more favorable, production increased and prices declined.

Even if yield increases and fertilizer costs per acre were to remain constant, a decrease or increase in product price would affect the profitability of fertilizer responses considerably.

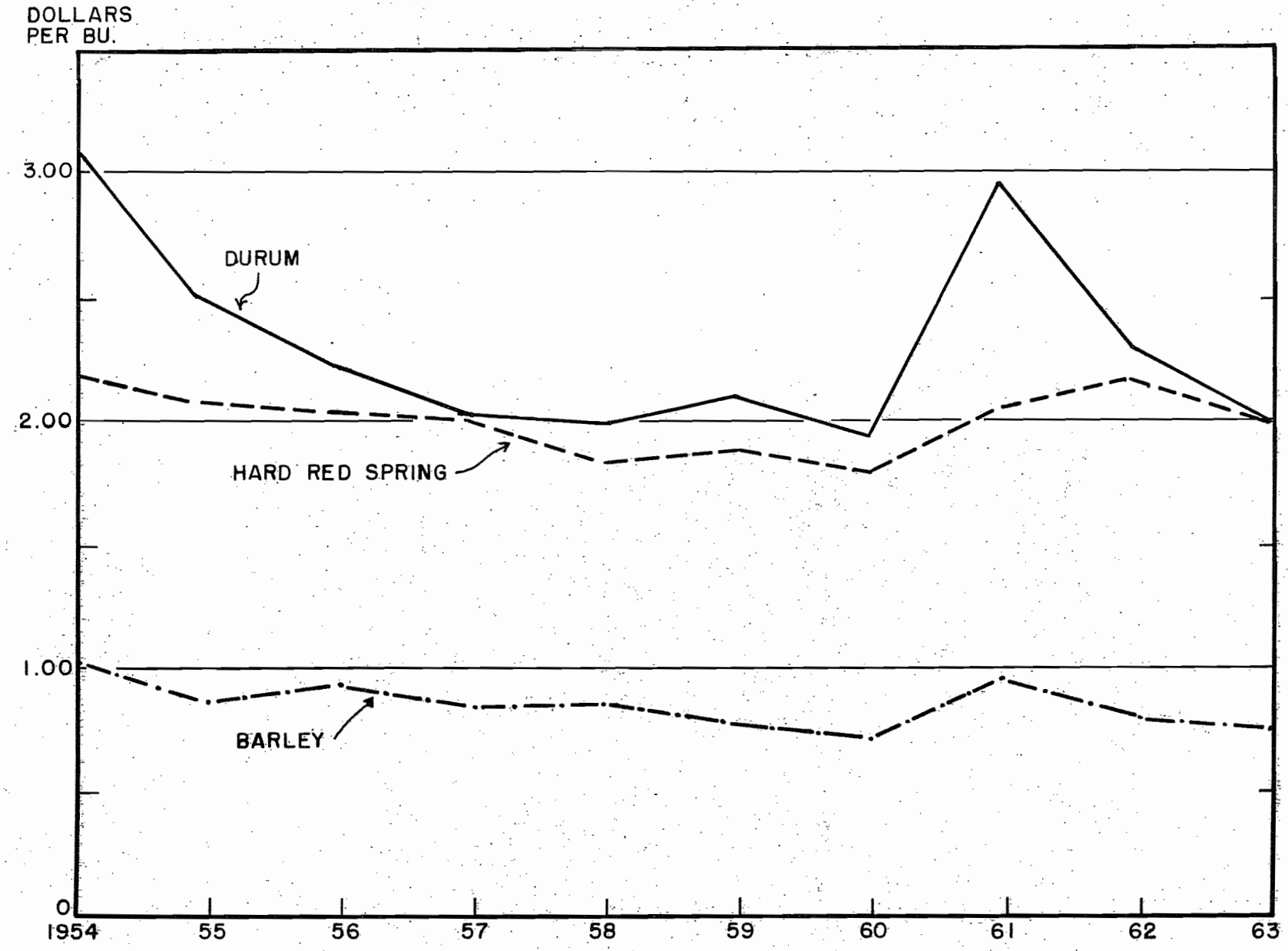

Figure 5. Season Average Prices Received by North Dakota Farmers for HRS Wheat, Durum and Barley, 1954-1963. Source: Price Trends in North Dakota, USDA Statistical Reporting Service and Department of Agricultural Economics, North Dakota State University of Agriculture and Applied Science, January 1964.

Active Test-Demonstration Farms in North Dakota

Eight counties completed their second year in the Tennessee Valley Authority Test-Demonstration Program. These were: Adams, Bottineau, Bowman, Burke, Cass, Hettinger, Renville and Traill counties. The location of the participating counties is shown on the map in figure 6.

The number of active test-demonstration cooperators is shown in table 1. At the start of the year, 40 cooperators were active in the program. One cooperator passed away and was replaced in the program by his son-in-law. Two cooperators dropped out because of lease arrangements and one because of work conflicts. One additional cooperator was added during the year. Thirty-eight cooperators were active at the end of the year.

TABLE 1. NUMBER OF ACTIVE TEST-DEMONSTRATION COOPERATORS

County	Cooperators Active January 1, 1963	Number Dropped During Year	Number Added During Year	Cooperators Active At End of Year
Adams	5	-	-	5
Bottineau	5	-	-	5
Bowman	5	1	1	5
Burke	5	1	-	4
Cass	5	-	-	5
Hettinger	5	1	-	4
Renville	5	-	-	5
Traill	5	1	1	5
Total	40	4	2	38

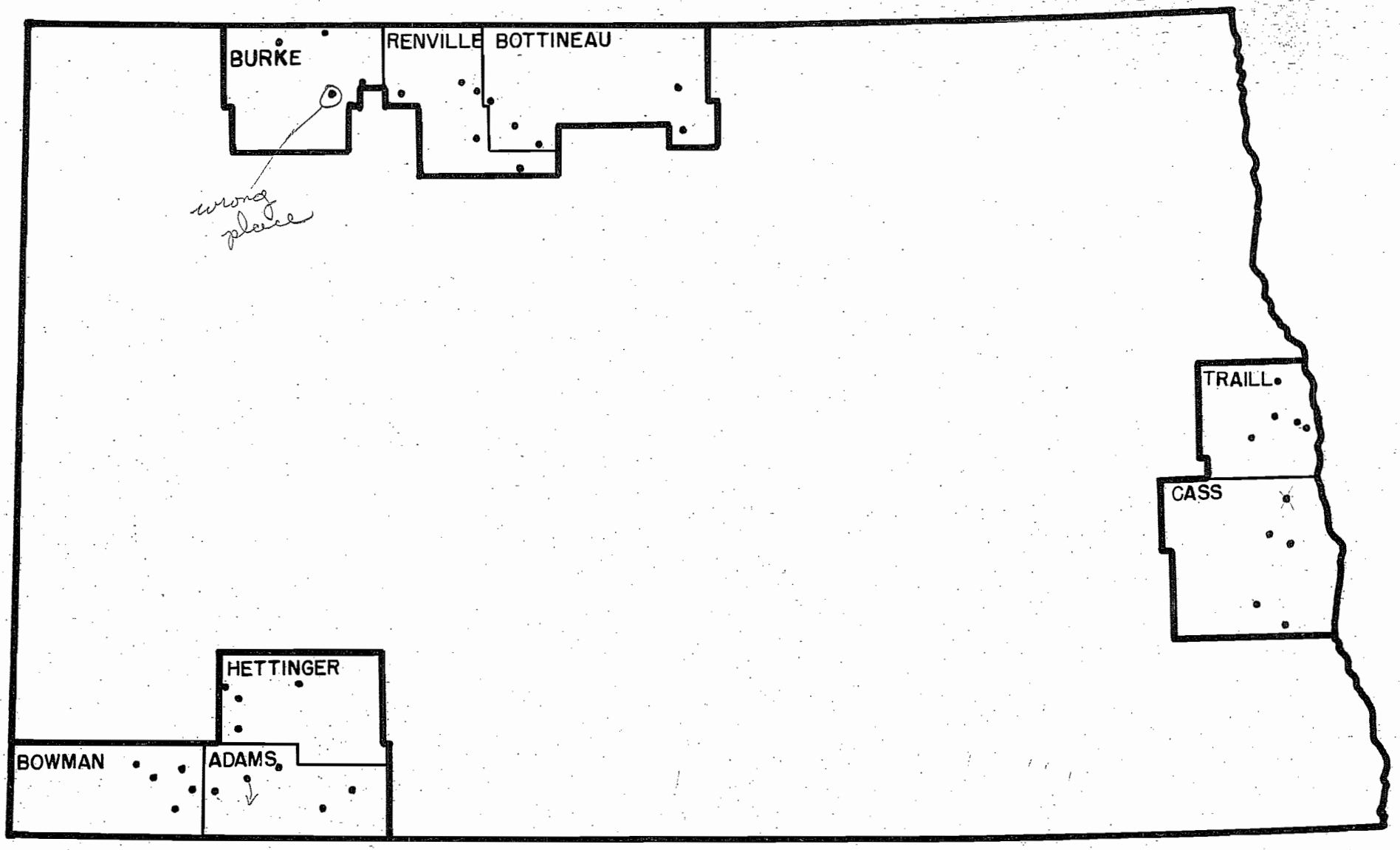

Figure 6. Location of Test-Demonstration Farms.

The test-demonstration cooperators keep farm records which are analyzed in conjunction with the North Dakota Extension Farm Account Route which has been in operation four years. Other farmers in each of the counties are co-operating in the farm account route. These additional farm records allow for comparative analysis of farm records in the test-demonstration counties.

The test-demonstration cooperators take soil samples which are analyzed by the Soil Testing Laboratory, Soils Department, North Dakota State University. In addition to soil fertility, soil moisture is a primary factor in fertilizer response. The results of the soil test and the soil moisture situation at planting time must be considered when making fertilizer recommendations and treatments to obtain optimum returns.

A good soil moisture situation suggests heavier fertilizer rates, and a poor moisture reserve suggests lower fertilizer rates. The test-demonstration cooperators and project leaders consider all factors relative to individual fields and farms when deciding on fertilizer treatments for specific crops and fields. The primary objective of the study is to determine the economic impact of recommended fertilizer program on the entire farm.

Moisture Situation in 1963

The moisture situation , as shown in figure 7, was generally good throughout the state in 1963. The average precipitation for the state in 1963 was about 17.15 inches. This was a decrease of about 18 per cent from 1962 which had an average of 20.99 inches. However, precipitation was above the normal annual precipitation for the state of 16.82 inches.[5]

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[5] Annual Summary for 1961, North Dakota Crop and Livestock Statistics No. 8, North Dakota State University of Agriculture and Applied Science, May 1962.

There were scattered areas of excess moisture in the Northern counties to droughty areas in the Southwestern counties. The Valley counties experienced excess moisture in 1962 and a shortage of moisture during the latter part of the growing season in 1963. The average precipitation in the Valley counties was 14.26 inches or about 23 per cent below normal.

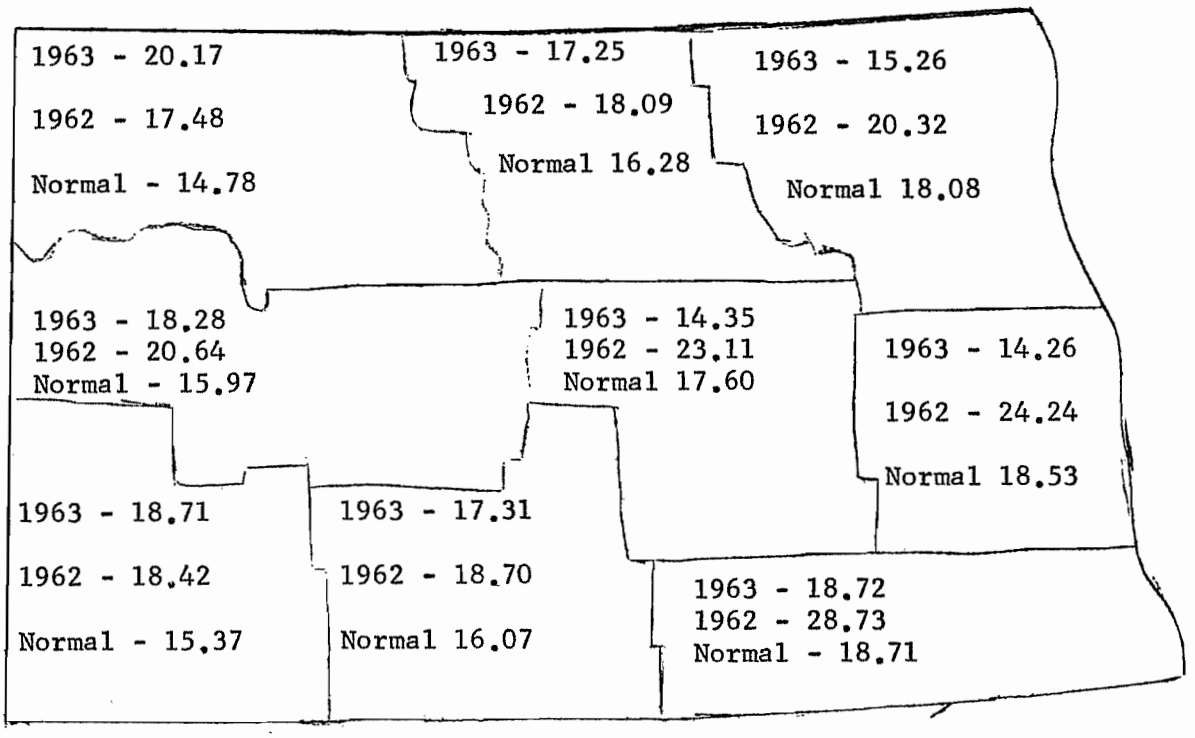

Figure 7. North Dakota Precipitation in 1962, 1963 and 1931-60 Average.

SOURCE: USDA Statistical Reporting Service, Agricultural Statistician, Fargo, North Dakota.

Crops Fertilized

The acreage fertilized on test-demonstration farms in 1963 was 17,651 acres as shown in table 2. This is a 34 per cent increase over 1962. The increase in acreage fertilized resulted primarily from two factors: (1) Favorable responses in 1962 encouraged cooperators to fertilize more acres and (2) Abatement of the excess moisture situation in the Valley which occurred in 1962. Examination of table 2 indicates the specific crops and areas where these increases took place.

TABLE 2. ACREAGE FERTILIZED IN 1962 AND 1963 ON TEST-DEMONSTRATION FARMS

Crop	Cass Traill		Adams, Bowman Hettinger		Bottineau, Burke Renville		All Counties	
	1962	1963	1962	1963	1962	1963	1962	1963
	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)
Wheat	1,180	1,756	3,782	5,539	4,442	4,050	9,404	11,345
Barley	1,102	1,636	493	578	986	1,762	2,581	3,976
Oats	147	356	186	275	150	314	483	945
Rye	-	-	-	-	-	99	-	99
Flax	-	95	-	-	-	30	-	125
Corn	306	417	116	190	-	-	422	607
Sugar Beets	197	425	-	-	-	-	197	425
Alfalfa	-	30	-	-	10	-	10	30
Millet	-	40	-	-	-	-	-	40
Canary Grass	-	29	-	-	-	-	-	29
Pasture	-	-	-	-	-	20	-	20
Brome & Clover	-	-	-	-	-	10	-	10
Soybeans	40	-	-	-	-	-	40	-
All Crops	2,972	4,784	4,577	6,582	5,588	6,285	13,137	17,651

Table 3 contains the acreage fertilized for each crop, by area, in 1963. For the two major crops, wheat and barley, the acreage fertilized on fallowed and nonfallowed land is also shown. Wheat is the highest value small grain and the most dependable for profitable yield responses to fertilizer treatments in North Dakota. About 65 per cent of the acreage fertilized on test-demonstration farms in 1963 was HRS wheat and durum.

TABLE 3. ACREAGE FERTILIZED IN 1963

Crop	COUNTIES			
	Cass Traill	Adams, Bowman Hettinger	Bottineau, Burke Renville	All Counties
Wheat on Fallow	1,032	4,164	3,955	9,151
Wheat on Nonfallow	724	1,375	95	2,194
All Wheat	1,756	5,539	4,050	11,345
Barley on Fallow	228	230	943	1,401
Barley on Nonfallow	1,408	348	819	2,575
All Barley	1,636	578	1,762	3,976
Oats	356	275	314	945
Flax	95	-	30	125
Rye	-	-	99	99
Corn	417	190	-	607
Sugar Beets	425	-	-	425
Alfalfa	30	-	-	30
Millet	40	-	-	40
Canary Grass	29	-	-	29
Pasture	-	-	20	20
Brome and Clover	-	-	10	10
Total of All Crops	4,784	6,582	6,285	17,651

TABLE 4. FERTILIZED ACREAGE CHECKED AT HARVEST TIME

Crop	COUNTIES			
	Cass Traill	Adams, Bowman Hettinger	Bottineau, Burke Renville	All Counties
Wheat on Fallow	624	900	1,674	3,198
Wheat on Nonfallow	519	294	45	858
All Wheat	1,143	1,194	1,719	4,056
Barley on Fallow	60	30	434	524
Barley on Nonfallow	1,172	230	355	1,757
All Barley	1,232	260	789	2,281
Oats on Fallow	-	50	84	134
Oats on Nonfallow	69	111	60	240
All Oats	69	161	144	374
Rye on Fallow	-	20	68	88
Flax on Nonfallow	-	-	30	30
Corn on Nonfallow	158	-	-	158
Millet on Nonfallow	40	-	-	40
Canary Grass on Fallow	29	-	-	29
Total of All Crops	2,671	1,635	2,750	7,056

The fertilized acreage checked for yield responses at harvest time is shown in table 4. About 40 per cent of the total acreage fertilized, 7,056 acres out of 17,651 acres, was checked for yield responses at harvest time. Several cooperators were unable to make checks because of hail losses.

The number of fields checked for yield responses in each county is shown by crop in table 5. A total of 212 fields was checked for yield responses. About 61 per cent was wheat, 29 per cent barley and 10 per cent other crops.

TABLE 5. NUMBER OF FIELDS CHECKED FOR FERTILIZER RESPONSES AT HARVEST

County	Wheat	Barley	Oats	Other	Total
Adams	28	7	1	-	36
Bowman	13	4	-	2	19
Hettinger	10	2	4	-	16
Bottineau	20	11	2	3	36
Burke	4	-	1	-	5
Renville	27	9	-	-	36
Cass	11	9	2	4	26
Traill	17	20	1	-	38
Total	130	62	11	9	212

Amount of Fertilizer Material Used

The test-demonstration cooperators used about 603 tons of fertilizer materials for the 1963 crop. This tonnage was an increase of about 40 per cent over 1962. The increase was due primarily to more acres being fertilized and more nutrients being applied per acre.

The test-demonstration cooperators used about 434 tons of Tennessee Valley Authority fertilizer material in 1963. Concentrated superphosphate and diammonium phosphate were the materials in greatest demand as indicated in table 6.

TABLE 6. FERTILIZER MATERIALS PURCHASED FROM TVA IN 1963

	Tons of Material						
County	0-53-0	0-54-0	0-57-0	20-52-0	21-53-0	30-10-0	Total
Adams	8.5	22.3	7.6	3.8	30.6	1.8	74.6
Bottineau	-	-	18.8	-	15.4	9.2	43.4
Bowman	17.0	-	10.3	7.0	15.7	.4	50.4
Burke	-	-	35.9	-	10.6	5.6	52.1
Cass	-	.5	-	-	47.1	17.1	64.7
Hettinger	-	-	19.1	4.5	20.8	2.9	47.3
Renville	-	10.5	-	-	26.8	2.0	39.3
Traill	-	-	14.8	-	29.9	17.0	61.7
Total	25.5	33.3	106.5	15.3	196.9	56.0	433.5

In addition to the Tennessee Valley Authority materials, test-demonstration cooperators purchased about 169 tons of fertilizer from local dealers as shown in table 7. Ammonium nitrate accounted for about 41 per cent of the materials purchased locally. This material was used for bulk spreading on nonfallow fields in Cass and Traill counties. Other materials purchased by cooperators in various counties supplemented the fertilizer ordered from the Tennessee Valley Authority.

TABLE 7. COMMERCIAL FERTILIZER PURCHASE IN 1963 BY TVA COOPERATORS

Grade of Fertilizer	COUNTIES								
	Cass	Traill	Adams	Bowman	Hettinger	Bottineau	Burke	Renville	All Counties
0-45-0		11.7		4.0	4.0	.5			20.2
0-46-0		2.0					3.0	1.8	6.8
0-54-0		2.5			5.4				7.9
11-48-0	2.8	8.0	2.4	2.0		1.0		1.0	17.2
33- 0-0	6.2	64.0							70.2
20-52-0		3.3							3.3
18-36-0	8.0		1.1						9.1
24-20-0	7.6								7.6
16-20-0	4.9								4.9
27-14-0	10.2								10.2
23-23-0		1.0							1.0
8-32-8		9.8							9.8
8-32-16		1.0							1.0
Total	39.7	103.3	3.5	6.0	9.4	1.5	3.0	2.8	169.2

Handling, Storing and Spreading Characteristics of Test-Demonstration Fertilizer Materials

The physical qualities of all fertilizer materials used were generally good. The cooperators preferred the 50 pound bags used in 1963 over the 80 pound bags that were used previously. Some problems were encountered in applying the fertilizer materials because the particle size in some cases was uneven, varying from fine dust to lumps. This caused spreading problems in some fertilizer attachments. On days when the humidity was high the materials took up moisture readily, especially materials high in nitrogen. This was a problem in the north central and southwestern parts of the state but not in the Valley. Some co-operators in the Valley counties stored fertilizer materials for 12 months without encountering any problems.

Educational Uses Made of Test-Demonstration Farms

The primary objective of the test-demonstration program in North Dakota is to determine the economic effects of a recommended fertilizer program. The crop yield comparisons on the fertilized and unfertilized portions of the fields are used to demonstrate the physical and economic effects of recommended fertilizer treatments on individual fields and crops. More people are becoming concerned about the actual results obtained from fertilizer treatment under various soil and moisture situation and cropping practices as the use of fertilizer increases.

Test-demonstration cooperators fertilized about 17,651 acres in 1963. Check strips were left and harvest yield comparisons made on 212 different fields representing 7,056 acres. Extension service people and others use the results obtained on these farms in farm meetings, new stories, radio and television programs.

No exact records have been kept on how extensively these test-demonstration farms and results obtained from the check strips were used in the extension program within each county. Generally, they were included as a part of other extension programs rather than as separate programs.

During 1963 approximately 1,748 people attended meetings in the cooperating counties where the results of the test-demonstration program were discussed. The attendance at meetings increased by about 600 per cent over 1962. An estimate of the educational uses made of the test-demonstration program during 1963 is as follows:

Number of people who visited fertilizer demonstrations (Including tour groups and individual visits).	552
Number of tour groups who saw fertilizer demonstrations.	9
Number of news articles mentioning one or more of these demonstrations and/or results of these demonstrations.	36
Number of radio and television programs in which reference was made to these demonstrations and results obtained.	13
Number of people attending meetings where results of these demonstrations were discussed.	1,748

The test-demonstration cooperators in the eight counties completed 36 farm record books. In addition, 15 farmers, not part of the test-demonstration program completed farm record books which are analyzed in the farm account route. These comparative analyses will be used rather extensively by extension people in their extension program.

Fertilizer Responses in 1963

State:

Crop yield responses to fertilizer treatments were generally satisfactory. The average net return per acre on the 7,056 acres checked at harvest time was 40 per cent as shown in table 8. This result can be compared to an average

net return per acre of 117 per cent in 1962.[6] The decrease in average net return of 77 per cent from 1962 to 1963 is explained by the decrease in durum and HRS wheat responses, increased fertilizer cost per acre and the decline in grain prices.

The average increase in yield per acre due to fertilizer was about the same as in 1962, except for durum and HRS wheat on nonfallowed land, which decreased from 8.1 and 5.0 bushels per acre respectively in 1962 to .8 and 3.0 bushels per acre respectively in 1963. The average nitrogen treatment increased from 8 to 13 pounds per acre. The average amount of phosphate used remained the same at 23 pounds per acre. The additional nitrogen increased the fertilizer cost per acre from $3.48 in 1962 to $4.12 in 1963. Mid-October prices for grain declined slightly from 1962 to 1963. The price of durum decreased the most, about 6.3 per cent per bushel.

The average net return for crops on fallowed land was about 72 per cent. On nonfallowed land there was an average net loss of 14 per cent per acre. This loss was caused primarily by the lack of precipitation in the Valley which resulted in poor fertilizer responses on durum and barley.

Southwest:

Two cooperators in Adams county experienced droughty conditions during the season. In Hettinger county two cooperators were hailed out completely and another cooperator suffered a hail loss of 26 per cent on all of his crops. Even with these adverse conditions Adams, Bowman and Hettinger counties produced the largest average net return to fertilizer in 1963 of about 82 per cent as indicated in table 9.

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[6] The 1962 Report on Test-Demonstration Farms in North Dakota, Agricultural Economics Report No. 31, NDSU of Agriculture and Applied Science, May 1963.

TABLE 8. AVERAGE COSTS AND RETURNS TO FERTILIZER BY CROP ON ALL TEST-DEMONSTRATION FARMS, 1963[1]

Crop	Acres Checked	Ave Fert Treat/A	Ave Yld/ Acre	Ave Yld Inc Per A	Ave Fert Cost/A[2]	Ave Net Return Per A[3]	Per Cent Profit
			Crops Grown on Fallowed Land				
Durum	986	7+21+0	35.3	2.7	$3.07	$2.36	
HRS Wheat	2,202	6+26+0	28.2	3.3	3.40	3.36	
HRW Wheat	10	0+32+0	31.7	10.1	3.20	14.78	
Barley	524	6+27+0	44.2	3.3	3.53	- .96	
Oats	134	1+23+0	48.6	-2.2	2.33	-3.38	
Rye	88	8+18+0	44.9	5.6	2.93	3.08	
Canary Grass	29	24+ 8+0	24.9	4.2	4.16	6.34	
All Small Grains	3,973	6+24+0	----	----	3.29	2.36	72
			Crops Grown on Nonfallowed Land				
Durum	436	15+20+0	30.8	.8	4.00	-2.63	
HRS Wheat	422	23+28+0	20.8	3.0	6.12	- .17	
Barley	1,757	23+22+0	46.2	6.0	5.45	- .86	
Oats	240	13+14+0	65.1	11.4	3.37	2.20	
Flax	30	9+ 3+0	10.5	1.0	1.56	1.13	
Corn	158	25+31+0	75.6	6.8	6.60	- .02	
Millet	40	24+ 8+0	40.7	.3	4.16	-3.91	
All Small Grains	3,083	21+22+0	----	----	5.18	- .75	-14
Total	7,056	13+23+0	----	----	4.12	1.66	40

[1]Weighted averages based on number of acres checked at harvest.

[2]Cost of fertilizer = 14 cents per pound of nitrogen and 10 cents per pound of P_2O_5.

[3]Net returns from fertilizer.
Based on Mid-October 1963 prices of grain.

Durum	= $2.09	Flax	= $2.69
HRS Wheat	= 2.03	Rye	= 1.08
HRW Wheat	= 1.78	Canary Grass	= 2.50
Barley	= .77	Corn	= .97
Oats	= .49	Millet	= .83

North Central:

Table 10 shows the average net return to fertilizer in Bottineau, Burke and Renville counties which was about 37 per cent in 1963. HRS wheat and durum produced profitable yield responses but not as great as the preceding year. Barley and oats responded poorly to fertilizer treatments. Yield responses on barley were decreased by heat late in the growing season. The growing season started with an excess of moisture, setting the crop back and causing some to drown out. In addition, two cooperators in Burke county were hailed out and unable to make check yields. One cooperator in Bottineau county received some hail damage on all of his crops.

Valley:

Cass and Traill counties, located in the Red River Valley, experienced the lowest average net return to fertilizer in 1963, about a minus 6 per cent as indicated in table 11. Crops grown on fallowed land produced an average net return of 59 per cent. However, the crops grown on nonfallowed land suffered an average net loss of 25 per cent. The loss on nonfallowed land can be attributed to the lack of moisture during the growing season. In contrast to the excess moisture situation in 1962, the Valley counties suffered from excess moisture early in 1963 and a lack of precipitation later in the year.

Individual:

Appendix A contains the crop yield responses to fertilizer treatment for each cooperator. Appendix B contains the average costs and returns to fertilizer for each cooperator.

TABLE 9. AVERAGE COSTS AND RETURNS TO FERTILIZER BY CROP IN ADAMS, BOWMAN AND HETTINGER COUNTIES, 1963[1]

Crop	Acres Checked	Ave Fert Treat/A	Ave Yld/ Acre	Ave Yld Inc Per A	Ave Fert Cost/A[2]	Ave Net Return Per A[3]	Per Cent Profit
			Crops Grown on Fallowed Land				
Durum	61	8+20+0	31.5	4.8	$3.09	$6.80	
HRS Wheat	829	6+27+0	27.1	4.6	3.57	5.78	
HRW Wheat	10	0+32+0	31.7	10.1	3.20	14.78	
Barley	30	5+22+0	45.4	3.2	2.82	- .33	
Oats	50	0+22+0	31.3	-10.3	2.20	-7.25	
Rye	20	6+16+0	38.3	8.0	2.44	6.15	
All Small Grains	1000	6+26+0	----	----	3.42	5.10	149
			Crops Grown on Nonfallowed Land				
HRS Wheat	294	14+30+0	17.9	2.5	4.99	- .02	
Barley	230	16+29+0	44.6	8.2	5.24	1.11	
Oats	111	9+19+0	47.4	5.0	3.25	- .82	
All Small Grains	635	14+28+0	----	----	4.78	.25	5
Total	1635	9+27+0	----	----	3.95	3.22	82

[1]Weighted averages based on number of acres checked at harvest.

[2]Cost of fertilizer = 14 cents per pound of nitrogen and 10 cents per pound of P_2O_5.

[3]Net returns from fertilizer.
Based on Mid-October 1963 prices of grain.

Durum	= $2.09	Barley	= $.77
HRS Wheat	= 2.03	Oats	= .49
HRW Wheat	= 1.78	Rye	= 1.08

TABLE 10. AVERAGE COSTS AND RETURNS TO FERTILIZER BY CROPS IN BOTTINEAU, BURKE AND RENVILLE COUNTIES, 1963[1]

Crop	Acres Checked	Ave Fert Treat/A	Ave Yld/ Acre	Ave Yld Inc Per A	Ave Fert Cost/A[2]	Ave Net Return Per A[3]	Per Cent Profit
			Crops Grown on Fallowed Land				
Durum	689	6+21+0	35.0	2.6	$2.89	$2.46	
HES Wheat	985	3+21+0	28.6	1.8	2.53	1.29	
Barley	434	4+25+0	42.9	1.6	3.07	-1.80	
Oats	84	1+23+0	58.9	2.7	2.41	-1.08	
Rye	68	9+19+0	46.9	4.9	3.07	2.18	
All Small Grains	2260	4+22+0	----	----	2.76	.99	36
			Crops Grown on Nonfallowed Land				
Durum	45	13+12+0	28.1	---	3.00	-3.00	
Barley	355	13+16+0	42.8	5.3	3.33	.80	
Oats	60	12+ 4+0	89.6	17.9	2.08	6.69	
Flax	30	9+ 3+0	10.5	1.0	1.56	1.13	
All Small Grains	490	13+13+0	----	----	3.04	1.19	39
Total	2750	6+20+0	----	----	2.81	1.03	37

[1]Weighted averages based on number of acres checked at harvest.

[2]Cost of fertilizer = 14 cents per pound of nitrogen and 10 cents per pound of P_2O_5.

[3]Net returns from fertilizer.

Based on Mid-October 1963 prices of grain.

Durum	= $2.09	Oats	= $ .49
HRS Wheat	= 2.03	Flax	= 2.69
Barley	= .77	Rye	= 1.08

TABLE 11. AVERAGE COSTS AND RETURNS TO FERTILIZER BY CROP IN CASS AND TRAILL COUNTIES, 1963[1]

Crop	Acres Checked	Ave Fert Treat/A	Ave Yld/ Acre	Ave Yld Inc Per A	Ave Fert Cost/A[2]	Ave Net Return Per A[3]	Per Cent Profit
			Crops Grown on Fallowed Land				
Durum	236	9+23+0	37.0	2.2	$3.57	$ .94	
HRS Wheat	388	13+35+0	29.8	4.4	5.24	3.44	
Barley	60	22+41+0	52.8	15.6	7.19	4.85	
Canary Grass	29	24+ 8+0	24.9	4.2	4.16	6.34	
All Small Grains	713	13+30+0	----	----	4.81	2.85	59
			Crops Grown on Nonfallowed Land				
Durum	391	15+21+0	31.1	.9	4.11	-2.58	
HRS Wheat	128	44+25+0	27.4	4.0	8.70	- .52	
Barley	1,172	27+23+0	47.5	5.8	6.13	-1.74	
Oats	69	22+16+0	72.3	16.0	4.67	3.18	
Corn	158	25+31+0	75.6	6.8	6.60	- .02	
Millet	40	24+ 8+0	40.7	.3	4.16	-3.91	
All Small Grains	1,958	25+23+0	----	----	5.84	-1.49	-25
Total	2,671	22+25+0	----	----	5.56	- .33	- 6

[1]Weighted averages based on number of acres checked at harvest.

[2]Cost of fertilizer = 14 cents per pound of nitrogen and 10 cents per pound of P_2O_5.

[3]Net returns from fertilizer.

Based on Mid-October 1963 prices of grain.

Durum	= $2.09	Canary Grass	= $2.50
HRS Wheat	= 2.03	Corn	= .97
Barley	= .77	Millet	= .83
Oats	= .49		

APPENDIX A

CROP YIELD RESPONSES TO FERTILIZER TREATMENT ON TVA TEST-DEMONSTRATION FARMS IN NORTH DAKOTA, 1963

APPENDIX TABLE A-1. CROP YIELD RESULTS ON TVA TEST-DEMONSTRATION FARMS IN ADAMS COUNTY, 1963

Cooperator	Field No.	1962 Crop	1963 Crop	Nutrient Per Acre	Yield-Bushels/Acre		
					Fert.	Check	Diff.
13	6	9	9	7	4	4	4
Daryl Anderson	Sec 7	Fallow	HRS Wheat	0+32+0	25.0	22.0	3.0
	Sec 5	Fallow	HRS Wheat	0+22+0	32.0	25.0	7.0
	Sec 10	Fallow	HRS Wheat	0+22+0	28.0	22.0	6.0
	Sec 12	Fallow	HRS Wheat	0+22+0	32.0	25.0	7.0
	Sec 5	Corn	HRS Wheat	14+36+0	25.0	21.0	4.0
	Sec 2	Corn	Barley	12+31+0	25.0	16.0	9.0
	Sec 18	Corn	Barley	12+31+0	35.0	23.0	12.0
Gene Davison[1]	D-6	Corn	HRS Wheat	14+35+0	16.9	13.3	3.6
	J-6	Sudan	HRS Wheat	14+35+0	12.5	11.1	1.4
	K-2	Sudan	HRS Wheat	14+35+0	10.4	8.6	1.8
	M-3	Corn	HRS Wheat	14+35+0	20.1	13.7	6.4
	T-4[2]	Corn	HRS Wheat	8+21+0	16.9	17.4	- .5
	U-1	Grain	HRS Wheat	14+35+0	21.9	18.7	3.2
	C-4	Corn & Wheat	Barley	10+26+0	27.5	20.4	7.1
Fred Ehlers	13-V	Fallow	HRS Wheat	0+22+0	29.3	27.3	2.0
	24-W	Fallow	HRS Wheat	0+22+0	29.7	26.8	2.9
	26-G	Fallow	HRS Wheat	0+27+0	25.1	20.7	4.4
	25-M	Fallow	HRW Wheat	0+32+0	31.7	21.6	10.1
	13-G	Corn	HRS Wheat	12+ 4+0	29.3	26.0	3.3
	24-K	Corn	HRS Wheat	14+36+0	30.7	27.3	3.4
	26-U	Corn	HRS Wheat	14+36+0	28.0	26.0	2.0
	26-O	Fallow	Barley	0+27+0	73.3	65.0	8.3
	26-B	Corn	Barley	10+26+0	57.5	53.3	4.2
John Larson[1]	2-A	Fallow	HRS Wheat	0+22+0	23.8	22.3	1.5
	11-F	Corn	HRS Wheat	12+31+0	8.6	9.7	-1.1
	1-D	Fallow	Oats	0+22+0	31.3	41.6	-10.3
Raymond Wothe	1-F	Fallow	HRS Wheat	0+28+0	23.5	16.6	6.9
	2-F	Fallow	HRS Wheat	0+28+0	24.7	17.8	6.9
	3-I	Fallow	HRS Wheat	0+28+0	22.0	19.4	2.6
	3-G	Fallow	HRS Wheat	0+28+0	30.0	22.2	7.8
	6	Fallow	HRS Wheat	9+ 3+0	28.7	25.9	2.8
	6-N	Fallow	HRS Wheat	9+ 3+0	31.7	31.7	---
	7-C	Fallow	HRS Wheat	10+26+0	30.0	28.4	1.6
	5-A	Corn	HRS Wheat	10+26+0	28.7	28.7	---
	2-C[3]		Barley	10+26+0	68.8	50.3	18.5
	2-G[3]		Barley	10+26+0	61.7	55.0	6.7
Adams County	Ave.	Fallow	HRS Wheat	1+23+0	27.8	23.7	4.1
		Fallow	HRW Wheat	0+32+0	31.7	21.6	10.1
		Nonfallow	HRS Wheat	13+32+0	21.7	19.0	2.7
		Fallow	Barley	0+27+0	73.3	65.0	8.3
		Nonfallow	Barley	11+29+0	42.4	32.8	9.6
		Fallow	Oats	0+22+0	31.3	41.6	-10.3

[1]Droughty conditions existed.

[2]Fertilizer check was closer to the edge of the field and had more grasshopper damage.

[3]Winter wheat plowed down in July 1962.

APPENDIX TABLE A-2. CROP YIELD RESULTS ON TVA TEST-DEMONSTRATION FARMS IN BOWMAN COUNTY, 1963.

Cooperator	Field No.	1962 Crop	1963 Crop	Nutrient Per Acre	Yield-Bushels/Acre Fert.	Check	Diff.
Earl Nelson	K	Fallow	HRS Wheat	10+26+0	20.2	17.1	3.1
	K	Corn	HRS Wheat	10+26+0	16.3	17.1	- .8
	L[1]		HRS Wheat	10+26+0	7.3	3.5	3.8
	G	Corn	Barley	10+26+0	46.2	42.1	3.9
	I	Corn	Barley	10+26+0	23.6	10.7	12.9
Walter Stzegura	Sec 29-J	Fallow	Durum	7+19+0	22.4	18.6	3.8
	Sec 31-J	Fallow	Durum	7+19+0	32.0	24.5	7.5
	Sec 31-F	Fallow	Durum	8+21+0	29.6	26.9	2.7
	Sec 30-C	Fallow	Durum	8+21+0	32.0	27.7	4.3
	Sec 30-F	Fallow	Durum	8+21+0	37.9	33.6	4.3
	Sec 25	Fallow	HRS Wheat	7+19+0	24.0	18.4	5.6
	Sec 25	Fallow	HRS Wheat	7+19+0	26.4	20.8	5.6
	Sec 26-V	Fallow	HRS Wheat	8+21+0	35.5	30.1	5.4
	Sec 26-I	Fallow	HRS Wheat	8+21+0	28.9	29.9	-1.0
	Sec 26-Q	Fallow	HRS Wheat	8+21+0	31.7	29.7	2.0
	Sec 30-M	Fallow	Barley	7+19+0	32.2	29.5	2.7
	Sec 30	Fallow	Barley	7+19+0	30.7	32.0	-1.3
	Sec 30-R	Fallow	Rye	6+16+0	47.4	34.9	12.5
	Sec 30-X	Fallow	Rye	6+16+0	29.1	25.7	3.4
Bowman County	Ave.	Fallow	Durum	8+20+0	31.5	26.7	4.8
		Fallow	HRS Wheat	8+21+0	27.8	23.8	4.0
		Nonfallow	HRS Wheat	10+26+0	10.9	8.9	2.0
		Fallow	Barley	7+19+0	31.5	30.8	.7
		Nonfallow	Barley	10+26+0	35.9	27.8	8.1
		Fallow	Rye	6+16+0	38.3	30.3	8.0

[1]Winter wheat disked down in July 1962.

APPENDIX TABLE A-3. CROP YIELD RESULTS ON TVA TEST-DEMONSTRATION FARMS IN HETTINGER COUNTY, 1963

Cooperator	Field No.	1962 Crop	1963 Crop	Nutrient Per Acre	Yield-Bushels/Acre		
					Fert.	Check	Diff.
Alvin Dill	A	Fallow	HRS Wheat	0+21+0	21.7	18.8	2.9
	C	Fallow	HRS Wheat	0+21+0	23.0	19.3	3.7
	G	Fallow	HRS Wheat	0+21+0	20.7	18.0	2.7
	B	Fallow	HRS Wheat	0+21+0	24.6	22.5	2.1
	F	Fallow	HRS Wheat	0+21+0	21.7	19.1	2.6
	H	Corn & Sudan	Oats	8+21+0	38.7	32.5	6.2
	E	Corn & Sudan	Oats	8+21+0	36.5	29.8	6.7
	E	Corn & Sudan	Oats	8+21+0	43.5	42.0	1.5
George Ott[1,2]	6[2]	Fallow	HRS Wheat	15+37+0	25.6	23.5	2.1
	6	Fallow	HRS Wheat	15+37+0	24.0	19.7	4.3
	15[2]	Fallow	HRS Wheat	15+37+0	32.0	27.5	4.5
	15	Fallow	HRS Wheat	15+37+0	40.0	30.4	9.6
	15	Fallow	HRS Wheat	15+37+0	26.1	19.2	6.9
	1[2]	Fallow	HRS Wheat	15+37+0	24.0	15.4	8.6
	1	Fallow	HRS Wheat	15+37+0	18.1	13.3	4.8
	21[3]	Corn	HRS Wheat	25+31+0	21.3	16.5	4.8
	25[4]	Corn	HRS Wheat	25+31+0	13.3	14.9	-1.6
	2	Corn	Barley	25+31+0	52.0	46.0	6.0
	4	Corn	Barley	25+31+0	46.7	38.7	8.0
	9	Corn	Oats	13+15+0	70.0	67.0	3.0
Hettinger County	Ave.	Fallow	HRS Wheat	9+31+0	26.3	21.2	5.1
		Nonfallow	HRS Wheat	25+31+0	18.9	16.0	2.9
		Nonfallow	Barley	25+31+0	50.2	43.5	6.7
		Nonfallow	Oats	9+19+0	47.4	42.4	5.0

[1]Hail loss of 26 per cent on all crops.

[2]Field numbers are duplicated when more than one check was made in the same field.

[3]Cornland disked in the spring.

[4]Cornland plowed in the spring.

APPENDIX TABLE A-4. CROP YIELD RESULTS ON TVA TEST-DEMONSTRATION FARMS IN BOTTINEAU COUNTY, 1963

Cooperator	Field No.	1962 Crop	1963 Crop	Nutrient Per Acre	Yield-Bushels/Acre		
					Fert.	Check	Diff.
Howard Anderson	2-I	Fallow	Durum	7+17+0	30.9	22.6	8.3
	3-T	Wheat	Durum	20+ 6+0	20.7	15.2	5.5
	W	Fallow	HRS Wheat	0+28+0	24.0	26.5	-2.5
	M	Fallow	HRS Wheat	9+23+0	29.0	27.1	1.9
	L	Fallow	HRS Wheat	0+28+0	28.5	28.7	- .2
	G	Fallow	Barley	0+28+0	51.8	52.0	- .8
	2-H	Wheat	Barley	27+ 9+0	47.4	34.9	12.5
	2-S	Wheat	Flax	9+ 3+0	10.5	9.5	1.0
Harold Bergman	C-9	Fallow	Durum	10+26+0	28.0	22.0	6.0
	H-14	Fallow	Durum	8+21+0	26.9	25.9	1.0
	I-15	Fallow	Durum	10+25+0	32.0	28.1	3.9
	B-8	Corn	Durum	7+17+0	34.1	38.5	-4.4
	D-10[1]	Fallow	Barley	0+28+0	43.6	40.8	2.8
	E-11[1]	Fallow	Barley	0+31+0	39.0	32.5	6.5
	J-16[1]	Durum	Barley	11+27+0	39.5	34.8	4.7
Kermit Kjonaas[2]	33-B	Fallow	Durum	0+16+0	39.3	32.6	6.7
	32-B	Fallow	Durum	0+21+0	34.0	32.0	2.0
	3-A	Fallow	HRS Wheat	0+21+0	19.6	19.6	---
	3-C	Fallow	HRS Wheat	0+21+0	20.6	19.6	1.0
	3-K	Durum	Barley	6+16+0	39.2	31.4	7.8
	33-D	Barley & Wheat	Barley	6+16+0	41.5	41.2	.3
C. L. O'Keefe	24-E	Fallow	Durum	0+20+0	40.3	38.8	1.5
	A	Fallow	HRS Wheat	0+26+0	31.1	28.8	2.3
	L	Fallow	HRS Wheat	0+23+0	28.1	24.1	4.0
	25-A	Fallow	HRS Wheat	0+27+0	29.8	27.9	1.9
	25-G	Fallow	HRS Wheat	0+23+0	28.8	26.8	2.0
	25-I	Fallow	HRS Wheat	0+27+0	28.5	31.7	-3.2
	24-G	Wheat	Barley	17+ 6+0	45.1	36.8	8.3
	25-K	Wheat	Barley	20+ 7+0	39.2	31.8	7.4
George Witteman[3]	12	Fallow	Durum	9+21+0	42.1	40.1	2.0
	8	Fallow	Barley	0+23+0	54.3	53.2	1.1
	10	Fallow	Barley	0+23+0	43.0	40.0	3.0
	17	Fallow	Oats	9+21+0	53.8	56.0	-2.2
	20	Fallow	Oats	0+23+0	59.5	56.2	3.3
	14	Fallow	Rye	4+19+0	40.0	35.7	4.3
	23-F	Fallow	Rye	4+19+0	51.5	48.0	3.5
	23-F	Fallow	Rye	21+19+0	55.3	48.0	7.3

(Continued)

APPENDIX TABLE A-4. CROP YIELD RESULTS ON TVA TEST-DEMONSTRATION FARMS IN BOTTINEAU COUNTY, 1963 (Continued)

Cooperator	Field No.	1962 Crop	1963 Crop	Nutrient Per Acre	Yield-Bushels/Acre		
					Fert.	Check	Diff.
Bottineau County	Ave.	Fallow	Durum	6+21+0	34.2	31.0	3.2
		Fallow	HRS Wheat	1+25+0	27.2	26.1	1.1
		Nonfallow	Durum	13+12+0	28.1	28.1	---
		Fallow	Barley	0+27+0	44.6	41.0	3.6
		Nonfallow	Barley	13+17+0	41.3	35.3	6.0
		Fallow	Oats	1+23+0	58.9	56.2	2.7
		Fallow	Rye	9+19+0	46.9	42.0	4.9
		Nonfallow	Flax	9+ 3+0	10.5	9.5	1.0

[1]Unusually hot weather prevalent late in the growing season.

[2]All crops received some hail damage and lodged badly.

[3]Field numbers are duplicated when more than one check was made in the same field. Different rates of fertilizer applied to each.

APPENDIX TABLE A-5. CROP YIELD RESULTS ON TVA TEST-DEMONSTRATION FARMS IN BURKE COUNTY, 1963

Cooperator	Field No.	1962 Crop	1963 Crop	Nutrient Per Acre	Yield-Bushels/Acre		
					Fert.	Check	Diff.
Harry Benshoof[1]	II-A	Fallow	Durum	0+19+0	34.2	31.1	3.1
	1-A	Fallow	HRS Wheat	0+22+0	32.3	29.5	2.8
	II-E	Fallow	HRS Wheat	9+11+0	30.2	28.8	1.4
Arnold Funk[2]	B	Fallow	HRS Wheat	0+28+0	32.8	30.8	2.0
	C & F	Grain	Oats	12+ 4+0	89.6	71.7	17.9
Burke County	Ave.	Fallow	Durum	0+19+0	34.2	31.1	3.1
		Fallow	HRS Wheat	2+21+0	31.9	29.6	2.3
		Nonfallow	Oats	12+ 4+0	89.6	71.7	17.9

[1]Received over 30 inches of rain during the growing season.

[2]Unusually wet growing season on this farm.

APPENDIX TABLE 6. CROP YIELD RESULTS ON TVA TEST-DEMONSTRATION FARMS IN RENVILLE COUNTY, 1963

Cooperator	Field No.	1962 Crop	1963 Crop	Nutrient Per Acre	Yield-Bushels/Acre		
					Fert.	Check	Diff.
Morten Clausen	2-B	Fallow	HRS Wheat	6+16+0	31.4	30.6	.8
	2-E&2-F	Fallow	HRS Wheat	6+16+0	27.3	21.8	5.5
	11-B	Fallow	HRS Wheat	6+16+0	35.6	27.4	8.2
	11-D	Fallow	HRS Wheat	6+16+0	35.0	26.1	9.9
	34-D	Fallow	HRS Wheat	6+16+0	37.5	34.1	3.4
	4-B	Fallow	HRS Wheat	6+16+0	36.3	35.6	.7
	4-D	Fallow	HRS Wheat	6+16+0	34.5	32.1	2.4
	9-E	Fallow	HRS Wheat	6+16+0	34.2	31.9	2.3
J. P. Lorenzen[1]	L	Fallow	Durum	8+21+0	38.8	39.1	- .3
	N	Fallow	Durum	0+21+0	38.0	35.7	2.3
	F	Fallow	HRS Wheat	8+21+0	26.9	27.7	- .8
	Y	Fallow	HRS Wheat	0+21+0	29.6	27.1	2.5
	Q	Fallow	Barley	0+21+0	44.2	43.3	.9
	H	Durum	Barley	15+ 5+0	46.0	43.5	2.5
Randolph[1] Bros.	22-I	Fallow	Durum	5+13+0	37.9	32.3	5.6
	21-L	Corn & Fallow	Durum	10+26+0	34.0	26.1	7.9
	21-S	Fallow	Durum	7+18+0	41.8	36.4	-5.4
	21-Q	Fallow	Durum	7+18+0	27.8	31.6	-3.8
	21-M	Fallow	Durum	7+18+0	36.0	37.2	-1.2
	21-O	Fallow	Durum	7+18+0	32.9	33.4	- .5
	22-E	Fallow	HRS Wheat	7+18+0	25.4	24.8	- .6
	15-D	Fallow	HRS Wheat	10+26+0	19.6	22.4	-2.8
	15-B	Fallow	HRS Wheat	7+18+0	20.4	21.4	-1.0
	22-H	Fallow	HRS Wheat	7+18+0	15.9	14.1	1.8
	16-F	Fallow	Barley	10+26+0	40.3	44.5	-4.2
	17-A	Fallow	Barley	7+18+0	32.3	34.6	-2.3
	22-C	Wheat	Barley	10+26+0	47.7	39.3	8.4
M. W. Schaefer	31-A	Fallow	Durum	7+18+0	32.9	30.6	2.3
	29-J	Fallow	Durum	0+28+0	34.4	31.2	3.2
	29-F	Fallow	HRS Wheat	0+20+0	18.8	20.5	-1.7
	19-A	Fallow	HRS Wheat	0+20+0	27.8	25.9	1.9
	29-Q	Grain	Barley	6+15+0	50.6	49.7	.9
David Witteman	12-E	Fallow	Durum	10+24+0	35.3	36.6	-1.3
	12-D	Fallow	Barley	11+27+0	45.1	41.8	3.3
	12-H	Fallow	Barley	11+27+0	43.4	42.3	1.1
	13-J	Fallow	Barley	0+22+0	53.2	48.0	5.2
Renville County	Ave.	Fallow	Durum	6+21+0	35.9	33.8	2.1
		Fallow	HRS Wheat	5+18+0	28.4	26.3	2.1
		Fallow	Barley	7+23+0	41.8	41.5	.3
		Nonfallow	Barley	12+12+0	47.4	44.1	3.3

[1]Wet year caused some of the crop to drown out.

APPENDIX TABLE A-7. CROP YIELD RESULTS ON TVA TEST-DEMONSTRATION FARMS IN CASS COUNTY, 1963

Cooperator	Field No.	1962 Crop	1963 Crop	Nutrient Per Acre	Yield-Bushels/Acre Fert.	Check	Diff.
Ervin Haux	7	Fallow	HRS Wheat	10+23+0	38.6	37.9	.7
	C	Fallow	HRS Wheat	10+23+0	45.1	43.6	1.5
	B[1]	Late Fallow	Barley	33+38+0	52.8	42.7	10.1
	F	Corn	Barley	30+10+0	67.6	65.4	2.2
Knight Farm	A	Corn	Durum	18+36+0	35.7	30.4	-5.3
	R	Barley	Durum	15+40+0	26.4	28.0	-1.6
	I	Corn	Barley	18+26+0	52.6	52.5	.1
	C	Soybeans & Fallow	Oats	12+17+0	27.1	25.9	1.2
Ralph Peterson	8-Sec 15	Fallow	Durum	10+26+0	41.3	39.6	1.7
	4-Sec 33	Fallow	Durum	8+21+0	35.9	33.3	2.6
	6-Sec 12	Fallow	Durum	8+21+0	35.3	33.8	1.5
	4-Sec 13[2]	Flax	Barley	48+21+0	51.9	45.3	6.6
	7-Sec 12[3]	Flax	Barley	38+21+0	37.7	35.6	2.1
	5-Sec 13	Barley	Corn	25+31+0	81.9	73.1	8.8
	1-Sec 33	Grain	Corn	25+31+0	69.5	64.7	4.8
Paul Pratt	16	Flax & Millet	Durum	27+14+0	46.3	37.2	9.1
	26	Flax	Barley	30+10+0	42.2	40.3	1.9
	9	Barley	Oats	30+10+0	91.9	61.9	30.0
	18	Fallow	Canary Grass	24+ 8+0	24.9	20.7	4.2
	30	Wheat	Millet	24+ 8+0	40.7	40.4	.3
Delmar Schulz	5	Fallow	HRS Wheat	13+32+0	23.5	15.8	7.7
	26	Fallow	HRS Wheat	20+51+0	29.6	23.0	6.6
	24	Soybeans	HRS Wheat	27+54+0	30.8	26.1	4.7
	15	Fallow	Barley	17+42+0	52.8	34.4	18.4
	19	Flax & Fallow	Barley	22+18+0	66.3	45.7	20.6
	2	Flax	Barley	23+25+0	51.1	35.6	15.5
Cass County	Ave.	Fallow	Durum	9+23+0	37.9	35.9	2.0
		Fallow	HRS Wheat	16+40+0	32.5	27.2	5.3
		Nonfallow	Durum	20+31+0	35.8	31.7	4.1
		Nonfallow	HRS Wheat	27+54+0	30.8	26.1	4.7
		Fallow	Barley	22+41+0	52.8	37.2	15.6
		Nonfallow	Barley	30+20+0	51.8	44.0	7.8
		Nonfallow	Oats	23+13+0	65.2	47.1	18.1
		Nonfallow	Corn	25+31+0	75.6	68.8	6.8
		Nonfallow	Millet	24+ 8+0	40.7	40.4	.3
		Fallow	Canary Grass	24+ 8+0	24.9	20.7	4.2

[1]33 pounds of nitrogen spread in the fall of 1962. Response is to S & F application.

[2]40 pounds of nitrogen spread in the fall of 1962. Response is to S & F application.

[3]30 pounds of nitrogen spread in the fall of 1962. Response is to S & F application.

APPENDIX TABLE A-8. CROP YIELD RESULTS ON TVA TEST-DEMONSTRATION FARMS IN TRAILL COUNTY, 1963

Cooperator	Field No.	1962 Crop	1963 Crop	Nutrient Per Acre	Yield-Bushels/Acre Fert.	Check	Diff.
Anderson[1] Bros.	1	Barley	Durum	15+ 5+0	40.7	35.5	5.2
	2-D	Beets	Durum	15+ 5+0	29.4	31.4	-2.0
	5	Barley	Durum	11+26+0	34.3	34.8	- .5
	12	Beets	Durum	11+26+0	17.4	18.3	- .9
	13	Durum	Durum	11+26+0	31.3	31.8	- .5
	14	Durum	Durum	15+ 5+0	36.4	38.1	-1.7
	15	Barley	Durum	11+26+0	37.1	38.4	-1.3
	24	Durum	Durum	15+ 5+0	33.9	35.6	-1.7
	26	Durum	Durum	11+26+0	22.7	21.9	- .8
	2-B	Barley	Barley	11+26+0	34.2	35.1	- .9
	8	Flax & Beets	Barley	11+26+0	34.0	39.9	-5.9
	9	Beets & Millet	Barley	11+26+0	54.5	50.7	3.8
	10	Barley	Barley	5+19+0	49.2	47.8	1.4
	11	Beets & Barley	Barley	11+26+0	51.5	47.4	4.1
	18	Barley	Barley	11+26+0	47.4	47.7	- .3
	20	Flax	Barley	11+26+0	46.9	44.1	2.8
	22	Beets	Barley	11+26+0	39.9	44.5	-4.6
	27	Beets	Barley	11+26+0	27.4	28.7	-1.3
Arthur Grove	E	Fallow	HRS Wheat	4+10+0	25.2	23.9	1.3
	I[2]	Beets	HRS Wheat	48+10+0	25.9	22.6	3.3
	L[2]	Wheat & Barley	Barley	43+26+0	47.4	39.2	8.2
	A[2]	Beets	Barley	48+10+0	20.9	20.4	.5
Orlin Gunderson	1-A	Fallow	Durum	10+24+0	31.9	28.9	3.0
	4[3]	Millet	Barley	62+30+0	47.5	36.9	10.6
	7[4]	Durum	Barley	52+32+0	45.2	24.7	20.5
Lorry Rotvold	P[4]	Fallow	HRS Wheat	10+26+0	25.3	24.1	1.2
	J[4]	Beets	HRS Wheat	50+26+0	27.2	22.7	4.5
	J[4]	Beets	Barley	50+26+0	50.3	43.5	6.8
	C	Grain	Barley	50+26+0	57.8	42.0	15.8
	E[4]	Wheat	Barley	50+26+0	54.8	44.8	10.0
Henry Schlichtmann	C	Fallow	HRS Wheat	8+36+0	20.8	20.0	.8
	7	Fallow	HRS Wheat	0+27+0	26.7	22.7	4.0
	1	Fallow	HRS Wheat	15+39+0	31.6	23.3	8.3
	5[2]	Wheat	Barley	45+31+0	61.7	50.8	10.9
	2	Wheat	Barley	25+31+0	60.0	42.5	17.5
	D	Wheat	Barley	28+22+0	57.2	45.7	11.5
	A-1	Flax	Barley	16+16+0	43.0	40.0	3.0
	8	Barley	Oats	20+25+0	92.5	82.5	10.0

(Continued)

APPENDIX TABLE A-8. CROP YIELD RESULTS ON TVA TEST-DEMONSTRATION FARMS IN TRAILL COUNTY, 1963 (Continued)

Cooperator	Field No.	1962 Crop	1963 Crop	Nutrient Per Acre	Yield-Bushels/Acre Fert.	Check	Diff.
Traill County	Ave.	Fallow	Durum	10+24+0	31.9	28.9	3.0
		Fallow	HRS Wheat	8+27+0	25.9	22.9	3.0
		Nonfallow	Durum	13+17+0	29.4	29.7	- .3
		Nonfallow	HRS Wheat	49+17+0	26.5	22.6	3.9
		Nonfallow	Barley	25+25+0	45.1	40.5	4.6
		Nonfallow	Oats	20+25+0	92.5	82.5	10.0

[1]40 pounds of nitrogen applied in fall of 1962, no check strips were left. Response is to spring treatment only.

[2]33 pounds of nitrogen applied in fall of 1962, no check strips were left. Response to S & F application.

[3]50 pounds of nitrogen applied in fall of 1962, no check strips were left. Response to S & F application.

[4]40 pounds of nitrogen applied in fall of 1962, no check strips were left. Response to S & F application.

APPENDIX B

AVERAGE COSTS AND RETURNS TO FERTILIZER, 1963

APPENDIX TABLE B-1. AVERAGE COST AND RETURNS TO FERTILIZER, ADAMS COUNTY, 1963[1]

Cooperator	Crop	Acres Checked	Ave Fert Cost/A[2]	Ave Added Return Per Acre[3]	Ave Net Return Per A	Per Cent Profit
13	22	4	5	5	5	
Daryl Anderson	HRS Wheat on Fallow	118	$2.44	$11.60	$9.16	
	HRS Wheat on Nonfallow	60	5.56	8.12	2.56	
	Barley on Nonfallow	58	4.78	8.52	3.74	3
	All Small Grains	236	3.81	9.96	6.15	161
Gene Davison[4]	HRS Wheat on Nonfallow	51	4.93	4.38	- .55	
	Barley on Nonfallow	8	4.00	5.47	1.47	
	All Small Grains	59	4.81	4.53	- .28	-6
Fred Ehlers	HRS Wheat on Fallow	41	2.32	6.10	3.78	
	HRW Wheat on Fallow	10	3.20	17.98	14.78	
	HRS Wheat on Nonfallow	22	3.98	6.03	2.05	
	Barley on Fallow	10	2.70	6.39	3.69	
	Barley on Nonfallow	20	4.00	3.23	- .77	
	All Small Grains	103	3.12	6.71	3.59	115
John Larson[4]	HRS Wheat on Fallow	40	2.20	3.05	.85	
	HRS Wheat on Nonfallow	10	4.78	-2.23	-7.01	
	Oats on Fallow	50	2.20	-5.05	-7.25	
	All Small Grains	100	2.46	-1.53	-3.99	-162
Raymond Wothe	HRS Wheat on Fallow	81	2.88	7.42	4.54	
	HRS Wheat on Nonfallow	8	4.00	----	-4.00	
	Barley on Nonfallow	19	4.00	9.47	5.47	
	All Small Grains	108	3.16	7.23	4.07	129
Adams County	HRS Wheat on Fallow	280	2.51	8.36	5.85	
	HRW Wheat on Fallow	10	3.20	17.98	14.78	
	HRS Wheat on Nonfallow	151	4.98	5.44	.46	
	Barley on Fallow	10	2.70	6.39	3.69	
	Barley on Nonfallow	105	4.43	7.45	3.02	
	Oats on Fallow	50	2.20	-5.05	-7.25	
	All Small Grains	606	3.45	6.49	3.04	88

Total 57

[1]Weighted averages based on number of acres checked at harvest.

[2]Cost of fertilizer = 14 cents per pound of nitrogen and 10 cents per pound of P_2O_5.

[3]Based on Mid-October 1963 prices of grain.

HRS Wheat = $2.03	Barley = $ .77
HRW Wheat = 1.78	Oats = .49

[4]Droughty conditions existed.

APPENDIX TABLE B-2. AVERAGE COST AND RETURNS TO FERTILIZER, BOWMAN COUNTY, 1963[1]

Cooperator	Crop	Acres Checked	Ave Fert Cost/A[2]	Ave Added Return Per Acre[3]	Ave Net Return Per A	Per Cent Profit
Earl Nelson	HRS Wheat on Fallow	30	$4.00	$6.29	$2.29	
	HRS Wheat on Nonfallow	88	4.00	4.00	----	
	Barley on Nonfallow	33	4.00	6.15	2.15	
	All Small Grains	151	4.00	4.92	.92	23
Walter Stezgura	Durum on Fallow	61	3.09	9.89	6.80	
	HRS Wheat on Fallow	115	3.07	8.84	5.77	
	Barley on Fallow	20	2.88	.54	-2.34	
	Rye on Fallow	20	2.44	8.59	6.15	
	All Small Grains	216	3.00	8.35	5.35	178
Bowman County	Durum on Fallow	61	3.09	9.89	6.80	
	HRS Wheat on Fallow	145	3.26	8.32	5.06	
	HRS Wheat on Nonfallow	88	4.00	4.00	----	
	Barley on Fallow	20	2.88	.54	-2.34	
	Barley on Nonfallow	33	4.00	6.15	2.15	
	Rye on Fallow	20	2.44	8.59	6.15	
	All Small Grains	367	3.41	6.94	3.53	104

[1]Weighted averages based on number of acres checked at harvest.

[2]Cost of fertilizer = 14 cents per pound of nitrogen and 10 cents per pound of P_2O_5.

[3]Based on Mid-October 1963 prices of grain.

Durum = $2.09
HRS Wheat = 2.03
Barley = .77
Rye = 1.08

APPENDIX TABLE B-3. AVERAGE COST AND RETURNS TO FERTILIZER, HETTINGER COUNTY, 1963[1]

Cooperator	Crop	Acres Checked	Ave Fert Cost/A[2]	Ave Added Return Per Acre[3]	Ave Net Return Per A	Per Cent Profit
Alvin Dill	HRS Wheat on Fallow	152	$2.10	$5.97	$2.99	
	Oats on Nonfallow	81	3.22	2.79	- .43	
	All Small Grains	233	2.49	4.87	2.38	96
George Ott[4]	HRS Wheat on Fallow	252	5.80	13.09	7.29	
	HRS Wheat on Nonfallow	55	6.60	5.25	-1.35	
	Barley on Nonfallow	92	6.60	5.16	-1.44	
	Oats on Nonfallow	30	3.32	1.47	-1.85	
	All Small Grains	429	5.77	10.82	+3.67	64
Hettinger County	HRS Wheat on Fallow	404	4.41	10.41	6.00	
	HRS Wheat on Nonfallow	55	6.60	5.25	-1.35	
	Barley on Nonfallow	92	6.60	5.16	-1.44	
	Oats on Nonfallow	111	3.25	2.43	- .82	
	All Small Grains	662	4.70	7.91	3.21	68

[1]Weighted averages based on number of acres checked at harvest.

[2]Cost of fertilizer = 14 cents per pound of nitrogen and 10 cents per pound of P_2O_5.

[3]Based on Mid-October 1963 prices of grain.

HRS Wheat = $2.03
Durum = 2.09
Barley = .77
Oats = .49

[4]Hail loss of 26 per cent on all crops.

APPENDIX TABLE B-4. AVERAGE COST AND RETURNS TO FERTILIZER, BOTTINEAU COUNTY, 1963[1]

Cooperator	Crop	Acres Checked	Ave Fert Cost/A[2]	Ave Added Return Per Acre[3]	Ave Net Return Per A	Per Cent Profit
Howard Anderson	Durum on Fallow	21	$2.68	$ 7.21	$4.53	
	HRS Wheat on Fallow	68	3.14	.17	-2.97	
	Durum on Nonfallow	20	3.40	11.50	8.10	
	Barley on Fallow	19	2.80	- .62	-3.42	
	Barley on Nonfallow	18	4.68	9.63	4.95	
	Flax on Nonfallow	30	1.56	2.69	1.13	
	All Small Grains	176	2.96	3.61	.65	22
Harold Bergman[4]	Durum on Fallow	140	3.62	6.18	2.56	
	Durum on Nonfallow	25	2.68	-9.20	-11.88	
	Barley on Fallow	87	3.04	4.45	1.41	
	Barley on Nonfallow	100	4.24	3.62	- .62	
	All Small Grains	352	3.59	3.93	.34	9
Kermit Kjonaas[5]	Durum on Fallow	60	1.81	9.91	8.10	
	HRS Wheat on Fallow	50	2.10	1.02	-1.08	
	Barley on Nonfallow	65	2.44	2.90	.46	
	All Small Grains	175	2.13	4.76	2.63	123
C. L. O'Keefe	Durum on Fallow	52	2.00	3.14	1.14	
	HRS Wheat on Fallow	185	2.47	3.33	.86	
	Barley on Nonfallow	84	3.18	6.13	2.95	
	All Small Grains	321	2.58	4.03	1.45	56
George Witteman	Durum on Fallow	37	3.36	4.18	.82	
	Barley on Fallow	72	2.30	1.60	- .70	
	Oats on Fallow	84	2.41	1.33	-1.08	
	Rye on Fallow	68	3.07	5.25	2.18	
	All Small Grains	261	2.69	2,83	.14	5
Bottineau County	Durum on Fallow	310	2.90	6.22	3.32	
	HRS Wheat on Fallow	303	2.56	2.24	- .32	
	Durum on Nonfallow	45	3.00	----	-3.00	
	Barley on Fallow	178	2.72	2.76	.04	
	Barley on Nonfallow	267	3.50	4.64	1.14	
	Oats on Fallow	84	2.41	1.33	-1.08	
	Rye on Fallow	68	3.07	5.25	2.18	
	Flax on Nonfallow	30	1.56	2.69	1.13	
	All Small Grains	1285	2.87	3.80	.93	32

[1]Weighted averages based on number of acres checked at harvest.

[2]Cost of fertilizer = 14 cents per pound of nitrogen and 10 cents per pound of P_2O_5.

[3]Based on Mid-October 1963 prices of grain.

Durum	= $2.09	Flax	= $2.69
HRS Wheat	= 2.03	Oats	= .49
Barley	= .77	Rye	= 1.08

[4]Barley damaged by heat late in the season.

[5]All crops received some hail damage and lodged badly.

APPENDIX TABLE B-5. AVERAGE COST AND RETURNS TO FERTILIZER, BURKE COUNTY, 1963[1]

Cooperator	Crop	Acres Checked	Ave Fert Cost/A[2]	Ave Added Return Per Acre[3]	Ave Net Return Per A	Per Cent Profit
Harry Benshoof[4]	Durum on Fallow	40	$1.90	$6.48	$4.58	
	HRS Wheat on Fallow	134	2.25	4.83	2.58	
	All Small Grains	174	2.17	5.21	3.04	140
Arnold Funk[5]	HRS Wheat on Fallow	35	2.80	4.06	1.26	
	Oats on Nonfallow	60	2.08	8.77	6.69	
	All Small Grains	95	2.35	7.03	4.68	199
Burke County	Durum on Fallow	40	1.90	6.48	4.58	
	HRS Wheat on Fallow	169	2.36	4.67	2.31	
	Oats on Nonfallow	60	2.08	8.77	6.69	
	All Small Grains	269	2.23	5.86	3.63	163

[1]Weighted averages based on number of acres checked at harvest.

[2]Cost of fertilizer = 14 cents per pound of nitrogen and 10 cents per pound of P_2O_5.

[3]Based on Mid-October 1963 prices of grain.

Durum = $2.09
HRS Wheat = 2.03
Oats = .49

[4]Received over 30 inches of rain during the growing season.

[5]Unusually wet growing season on this farm

APPENDIX TABLE B-6. AVERAGE COST AND RETURNS TO FERTILIZER, RENVILLE COUNTY, 1963[1]

Cooperator	Crop	Acres Checked	Ave Fert Cost/A[2]	Ave Added Return Per Acre[3]	Ave Net Return Per A	Per Cent Profit
Morten Clausen	HRS Wheat on Fallow	255	$2.44	$8.58	$6.14	252
J. P. Lorenzen[4]	Durum on Fallow	100	2.66	2.09	- .57	
	HRS Wheat on Fallow	53	2.48	2.80	.32	
	Barley on Fallow	35	2.10	.69	-1.41	
	Barley on Nonfallow	50	2.60	1.93	- .67	
	All Small Grains	238	2.53	2.01	- .52	-21
Randolph Bros.[4]	Durum on Fall	149	3.03	7.70	4.67	
	HRS Wheat on Fallow	128	3.19	-1.18	-4.37	
	Barley on Fallow	101	3.25	-2.33	-5.58	
	Barley on Nonfallow	18	4.00	6.47	2.47	
	All Small Grains	396	3.18	2.21	- .97	-31
M. W. Schaefer	Durum on Fallow	45	2.79	5.85	3.06	
	HRS Wheat on Fallow	77	2.00	1.49	- .51	
	Barley on Nonfallow	20	2.34	.69	-1.65	
	All Small Grains	142	2.30	2.76	.46	20
David Witteman	Durum on Fallow	45	3.80	-2.72	-6.52	
	Barley on Fallow	120	3.73	2.27	-1.46	
	All Small Grains	165	3.75	.91	-2.84	-76
Renville County	Durum on Fallow	339	2.99	4.41	1.42	
	HRS Wheat on Fallow	513	2.57	4.48	1.91	
	Barley on Fallow	256	3.32	.24	-3.08	
	Barley on Nonfallow	88	2.83	2.58	- .25	
	All Small Grains	1196	2.87	3.41	.54	19

[1]Weighted averages based on number of acres checked at harvest.

[2]Cost of fertilizer = 14 cents per pound of nitrogen and 10 cents per pound of P_2O_5.

[3]Based on Mid-October 1963 prices of grain.

Durum = $2.09
HRS Wheat = 2.03
Barley = .77

[4]Wet year caused some of the crop to drown out.

APPENDIX TABLE B-7. AVERAGE COST AND RETURNS TO FERTILIZER, CASS COUNTY, 1963[1]

Cooperator	Crop	Acres Checked	Ave Fert Cost/A[2]	Ave Added Return Per Acre[3]	Ave Net Return Per A	Per Cent Profit
Ervin Haux	HRS Wheat on Fallow	67	$3.70	$2.37	$-1.33	
	Barley on Fallow	20	8.42	7.78	- .64	
	Barley on Nonfallow	17	5.20	1.69	-3.51	
	All Small Grains	104	4.85	3.30	-1.55	-32
Knight Farm	Durum on Nonfallow	72.4	6.11	3.87	-2.24	
	Barley on Nonfallow	72	5.12	.08	-5.04	
	Oats on Nonfallow	21	3.38	.59	-2.79	
	All Small Grains	165.4	5.33	1.80	-3.53	-66
Ralph Peterson	Durum on Fallow	199	3.53	4.18	.65	
	Barley on Nonfallow	156	8.12	3.35	-4.77	
	Corn on Nonfallow	158	6.60	6.58	- .02	
	All Small Grains	513	5.87	4.66	-1.21	-21
Paul Pratt	Durum on Nonfallow	32	5.18	15.60	10.42	
	Barley on Nonfallow	40	5.20	1.46	-3.74	
	Oats on Nonfallow	30	5.20	14.70	9.50	
	Millet on Nonfallow	40	4.16	.25	-3.91	
	Canary Grass on Fallow	29	4.16	10.50	6.34	
	All Small Grains	171	4.78	7.68	2.90	61
Delmar Schulz	HRS Wheat on Fallow	163	7.32	13.85	6.53	
	HRS Wheat on Nonfallow	28	9.18	9.54	.36	
	Barley on Fallow	40	6.58	14.17	7.59	
	Barley on Nonfallow	130	5.20	14.35	9.15	
	All Small Grains	361	6.62	13.73	7.11	107
Cass County	Durum on Fallow	199	3.53	4.18	.65	
	HRS Wheat on Fallow	230	6.26	10.51	4.25	
	Durum on Nonfallow	104.4	5.82	7.47	1.65	
	HRS Wheat on Nonfallow	28	9.18	9.54	.36	
	Barley on Fallow	60	7.19	12.04	4.85	
	Barley on Nonfallow	415	6.28	5.98	- .30	
	Oats on Nonfallow	51	4.45	8.89	4.44	
	Corn on Nonfallow	158	6.60	6.58	- .02	
	Millet on Nonfallow	40	4.16	.25	-3.91	
	Canary Grass on Fallow	29	4.16	10.50	6.34	
	All Small Grains	1314.4	5.79	7.08	1.29	22

[1]Weighted averages based on number of acres checked at harvest.

[2]Cost of fertilizer = 14 cents per pound of nitrogen and 10 cents per pound of P_2O_5.

[3]Based on Mid-October 1963 prices of grain.

Durum	= $2.09	Corn	= $ .97
HRS Wheat	= 2.03	Millet	= .83
Barley	= .77	Canary Grass	= 2.50
Oats	= .49		

APPENDIX TABLE B-8. AVERAGE COST AND RETURNS TO FERTILIZER, TRAILL COUNTY, 1963[1]

Cooperator	Crop	Acres Checked	Ave Fert Cost/A[2]	Ave Added Return Per Acre[3]	Ave Net Return Per A	Per Cent Profit
Anderson Bros.	Durum on Nonfallow	287	$3.48	$- .63	$-4.11	
	Barley on Nonfallow	415	4.01	- .39	-4.40	
	All Small Grains	702	3.79	- .49	-4.28	-113
Arthur Grove	HRS Wheat on Fallow	33	1.56	2.64	1.08	
	HRS Wheat on Nonfallow	55	7.72	6.70	-1.02	
	Barley on Nonfallow	78	8.18	3.43	-4.75	
	All Small Grains	166	6.71	4.35	-2.36	-35
Orlin Gunderson	Durum on Fallow	37	3.80	6.27	2.47	
	Barley on Nonfallow	52	10.94	12.86	1.92	
	All Small Grains	89	7.97	10.12	2.15	27
Lorry Rotvold	HRS Wheat on Fallow	40	4.00	2.44	-1.56	
	HRS Wheat on Nonfallow	45	9.60	9.14	- .46	
	Barley on Nonfallow	104	9.60	9.28	- .32	
	All Small Grains	189	8.41	7.80	- .61	-7
Henry Schlicht-mann	HRS Wheat on Fallow	85	4.47	9.03	4.56	
	Barley on Nonfallow	108	6.55	8.51	1.96	
	Oats on Nonfallow	18	5.30	4.90	- .40	
	All Small Grains	211	5.60	8.41	2.81	50
Traill County	Durum on Fallow	37	3.80	6.27	2.47	
	HRS Wheat on Fallow	158	3.74	6.03	2.29	
	Durum on Nonfallow	287	3.48	- .63	-4.11	
	HRS Wheat on Nonfallow	100	8.57	7.80	- .77	
	Barley on Nonfallow	757	6.05	3.51	-2.54	
	Oats on Nonfallow	18	5.30	4.90	- .40	
	All Small Grains	1357	5.35	3.34	-2.01	-38

[1]Weighted averages based on number of acres checked at harvest.

[2]Cost of fertilizer = 14 cents per pound of nitrogen and 10 cents per pound of P_2O_5.

[3]Based on Mid-October 1963 prices of grain.

Durum = $2.09
HRS Wheat = 2.03
Barley = .77
Oats = .49