Progress and Problems in the Iowa Soil Conservation Districts Program

A Pilot Study of the Jasper Soil Conservation District

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FOREWORD

In 1939 the General Assembly of Iowa enacted legislation establishing the Iowa Soil Conservation Districts Program. This program provided a means whereby farm owners and operators could organize at a county level to cooperate with federal, state and local agencies in controlling erosion and water runoff and in improving the productivity of their lands. Since 1939, 100 soil conservation districts have been organized covering the entire state.

During the past 20 years, substantial progress has been registered by the districts program in Iowa. However, much work remains to be done in the years ahead. Approximately one out of five farmers is cooperating in soil conservation districts. In light of the continuing erosion and depletion of the state's soil resources, the question arises "Why are not more farmers participating in the program?" Also, of those participating in the program, "How well are they carrying out the recommended measures?"

To obtain some of the answers to these and related questions in an effort to further improve the functioning of the Soil Conservation Districts Program, the Iowa Agricultural and Home Economics Experiment Station was requested to make a study of the program. Because of limited resources, the study was limited to one district, the Jasper district.

Although this study does not provide all the answers to problems faced by each soil conservation district, it does reveal important reasons why farmers do or do not cooperate in the program. Also, suggestions for obtaining more complete cooperation are offered for consideration.

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SUMMARY

The Iowa Soil Conservation Districts Program was initiated in 1939. Since that time, about 22 percent of the farms in Iowa have plans developed with soil conservation districts. But 78 percent of the farms have not been planned as yet, and satisfactory adoption of land-use practices has been achieved on only part of the land in the planned farms.

In this investigation various factors were identified and analyzed in terms of their association with farmers' acceptance of district plans and application of district recommendations. The data obtained indicate that district progress was impeded significantly by (1) small size of farm, (2) tenant operatorship, (3) cash and crop-share leasing arrangements and (4) high inherent productivity of the land. Other factors tested were (1) the length of the operators' planning horizons, (2) the ages of the operators and (3) the types of livestock programs being pursued. However, statistical tests of significance of these latter factors were inconclusive.

The attainment of program objectives on any given soil usually requires the application of, not one, but a combination of conservation measures. The reasons why farmers apply, or fail to apply, specific land-use practices, however, are basic in determining courses of action which will best encourage compliance with district recommendations. The following are reasons, beliefs or attitudes most often expressed by farm operators as contributing to their failure to follow district recommendations: (1) Insufficient cooperation between landlords and tenants in arranging for adoption and maintenance of recommended practices. (2) Belief that the practices were not necessary either because they would not adequately control erosion or because erosion was not excessive now. (3) Insufficient knowledge of the district's program and of the practices recommended. (4) Belief that application of recommended practices would increase capital and labor requirements without yielding commensurate additional income. (5) Farm and/or field layout would be such as to make recommended practices impractical. (6) Pressure of current financial obligations precluded the possibility of introducing practices which would increase current investment and/or reduce current income.

In contrast to the factors listed above which have impeded the progress of the district's program, the following are expressed reasons, attitudes or beliefs which account for farm operators complying with district recommendations: (1) Practices were established before the present operator's tenure, and established practices were maintained. (2) Landlords initiated and/or financed the application of the practices. (3) Farm and field layouts were well adapted to recommended practices. (4) Net incomes of farms were increased by application of the recommended practices. (5) Operators took pride in maintaining, or felt morally obligated to keep, soil productivity at high levels. (6) Soil conditions were such that erosion control was a minor problem. (7) A good financial position with little pressure for current income enabled operators to make immediate investments in land necessitated by recommended practices and wait for deferred income.

Characteristics found on farms, which have facilitated the achievement of specified district objectives, provide the foundations for further progress. Conversely, characteristics found on farms which have deterred the attainment of district goals suggest certain adjustments in the interest of furthering progress toward objectives of soil conservation. Further progress in soil conservation district programs may well be founded upon the extension of the favorable characteristics and the adjustment of unfavorable conditions in line with district objectives.

Progress and Problems in the Iowa Soil Conservation Districts Program

A Pilot Study of the Jasper Soil Conservation District[1]

BY LOYD K. FISCHER AND JOHN F. TIMMONS[2]

For several decades there has been increasing public interest in the land-use practices[3] applied on the agricultural land of Iowa and of the nation. A high rate of soil erosion on many Iowa farms has reduced, and sometimes destroyed, the productivity of the soil. Many people, both in and out of government, have expressed concern over the extent and continuing rate of soil deterioration.[4] In response to this concern, public measures have been enacted and public agencies created for the purpose of restraining the wasteful use of soil resources.[5]

In Iowa, one of the major approaches to providing public guidance to individual users of soil resources is the Soil Conservation Districts Program. This program represents a relatively new development in the coordination and integration of the various levels of government. Through this device, federal, state and local agencies cooperate with farm owners and operators to maintain and improve the present and future productivity of soil resources.

Since its inception in 1939, the Iowa Soil Conservation Districts Program has made substantial progress in gaining farmer participation. However, by program standards, the rate of soil erosion loss is still excessive on much of Iowa's land. Why have not the conservation objectives been more nearly achieved? More specifically, why have some farmers participated and others remained outside of the program? Also, of the farmers who have initiated farm plans with the various districts, why have some carried out the district recommendations while others have not applied acceptable land-use practices? Why have other farmers, once in the program, dropped out?

These are questions which gave rise to this study. Adjustments in the Soil Conservation Districts Program necessary to assure continued progress toward program objectives should be indicated by the answers to these questions. Some of these answers and their implications for the program have been developed in this study.

Although other studies have provided helpful information as a basis for conducting this inquiry, no previous investigation has dealt specifically with the above questions. Because of the dearth of information on possible answers to these questions, and because of limited funds available, this investigation has been restricted to one soil conservation district, the Jasper district in central Iowa. The information provided by this study should prove useful in furthering the districts' progress toward their objectives. Also, the procedures developed in this initial study should serve as guides for subsequent investigations and analyses by other districts in Iowa and in other states.

ORIGIN OF SOIL CONSERVATION DISTRICTS PROGRAM

The farmer and each level of government having an interest in the productivity of the land have assumed responsibilities in soil conservation.[6] Each has something to offer and something to gain. National action is deemed necessary because of several aspects of the problem, as follows: (a) the importance of erosion control to future national strength and well-being; (b) the geographic character of the problems of water control, which are not limited by state boundaries; (c) the inability or reluctance of individual farm operators and owners and state and local units of government to assume full responsibility for overcoming the problem; (d) the necessity of integrating soil conservation programs into other national programs for agriculture (e.g., production control, land development and price

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[1]Project 1094, Iowa Agricultural and Home Economics Experiment Station.
[2]Former research associate and professor of economics, Iowa State College, respectively. The authors are indebted to many people who helped with the study. W. Robert Parks, dean of instruction, Iowa State College, helped plan the study and contributed to its progress. Members of the State Soil Conservation Committee of Iowa requested this study and rendered invaluable assistance throughout the investigation. The contributions of the United States Soil Conservation Service were substantial in arranging for the soil mapping of several thousand acres of land in the farms of noncooperators, in devising conservation plans for the farms of the sample noncooperators and in making adjustments in the plans of the sample noncooperators to attain a uniform level of planning throughout all sample farms. The Statistical Laboratory helped to design the sample and advised on many phases of the study. A debt of gratitude is owed the Jasper district commissioners who advised on all phases of the study and who were most cooperative in making district records available. Finally, special thanks are reserved for the farmers of Jasper County who freely gave their time in providing the information upon which this study is based.

[3]As used in this bulletin, the term "land-use practices" refers to both "basic" and "associated" practices. The basic land-use practices are cropping systems, contouring, contour strip-cropping and terracing for which specific recommedations are made by fields in the district farm plans. Associated land-use practices are liming, tiling, application of commercial fertilizer, spreading of barnyard manure, plowing under a green manure, grassed waterways and field layout.

[4]As used in this study, soil deterioration refers to irreversible exploitation of soil resulting primarily from excessive rates of erosion loss. More precisely, the term implies any disinvestment of soil which permanently lowers land rent, defined as net value productivity.

[5]Wasteful use is defined as the disinvestment of soil resources without a commensurate yield of want-satisfying goods and services over time.

[6]The problem of soil conservation is that of determining desirable rates of utilization of soil resources over time.

support programs); and (e) the desirability of maintaining uniformly high standards for conservation work throughout the United States.

State and local action is equally necessary because, with few exceptions, the district programs provide for neither legal coercion nor direct monetary subsidization of farm owners and operators. Therefore, the effectiveness of the program is largely dependent upon the voluntary participation of agricultural land users. To gain the essential active participation of farm people, national programs must be adjusted to fit varying local conditions and the needs and wishes of individual farmers. Also, the promotion of democratic government resulting from local participation in national programs is often considered a value in itself.[7]

Recognizing the desirability of federal, state and local participation in soil conservation programs, President Franklin D. Roosevelt on Feb. 26, 1937, sought the cooperation of all the states. He asked that the state legislatures pass enabling acts permitting, but not forcing, farm owners and operators to join together into soil conservation districts as a prerequisite for federal assistance through the Soil Conservation Service. He also submitted to the states "A Standard State Soil Conservation Districts Law." None of the states passed the standard law verbatim. Modifications were made to suit local conditions and preferences, and many of the state laws have been amended since their enactment. However, by 1945 all of the 48 states, plus Alaska, Hawaii and Puerto Rico, had passed enabling legislation which the national government deemed satisfactory as bases for cooperation between the United States Soil Conservation Service and the individual soil conservation districts.

Iowa Soil Conservation Districts Program

In 1939 the Iowa legislature passed the law under which farmers could organize local soil conservation districts.[8] The first Iowa district was organized in April 1940. By February 1952, all rural areas of the state were included in soil conservation districts. Each district is organized on a county-boundary basis, except for East and West Pottawattamie districts which together encompass Pottawattamie County. This makes a total of 100 soil conservation districts.

The governing body of the individual district in Iowa consists of three "commissioners" nominated by petition and elected by the farm owners and operators of the district to 6-year terms of office.[9] This is in line with the Iowa State Soil Conservation Districts Law which places the responsibility for the management of the soil conservation program upon local people. District commissioners, as representatives of their district, have considerable authority to achieve the prevention and control of soil erosion and the conservation of soil resources.

Among the powers of the district commissioners is the right to enter into "memoranda of understanding" with other governmental agencies for the promotion of soil conservation.[10] Each district has in this manner entered into working agreements with the Iowa Cooperative Extension Service, with the Iowa Agricultural and Home Economics Experiment Station and with the United States Department of Agriculture and a supplemental memorandum with the United States Soil Conservation Service. The Secretary of the United States Department of Agriculture has designated the State Conservationist of the Soil Conservation Service as his official representative relative to the districts program. Through the State Conservationist, the Soil Conservation Service makes technicians available to assist the districts in carrying out their programs and work plans and also may provide materials, labor, equipment and other assistance under certain conditions specified in the memoranda of understanding.

In like manner, the soil conservation districts enter into memoranda of understanding with the Cooperative Extension Service. The Extension Service cooperates with the district commissioners by supplying information and providing personnel needed in the development of the educational aspects of the district programs and work plans, in suggesting plans and methods for developing effective educational programs, in furnishing personnel for carrying out these programs, in training local leaders and in conducting soil conservation demonstrations. County extension directors, as the local representatives of the Extension Service, cooperate with the districts in correlating the soil conservation educational efforts of all agencies within each district.

In accordance with the districts law, the Agricultural and Home Economics Experiment Station of Iowa State College cooperates with the districts in the conduct of research relative to problems confronting the districts.

The districts law provides for a State Soil Conservation Committee to serve as the administrative body at the state level and sets forth the composition, powers and duties of this committee.[11] In general, after a soil conservation district has been organized, the duties of the state committee are to offer such assistance as may be appropriate to the commissioners of the districts in the carrying out of any of their powers and programs. Such assistance includes coordination of the program of all of the districts in Iowa so far as this may be done by advice and consultation. The state committee also acts as the intermediary through which the individual districts obtain the cooperation and assistance of the agencies of the United States government and the agencies of the State of Iowa. The state committee is responsible for the allocation, to the various districts, of funds appropriated for the program by the General Assembly.

Objectives of Iowa Soil Conservation Districts Program

In the Soil Conservation Districts Law of Iowa it is . . . declared to be the policy of the legislature to provide

[7]For further development of this viewpoint see: Herman Walker, Jr. and W. Robert Parks. Soil conservation districts: local democracy in a national program. Jour. Politics. 8:538-49. Nov. 1946.
[8]Iowa. Code, 1942. Sections 467A.1 to 467A.12.
[9]As set out in the original act of 1939, only landowners were permitted to vote in these elections. However, in 1953 the legislature modified the act permitting tenant farm operators to vote. Iowa. Code, 1954. Section 467A.5. Assistant district commissioners may be designated by the three elected commissioners as necessary to carry out the district program.
[10]Ibid., Section 467A.7.
[11]Ibid., Section 467A.5.

> for the restoration and conservation of the soil resources of this state, and for the control and prevention of soil erosion and thereby to preserve natural resources, control floods, prevent impairment of dams and reservoirs, assist and maintain the navigability of rivers and harbors, preserve wildlife, protect the tax base, protect public lands, and promote the health, safety and public welfare of the people of this state.[12]

The Soil Conservation Districts Program is conceived by the legislature to be one of the means by which these goals may be achieved. It should be pointed out, however, that these broad ends are subject to continuous modification as the definitions of various terms (e.g., public welfare) change. Furthermore, this passage states the objectives only in relative terms (i.e., restore, conserve, control, prevent, maintain, preserve, protect and promote) and does not specify to what extent or to what level the given ends shall be achieved.

The law further specifies that districts are empowered "To develop comprehensive plans for the conservation of soil resources and for the control and prevention of soil erosion within the district . . . ."[13] From the law and from discussions with administrators of the program, this study has determined that the primary goal of the districts program is the attainment of what has been termed a "safe level of erosion loss" on all agricultural land.[14] This end is thought to be consistent with, and a means of approaching, the general objectives presented in the districts law.

However, maximum permissible rates of soil loss vary between soil types; estimates for the various soils in Iowa usually range from 2 to 8 tons of soil loss per acre per year. No attempt has been made in this study to establish the maximum permissible rate of soil loss for each field or the current average rate of soil losses. Instead, the basic land-use practices recorded in the farm plans, as revised for this study, serve as the objectives of the program.[15] This goal recognizes the fact that a district's objectives as applied to each farm are pointed out to the farm operator and owner by the district farm planner as farm plans are developed. Furthermore, the district governing body approves these practices as necessary means to accomplish district goals. Explicit in this study is the assumption that the average rates of soil loss will not exceed the district's goal on planned farms if the recommended land-use practices are applied. Consequently, the emphasis of this study is on discovering and analyzing factors which impede and those which encourage the application of land-use practices recommended by the district.

The "norm to be achieved" for this study for each field is, then, the application of the combination of the basic land-use practices recommended for that particular field. However, the application of an alternative combination of practices on a given field will not be construed as a departure from the district norm unless the substituted combination of practices results in an average soil loss considered by the district to be in excess of the maximum permissible.

[12]Iowa. Code, 1954., Section 467A.1.
[13]Ibid., Section 467A.7.
[14]This end-in-view was given by Jasper district commissioners as the most important and most urgent objective of their district's program.
[15]As explained in the next section, the land-use plans of all the sample farms were adjusted by the district farm planner so that the application of the practices recommended for each farm would, presumably, just attain the erosion-control norm of the district.

An operational objective, or end-in-view, of the districts program is the desire that all agricultural land and land users be brought into the program. This end is viewed by the district governing body as a means of approaching the ultimate goal of gaining acceptance of the land-use practices which will adequately control erosion. Land-use practices, other than those recorded in the farm plans, being applied on soils of a given land capability class were compared with the alternative land-use practices set out in the Technical Guide of the Soil Conservation Service.[16] The combination of land-use practices being applied on any field was considered acceptable if the resultant soil loss would not exceed the rate associated with practices recommended in the "Guide" for soil of the same capability.

Existing Situation in Achieving Objectives of the Program

As of Jan. 1, 1958, Iowa soil conservation districts had developed basic conservation plans for 42,200 farms which represent 21.8 percent of all Iowa's farms. These farms encompass 7,594,697 acres representing 22.3 percent of Iowa's farmland.[17] Furthermore, nearly all farmers, whether or not they are participating in the districts program, have applied some acceptable land-use practices (e.g., permanent meadow) on at least part of their land. Some operators adequately control erosion on all of their land. In other words, the situation relative to achieving district objectives reflects considerable accomplishment. An explanation of how and why this level of success has been achieved should provide bases for devising means of promoting further progress.

Despite these elements of success, the ultimate objectives of the program have not been fully achieved. As of Dec. 31, 1957, 150,733 (78.2 percent) of Iowa's farm operators were not participating in the program with basic conservation plans. Included in these farms are 26,449,836 acres (77.7 percent) of Iowa's farmland. Furthermore, departures from district objectives are found, not only on the farms of noncooperators, but also on the farms of cooperators. In this study, the problem has been defined, identified and presented in terms of (a) farms on which plans have not been initiated and (b) nonapplication of land-use practices planned for cooperators' farms. These are interpreted as the failure elements in the situation. They constitute the existing problem.

Objectives of This Study

This study attempts to (1) discover why some farmers participate in the program while others do not and, of those farmers who participate to the extent of initiating farm plans, why some of them achieve the objectives of erosion control while others do not, (2) to ascertain and analyze the principal obstacles and resistances which have impeded the work of the soil conservation districts program and (3) to discover and develop means for the removal or mitigation of these obstacles and resistances.

[16]Technical Guide. SCS, USDA.
[17]Percentages are based on 192,933 farms and 34,044,533 acres reported in the 1954 U.S. Census of Agriculture. Iowa. In addition, 19,573 farmers, controlling 3,605,510 acres, have entered into initial plans and are in the process of developing basic conservation plans.

Thus, the study is intended to provide helpful ideas and information (1) for further research into soil conservation district programs and (2) to assist technicians and administrators of soil conservation districts in their efforts to improve their programs.

METHOD OF INVESTIGATION AND ANALYSIS

The soil conservation districts of Iowa possess neither power to force nor funds to subsidize compliance with district objectives. Consequently, their problem is one of gaining (a) voluntary participation in the program by farm owners and operators and (b) application by farm operators of the land-use practices recorded in the farm plans.

These two aspects of the program possess a "means-ends" interrelationship. That is, inducing farmers to participate in the program is viewed by district administrators as a means of gaining acceptance of recommended land-use practices, which, in turn, are means of attaining a desirable level of erosion control. In like manner, the control of soil erosion is not only an end-in-view, but also a means of attaining the more ultimate end of maximizing net value, over time, of the goods and services produced from agricultural resources.

Cooperation in the district program and compliance with district recommendations are obviously not completely interdependent. Therefore, these two objectives must be treated separately, at least to some extent. Consequently, this analysis has been divided into two segments. Samples were drawn from cooperating farms (i.e., those having basic farm plans) and from noncooperating farms (i.e., those farms which had not previously been planned). These sample farms have been carefully investigated to determine if special differentiating characteristics exist (a) between noncooperating and cooperating farms and (b) between cooperating farms from three different levels of compliance with district recommendations. Also, the operators of all of the sample farms were asked to give the reasons why they had or had not carried out district recommendations.

Formulation of Hypotheses Directing This Study

The Jasper Soil Conservation District has two objectives considered in this study. The Jasper district governing body desires that, eventually, (1) all Jasper agricultural land users cooperate in the district program and (2) all agricultural land be farmed under combinations of land-use practices which achieve district conservation objectives. The achievement of either objective does not ensure the attainment of the other, nor does the failure to attain one preclude the achievement of the other.

As a result of the dual objective of the Jasper district program, there arise two problems which may be delimited by the following hypotheses:

1. The ultimate objective of the Jasper district that all its farmers enter into working agreements (i.e., basic farm plans) with the soil conservation district, is far from being achieved.
2. On the farms in Jasper district, both of noncooperators and of cooperators, there are many fields on which the land-use practices being applied are not adequate according to the standards of the district.

The first of these two hypotheses has been tested by determining the cumulative number of basic farm plans signed by Jasper district farm owners and operators as compared with the total number of farms in Jasper County. The second of these two hypotheses has been tested by comparing the land-use practices being applied on the fields of a sample of farms with the practices recommended by the Jasper Soil Conservation District. In these ways, the extent of achievement of district objectives was determined.

Possible Explanations of District's Problems

In attempting to explain or diagnose these problems, a secondary set of hypotheses proposes that:

1. Certain characteristics of farms tend to impede the acceptance of farm plans and compliance with district land-use recommendations.
2. Certain beliefs, customs and habits of farm operators tend to make farmers resist complying with district objectives.

Characteristics of the sample farms were analyzed to determine their association with the attainment of district objectives. Relationships between (a) the extent of achievement and (b) the following farm characteristics, were tested: (1) farm size in acres; (2) ownership-interest of the farm operators; (3) leasing arrangements on rented farms; (4) potential crop productivity of the farms; and (5) livestock programs.

In addition to the analysis mentioned earlier, another approach to explaining the existence and extent of the problems confronting the district was the questioning of the operators of the sample farms as to their reasons for complying or for not complying with district objectives.[18] From their stated reasons, an indication was obtained of the relative importance of various factors which might promote or impede district progress.

Strong features of the district's program and characteristics common to those farms which have attained specified district objectives suggest the foundations for further progress. Conversely, weak features of the district's program and characteristics common to farms which have failed to attain specified district objectives, suggest program adjustments and the need for a better understanding of soil conservation in the interest of furthering progress toward objectives of the district.

Procedures for Testing Hypotheses

The delimiting hypothesis relative to the failure of farmers to accept basic farm plans is readily tested. Table 1 gives the cumulative numbers and percentages of Jasper farms which have been planned for each year since the inception of the program. The table also gives the numbers and percentages of acres encompassed. Although these data appear accurate and precise, their significance is indeterminate because (a) planned farms represent all degrees of seriousness of erosion problems, (b) the level of planning developed with cooperators is

[18]These interviews were restricted to farm operators; therefore, the views of landlords are not represented.

TABLE 1. CUMULATIVE NUMBERS AND PERCENTAGES OF JASPER COUNTY FARMS PLANNED BY THE SCD, AND NUMBERS AND PERCENTAGES OF ACRES ENCOMPASSED BY PLANS AT THE END OF EACH FISCAL YEAR, 1942-1957, INCLUSIVE.

Year	No. of farms planned*	Percent of all farms†	No. of acres encompassed‡	Percent of all agricultural land§
1942	9	0.3	3,567	0.8
1943	34	1.3	8,240	1.8
1944	93	3.4	9,677	2.2
1945	163	6.0	27,592	6.2
1946	214	7.9	36,060	8.1
1947	277	10.3	46,724	10.5
1948	332	12.3	58,792	13.2
1949	378	14.0	65,880	14.8
1950	447	16.6	77,077	17.3
1951	481	17.8	82,048	18.4
1952	529	19.6	89,725	20.1
1953	508**	18.8	79,087	17.7
1954	580	21.5	90,871	20.4
1955	616	22.8	97,079	21.8
1956	636	23.4	100,220	22.5
1957	689	25.4	110,785	24.8

*Excluding plans cancelled for any reason.

†Based on U.S. Census of Agriculture. Preliminary report. Jasper County. 1954. Land in farms, 445,689 acres.

‡Additional acres have been incorporated into the planned farms, by rental or purchase, of which the district has no record.

§Based on U.S. Census of Agriculture. Op. cit. Land in farms, 445,689 acres.

**In 1953, farm plans were categorized as initial, advanced and basic. The adoption of this system involved changes in figures which accounts for the discontinuity. Since that time the system has changed again, and only district cooperators with basic plans are reported.

not uniform among farms and (c) the extent to which recommended practices were applied varies from none to all on the planned farms.

The general procedure for testing the delimiting and diagnostic hypotheses involved selecting a stratified random sample of farms from one soil conservation district. Information regarding the problematic situation on the sample farms has been assembled and analyzed for the purpose of testing factors which are hypothesized to be (a) important deterrents to participation in the district program and/or to the acceptance of land-use practices which are compatible with district goals or (b) reasons for the continuance of land-use practices which are incompatible with district goals.

The testing of these hypotheses has been performed in two ways: (1) procurement and analysis of data relative to specified farm characteristics for the purpose of investigating the possibility of correlation between such characteristics and the extent of compliance with district objectives within such farms and (2) an inquiry into the stated reasons of farm operators for complying or failing to comply with district recommendations.

In proceeding with this investigation, it was necessary to devise a means for delineating the specific problems, relative to the objectives of the district program, existing on individual farms. Since the objectives of the program for any farm have been presented in terms of recommended land-use practices, departures from this norm in terms of the application of land-use practices which will not achieve district conservation objectives, serve to delimit the problematic situation on each farm.

As a practical operational matter, districts often enter into initial working agreements (with farm owners and operators) which do not specify all of the land-use practices necessary to fully achieve the district objectives. Such plans are viewed by the district as "opening wedges" through which adequate conservation plans may eventually be worked out. To provide a uniform and meaningful norm, the plans for all the sample farms of cooperators were reviewed by the district farm planner. He made adjustments in the recommended land-use practices necessary to attain (a) uniformity in plans among farms and (b) compatibility of the plans with ultimate district objectives. In addition, from soil maps provided by the SCS, the farm planner devised comparable plans for a sample of farms drawn at random from the noncooperating farms of the district.

In this investigation, the land-use practices applied by the farmers on each field of tillable land were compared with practices recorded in the farm plans.[19] The application on a given field of the specified practices was considered to be the attainment of the "norm" of the district relative to achieving a "safe level of erosion loss" for that field. Conversely the application of combinations of land-use practices, not as effective in erosion-control as the recommended practices, was considered as below the district norm. No particular merit or significance was attached to restricting rates of soil loss to levels below permissible maximums because the value to society of such action is indeterminate and may be negative and because such action on some land would not compensate for the use of practices which would result in excessive erosion on other land.[20]

Land which was not tillable, as defined above, was excluded from this measurement because the maintenance of permanent vegetation on a tract was of itself considered an acceptable use of land. Consequently, a farm having large acreages of land incapable of being tilled under prevailing cultural practices would tend to rate high in compliance with the district norms regardless of the extent to which the farm's tillable land was abused.

The characteristics of farms relative to certain factors were hypothesized to have an effect on the attainment of district objectives. Direct correlations between specified firm characteristics and the extent of the operators' compliance with district recommendations is considered to be evidence substantiating the hypotheses. Inverse correlations are contradictory evidence.

Reliability of estimates from the sample of farms was calculated and is presented in terms of chi square tests of interdependence throughout this report. Assuming randomness of sample and disregarding errors of measurement, an estimate was obtained whereby the degree of confidence might be placed in the results of the study.

The number of times a sample may be subdivided and still yield statistically significant answers is very definitely limited by the size of the sample. Because of limitations on the size of the sample, confounding factors were a difficult problem. Where statistically significant results supporting the hypotheses were obtained, despite the tendency of coexistence of factors hypothesized to be competitive in their effect, such results would

[19]A field is defined as a contiguous tract which is homogeneous as to district recommendations and as to land-use practices being applied. Practices recommended and practices applied may or may not be the same. Land is considered to be tillable if it has been in row crops or if row crops have been recommended for it.

[20]The failure of farm operator to use his land to the extent of its capabilities, commensurate with maximum productivity over time, would reduce the net value of product over time. If, for two fields, the maximum permissible annual rate of soil loss is 5 tons per acre, a loss rate, for example, of 2 tons on one field will not compensate for the rapid deterioration of the second field undergoing a loss rate of, say, 30 tons per acre.

seem to provide additional verification.[21] Where test results failed to support the hypothesis when competitive factors were confounded, an acceptable test has not been made since the effects of competing factors would tend to cancel out. The limited size of the sample did not permit further subdivisions which would allow separate testing of the factors in question.[22] Where complementary factors tend to coexist, significant results give little indication of the relative effects of each factor but do indicate that one or more of the factors being considered is important.[23] Analysis of the reasons given by farm operators for their decisions, relative to the practices recorded in the plans for their farms, constituted the best method available for discovering the factors which motivated their actions.

The second aspect of this investigation concerns the stated reasons of farm operators for accepting or rejecting district recommendations.

[21]e.g., owner-operated farms tended to be small in size.
[22]e.g., owner-operated farms according to size of farm.
[23]e.g., owner-operatorship and long planning horizon.

Survey Design

SELECTION OF AREA

The area selected for this investigation was the Jasper Soil Conservation District. The study was restricted to one district because of the limited resources available and because of the large amount of cooperation and assistance required from the district administrative and technical staffs. Furthermore, it was considered essential that the level of farm planning be consistent throughout the sample.[24] Such consistency could best be attained by having the farm plans be, to as large an extent as possible, the product of one technician.

Jasper district was chosen for the following reasons: (a) Only farms planned prior to June 30, 1950, were included in the sample to allow the operators time to apply recommended practices. Jasper district was established in April 1942 and thus had a relatively large number of farms planned prior to 1950. (b) The dis-

[24]The application of the practices recorded in each sample farm plan would, ideally, just attain the erosion-control objectives of the district.

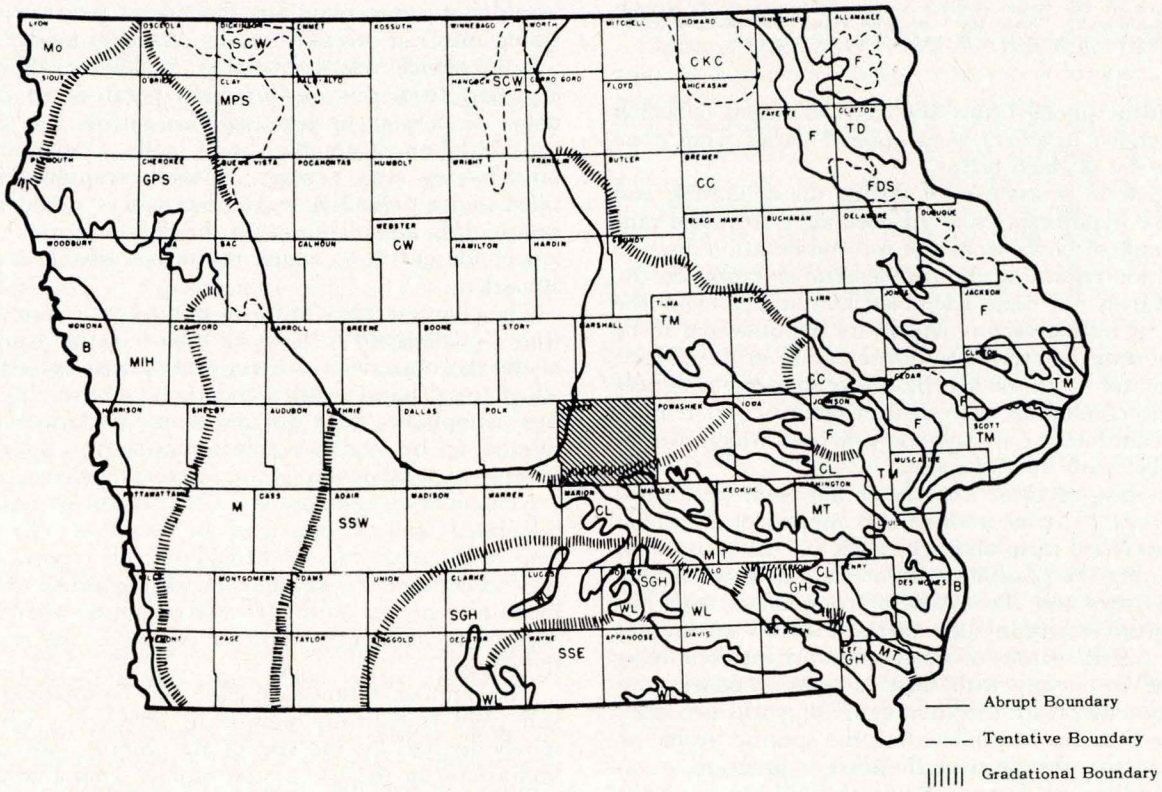

Figure 1. Jasper district and its geographical relationship to the principal soil association area of Iowa.

Principal Soil Associations[a]

B: Soils of bottomlands
CC: Carrington and Clyde
CpC: Carrington, plastic till phase, and Clyde
CL: Clinton and Lindley
CW: Clarion and Webster
F: Fayette
FDS: Fayette, Dubuque, and Stony Land
GH: Grundy and Haig[b]
GPS: Galva[b], Primghar[b], and Sac[b]
M: Marshall
MIH: Monona[b], Ida[b], and Hamburg[b]
Mo: Moody[b]
MPS: Marcus, Primghar[b], and Sac[b]
MT: Mahaska[b] and Taintor[b]
SCW: Storden[b], Clarion, and Webster
SGH: Shelby, Grundy, and Haig[b]
SSE: Shelby, Seymour[b], and Edina
SSW: Shelby, Sharpsburg[b], and Winterset[b]
TD: Tama and Downs[b]
TM: Tama and Muscatine
WL: Weller and Lindley

[a]Iowa Agr. Exp. Sta. in cooperation with Div. of Soil Survey, U.S. Dept. of Agr. 1948.
[b]New names not on county soil maps.

trict is centrally located and consequently was readily accessible for study and also has climatic conditions tending to be average for the state. (c) The physical conditions are diverse, representing four of the major soil association areas in the state (see fig. 1). As a consequence, problems of a physical nature encountered on the sample farms have implications over much of the state. (d) The Jasper district commissioners and farm planners were willing to cooperate in the planning and conduct of the study.

Conclusions reached from information obtained in one district can be generalized to other districts only within limits and with considerable caution. But, in view of the considerations mentioned, this initial study was restricted to one district with the hope of devising means by which other researchers and district administrative and technical staffs might conduct similar studies. In this way the specific problems confronting each district can be recognized, and action can be taken to overcome the obstacles discovered.

SELECTION OF POPULATION AND SAMPLE

Among the objectives of this study is the analysis of the strong and weak features (success and failure elements) of the district's program in relation to farmers who are participating and also those who are not.[25] As a consequence, the scope of the study encompasses both cooperating and noncooperating farms.

Cooperators. The population of cooperators is a total of 465 farms having basic farm plans initiated prior to July 1, 1950.[26] This number excludes 52 farms on which the plan was cancelled because of change in ownership. These 52 farms were not included because the present owners were not principals in the agreements signed with the district. If any of the 52 farms have been replanned, the new plans, if initiated prior to July 1, 1950, had an equal opportunity of falling into the sample. If a new plan was initiated after June 30, 1950, the farm would not be in the population as defined. These 52 farms are, however, indicative of the dynamic setting in which the program operates.

From the population of 465 cooperators, a stratified random sample of 60 was drawn (table 2). The stratification was accomplished by having the district farm planner, who has held that position since the organization of the district in 1942, separate the farms into three categories according to their relative progress toward the district objective of erosion control. A sample of 20 farms was drawn at random from each of the three strata.

Planned farms on which the district norm relative to erosion control had, in the judgment of the farm planner, been achieved, or toward which satisfactory progress was being made, were designated Status I. Of the 465 farms, 232 were placed in this category. Of the 20 farms selected from this stratum, 2 farms combined during the process of analysis into 1 unit (firm) leaving a total of 19 cases in this segment of the sample.

[25]Farm operators whose farms have been planned by the district will, hereafter, be referred to as "cooperators" and all others referred to as "noncooperators."

[26]Operators whose farms were planned after 1950 may not, in many instances, have had time to establish all land-use practices recommended despite their full intentions to do so.

TABLE 2. POPULATIONS AND SAMPLES FROM JASPER SOIL CONSERVATION DISTRICT.

Group	Number in population	Number in sample
Total farms (1954 U.S. Census)	2,696	93
Cooperators in SCD (all, to June 30, 1954)	623*	....
Cooperators in SCD (all, to June 30, 1950)	465†	59
Status I	232‡	19
Status II	189§	20
Status III	44**	20
Status IV (noncooperators)	1,648††	34

*Number of agreements signed prior to July 1, 1954, a few of which were the second agreement for a given farm.

†Farms (50 acres or larger) planned by the district prior to July 1, 1950.

‡Planned farms on which conservation practices have been established or on which satisfactory progress toward these objectives is being made, as judged by the district farm planner.

§Planned farms on which the district objectives have not been attained and on which progress is being made toward the norm at less than a satisfactory rate.

**Planned farms which are below the norm and on which no progress is being made toward the district objectives or on which the plan has been cancelled.

††Farms (over 50 acres in size) which had not been planned by the district prior to July 1, 1954. Number derived from U.S. Census of Agriculture. Iowa. Jasper County. 1954.

Among the 465 cooperators in the population, 189 were, as evaluated by the district farm planner, making progress which was less than satisfactory toward the district norm. These farms were designated as Status II.

The third category, comprising 44 farms, was below the norm of the district and had plans on which no progress was being made or plans which were cancelled for reasons other than change of ownership. These were termed Status III farms. It should be pointed out that the operators of Status III farms are cooperators only in the sense that their farms had received aid from the district in developing plans for their farms. They were not making use of the farm plans nor were they utilizing district facilities or personnel. In several instances, the farms had been planned before the tenure of the present operator, and in some cases, the present operator was not even aware of the plan. This group constitutes a failure element in that the recommended practices deemed necessary by the district to adequately control soil loss have not been applied despite the district resources expended on the farms.

As stated previously, the categorization of the cooperating farm firms was performed by the district farm planner. These classes were established by him on the basis of his inspection, records, knowledge and judgment as to their relative progress toward district objectives. Empirical analysis of the farms selected from the three categories strongly support the stratification as established. The data in table 3 indicate that on Status I farms, district objectives have been substantially achieved. The operators of Status II farms have been much less successful. They have achieved district objectives of erosion control on 23 percent of their tillable acres. Status III farmers, having attained the erosion control norm on only 11 percent of their tillable acres, have made even less progress.

The stratification of the population of cooperators is further verified by the data in tables 11 and 14. These data compare the practices applied with practices recommended. As would be expected, meadow crops and mechanical erosion-control practices are being applied freely on Status I farms, less freely on farms of Status II and Status III.

TABLE 3. STATUS OF SAMPLE FARMS AS RELATED TO THE ATTAINMENT OF THE DISTRICT OBJECTIVE OF EROSION-CONTROL ON TILLABLE LAND.

Sample categories	Farms in category (no.)	Average size of sample farms	Tillable land in sample farms					
			Average per farm		Up to norm* average per farm		Below norm† average per farm	
		(acres)	(acres)	(percent)	(acres)	(percent)	(acres)	(percent)
Status I	232	208	109	52	98.0	87	10.5	13
Status II	189	224	140	63	32.7	23	107.3	77
Status III	44	216	119	55	13.5	11	105.3	89
All coops‡	465	216	123	57	48.3	39	74.7	61
Status IV	1,648§	172	145	84	52.3	36	93.3	64

*Acceptable land-use practices being applied.
†Unacceptable land-use practices being applied.
‡The term "coops" in this and in succeeding tables refers to cooperators in the district program.
§Estimated.

Noncooperators. For noncooperators, who have been designated Status IV, the population includes 1,648 farms in Jasper district, 50 acres or larger in size, whose owners have not entered into an agreement with the soil conservation district. The sample of noncooperators was obtained from 60 quarter-sections selected, three at random from each of the 20 survey townships in Jasper district. All farms from the population, as defined above, whose farmsteads lay in the 60 quarter-sections comprised the sample of 34 farms.

Farms smaller than 50 acres in size were excluded from the sample of noncooperators because (a) many of these small places are not farms but are rural residences, and (b) the small size of the farm in these cases is likely to be such an overriding consideration that the effect of other characteristics would be seriously confounded. This is evidenced by the fact that none of the farms in the "cooperator" population were smaller than 50 acres.

Measurement of Performance

Table 3 presents a measurement of the average problematic gap on the farms in each of the categories.[27] The measurement is ordinal in the sense that the amount by which the average rate of soil loss per acre on any given field exceeds the maximum permissible is not calculated. This lack of a quantitative measurement would not bias the results from this study if the loss to society from the failure of farm operators to attain the district norm (i.e., on fields designated "below" norm) averages the same per acre throughout all sample categories. Although such does not appear to be the case, further consideration indicates that this difference does not invalidate but, rather, reinforces the evidence obtained. Analysis of the data indicates that the fields on farms in category I which have been designated "below norm" are on the average substantially nearer the norm than are similarly designated fields in category III. Consequently, the rate of soil deterioration would probably average much higher on "below norm" acres of the latter category of farms. In making comparisons between the average performances of the farm operators in the various categories of cooperators, the tendency of Status I farms to be nearer the district objectives than Status III farms, both in terms of proportion of acres up to the norm and also as to proximity to the goal on "below norm" acres, makes more distinct the differences between these categories. Therefore, comparisons of the data in table 3 relative to the various categories of cooperators are more meaningful than would otherwise be true.

On the other hand, the data for Status IV (i.e., noncooperating) farms are not strictly comparable to the information for farms in categories I, II and III (i.e., district cooperators). This is true because the farm plans for Status IV farms were devised from the land-capability maps of the respective farms without consultation with the farm operator. Furthermore, the farms were planned on a very intensive basis, and as a consequence, large acreages of land planned for crop rotations are presently in permanent vegetation and are thus automatically up to the district norm.[28] A further weakness of the cumulative data for Status IV farms is that there is no homogeneity among the farms within this category as to progress toward or attainment of the district norm of a "safe level of erosion control." Variations between farms within this stratum are as great as the variations between farms of this and other strata. In other words, some of the operators of the noncooperating farms have reached the district norm on their entire farm; others are far below the norm on most of their tilled land.

Since the data in table 3 for Status IV farms is subject to the limitations above, no attempt will be made in this study to classify these farms, as a group, relative to their attainment of the district objectives. Noncooperating farms are treated as homogeneous only in the sense that on none of them has a district farm plan been initiated. Consequently, characteristics hypothesized to be favorable to plan initiation would be expected to occur more frequently on cooperating farms.

FARM CHARACTERISTICS AND THEIR EFFECT UPON ATTAINMENT OF DISTRICT OBJECTIVES

This investigation has been conducted along three lines of approach. The first approach, discussed in this section, is the assembly and analysis of information relative to specified farm characteristics. This analysis attempts to determine the association of certain characteristics of farms with their operators' participation in the district program and their compliance with district recommendations. It has been hypothesized that some characteristics of farms tend to inhibit and others to facilitate the progress of the districts program in terms of both the number of farms planned and the extent of application of planned practices on the farms of cooperators.

The factors tested are: (a) farm size in acres, (b) ownership interest of operator, (c) leasing arrangement on rented farms, (d) potential farm productivity, (e) livestock program, (f) age of operator and (g) planning horizon of operator. Information relative to these fac-

[27]The measurement of the "problem" on each farm is in terms of acres of tillable land on which the land-use practices being applied permit a rate of erosion loss in excess of the maximum permissible.

[28]Permanent vegetation is, of itself, considered to be, in most cases, a sufficient practice to attain the erosion-control objectives of the district.

tors has been obtained from the farm operators through personal interviews. The data from these schedules have been analyzed and reveal special differentiating characteristics between those farms on which district objectives have been achieved when compared with other farms in the district.

The characteristics tested were selected on the basis of previous knowledge and preliminary investigation because they were deemed to be relevant and capable of being tested with considerable precision with the sample selected. These characteristics are not, however, considered to be the only factors influencing farmers' decisions. Others may be of equal or greater importance. Furthermore, a farmer's determination to carry out a conservation program may succeed despite the existence on his farm of any or all of the hypothetical obstacles tested. Conversely, the absence of any or all of the tentative impediments does not ensure compliance with district recommendations.

Farm Size in Acres

Among the characteristics of farms which apparently influence the owners' and operators' decisions relative to compliance with district objectives is the factor of "size of farm in acres." It was hypothesized that farms relatively large in acres would lend themselves to a soil conservation program more readily than would smaller farms.

There are a number of possible reasons why owners and operators of large farms might more readily accept and carry out a district farm plan. In the first place, larger farms tend to have larger fields which are more readily adaptable to mechanical conservation practices (e.g., contour and strip-crop farming). Furthermore, owners and operators of large farms may be in a stronger financial position and thus be better able to sacrifice some current income and/or finance investments in land.[29] Also, large farms are apt to have roughage-consuming livestock, machinery, buildings and equipment which are more adequate and better adapted to conservation farming. Finally, large acreages may permit the attainment of adequate erosion control largely by a more extensive use of land (e.g., by reducing the proportion of row-crops in the cropping sequence).[30] Thus the use of mechanical practices, such as terraces, which seem to encounter more resistance from farm operators is minimized. On the other hand, small farms may tend to be more severely depleted and eroded from previous exploitation and, as a consequence, require more extensive and effective erosion-control measures.

Effect of Farm Size on Plan Initiation

The data in table 4 concerning status of farms as related to farm size indicate that size of farms in acres has a pronounced effect on the initiation of farm plans.

TABLE 4. STATUS OF FARMS AS RELATED TO FARM SIZE AND SIZE DISTRIBUTION.*

Category	Average size of farm in acres	Distribution of farms by size							
		50-99		100-179		180-259		260 and over	
		(no.)	(percent)	(no.)	(percent)	(no.)	(percent)	(no.)	(percent)
Status I	208	3	16	5	26	5	26	6	32
Status II	224	0	0	7	35	6	30	7	35
Status III	216	3	15	3	15	9	45	5	25
All coops	216	6	10	15	25	20	33	18	31
Status IV	172	6	18	15	44	11	32	2	6

*Chi square test of independence was significant at the 97-percent level.

The average size of sample farms in categories I, II and III (district cooperators) is 216, or 44 acres larger than the average of 172 acres for the farms in Status IV (noncooperators). These data indicate that farms of district cooperators have a definite tendency to be larger in total acreage than the farms of noncooperators.

These findings indicate that districts must eventually recognize that certain adjustments may be necessary to bring smaller farms into the district program. Not only does the district encounter special resistances characterizing small farms, but also the extent of soil exploitation on such farms may be quite out of proportion to the acreage. Remedial measures for this and other district problems are discussed in later sections.

Effect of Farm Size on Application of Practices

Despite its effect on the initiation of farm plans, farm size does not appear to influence cooperators' compliance with district land-use recommendations. In other words, there is no significant difference in the proportion of farms with particular acreages in the three categories of cooperators. However, since none of the cooperating farms in Jasper district are under 50 acres in size and all but six, or 10 percent of the cooperating farms are over 100 acres in size, it is, perhaps, not surprising that acreage ceases to be an important limiting factor within this group. It might be noted that of these six farms under 100 acres in size, three, or 50 percent are from category III (i.e., unsatisfactory cooperators).

Ownership-Interest of Farm Operator

Statistical tests of independence of the data in table 4 of the previous section concerning plan status and size of farm are to some extent confounded by a second factor, "ownership-interest of operator."[31] Farm operators having an ownership-interest are apparently more likely to be cooperators than are tenants unrelated to their landlords. On the other hand, tenant-operated farms tend, on the average, to be large in acreage, a factor which seems to favor participation in the district program.[32]

The following are possible reasons why the objectives of the district are more likely to be achieved on a farm in which the operator has an ownership interest. Where the farm is owner-operated, management decisions are

[29]The initiation of any change in farming operations which requires additional investment or reduced current income is, undoubtedly, influenced by the financial position of the owner and/or operator of the farm. This factor has been investigated in other studies (See: John C. Frey. Some obstacles to recommend land-use practices in western Iowa. Iowa Agr. Exp. Sta. Res. Bul. 391. 1952. pp. 48 ff.) but was not specifically treated here.

[30]Land is used more extensively with relatively large inputs of land as compared to other resources such as labor, capital and management.

[31]Included in this classification are farms operated by owners, part-owners and sons or sons-in-law of the owner.

[32]According to the 1954 U.S. Census of Agriculture, tenant-operated farms in Jasper County averaged 181 acres in size as compared with 121 acres for owner-operated farms. U.S. Census of Agriculture: 1954.

made by one person who is agriculturally oriented and a local resident, factors which make district educational and promotional efforts more effective. On such farms, the problem of dissociation of costs and benefits (interpersonally or intertemporally) is minimized because current expenses and returns are not shared and because the owner-operator tends to have a long-time interest in the farm. Also, owner-operators often have a personal interest in maintaining farm productivity beyond the expectation of immediate financial return. Such personal interests reflect values which were sometimes expressed by respondents as "obligation to posterity" or "love of the land." Where the farm is operated by a part-owner, (a) the factors just mentioned relative to owners would be equally applicable to the owned part of these farms; and (b) the operators may maintain current income by disinvesting rented land and investing in the owned part of the farm.

As with owners and part-owners, related tenant-operators tend to have a long-time interest in their farms and, consequently, are more certain of realizing benefits from long-term investments in land (e.g., lime, terraces, tile, grassed waterways, timber, etc.). Possible inequities in the sharing of the costs and benefits of applying recommended practices would tend to be of small concern in agreements involving parents and sons or sons-in-law.[33] Since the owners of such farms have, in many cases, operated the farm they tend to have a personal interest, not only in the present operator, but also in the farm itself. The owners of farms operated by related tenants tend to be agriculturally oriented and local residents. Furthermore, related tenants are often allowed to make major decisions on these farms relative to investments in land, or at least are able to exert a large measure of influence on the owner concerning such decisions.

EFFECT OF OWNERSHIP INTEREST ON PLAN INITIATION

A statistical test of significance of the data in table 5 indicates that we can be 92 percent confident that ownership-interest on the part of the operator is not independent of the initiation of a farm plan. (Test included owners, part-owners and related tenants against unrelated tenants for Status IV, and all cooperators.) Whereas 81 percent of the cooperators in the sample were owners, part-owners or related tenants, only 63 percent of the sample of noncooperators had an ownership-interest in their farms. Conversely, tenant-operated farms comprised 34 percent of the sample cooperating farms, 50 percent of the sample noncooperating farms and 41 percent of all farms in Jasper County.[34]

The fact that the program is not reaching tenants to the same degree it reaches owner-operators is of considerable significance to the district. Nearly 50 percent of all farms in Iowa are rented in whole or in part; over 50 percent of the land is operated by nonowners. Achieving the objectives of the district's program will, apparently, necessitate measures which will increase tenant participation.

EFFECT OF OWNERSHIP INTEREST ON APPLICATION OF PRACTICES

Despite a significant difference between cooperating and noncooperating farms relative to ownership-interest, no similar differentiation exists between the various categories of cooperators. The extent to which plans were carried out on the farms of cooperators is not shown, by the data in table 5, to be dependent on the ownership-interest of the operator. Apparently, the initiation of a district plan on a farm operated by a nonrelated tenant, is evidence that serious obstacles to compliance with district recommendations did not exist on that farm or have been overcome. The initiation of the farm plan indicates (a) that both the owner and the operator have interest in soil conservation, (b) that the owner and the operator are interested in conserving the soil on the farm and (c) that the owner and tenant do, in some sense, consider the problem to be a mutual one. In view of these considerations, little difference could be expected in the extent to which district plans are carried out on planned farms whether operated by persons having an ownership-interest in the farm or by tenants unrelated to the owner.

Leasing Arrangements on Rented Farms

As shown previously, tenants are less likely to ask for help from the district than are owners or part-owners. After plans have been initiated, however, the application of planned practices appears to be as great on rented farms as on farms operated by owners or part-owners.

The data in table 6 indicate that the type of leasing

[33]In many cases, the parent-owner is assisting the operator in becoming established in business; in others, the tenant is contributing to the support of the owner. In either case, transfers of income are being made intentionally and voluntarily.

[34]U.S. Census of Agriculture: 1954. Iowa. Jasper County.

TABLE 5. PLAN STATUS OF SAMPLE FARMS AS RELATED TO TENURE.*

Categories	Owner-oper.		Part-owner operator		Related-tenant operator		Owner, Part-owner rel.-tenant		Nonrelated tenant		All tenants		Total	
	(no.)	(percent)	(no.)	(percent)	(no.)	(percent)	(no.)	(percent)	(no.)	(percent)	(no.)	(percent)	(no.)	(percent)
Status I	6	32	7	37	2	10	15	79	4	21	6	32	19	100
Status II	10	50	3	15	4	20	17	85	3	15	7	35	20	100
Status III	10	50	3	15	3	15	16	80	4	20	7	35	20	100
All coops	26	44	13	22	9	15	48	81	11	19	20	34	59	100
Status IV	10	29	7	20	5	14	22	64	12	36	17	50	34	100
All Jasper farms†	1,181	44	413	15	....	....	....	....	....	....	1,102‡	41	2,696	100

*Chi square independence test significant at 92-percent level.
†U.S. Census of Agriculture. Iowa. Jasper County. 1954.
‡Includes nine manager-operated farms.

TABLE 6. STATUS OF RENTED FARMS AS RELATED TO LEASING ARRANGEMENT.*

Category	All farms in sample	All tenant-operated farms (no.)	All tenant-operated farms (percent all farms)	Cash crop-share and share-cash (no.)	Cash crop-share and share-cash (percent rented farms)	Cash leases (no.)	Cash leases (percent rented farms)	Crop-share leases (no.)	Crop-share leases (percent rented farms)	Share-cash leases (no.)	Share-cash leases (percent rented farms)	Livestock-share leases (no.)	Livestock-share leases (percent rented farms)
Status I	19	6	32	2	33	0	0	1	17	1	17	4	67
Status II	20	7	30	1	17	0	0	0	0	1	14	6	86
Status III	20	7	35	6	86	1	14	1	14	4	58	1	14
All coops	59	20	52	9	45	1	5	2	10	6	30	11	55
Status IV	34	17	50	14	82	1	5	3	18	10	59	3	18
All Jasper farms	2,696	1,093†	41	618	57	91	9	53	5	474	43	423	38

*Chi square independence test significant at the 98-percent level.
†U.S. Census of Agriculture. Iowa. Jasper County, 1954. Includes 52 unspecified tenants.

arrangement on rented farms has a very definite effect on the decisions of the entrepreneurs relative to the initiation of farm plans and also the application of the planned practices. Conversely then, a leasing arrangement which provides for proportional sharing of the costs and benefits of the planned land use and practices between the owner and the operator of a rented farm would provide the necessary economic incentives for working out an optimum conservation plan for a farm. Such a mutually satisfactory sharing of costs and benefits can most easily be attained when landlords and tenants recognize and accept their individual and mutual responsibilities for the solution of these problems.

Cash leases could provide an economic climate similar to owner-operatorship if terms mutually satisfactory to tenant and owner could be reached. However, the risk element of high fixed cost for the tenant with a cash lease probably tends to encourage short-run exploitation of land and inhibits the development and acceptance of an effective conservation plan.

It has been hypothesized in this study that a stock-share lease would be the rental arrangement most likely to encourage compliance with the district's program. Possibly the most important, but unmeasurable, reason for this is that the owner and operator are already working together in the operation of the farm and are, as a consequence, amenable to a cooperative agreement with the district. Another reason might be that the pooling of two sources of capital permits the acquisition of adequate livestock and machinery. Since the landlord shares in the income from the livestock, he would be more likely to provide the necessary fencing, buildings and equipment for livestock enterprises. Also, stock-share arrangements tend to be longer term than other types of leases. The fact that landlords of these farms are generally local residents and agriculturally oriented also might have an important bearing on compliance.

Furthermore, livestock-share landlords tend to have a more personal as well as a greater financial interest in the farm. Consequently, they take more pride in keeping the farm attractive and productive. Another relevant factor might be that a large proportion of the income of such a farm is usually derived from livestock enterprises; and therefore, more effective use is made of forages. Also, as a result of the livestock enterprises, roughage feeds from grass and legume crops find ready use, and large quantities of manure are generally available as an aid in maintaining and improving soil resources.

EFFECT OF LEASING ARRANGEMENTS ON PLAN INITIATION

As previously pointed out, tenancy seems to be an impediment to participation in the district program. However, this general statement does not hold, apparently, for tenant-operated farms having livestock-share leases. According to the 1954 U.S. Census of Agriculture, 423 (15 percent) of the farms in Jasper County have stock-share leases. In the sample of 34 noncooperating farms only three, or 9 percent, had stock-share leases. On the other hand, 11 of the 59 district cooperators, or 19 percent, have stock-share leases.

A test of independence of the data in table 6 indicates that we can be 98 percent confident that cooperation in the district program and leasing arrangement are not independent. These data provide evidence that renters with stock-share leases are more frequently cooperators than are tenants with other types of leases.

EFFECT OF LEASING ARRANGEMENTS ON APPLICATION OF PRACTICES

The data in table 6 were further tested to determine the effect of the leasing arrangement on the extent of compliance with district recommendations on planned farms. These tests indicate that we can be 98 percent confident that the application of planned practices is not independent of leasing arrangements.

As shown in table 6, a relatively large proportion of the sample planned farms are tenant-operated under a stock-share lease. Furthermore, these planned farms, operating under stock-share leases, with only one exception, have made substantial progress in implementing their farm plans. On the other hand, a relatively small proportion of the farms with other types of leases have been planned by the district, and on the average, little progress had been made toward achieving conservation objectives on these planned farms.

Potential Farm Productivity

An attempt is made in this section to determine the effect of the inherent productiveness of farms on owners' and operators' decisions relative to complying with district objectives. It has been hypothesized that the owner and/or operator of a farm having a relatively low inherent productivity will be more likely to accept and carry out a farm plan than will the entrepreneurs of highly productive farms. A possible reason why this

hypothesis might be valid is that erosion-control problems tend to be readily apparent on farms of low productivity because of exposed subsoil, gullies and low yields. Because of the generally low levels of fertility on such farms, yield responses from the application of planned practices are generally prompt and strong. Furthermore, technical assistance, as offered by the district, is usually required because of the erosion-control measures necessary. A final reason might be that farms of low productivity tend to be well-adapted for grass and legume crops; as a consequence, their entrepreneurs often have, or willingly acquire, roughage-consuming livestock.

EFFECT OF FARM PRODUCTIVITY ON PLAN INITIATION

Taken as a group, the total sample of cooperating farms is not significantly different in productivity (as categorized in table 7) from the sample of noncooperating farms. From these data one might conclude that low farm productivity neither facilitates nor deters the initiation of farm plans. More likely other factors associated with "poor" farms often tend to obstruct cooperation. These factors, thus, balance out the over-all effect of the facilitating factors mentioned previously relative to carrying out practices on planned farms of low productivity. Conditions which might exist on such farms would tend to obstruct a conservation program. For instance, such farms have often been severely damaged by past erosion and consequently require intensive erosion-control measures. Then, too, the entrepreneurs of these farms may be in a poor financial position making it difficult for them to forego current income and/or finance investments in land. Also there may be some tendency for "poor" farms to have entrepreneurs who are poor managers, the implication being that a superior farmer would possess a more productive farm or develop his farm to a higher level of productivity.

EFFECT OF FARM PRODUCTIVITY ON THE APPLICATION OF PRACTICES

An examination of the data in table 7 shows that the sample farms from the three strata of cooperators vary widely in their potential productivity. Whereas 63 percent of the farms in Status I fall in the "low" productivity rating, only 15 percent of the Status III farms are so classified. On the other hand, 80 percent of Status III farms are "high" in potential productivity as contrasted to only one farm, or approximately 5 percent, of Status I farms.

A statistical test of independence of the data in table 7, relative to extent of cooperation on planned farms and their rating as to farm productivity, indicates that we can be 99 percent confident that these two factors are not independent. There is no significant difference in the average acreage of farms in the various sample categories of cooperators (see table 4); therefore, the very pronounced differences in farm productivity among these categories are, presumably, the result of differences in land capability and the closely related factors of extent and severity of erosion-control problems.

In summary, the data in table 7 indicate that the potential productivity of farms is an important consideration in influencing the extent to which the farm plan of a cooperating farm will be carried out. On the other hand, these data provide no evidence that farm productivity affects plan initiation. Factors other than low farm productivity, but associated with it (e.g., poor financial position and small acreage), may obstruct participation in the district programs on some of these farms.

TABLE 7. STATUS OF SAMPLE FARMS AS RELATED TO THE POTENTIAL PRODUCTIVITY.*†

Category	Sample farms (no.)	Potential productivity of farms: High (no.)	High (percent)	Medium (no.)	Medium (percent)	Low (no.)	Low (percent)
Status I	19	1	5	6	32	12	63
Status II	20	9	45	5	25	6	30
Status III	20	16	80	1	5	3	15
All coops.	59	26	44	12	20	21	36
Status IV	34	14	41	12	35	8	24

*Potential farm productivity is here defined as the inherent ability of a farm to yield rent (i.e., outputs over inputs) under current cultural practices. The farms have been categorized as high, medium or low in productivity by a comparison of the various land capability maps. In the process of classification, primary consideration was given to the following factors: (a) the total potential farm productivity as evidenced by land capability and farm size in acres, (b) the extent and severity of erosion control problems and to a lesser extent (c) the adaptability of the farm to the use of mechanical erosion-control practices.
†Significant at the 99-percent level.

LIVESTOCK PROGRAM

In general, there are two methods of achieving the conservation objectives of the district on any given farm: (1) make intensive use of mechanical erosion-control measures and commercial fertilizers while maintaining a high proportion of tilled crops in the cropping sequences or (2) reduce the proportion of tilled crops in the cropping sequence and increase the proportion of meadow crops. With very few exceptions, in actual practice, a combination of these two methods is used. However, according to this study farm operators seem to accept changes in cropping sequences much more readily than they accept mechanical erosion-control practices. Consequently, the adoption of a conservation program on a farm almost invariably results in an increase in the production of roughage feeds resulting from both increased acreages of meadow crops and also from increased per-acre yields from improved land-use practices.

In view of their increased production of roughage, the entrepreneurs of cooperating farms are usually faced with the problem of economically disposing of the addi-

TABLE 8. STATUS OF SAMPLE FARMS AS RELATED TO LIVESTOCK PROGRAM.*

Category	Grain-consuming livestock units† (per acre)	Grain-consuming livestock units† (per farm)	Roughage-consuming livestock units (per acre)	Roughage-consuming livestock units (per farm)
Status I	0.74	153.5	0.17	35.7
Status II	1.30	290.9	0.21	47.3
Status III	0.81	177.6	0.17	37.0
Status IV	0.70	120.4	0.15	28.0

*Not significant at the 80-percent level.
†Various livestock were assigned "unit" values as in animal units of livestock fed annually, 1919-20 to 1948-49. USDA, BAE, Washington, D. C. Oct. 1949.

tional meadow crops. It was hypothesized that farmers would be more likely to accept and implement such a farm plan if they had adequate roughage-consuming livestock. Of course, feeding livestock is not the only way in which a farmer can dispose of his roughage. He might sell hay for cash, or contract to have his hay harvested for cash or shares. He may rent out his meadows for pasture or contract to pasture livestock. Another alternative might be to harvest seed from the grasses or legume. A final possibility is to plow under the growth as green manure.

EFFECT OF LIVESTOCK PROGRAM ON PLAN INITIATION

Table 8 shows the average number of units of livestock per farm and per acre for each of the four categories. Although the noncooperating farms have, on the average, substantially fewer units of livestock than do the three categories of cooperators, this difference is not statistically significant.[35]

EFFECT OF LIVESTOCK PROGRAM ON APPLICATION OF PRACTICES

The data in table 8 provide no evidence that implementation of district plans is dependent on the livestock programs on farms. There is no significant relationship between the number of units of roughage-consuming livestock and the extent of compliance on planned farms.

Apparently, farm operators do not consider the feeding of roughage to their own livestock as being the only practicable utilization for meadow crops. In many cases, farmers consider meadow crops to be complementary to tilled crops and grow them only for their soil-conserving effects and increases in yields of subsequent grain crops. In such cases roughage, not needed for hay or pasture, is not harvested but, instead, is plowed under for humus and nitrogen.

On the other hand, some farmers consider the meadow crops to be relatively good as cash crops. Sales of seed from legume crops (e.g., birdsfoot trefoil) were reported to have grossed as high as $100 per acre with only a fraction of the cost of corn production. Also, annual yields of hay of 5 tons per acre were frequently reported on farms using recommended land-use practices. Furthermore, such yields were often reported on land relatively low in capability and not well suited for row crops.

This study has not attempted to determine the relative profitability of meadow and grain crops on farms in Jasper district. However, it would appear that meadow crops, as compared with tilled crops, have several advantages. In the first place, the value of the product as pasture, hay or seed, if utilized economically, quite likely exceeds the value of an oat crop. On soils of low capability (e.g., Shelby series), meadows are quite competitive in net value of crop to corn or soybeans. Furthermore, yields of grasses and legumes tend to be less variable since meadow crops are not so susceptible to weather, insect or disease damages as are grain crops. A final consideration, which is of major importance to many farmers, is that meadow crops reduce the necessity of using mechanical erosion-control practices.

OTHER FACTORS

Hypotheses relating to possible adverse effects on district progress of advanced age of farm operators and short planning horizons were neither supported nor refuted by the data collected. The average age of all the operators of the farms was approximately 48 years; the mean age of the operators of the various categories varied less than 3 years from this over-all mean. With few exceptions, planning horizons of the operators were for longer than 5 years. Each respondent was asked how many years he was reasonably certain of having a personal or financial interest in his farm; only nine from the total of 93 operators were planning on the basis of less than 5 years. These nine were distributed throughout all categories. In short, no significant difference between the various categories was revealed relative to these factors.

There are, undoubtedly, factors other than those investigated which influence, to a greater or lesser extent, the decisions of farm operators relative to participation in the district programs. Among the factors which might be relevant but which have not been investigated in this study are: (1) financial position of the owner and operator, (2) sex, age, occupation and place of residence of the owner and (3) formal educational level attained by the owner and operator. Other factors may be equally or more important.

Situations existing on any farm relative to the considerations treated in this section will neither ensure nor preclude full participation in the district program. Farm operators who are convinced that soil conservation as advocated by the district program is profitable or morally obligatory will probably achieve district objectives. On the other hand, no combination of favorable circumstances is apt to induce complete compliance with district objectives in the case of individuals who feel that such action is neither necessary nor profitable.

REASONS FOR COMPLYING AND FOR NOT COMPLYING WITH SPECIFIED LAND-USE PRACTICES

The component parts of the basic farm plans are the specific cropping systems, tillage practices and erosion-control measures which, when applied in the proper combinations, will achieve the district objectives of erosion control. The operator of each sample farm was questioned as to the land-use practices applied by him on each of the fields on his farm. If a farmer stated that he applied the basic land-use practices on a particular field as specified in his farm plan, it was assumed that he had achieved the district objective of erosion control for that field. On the other hand, if practices other than those specified in the farm plan were being used, the practices applied were compared with the recommendations in the "Technical Guide" of the SCS. The substituted practices were not considered to be departures from district objectives unless they were not

[35]Analysis of variance tests of significance were not sensitive because of the large variation of values within each category.

equivalent in erosion-controlling ability to the practices recommended in the "Guide" for soils of similar capability.

No attempt was made in this investigation to (a) corroborate the farmers' statements of compliance, (b) determine the quality of application of the practices used or (c) qualify the effectiveness of the basic erosion-control practices according to a farm operator's concurrent use of practices associated with soil conservation. That these factors were not taken into account in measuring farmers' progress toward district objectives is not to imply their lack of importance but reflects instead an inability to accurately measure, with the data available, the effect of these factors on the attainment of the district objective. Some of these associated practices and the operators' attitudes toward them are discussed later.

To rate farmers' use of their land, it was assumed for this study that the rate of soil loss in a field depends on (a) the mechanical erosion-control measures applied and (b) the relative proportions of intertilled row crops, solid-drilled annual crops and meadow crops in the cropping sequence.

Which of the three basic mechanical practices (terracing, strip-cropping and contouring) is considered for a given field is dependent on the proportion of intertilled crops in the rotation and the severity of the soil-erosion hazard. Terracing, where applicable, is considered to be the most effective of the three mechanical practices in reducing soil loss. Contour-strip-cropping is somewhat less effective than terracing but provides better erosion control than does solid contouring. On the other hand, contour tillage on soils having an erosion hazard results in lower rates of soil loss than does straight farming, particularly in the production of intertilled crops. In Jasper district, permanent vegetation is considered, with few exceptions, to adequately control soil loss.[36]

On soils having an erosion hazard, however, the introduction of tilled crops, particularly intertilled row crops, into the cropping sequence usually entails the concurrent use of mechanical erosion-control practices for the achievement of district objectives. In like manner, increases in the proportion of tilled crops and/or decreases in the proportion of meadow crops in a cropping sequence require the application of compensatory mechanical erosion-control measures to prevent higher rates of soil loss.

For example, to maintain a safe level of erosion loss, a soil of some hypothetical land-capability class might require any one of several combinations of land-use practices, as follows:

Conservation practices	*Rotations*
1. Terraces with contouring	C-C-O-M-M[37]
2. Contour strip-crop	C-C-O-M-M-M
3. Contouring only	C-O-M-M
4. No practices	No row crops

Each of these four combinations of land-use practices would, presumably, keep average soil loss rates below the maximum permissible. Therefore, any of the four would be acceptable to the district as a means of achieving district objectives.

Tables 11 and 14 present cumulative data concerning planned and applied basic erosion-control practices on the farms of the four sample categories. The data in these tables for the farms of Status I, II and III (i.e., district cooperators) are comparable since they refer to farm plans made with the cooperation of the owners and/or operators. Plans for Status IV farms (i.e., noncooperators), however, were made from land-capability maps without the cooperation of the entrepreneurs and without the farm planner visiting these farms. On the average, these farms apparently were planned at a somewhat more intensive level than were the farms of the other categories.[38] This is evidenced by the fact that 84 percent of the land in the Status IV farms is classified as tillable (i.e., planned or used for row crops) as compared with 52 to 63 percent tillable for the other categories. This disparity in proportions of tillable land is not due to differences in land capability between the farms of the various categories (see table 7).

In the following sections, the specific reasons given by farm operators for applying, and for not applying, the component parts of their farm plans are discussed. Although widely varying proportions of the planned practices have been applied by the operators of different sample categories, the operators who have accepted (or have not accepted) a particular practice have made these decisions for reasons which are apparently independent of the extent of their compliance with district objectives. An analysis of the reasons given revealed no differences in the motivations among the farmers of the different categories. Apparently, cooperators and noncooperators had the same reasons for not carrying out the practices which they did not apply. Furthermore, to the extent that noncooperators were in line with district plans, they apparently applied the practices for the same reasons as the cooperators.

Since no differences in reasons for carrying out and not carrying out recommended practices were noted within the sampling groups (I, II, III and IV), it was considered unnecessary to weight the responses for each group in terms of differential sampling rates in arriving at over-all estimates for the combined groups. Therefore, all 93 operators of the farms in the four categories are given equal weight in the tables.

Farm operators were questioned about their compliance or noncompliance with district objectives of erosion control for each field on their farms. Often a farmer who had applied a particular practice (e.g., contouring) on one field had rejected it on another. Furthermore, the reasons given by an operator for accepting (or not accepting) any particular practice quite often differed between fields because of differences in tenure status or soil conditions.

Almost all of the farmers had attained the objectives of the district on at least part of their farms. On the other hand, few farmers had applied acceptable com-

[36]At least one soil type, Clarion sandy loam, encompassing a small area in Jasper district, requires terraces on steep slopes used for permanent meadow.

[37]"C" refers to any intertilled row crop, "O" refers to any solid-drilled annual crop and "M" refers to grasses and legumes.

[38]Because of the additional tillage, seeding, harvest and erosion-control operations required in the production of intertilled crops as compared with meadow crops, row crops are considered to represent a more intensive use of land.

binations of land-use practices on their entire farms. Consequently, with few exceptions each respondent was questioned relative to both his acceptance and his non-acceptance of district recommendations.

Inquiry into the reasons for complying or not complying with specific practices was made, as follows: (1) If the operator accepted the erosion-control measures as specified in the farm plan, he was asked to explain why he used the practices. (2) If he used an acceptable alternative combination of practices, he was asked why he had used the substituted practices. (3) If he used a combination of practices which were not acceptable, he was asked to give his reasons for not modifying his use of the soil by reducing the proportion of row crops in the cropping sequence and/or applying additional (or more effective) mechanical erosion-control practices.

Field Layout

The manner in which the fields are laid out on a farm does not in itself affect the rate of soil loss. However, field layout often indirectly has a real effect on the level of conservation attained on a farm. The farm planner in laying out field boundaries strives to have the fields of a farm (a) readily accessible from the farmstead, (b) relatively uniform in size, (c) homogeneous as to land capability, (d) adaptable to the use of mechanical erosion-control measures and (e) conform to the preferences of the owner and operator. These goals are rarely complementary and often are directly competitive; as a consequence, the final pattern of fields in the farm plan is usually a compromise between these various objectives.

From the standpoint of gaining acceptance by the farmers, the planned field layout cannot depart radically from their preferences. On the other hand, in relation to erosion control a very important objective in laying out fields is to attain homogeneity as to land capability within the boundaries of each field. Soil homogeneity permits the application, throughout each field, of a uniform set of land-use practices which will utilize the soil of the entire area to the extent of its capabilities without exceeding the capacity of any part. Such a field can readily be farmed so as to maximize productivity over time. In Jasper district and many other areas of the state, however, soils on any farm are quite heterogeneous as to capability, and as a consequence contiguous tracts of homogeneous land tend to be relatively small and odd-shaped. Operators then have the alternatives of (a) fields which are small, irregular in shape and of diverse sizes or (b) fields which are larger, regular in shape and uniform as to size but more or less heterogeneous as to land capability. If a field is heterogeneous as to land capability, however, the operator must (a) disinvest the soil of low capability and/or underfarm the soil of high capability or (b) use more intensive mechanical practices (e.g., terraces or strip-cropping) on the more erodible part of the heterogeneous area but treat the whole as a unit from the standpoint of cropping sequences.

Since the farm plans for the noncooperators were made from land capability maps without the planner going on the farm or consulting the owner or operator, no attempt was made to lay out field boundaries on Status IV farms. Consequently, the views of the non-cooperating operators relative to field-layouts were not obtained.

Reasons Why Cooperators Comply With Field Layout Plans

In table 9 is a list of the more frequently mentioned reasons given by the operators of cooperating farms for complying with the conservation plan relative to field boundary arrangements. The reasons stated in the table are necessarily brief and are an aggregation of a number of related factors.

On many farms on which the fields had been laid out according to plans, the operators had had no part in making the decision. Often the field boundaries were established before the present operator moved to the farm. In other instances, the landlord relocated field boundaries to correspond to the farm plan without consulting the tenant. In few instances did a tenant relocate field boundaries without the full cooperation of the landowner. Generally speaking, tenants seem to feel that the moving of a field boundary, at least where fencing is involved, is the responsibility of the landlord. Few tenants seemed to feel strongly enough about the problem to finance or even initiate such a change. Exceptions were noted when the new field arrangement resulted in larger fields. Also, some tenants who farmed on the contour were quite eager to have contour fencing where applicable.

The reason given in table 9 relating to complementarity between field layout and other practices, refers primarily to contour farming. Since the capability of land is greatly influenced by slope, there is a strong tendency for the boundaries of land-capability classes to correspond closely to contour lines. Consequently, the establishment of fields on the basis of land capability often, with only minor modifications, results in field boundaries laid out on the contour. Such an arrangement of field boundaries usually results in a substantial reduction in the number of point rows in a contour-farmed field, which in turn reduces the time required to till a given area. The result is a saving in labor and machinery cost on contour-farmed fields. There is, as a consequence, a strong tendency on the part of the operator toward accepting the changed field boundary arrangements where he intends to farm on the contour.

One reason often given by farm operators for accepting changed field boundary arrangements is that the practice increased net farm income. As mentioned earlier, however, homogeneity within a field relative to land

TABLE 9. REASONS GIVEN BY 38 DISTRICT COOPERATORS FOR COMPLYING WITH PLANS RELATIVE TO FIELD LAYOUT.*

Reasons	Operators expressing each	
	Number†	Percentage
Established by landlord or previous owner	11	29
Complements practice of contouring	15	39
Reduces labor and machinery costs	19	50
Increases net income from farm	12	32

*Field layout recommendations were available for only the 59 farms in sample categories I, II and III (i.e., cooperators).
†Some operators expressed more than one reason.

capability is a necessary condition for maximizing productivity over time. A great many fields in Jasper County farms are extremely heterogeneous as to land capability It is not unusual to find up to five soil types and three land capability classes in one field as presently operated. It is physically impossible to farm such a heterogeneous area as a unit and utilize each soil up to, but not beyond, its capabilities. Most often neither the good land nor the poor land is producing up to its full capabilities in such a field.

REASONS FOR COOPERATORS NOT COMPLYING WITH FIELD LAYOUT PLANS

As indicated in table 10 there is a quite strong feeling among tenants that the landlord should take responsibility for and finance the relocation of field boundaries where fencing is involved. The farm operators who gave this as a reason had accepted the plans in principle but, with one exception, were not willing to implement the practice. The excepted tenant had been refused permission by the landlord to make the change.

Another rather large group, mostly of owner-operators, agreed that the plans were valid and desirable but were not willing to go to the work and expense of moving the fences. Other operators closely associated with the group just discussed were willing to grant that the plans had some merit but were not convinced that the benefits from such a reorganization would justify the labor and other costs involved.

A number of farmers voiced strenuous objection to the small size of fields recommended. Such an objection would be more likely to come from an operator who was not contouring, since the principal objection to small fields is the resulting point rows. When the tillage of a field is on the contour, the length of rows is not likely to be reduced by contour fencing.

A few farmers mentioned that following field layout plans is not necessary for attaining the district norm of soil-erosion control. A farmer may follow these plans and still pursue land-use practices which result in serious soil deterioration. Conversely, another operator may not follow the farm plan relative to field boundaries and still achieve district objectives of erosion control. It is, however, generally evident that those operators who protested the desirability of following field layout on the contour did not adequately control erosion on their farms.

TABLE 10. REASONS GIVEN BY 36 DISTRICT COOPERATORS FOR NOT COMPLYING WITH PLANS RELATIVE TO FIELD LAYOUT.

Reasons	Farm operators expressing each	
	Number*	Percentage
Landlord's responsibility	12	33
Unnecessary for erosion control	7	19
Cost too high for the benefits	21	58
Requires too much labor	13	36
Fields are too small	8	22

*Some operators expressed more than one reason.

CROPPING SEQUENCE

Possibly the most basic part of the district plan for a farm is the cropping sequence recommended for each of the fields. Table 11 presents the average acres, recommended and applied, of row crops and of temporary and permanent meadow on the farms of each of the sample categories. Direct comparisons of the data between categories of farms tend to be misleading since the achievement of the objectives of the district on a farm requires the application not only of the suggested cropping sequence but also of the planned mechanical erosion-control practices. Farms of Status I and Status IV have, on the average, acreages of the various types of crops substantially as recommended. However, investigation of the data in table 11 indicates that, whereas the cooperating farmers (Status I and Status II) have, in most cases, applied mechanical practices as planned, noncooperators (Status IV) have applied such practices only rarely.

The many possible crop rotations, varying from permanent vegetation to continuous row crops, have widely differing effects on erosion loss and consequent maintenance of soil productivity. Furthermore, the rate of soil loss resulting from the application of a particular cropping sequence depends also on the mechanical erosion-control practices used concurrently. This is true except with rotations having a low proportion of intertilled crops and/or on soil having little or no erosion hazard. Consequently, planning a given cropping sequence for a given field presupposes the application of the accompanying mechanical practices. Therefore, failure to apply the necessary mechanical practices on a given field invalidates the cropping sequence specified in the farm plan for that field.

REASONS FOR COMPLYING WITH CROPPING SEQUENCE PLANS

Operators of each of the sample farms, having fields on which district objectives of erosion control were being complied with, were questioned as to their reasons for using the land-use practices applied. Table 12 presents the reasons most frequently given by farm operators for accepting the specified cropping sequences.

TABLE 11. STATUS OF SAMPLE FARMS AS RELATED TO APPLICATION OF PLANNED CROPPING PRACTICE.

Category	Average size of farm in acres	Average tillable acres*	Tillable land as percent of total	Acreage row crops			Acreage meadow crops		
				Average recommended	Average applied	Recom. as percent applied	Average recommended	Average applied	Applied as percent recommended
Status I	208	109	52	38	40	96	83	79	95
Status II	224	140	63	48	61	80	106	87	82
Status III	216	118	55	39	52	76	114	64	56
Status IV	172	145	84	59	57	102	70	71	101

*Land was defined as tillable if used for row crops by operator or specified in farm plan for a rotation containing row crops.

TABLE 12. REASONS GIVEN BY 41 FARM OPERATORS FOR COMPLYING WITH PLANS RELATIVE TO CROPPING SEQUENCES.

Reasons	Operators expressing each	
	Number*	Percentage
Landlord favors	12	29
Increase net income	39	95
Personal satisfaction in keeping farm productive	16	39
Saves labor and machinery costs	24	59
Complements other practices	18	44

*Some operators gave more than one reason.

The factor which apparently influenced operators' acceptance of cropping sequences to the greatest extent was the belief that to do so would increase net incomes from their farms. These farmers felt that the increase in per-acre yield of grain crops more than compensated for the reduction in acreage of such crops as specified in farm plans. Furthermore, respondents were quick to point out the large yields of high-quality roughages and the value of these crops both as feed and for sale. Meadow crops were cited as being: (a) dependable as to yield, (b) supplementary to corn in labor requirements, (c) of high value as compared with small grains and (d) highly effective in controlling soil-erosion loss, particularly when used in contour strips.

In general, the farm plans called for an increase in the number of acres of meadow crops and, conversely, a decrease in row crops. Solid-drilled grain crops (e.g., oats) are not as conducive to soil erosion as are intertilled crops; on the other hand, they do not hold the soil as well as do meadow crops. Small grains apparently are not as profitable as either row crops or meadow crops and therefore are economically justified primarily because of their supplementarity to meadow crops.

REASONS FOR NOT COMPLYING WITH CROPPING SEQUENCE PLANS

As presented in table 13 a large proportion of those operators who rejected the suggested rotations stated that the planned cropping sequences were not necessary for conservation. These operators usually insisted that erosion loss was not excessive with their present cropping practices.

TABLE 13. REASONS GIVEN BY 62 FARM OPERATORS FOR NOT COMPLYING WITH PLANS RELATIVE TO CROPPING SEQUENCES.

Reasons	Operators expressing each	
	Number*	Percentage
Landlord objects	4	6
Reduce farm income	35	56
Too short time-interest	2	3
Not effective in controlling erosion	4	6
Not necessary for maintenance of productivity	28	45
Increased labor and machinery costs	4	6

*Some operators gave more than one reason.

A large proportion of the operators claimed that to follow the rotation recorded in the farm plan would seriously reduce their income. Probably the landlords who objected to the rotations also felt that the "plan" rotations would reduce the rent.

Because of lack of the necessary information, little attempt has been made to appraise the validity of the reasons given for not following these and other practices. Some of the reasons were almost certainly invalid but others may be, to some extent at least, an accurate appraisal of the particular situation.

MECHANICAL EROSION-CONTROL PRACTICES

In table 14 is presented the average acres per farm, planned and applied, of the three principal mechanical erosion-control practices—contouring, strip-cropping and terracing. In general these data indicate that, in sample categories I and II, the practices of contouring and strip-cropping have been applied largely as recorded in farm plans. The farmers in sample categories III and IV, however, had applied the specified mechanical erosion-control measures on only a small proportion of the acres on which these measures were planned. The practice of terracing was quite generally rejected by the farmers of all categories in the Jasper district.

The significance of these cumulative data is rather difficult to determine. The failure of a group of farmers to apply one particular practice to the extent set forth in their plans does not itself necessarily result in excessive erosion on their farms. Not only are the land-use practices planned in combinations rather than singly, but the combinations of practices are planned for specified fields. As a consequence, summation of acreages of the various practices, planned and applied, has few clear implications. However, two important inferences can be drawn from the data in table 14: (1) farmers who are participating actively in the district program (i.e., categories I and II) use mechanical erosion-control practices to a much greater extent than do farmers who are not participating and (2) the farmers in all of the categories have, for the most part, not used terraces in the Jasper district.

CONTOURING

Tilling the soil on the contour is apparently, for many farmers, a quite radical departure from the straight rows in which they have long taken pride. Many farmers seem to find it difficult to consider the merits and demerits of contour farming in a rational manner. Re-

TABLE 14. STATUS OF SAMPLE FARMS AS RELATED TO APPLICATION OF SPECIFIED MECHANICAL CONSERVATION PRACTICES.

Categories	Av. total acres per farm	Acres of contouring			Acres of strip-cropping			Acres of terracing		
		Average acres per farm		Applied as percent planned	Average acres per farm		Applied as percent planned	Average acres per farm		Applied as percent planned
		Planned	Applied		Planned	Applied		Planned	Applied	
Status I	208	93.3	94.7	101	57.8	84.1	145	18.5	2.3	13
Status II	224	119.1	109.3	92	81.2	65.5	81	39.7	8.6	22
Status III	216	98.7	19.4	22	66.9	9.5	14	32.8	3.7	11
Status IV	172	110.0	13.9	13	34.3	7.1	21	71.4	0.2	

TABLE 15. REASONS GIVEN BY 50 FARM OPERATORS FOR COMPLYING WITH PLANS RELATIVE TO CONTOURING.

Reasons	Operators expressing each	
	Number*	Percentage
Landlord favors	9	18
Increases net income	46	92
Feel obligated to maintain farm productivity	20	40
Saves labor and machinery costs	9	18

*Some operators expressed more than one reason.

jection often appeared to be on the basis of a general aversion to the whole idea rather than being the result of specific objections as to the benefits and costs of contouring.

Reasons for Complying With Contouring Plans

Table 15 presents the reasons given by farmers for accepting the practice of contour farming. The majority of the farmers who had accepted contouring had, in effect, two main reasons: (1) they felt that contouring would increase their net income over time and (2) they took pride in maintaining their farms at high levels of productivity. Often both reasons were given for farming on the contour. Many of the farmers considered themselves to be morally obligated to minimize soil deterioration. In several cases, the landlord had insisted that the land be farmed on the contour, and in these cases one could probably conclude that the landlords' reasons were similar to those cited above.

Reasons for Not Complying With Contouring Plans

The most commonly stated reason for rejecting contouring (table 16) was that the practice is not necessary for conservation. Four farmers voiced the opinion that contouring increased, rather than reduced, the rate of soil loss. In most instances, the farmers who gave such an answer qualified it by specifying the necessity of maintaining what they considered to be a "good" rotation of crops. However, the cropping sequence applied by these farmers was rarely any less intensive than the one specified (with contouring) in the farm plan.

Another important reason for not farming on the contour was the belief that the practice would reduce net income primarily by (a) increasing costs of labor and machinery resulting from point rows and (b) reducing production from smaller fields and unused land. Many farmers voiced the more explicit objection that contouring made weed control difficult if not impossible. This also may affect costs and yields.

A few operators who had accepted the practice as being desirable were either prevented from using contouring tillage by their landlords or intending to apply the practice the next crop year. Another small group admitted the desirability of contour tillage but insisted that the size and lay of their fields were such that contouring was not practicable.

Rarely had those who rejected contouring ever had any experience with the practice. One would suspect that many of the reasons given were merely rationalizations. Respondents had, it appeared, often rejected the practice and then searched for reasons to justify their noncompliance. On the other hand, some farmers (usually with only moderately erosive land) have maintained high crop yields over a period of many years without contouring. Several of these operators stated that whenever their yields dropped below those of their neighbors who were contouring, then they would also farm on the contour. Again data is not available to test the validity of any of the reasons given.

TABLE 16. REASONS GIVEN BY 53 OPERATORS FOR NOT COMPLYING WITH CONTOURING PLANS.

Reasons	Operators expressing each	
	Number*	Percentage
Landlord objects	9	19
Not necessary	32	60
Not effective erosion-control measure	4	8
Reduces net income	17	32
Makes weed control difficult	14	26
Increases labor and machinery cost	13	25
Intend to apply the practice	4	8

*Some operators expressed more than one reason.

CONTOUR STRIP-CROPPING

A practice closely associated with contouring is that of strip-cropping. Although fields may be, and often are, contoured and not strip-cropped, the inverse is not true. The practice of strip-cropping is dependent on contouring and the strips are, in fact, an effective erosion-control practice only when laid out on the contour. As a consequence, the reasons for rejecting or accepting the practice of contouring apply also to strip-cropping. However, there are other reasons which apply only to contour strip-cropping and not to contouring as such.

Reasons for Complying With Contour Strip-Cropping Plans

Table 17 presents the reasons farm operators have applied plans relative to contour strip-cropping. As would be expected the reasons are similar to those given for solid contouring. In this regard, many farmers were convinced that meadow strips were equal or superior to terraces in reducing soil losses.[39]

Reasons for Not Complying With Contour Strip-Cropping Plans (Table 18)

Despite the fact that many farmers are firmly convinced of the merit of strip-cropping, others stated that the strips were unnecessary to adequately control erosion. Still other operators, although agreeing that the strips contributed to the effectiveness of contouring, did

[39]Experimental data do not support this belief except under conditions unsuited for terraces.

TABLE 17. REASONS GIVEN BY 33 FARM OPERATORS FOR COMPLYING WITH STRIP-CROPPING PLANS.

Reasons	Operators expressing each	
	Number*	Percentage
Landlord	6	18
Increases net income	31	94
Pride in keeping farm attractive and productive	14	42
Complementarity to contouring	23	70

*Some operators expressed more than one reason.

TABLE 18. REASONS GIVEN BY 55 FARM OPERATORS FOR NOT COMPLYING WITH STRIP-CROPPING PLANS.

Reasons	Operators expressing each	
	Number*	Percentage
Landlord objects	9	16
Not necessary for erosion control	21	38
Increase labor and machinery requirements	29	53
Inconvenient for pasture	19	35
Intend to apply	6	11

*Some operators expressed more than one reason.

not consider the benefits to be adequate to compensate for the additional cost and inconvenience.

Among those operators who farm on the contour, perhaps the most important single reason for rejecting strip-cropping is the difficulty encountered in pasturing meadow strips. They do not consider satisfactory the alternatives of (a) using the meadow strips for hay only and increasing the acreage of permanent meadow to take care of their pasture needs or (b) using temporary fencing to separate the meadow and grain crops. Possibly part of this difficulty stems from their failure to adopt a 6-year cropping sequence (i.e., C-C-O-M-M-M) which permits the meadow strips to remain 3 years, minimizing not only the seeding but also changes in fencing.

Generally speaking, contour strip-cropping is a popular practice and is apparently gaining in popularity. Almost all of the farmers interviewed credited the practice with being highly effective in controlling erosion. Nearly all of the respondents conceded that the practice was necessary—at least on farms other than their own. A number of farmers not now using the practice were contemplating the establishment of strips in the near future.

TERRACING

Terracing is treated as a separate practice; however, like strip-cropping, terracing requires concurrent application of contouring. Consequently, the reasons given by farmers for not contouring also apply to terracing in addition to the further objections to terracing.

Reasons for Complying With Terracing Plans

Among the 93 operators of the sample farms from Jasper district only eight were using terraces, and two of these were terracing because the practice was initiated by their landlords. Six of the farmers who had terraces felt that the practice increased yields and profits over a period of years (see table 19). They were unanimously of the opinion that properly constructed terraces were

TABLE 19. REASONS GIVEN BY EIGHT FARM OPERATORS FOR COMPLYING WITH PLANS RELATIVE TO TERRACING.

Reasons	Operators expressing each	
	Number*	Percentage
Landlord requires	2	25
Increase net income	6	75
Pride in keeping farm productive	2	25
Complementarity to other erosion-control measures	3	38

*Some operators expressed more than one reason.

TABLE 20. REASONS GIVEN BY 37 FARM OPERATORS FOR NOT COMPLYING WITH PLANS FOR TERRACING.

Reasons	Operators expressing each	
	Number*	Percentage
Landlord objects	11	30
Not necessary for adequate erosion control	6	16
Reduce net farm income	9	24
Increase labor and machinery costs	4	11
Intend to apply	2	5

*Some operators expressed more than one reason.

effective in controlling erosion. Only two of them expressed any real difficulty in tilling terraced fields.

Reasons for Not Complying With Terracing Plans

In contrast to the opinion of the farmers who are using terraces, those who are not were convinced that the practice was neither necessary nor profitable (see table 20). Almost all of these farmers stated that terracing was not necessary because their present land-use practices were maintaining or increasing soil productivity and/or terracing would not reduce soil erosion below the present rate. They were further convinced that the increased costs resulting from (a) construction and maintenance of the terrace structures, (b) additional time required to till terraced fields, (c) damage to machinery and (d) reduced yields caused by baring subsoils, would reduce their net income. In fact, some were certain that terraces would reduce yields and, consequently, gross income over time in addition to increasing costs.

It should be pointed out that, with possibly one or two exceptions, the farm operators who voiced the objections in table 20 have had no personal experience with terraces. Few of them had ever actually seriously considered using the practice. As a result, some of the reasons for rejecting terracing are undoubtedly based on misconceptions resulting from a lack, or misinterpretation, of facts. On the other hand, a number of farmers were using contour strip-cropping in place of the planned terraces and in so doing were below district standards of erosion control. However, because of the arbitrary nature of the soil-loss norm, it is possible that the rate of soil loss on such fields is within permissible soil-loss limits.

Associated Land-Use Practices

In previous sections, the land-use practices of cropping sequence, contouring, contour strip-cropping and terracing have been discussed. A number of other land-use practices associated with, and used in conjunction with, these basic erosion-control measures are specified in every farm plan. In this section the following associated practices will be treated: (a) grassed waterways, (b) green manure, (c) commercial fertilizer, (d) lime and (e) barnyard manure. Other practices, similar in nature but not treated here, are farm ponds, tiling, ditching, wildlife preservation and pasture renovation. The effect of these measures on the attainment of district objectives varies greatly between the various practices and according to the extent and quality of their application and the physical conditions of soil on which they are applied.

GRASSED WATERWAYS

Among the operators of the sample farms, the most widely accepted of all district recommendations is that of preventing gully erosion by establishing grassed waterways. In fact only two of the 93 respondents stated that the practice was unnecessary and wasteful of land. Although the establishment of grassing waterways is classified as an associated, rather than a basic, conservation practice in this study, it is a critical factor in preventing rapid soil deterioration on many soils.

During the interrogation, each farm operator was asked if all of the waterways, excluding streams and drainage ditches, on his farm were under control (i.e., not cutting out). The farms in the sample were categorized into three groups on which plans were (a) being complied with, (b) being partially complied with and (c) not being complied with. Table 21 gives the number and percentages of farms from each of the sample categories falling into each of the three groups.

Reasons for Complying With Grassed-Waterways Plans

Table 22 presents the reasons given by farmers for applying the practice of grassed waterways. A large proportion of the farmers who accepted the practice did so at least partly because of the greater speed with which they could till ground. Along this same line, many of the farmers mentioned that gullies were destructive of machinery and consequently well-shaped grassed waterways protected investments in cornpickers, combines and other expensive machinery.

One of the reasons given by a considerable number of the sample operators was that grassed waterways improved the appearance of their farms. A remark often made with obvious pride by the farm operators was that an automobile could go anywhere on their farms.

TABLE 21. STATUS OF SAMPLE FARMS ACCORDING TO EXTENT OF OPERATORS' COMPLIANCE WITH PLANS RELATIVE TO GRASSED WATERWAYS.

Category	Practice applied as planned*		Practice applied but not as planned†		Practice not applied‡	
	(no. of operators)	(percent)	(no. of operators)	(percent)	(no. of operators)	(percent)
Status I	16	84	3	16	0	0
Status II	17	85	2	10	1	5
Status III	14	70	4	20	2	10
Status IV	24	70	6	18	4	12
Total	71	76	15	16	7	8

*All waterways under control.
†Attempts being made to shape and sod uncontrolled gullies.
‡Uncontrolled gullies, with no effective attempts being made to shape and establish sod.

TABLE 22. REASONS GIVEN BY 88 FARM OPERATORS FOR COMPLYING WITH PLANS FOR GRASSED WATERWAYS.

Reasons	Operators expressing each	
	Number*	Percentage
Established before present operator's occupancy or by landlord	8	9
Saves machinery	43	49
Improves appearance of farm	43	49
Saves time during tillage operations	84	95
Prevents destruction of land	28	32

*Some operators expressed more than one reason.

TABLE 23. REASONS GIVEN BY 15 FARM OPERATORS FOR NOT COMPLYING WITH PLANS FOR GRASSED WATERWAYS.

Reasons	Operators expressing each	
	Number*	Percentage
Landlord's responsibility	6	40
Waste land	2	13
Cost is too great	6	40
Haven't been able to establish sod	12	80
Too much water from neighbor's farm	3	20
Intend to comply	10	67

*Some operators expressed more than one reason.

Another substantial group, mostly from farms with a severe erosion hazard, were convinced that gully erosion, if not controlled, would in a very few years make at least part of their land unfit for tillage.

Reasons for Not Complying With Grassed-Waterways Plans

The reasons farmers gave for not controlling waterways on their farms varied considerably. However, in all but two instances, the respondents conceded that grassed waterways were desirable. Two operators considered the grassed strips to be unnecessary and a waste of land. Table 23 presents the number and proportion of farmers giving the various reasons for not having all of their waterways under control.

COMMERCIAL FERTILIZER

A list of general recommendations accompanying every farm plan suggests that commercial fertilizer be applied to all soils as indicated by soil test. Table 24 gives the number and proportion of farmers in each sample category who (a) apply fertilizer according to recommendations, (b) apply fertilizer but not according to recommendations and (c) do not apply commercial fertilizer.

Commercial fertilizer is apparently gaining acceptance very rapidly. A large proportion of those operators who are now using fertilizer have only recently accepted the practice. Furthermore, most of those who do not apply fertilizer at present indicated considerable interest in its use. Many of them intend to apply some fertilizer on a trial basis in the near future.

Reasons for Complying With Commercial Fertilizer Plans

Table 25 presents the reasons given by farm operators for using commercial fertilizer. As would be expected

TABLE 24. STATUS OF SAMPLE FARMS ACCORDING TO OPERATORS' COMPLIANCE WITH PLANS FOR COMMERCIAL FERTILIZER.

Category	Practice applied as planned*		Practice applied but not as planned†		Practice not applied‡	
	(no. of operators)	(percent)	(no. of operators)	(percent)	(no. of operators)	(percent)
Status I	10	53	4	21	5	26
Status II	5	25	13	65	2	10
Status III	2	10	6	30	12	60
Status IV	10	29	7	21	17	50
Total	27	29	30	32	36	39

*Fertilizer applied on all tilled soil as specified by a complete soil test made at least once each cropping sequence.
†Some fertilizer applied but not according to soil test and/or not on all tilled ground.
‡No fertilizer applied.

TABLE 25. REASONS GIVEN BY 35 FARM OPERATORS FOR COMPLYING WITH PLANS FOR COMMERCIAL FERTILIZER.

Reasons	Operators expressing each	
	Number*	Percentage
Landlord shares cost	7	20
Increases net income	34	97
Aids in controlling erosion	23	66

*Some operators expressed more than one reason.

TABLE 26. REASONS GIVEN BY 59 FARM OPERATORS FOR NOT COMPLYING WITH PLANS FOR COMMERCIAL FERTILIZER

Reasons	Operators expressing each	
	Number*	Percentage
Landlord will not cooperate	13	22
Not necessary for erosion control	19	32
Would reduce net income	31	53
Fertilizer is too costly	24	41
Intend to comply in future	13	22

*Some operators expressed more than one reason.

the reason most often given is that fertilizer increases production and net income. However, a large proportion of the respondents who used fertilizer also mentioned factors having to do with complementarity to other erosion-control practices. Farmers often stressed the fact that the extensive root systems and heavy plant growth engendered by fertilizer greatly improved soil permeability, water-holding capacity and resistance to erosion loss.

Reasons for Not Complying With Commercial Fertilizer Plans

The two principal reasons given for applying commercial fertilizer were that the practice increased income and decreased soil loss. Paradoxically, the two most frequently mentioned reasons for not applying fertilizer are that the practice (a) reduces net farm income or does not increase income enough to justify the added cost and (b) is not necessary for, or does not contribute to, erosion control. (See Table 26.)

This divergence of opinion might be accounted for in two ways—either as a result of the dissimilar situations on different farms or of the conceptions of the farm operators. In reference to the effect on net income, it is difficult to conceive of a situation on any of the sample farms in which the judicious use of commercial fertilizers would not result in some increase in net farm income. It may be true, however, that a farmer in a particularly tight financial position might have alternative uses for his limited capital which would yield a higher marginal revenue than would fertilizer.

Relative to the effect of fertilizer use on the rate of soil loss, generalizations are of little value. The situation on each field relative to soil type, slope, present condition (i.e., topsoil remaining, amount of organic matter and level of fertility) and present use all greatly influence the effect that fertilizer use has on rate of soil loss. However, again as with most other land-use practices, those farmers who are most critical of fertilizer use have had little or no personal experience with the practice. Often farm operators who had used fertilizer to a very limited extent knew neither the amount per acre nor the chemical analysis of the fertilizer they had applied. In general, improper use, rather than failure to use fertilizer, is the problem that will be of most concern in the future.

Agricultural Lime

As in the case of commercial fertilizer, the general recommendations in the farm plans call for the application of lime on all soils as indicated by soil tests. The practice of liming apparently has very wide acceptance. Of all farm operators (see table 27), only nine (10 percent) did not lime their soils. Of these nine farmers, four stated intentions of applying lime in the future and two others did not use lime because they were unable to gain the cooperation of their landlords.

Reasons for Complying With Plans for Agricultural Lime

As shown in table 28, the two most frequently expressed reasons for applying lime are increased income and complementarity to establishing meadow seedings. These two reasons are closely associated in that maintaining a planned cropping sequence depends on consistently successful attempts in seeding grasses and legumes. These cropping sequences aid in maintaining soil tilth and fertility which contribute, not only to the yields of the meadow crops, but also to the yields of subsequent grain crops.

Agricultural conservation payments did not appear to be an important reason for using lime. However, the current specification that applications to qualify for payment must be made according to soil test is presently having a strong effect in inducing farmers to have their soils tested. Most farmers collected the incentive payments for liming, but only four gave the subsidy as a determining factor in the use of agricultural lime.

Reasons for Not Complying With Plans for Agricultural Lime (Table 29)

A rather small proportion of the farmers interviewed failed to use lime. A few tenant-operators had not ap-

TABLE 27. STATUS OF SAMPLE FARMS ACCORDING TO OPERATORS' COMPLIANCE WITH PLANS FOR LIMING

Category	Practice applied as planned*		Practice applied but not planned†		Practice not applied‡	
	(no.)	(percent)	(no.)	(percent)	(no.)	(percent)
Status I	16	84	3	16	0	0
Status II	13	65	7	35	0	0
Status III	13	65	5	25	2	10
Status IV	19	56	8	24	7	20
Total	61	66	23	25	9	10

*Agricultural lime applied on all tilled soil as specified by soil test.
†Some lime applied but not according to soil test and/or not on all tilled ground.
‡No fertilizer applied.

TABLE 28. REASONS GIVEN BY 65 FARM OPERATORS FOR COMPLYING WITH PLANS RELATIVE TO AGRICULTURAL LIME.

Reasons	Operators expressing each	
	Number*	Percentage
Landlord bears the cost	12	18
Increases net farm income	63	97
Complementary to cropping sequence	47	72
Agricultural conservation payments	4	6

*Some operators expressed more than one reason.

TABLE 29. REASONS GIVEN BY 26 FARM OPERATORS FOR NOT COMPLYING WITH PLANS RELATIVE TO AGRICULTURAL LIME.

Reasons	Operators expressing each	
	Number*	Percentage
Landlord's responsibility	5	19
Not necessary for conservation	14	54
Reduce net farm income	8	31
Cost is too high	4	15
Intend to apply practice	4	15

*Some operators expressed more than one reason.

plied lime to their soil because they felt that the landlord should pay for the cost, and he had refused. In one instance, the tenant had offered to pay for half the lime, but the offer was not accepted by the landlord.

On most farms where the practice was rejected the operators stated that no lime was needed on their farms, because they had no difficulty in establishing legume seedings and had seen no other evidence of hyperacidity. In some soils where tests were made, no lime was recommended even though the field had not previously been limed. Such a test was in itself considered as full compliance with the recommendations.

BARNYARD MANURE (TABLE 30)

Farmers generally are aware of the value of barnyard manure, particularly as an aid to increasing current production. Many farm operators also consider manure as having considerable value as an aid in controlling erosion on infertile, erosive soils. District recommendations as to the use of manure are the same for all farms. The farm plans specify that all manure shall be spread on the ground before plowing or on permanent or temporary meadow at any time, except when muddy.

Reasons for Complying With Barnyard Manure Recommendations

Most farmers contacted reported that they spread all available manure on their fields. As would be expected the major reasons for spreading the manure were (a) the increased production and income resulting from the practice and (b) complementarity to other erosion-control practices.

The yield response from manure was considered by most farmers to be very good. This was particularly true on those farms on which commercial fertilizer was not used. Many of the respondents concentrated the use of manure on their poorer and most erosive soils; others attempted to cover all of their land at least once during each crop rotation. Either method was considered to be acceptable.

TABLE 30. STATUS OF SAMPLE FARMS ACCORDING TO OPERATORS' COMPLIANCE WITH RECOMMENDATIONS RELATIVE TO BARNYARD MANURE.*

Category	Practice applied as recommended†		Practice applied but not as recommended‡		Practice not applied§	
	(no. of farms)	(percent of status)	(no. of operators)	(percent of status)	(no. of operators)	(percent of status)
Status I	16	84	2	11	0	0
Status II	16	80	3	15	0	0
Status III	17	85	2	10	1	5
Status IV	21	62	10	29	2	9
Total	70	75	16	17	3	6

*Data is for 89 farms; four of the 93 sample farms had no livestock and no manure.
†All available manure spread on cornstalk ground before plowing or on meadow at any time except when muddy.
‡Available manure spread, but not according to recommendations, usually on nearest field.
§Manure allowed to accumulate or dumped in ditches.

Reasons for Not Complying With Barnyard Manure Recommendations

Four of the farmers contacted had no livestock; these operators were not using the practice for the obvious reason that they had no manure to spread. The remaining three operators who were not following the practice hauled out their manure primarily to get rid of it. They spread the manure on the nearest field they could get into and occasionally resorted to the practice of dumping it into a ditch under the guise of controlling gully erosion.

GREEN MANURE

The general recommendations included with every farm plan specify that the last growth on temporary meadows be plowed under as green manure if the hay or pasture is not needed for feed. Since a farmer's need for feed is highly subjective, compliance or noncompliance with this recommendation was difficult to ascertain. For instance, a farmer's need for hay or pasture may be the result of his having sold hay or rented-out pasture. Most of the farmers contacted stated that they did plow under green manure when it was practicable to do so. However, further inquiry usually revealed that situations rarely arose in which such action was deemed to be practicable. It should be pointed out that feeding the crop, either as hay or pasture, and returning the manure to the soil in no way prejudices the soil-conservation program on a farm.

DYNAMIC VARIABLES IN DISTRICT PROGRAMS

The agricultural industry, perhaps more than any other, is subject to unpredictable and uncontrollable variables. A conservation program, no matter how well conceived, will not remain effective for long unless adjustments are made in the light of changes in the agricultural environment. Dynamic factors in the agricultural environment which would tend to affect the district program are: natural phenomena, technology, price relationships, tenure and knowledge and preferences of farmers.

Natural phenomena such as adverse weather, noxious weeds, insects and plant diseases quite often disrupt a farmer's schedule of land-use practices. For instance, the loss of a legume seeding by whatever cause will often divert a field from the planned cropping sequence. Particularly with contour strip-cropping, such a diversion may necessitate a comprehensive readjustment of cropping practices to maintain the effectiveness of erosion control.

Another variable in agriculture is that of technological advances. The influences of new developments

generally vary greatly in their effect on different farm enterprises. An example would be the development of a higher-yielding crop variety or of tillage or weed-control practices peculiarly adapted to one crop. Such developments will alter the combinations of enterprises which will be economically optimum. Similar in effect will be the acquisition of new knowledge by farm entrepreneurs. Changing preferences of farm operators also are of importance. Many times a farm operator will accept only part of the recommended practices when a plan is initiated. As his knowledge and appreciation of conservation farming increases, he may, if encouragement and technical assistance are forthcoming, be willing to apply more and more of the measures recommended.

Among the dynamic factors in agriculture, changes in tenure are perhaps the most crucial to the district program. As mentioned previously, uncertain or short expectancy of tenure would be expected to discourage investment in land and encourage exploitation of soil resources. This, in itself, would tend to impede district progress. Furthermore, changes in operatorship or ownership on a planned farm constitute a time of crisis for the conservation plan. Land-use practices applied by one operator may be unacceptable to another. Only in rare instances would the conservation plan devised for a landlord and tenant be completely satisfactory to a subsequent owner or operator. Also, the new entrepreneur may not be familiar with the land-use practices presently being applied. Almost certainly a change in either the owner or the operator of a planned farm will require considerable activity by district personnel to ensure continuance of an acceptable district plan.

Although the rate of change in operatorship and ownership of farms varies over time, some indication can be gained of the magnitude of this problem. In Jasper district from 1942 to 1950, 52 farm plans were cancelled as a result of changes in farm ownership. This represents approximately 1 year's output of new plans and indicates a substantial problem which becomes increasingly critical to the district as more and more of the farms are planned. During the last decade, an annual average of 63 farms per 1,000 of all farms in the West North-Central states changed ownership.[40] Assuming that this rate of turnover occurred in the 2,696 farms of Jasper County, approximately 170 farm transfers would have taken place per year in this one district.[41]

No completely reliable figures are available as to the rate of change of operators on Iowa farms. Data available relative to stability of tenure are, for the most part, presented in terms of years of occupancy to date. However, the U.S. Census of Agriculture does report the number of farm operators who have occupied their present farm for 1 year or less. Approximately 7 percent of all farms in the state had had a change in operator within the 12-month period prior to the 1950 census.[42] In Economic Area 5 which includes Jasper district, the percentage of all farms undergoing such a change was 6.8 percent. On farms operated by full-owners the percentage turnover was 4.3 percent, for part-owners 3.1 percent and for tenants 10.1 percent. If these percentages were applied to Jasper district, they would indicate that 115 of the 1,141 tenant-operated farms had a change of operator in 1949. On the same basis the turnover of operators on all Jasper farms would have numbered 193.

That changes in tenure constitute a serious problem at the present level of progress in the district program is readily demonstrated. As of June 30, 1957, Jasper district had 689 basic farm plans. This excludes plans which were accepted but subsequently cancelled. Using, for illustrative purposes, the percentage changes for 1949, which was a year of considerable stability as compared with others of the last 30 years, an expected annual turnover of entrepreneurs can be shown. Assuming that the state data, previously presented, apply to the planned farms in Jasper County, this district could expect a change of operator on about 42 planned farms per year.[43] The significance of these figures becomes evident when compared with the annual output of basic farm plans, which averages about 50 for the district. As the district program progresses, the time will quite likely arrive when the prevention of retrogression in the district's program, resulting from changes in tenure alone, will entail the expenditure of more resources than are used in developing plans for farms not previously planned.

CONCLUSIONS AND RECOMMENDATIONS

Throughout this investigation, answers to two questions were sought: Why do some farmers participate in the program while others do not? And of those farmers who do participate to the extent of initiating a district plan on their farms, why do some achieve the district objectives of erosion control while others fail to apply acceptable land-use practices? In pursuing both phases of this study, it was necessary to draw samples of farms from two populations. One population, from which 34 farms were drawn, was defined as all farms in Jasper district over 50 acres in size which had not been planned by the district. A second population includes all farms planned by the SCD prior to June 30, 1950. This latter population was stratified into the three categories according to the extent of progress which had been made toward district objectives. A random sample of 20 farms was drawn from each stratum. Analyses were made of data, concerning the farm operators and the farm businesses, which were obtained by personal interview from the farm operators. The owners of rented farms were not interviewed.

Obstacles to district progress were considered to stem from two sources. In the first place, certain characteristics of farm businesses tend to impede the program. Secondly, the present level of knowledge of farm operators, as well as their preferences and habits, is often

40USDA Agricultural statistics. 1954. p. 435. Farm ownership changes in this area, which includes Iowa, varied during the 10-year period, 1945-54, from a high in 1947 of 82.7 per 1,000 of all farms to a low of 42.7 in 1954.

41U.S. Census of Agriculture. Jasper County. 1954.

42As compared with data from previous censuses this was a year of relatively high stability of tenure. Comparable figures from 1920, 1930 and 1945 are: 7.7 percent, 11.9 percent and 14.4 percent, respectively.

43Stability of tenure is probably high on planned farms as compared with all farms, but this difference will become progressively smaller as larger and larger proportions of the farms are planned.

manifested by resistances to complying with district objectives.

In the investigation of characteristics of the farm firms, various factors were analyzed in terms of their effect on farmers' acceptance of district plans and application of planned conservation treatments. The characteristics of farms relative to the following factors were investigated: (1) farm size in acres, (2) ownership-interest of the farm operator, (3) leasing arrangements on rented farms, (4) potential crop productivity and (5) livestock programs.

Bringing Small Farms Into the District Program

The data obtained indicated that small size of farm is a strong deterrent to progress toward program objectives. The sample farms of noncooperators were, on the average, 44 acres or 26 percent smaller than the sample farms of cooperators. However, the small farms (under 100 acres) which were planned were not significantly different from larger farms relative to the extent of application of conservation measures planned. If these results are representative, perhaps the resistance to initiating plans on small farms is due to misconceptions on the part of the farmers. In other words, the effect on costs and net income of implementing conservation practices may not be as unfavorable as the operators of small farms are inclined to believe.

The districts may not have all the means to launch a concerted effort toward enlarging farms. On the other hand, where farm size is a problem, district officials can point out to prospective cooperators means by which farm operations might be enlarged. In some instances enlargement can be accomplished by acquiring additional land by rental or purchase. Or, the land presently in the farm might be used more intensively. Mechanical erosion-control practices, tiling and commercial fertilizers permit more intensive use of land without causing soil deterioration. Another common way of increasing the size of operations on a farm is to shift from cash-grain to livestock enterprises. The method by which any particular farmer might acquire or maintain an adequate income from his farm depends, of course, on his preference, abilities and opportunities. These are factors which farm planners must take into account when assisting farmers in developing conservation plans.

Much of the responsibility for public action aimed at encouraging the acquisition of adequate-sized units by farmers must be assumed by agencies other than the soil conservation districts. The solutions for problems of this nature lie primarily in the realm of education and credit. But it might be profitable for the program if district personnel functioned as intermediaries between their present and prospective clients and the Extension Service, public schools and private and public credit agencies.

Extending Planning Horizons of Farm Operators

All farm operators hold some rights in the land which they occupy. None has rights which are absolute. The extent of the rights held by farm operators range from a fee simple title, through a life estate, a long-term lease and down to a 1-year rental agreement. In general, it can be assumed that the length of an individual's planning horizon on a farm is closely associated with the extent and permanence of his rights in the land. Investments in land which are expected to yield benefits over a period of years are not likely to be financed by an individual with a planning horizon of only 1 year. Furthermore, individuals are likely to be reluctant to pay the entire cost of an investment from which they can expect to receive, for whatever reason, only a fraction of the returns. For these reasons, obstacles to the districts program are likely to occur wherever the costs and benefits of planned land-use practices are to be divided between individuals (e.g., owners and operators).

Much of the problem of determining equitable shares of costs and benefits of land-use practices is avoided under owner-operatorship. Whereas 81 percent of the sample cooperators are owners, part-owners or related tenants, only 63 percent of the noncooperators have an ownership interest in their farms. Conversely, tenant-operated farms comprise 34 percent of the sample cooperating farms, 41 percent of all Jasper County farms and 50 percent of the sample noncooperating farms.

In general, if the application of a particular land-use practice is profitable to the firm, knowledge of that fact would be sufficient to gain its adoption on an owner-operator farm. Before any major change in land use is initiated on a rented farm, however, the owner and operator must arrive at a mutually acceptable arrangement for sharing the costs and benefits of such a reorganization. Where the tenant and landlord are closely related, the resolution of such problems may be simplified to the extent that personal considerations tend to transcend those of a financial nature.

Adjusting Farm Leases to District Program Objectives

On rented farms, the leasing arrangement is apparently a critical factor in determining the extent of compliance with district objectives. Leasing arrangements tend to be set by custom established over many years. Consequently, steps must be taken to break away from custom where necessary to implement district recommendations.

Generally speaking, leases would be expected to impede district progress less and less as they facilitate achievement of goals mutual to both tenant and landlord. In the prevailing livestock-share arrangements, most costs and returns are shared equally. The financial interests of a farm owner and tenant are identical with the interest of their firm to the degree that costs and returns are shared alike. However, a different situation arises when the tenant or the landlord bears the cost of any input and the returns are not shared in the same proportion. Under such a set of conditions the best interests of the firm might be quite different from the interest of each individual involved. A tenant-operator would be inclined to minimize inputs from which the proportion of the costs incurred by him were greater than the proportion of benefits received by him. The landlord would be expected to act in like manner. In other words, each would attempt to make management

decisions on the basis of his own instead of the firm's benefit/cost ratio.

Bringing Crop-Share Leased Farms Into the District Program

As indicated above, the common type of leasing arrangement which most nearly approaches the equal sharing of costs and income is the stock-share lease. Considerable evidence was provided by this investigation that such leases do provide good bases for achieving district objectives on rented farms. Over half of the sample cooperating farms which were tenant operated had stock-share leases; by way of contrast, only 18 percent of the noncooperating farms were being operated under stock-share leases. Generally with this type of leasing arrangement, the tenant's labor, and sometimes his machinery, is balanced against the owner's land. After this initial agreement is reached, it is customary on farms having such leases that all, or nearly all, of the enterprises on the farm are joint endeavors of the tenant and landlord. Furthermore, the two parties usually share both expenses and income of all enterprises on a 50:50 basis.

Encouraging Conservation Investments on Rented Farms

From the standpoint of a conservation program, the crucial decisions under such an arrangement concern the determination of which of the recommended measures are investments in the land and which are production practices. Such a distinction is essential. Since the landlord furnishes the land, he would logically be expected to pay in full for investments in land. On the other hand, the cost of production practices would be shared by the tenant. No clear criteria have been developed for determining which inputs are purely investments in land and which are purely production practices. In the long run, any expenditure on land which has the effect of increasing the net product of the land can logically be considered to be a production practice. Following this line of reasoning, tiling is a production practice which yields returns over a period of perhaps 50 years. Applications of terraces, agricultural limestone, rock phosphate, commercial nitrogen and hybrid seed corn yield the major portion of their benefits over progressively shorter periods of time.

Methods of determining which inputs are considered to be production practices are arbitrary. Commonly so classified are those practices which yield the major portion of their benefits during one crop year or one complete crop rotation. A third method which might be more applicable to conservation farming would be to consider as production practices all inputs whose major benefits would be realized within the planning horizon of the tenant. As a supplement to this method, compensatory clauses could be included in the lease. In this way the tenant could be assured of prorated reimbursement for expenditures from which substantial benefits are realized subsequent to his period of tenure.

Research is being conducted to determine the carry-over effects of inputs of commercial fertilizer. Similar data would be useful as aids in prorating the effects of other practices such as contour tillage, strip cropping, terracing, tiling, green manure and barnyard manure. The principal means by which the obstacles inherent in tenant operation might be overcome would appear to be in research and education. Users of agricultural land must be provided with information from which they can make reasonable estimates of the amount and timing of benefits realized from a given expenditure on conservation measures. On the basis of such information, soundly conceived leasing arrangements can be devised. In many instances, encouragement and assistance will need to be provided to prospective cooperators relative to adjusting their leasing arrangements.

Thus, there are serious impediments to district progress unique to tenant-operated farms. In the first place, two or more individuals must agree to changes in the farm organization. Second, after agreeing on certain land-use practices as being desirable, the tenant and landlord must arrive at mutually acceptable methods of sharing costs and benefits. Since the leasing arrangement is the instrument through which such agreements are reached, the district should, it would seem, consider the lease as an integral part of the farm plan. At least, advice and guidance should be provided relative to needed adjustments in rental agreements as a necessary step in achieving district objectives.

Extending Program Cooperation to Erosive Soils

Soil deterioration in Iowa results primarily from erosion caused by movement of surface water. As mentioned previously the number of acres of land being utilized according to district objectives gives an incomplete picture of district accomplishments. In general, land which is not subject to erosion does not deteriorate to any great extent under any system of land use. While exploitive cultural practices may affect adversely the structure, organic matter content and fertility of such a soil, the cost of rejuvenation would probably not exceed the cost of maintaining the soil in its optimum productive state. On the other hand, erosive soils are subject to permanent damage. Loss of the basic soil material, particularly on shallow soils, often results in permanent reduction in soil productivity. Where complete restoration is possible (e.g., in very deep loess) the cost of rejuvenating severely eroded soils is likely to greatly exceed the cost of maintaining a desired level of productivity.

If, as we have assumed, the problem of the district is primarily one of preventing excessive soil loss, the kind of soil being brought under approved land use is as important as the number of acres treated. The data indicate no significant difference on the average between the soils on planned and unplanned farms. But considering only the planned farms, those on which district objectives were most nearly achieved tended to be low in inherent productivity and have highly erosive soils. Over 60 percent of the Status I cooperators operated farms of low capability, while only 15 percent of the Status III cooperators were on low-capability farms. On the other hand, 80 percent of the Status III farms were classified as being highly productive as contrasted to only 5 percent of the Status I farms so classified.

Apparently district farm plans are practical and workable on farms having low inherent productivity

and serious erosion problems. In view of the very real contribution made by such a plan when implemented, considerable effort is justified in gaining the initiation of plans on such farms. Applications for assistance on more erosive soils should be given high priority by the district. There are, of course, other factors such as watershed group planning which might modify this priority.

Servicing Cooperators Operating Erosive Soils

Not only should every effort be made to gain the initiation of conservation plans on farms with highly erosive soil, but also, once initiated, such plans should receive the maximum of servicing. After conservation measures have been implemented and highly erosive soils stabilized by permanent vegetation or mechanical erosion-control measures, a superficial examination of the soil, particularly by the uninitiated, may not reveal the extent of the erosion hazard. As a consequence, changes in tenure are particularly crucial on such farms. New farm operators might be inclined to exploit investments in land made by previous owners and operators. On erosive soils, the failure of an operator to continue erosion-control practices will likely in a very short time undo the beneficial results of past efforts and expenditures. Plan maintenance or follow-up work is an important part of the entire SCD program but is crucial on farms with highly erosive soils.

Extending Information on Roughage Production

An attempt was made to determine the relationship of livestock programs to the extent of achievement of district objectives. The data indicated no causal relationship. Apparently, satisfactory means other than direct feeding to livestock are available for utilization of roughage crops. Wider dissemination of information on such alternatives might overcome the doubts of some land-users not now cooperating in the program. Furthermore, dissemination of information on complementary aspects of roughage and grain production should also serve as incentives for farmers to achieve district conservation objectives.

Factors on Which Further Study Is Needed

Factors other than those mentioned are undoubtedly of considerable importance but were not adequately tested in this investigation. For instance, the length of the planning horizons of individuals, which is to some extent reflected in the age of owners and operators, as well as in tenure arrangements, certainly influences decisions relative to investments in land. Another factor of considerable importance is that of the financial position of the owner and operator. Public and private credit agencies have recently made some attempts to provide credit on terms appropriate for financing conservation measures. A great deal more needs to be done in this regard.

Extending District Program to Nonresident Owners

Another factor not tested directly is that of the place of residence and extent of agricultural orientation of the owners of rented farms. Present promotional and educational efforts of the district and other interested agencies fail to reach a large segment of landowners. If general programs of this type fail to reach all landowners, eventually it may become necessary to contact them individually. With the combined efforts of the tenant operators and the district, some landlords, now unwilling to participate in the district program, may be prevailed upon to initiate conservation programs on their farms.

Adapting District Program to Farmers' Attitudes and Preferences

The attainment of program objectives on any given soil requires, as a general rule, the application of not one but a combination of conservation measures. However, the reasons why farmers apply, or fail to apply, specific practices is basic in determining courses of action which will best encourage compliance with district recommendations. From this investigation, two reasons stand out as the most important incentives farm operators have for complying with district recommendations. In general, the farm operator who had applied a given conservation measure did so because he felt (a) morally obligated to maintain soil productivity and (b) that the practice could be profitably applied. Conversely, farmers who had not accepted district recommendations believed that (a) the land-use practices presently being applied would adequately conserve soil resources and (b) the suggested conservation measures were uneconomic.

Among the recommendations investigated in this study were those related to field boundary layout. The manner in which the fields on a farm are laid out does not in itself affect the rate of soil loss. Also, from the standpoint of gaining acceptance, the recommended layout cannot depart radically from the owner's and operator's preferences. On the other hand, in relation to field layout a very important objective in erosion control is the attainment of homogeneity as to land capability within the boundaries of each field. Soil homogeneity permits the application, throughout each field, of a uniform set of land-use practices which will utilize the soil of the entire area to the extent of its capabilities without exceeding the capacity of any part.

Often homogeneous soil areas on a farm are smaller than a farm operator is willing to till as separate fields. In such cases, the farm planner may need to lay out larger fields which are more or less heterogeneous as to land capability. He may then compensate in the farm plan for the soil heterogeneity by recommending proportions of tilled crops or intensity of mechanical practices for the entire field which will safeguard the most erosive soils in the field. In some fields, a better alternative might be the application of more intensive mechanical practices (e.g., terracing in addition to contouring) on the more erosive soils but treat the entire area as a unit relative to cropping sequences.

Since capability of soil tends to conform rather closely to the percent of slope, the boundary between two land-capability classes often lies on the contour. Consequently, the application of recommended field boundary

arrangements is usually complementary to contour tillage. Separation of fields on the contour tends to minimize point rows with contour tillage. Information of an educational nature should stress the possible complementarity of contour tillage and field layout.

Cropping Sequence

Basic to the conservation of land resources is the nature of the cropping sequences being applied on the various soils. In general, increases in the proportion of meadow crops and decreases in the proportions of row crops on erosive land will reduce the rate of soil loss. Cropping sequences which aid in erosion control and are also productive income-wise should be encouraged. Long rotations (e.g., CCOMMM instead of COM) minimize meadow seeding costs and acreages of low-income but erosive small-grain crops. At the same time acreages of corn are not reduced. The 6-year sequence of crops, given as an example, lends itself well to conservation farming (e.g., strip cropping) and yet is highly productive on erosive soils.

The Problem of Mechanical Practices

Farm operators seem to be reluctant to apply mechanical erosion-control practices but will much more readily adjust cropping sequences. In view of current extensive and costly public programs designed to reduce the production of grain crops, this preference might well be used more extensively in district programs. Any information provided to farmers relative to the economic production and utilization of meadow crops will aid the district in gaining compliance with recommended cropping sequences.

The acceptance and application of mechanical erosion-control practices by a farmer involves not only a basic change in his ideas relative to what constitutes good tillage but also often entails a quite comprehensive reorganization of his farm. Efficient application of conservation practices usually requires changes in field layout and in cropping sequences. Changes in the quantity produced of cash crops, feed grains and roughage feeds as a result of the changed cropping patterns may further necessitate changes in livestock enterprises for efficient utilization of the crops produced. That there should be resistances to such sweeping changes is not surprising. Still, much of the resistance to the use of mechanical erosion-control measures seems to be irrational. Farm operators often appear to reject conservation measures purely on the basis of prejudice without considering the relative costs and benefits of a given practice. Many times the reasons given by farm operators for failing to apply land-use practices are in complete variance with experimental data and the experience of other farmers who have applied the practice under similar conditions. On the other hand, some of the conservation practices may not be profitable to the individual farmer. In such a situation, if society wants the practice applied, public investment would seem to be the answer.

Determining and Emphasizing the Profitability of Recommended Practices

In some cases, the application of a conservation measure promises to be profitable for an individual and he is fully cognizant of that fact; because of limited capital, however, he is prevented from applying the practices. Obstacles of this kind can best be overcome by the provision of appropriate credit. If the capital rationing is internal (i.e., failure of an individual to invest capital available on appropriate terms) improved credit facilities will not remove this impediment.

Education of agricultural land-users relative to the consequences of continued excessive erosion loss and the benefits to be derived from sound land-use practices is essential. Continued search for improved methods of controlling erosion and wide dissemination of such information will contribute materially to the district's progress.

Increasing Service to District Cooperators

Considerable evidence obtained in this study points to the need for increasing attention to the servicing of district cooperators in order to keep the farm plans intact and up to date. The loss of cooperators is serious. For example, between 1942 and 1950, 52 farm plans were cancelled as a result of changes in farm ownership alone. Operators on planned farms may be expected to change at the rate of 40 to 50 per year. This means that special attention should be given to keeping farms owned and operated by new owners and operators in the program and thus protecting the public investment already made in bringing farms into the program with the attending costs of planning.

Many additional farms in the program on which ownership and operatorship remains continuous, experience difficulties in keeping up with original district plans. For example, 189 of the 465 farms planned through 1950, or two out of five cooperators, were behind schedule in carrying out district recommendations. About 9 percent of the cooperators, one of each 10, had cancelled plans or were at a standstill with respect to the plan. Throughout this study, reasons were advanced why farm operators were obstructed from making progress on particular practices recommended in the district program.

These findings point the way to further progress in the district program. First, either additional resources are required to service plans already in operation or attention redirected somewhat from bringing new cooperators into the program to servicing more adequately present cooperators. Also, in bringing new cooperators into the program as well as servicing present cooperators, special attention should be devoted to removing specific obstacles to particular recommended practices as indicated by results of the study.