

# APPRAISING YOUR SOIL CONSERVATION DISTRICT

with the help of procedures developed in the Jasper District



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## FOREWORD

During the last two decades, the 100 soil conservation districts in Iowa have made substantial progress in controlling soil erosion and water runoff and in improving the productivity of our soils. However, the task of soil and water conservation is a continuing job. Despite progress registered by districts, soil erosion and depletion continue to menace the future productivity of our soils.

Why aren't more farmers participating in the district program? To what extent are those who are district cooperators actually carrying out recommended land-use measures and practices? What might be done to increase the effectiveness of district programs?

To obtain answers to these kinds of questions, the Iowa Agricultural and Home Economics Experiment Station was asked to study the program. The study was limited to the Jasper Soil Conservation District. Most of the data presented in this report were taken from the results of that study. (A more detailed report of the study was presented in Iowa Agr. and Home Econ. Exp. Sta. Res. Bul. 466, "Progress and Problems in the Iowa Soil Conservation Districts Program," 1959.)

This report presents and illustrates, with the aid of data from the Jasper study, the appraisal procedures developed for appraising soil conservation districts. These procedures should prove helpful to district officials who wish to appraise the functioning of their own district program. Also pointed out are some of the problems existing in the Jasper Soil Conservation District and suggested solutions to those problems. These problems and proposed solutions may be applicable throughout Iowa and elsewhere. In any case, interpretation of the results of the Jasper study may be helpful in revealing the strengths and weaknesses of the programs of other districts.

Bryan Weberg  
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## SUMMARY

This report is based on findings from a study of cooperating and noncooperating farms in the Jasper Soil Conservation District of Iowa. The basic conservation farm plans were developed through cooperation with the district. The following findings and their implications stand out as important to the continued success of district programs.

### Finding 1

Cooperation in the Jasper Soil Conservation District Program is limited mainly to operators of larger than average farms, owner-operators and livestock-share tenants. Operators of smaller farms and tenant-operators, particularly crop-share tenants, are not cooperating to a significant degree.

*Implication:* Special efforts must be made either (1) to adapt the program to operators of smaller farms, crop-share tenants, part-time farmers and other groups of operators and owners or (2) to help bring about changes such as farm enlargement and improved leasing arrangements. Perhaps a combination of the two measures is needed to bring noncooperators into the program and insure their continued cooperation once in the program.

### Finding 2

Many cooperators either drop out of the program or fall behind in carrying out their conservation farm plans. Insufficient time has been devoted to servicing and follow-up work after the farm plans have been developed. This is due in part to insufficient resources available in the soil conservation district for follow-up assistance. Farm plans tend to be fixed; yet the forces affecting the execution of the plan are exceedingly dynamic. These forces include: natural forces such as weather, insects and diseases; technological developments; cost and price changes; changes in farm ownership; and changes in operators of farms.

*Implication:* To keep farm cooperators in the program and on schedule in their progress on farm plans, more time and effort must be devoted to keeping the plans adjusted to the dynamic agricultural environment within which the plans must be carried out. This may be accomplished through: (1) expanded educational programs emphasizing basic principles, interrelationships, changing conditions and alternative approaches from which the cooperator may make the neces-

sary adjustments from his original plan; and (2) expanded technical assistance, which farmers need to revise their plans and carry out the adjustments caused by external changes.

### Finding 3

A wide variety of reasons peculiar to an individual farmer's situation and attitudes prevents or obstructs his entering the program and his carrying out particular conservation practices once he has entered the program.

*Implication:* Unless these reasons are identified within the district and removed through educational programs, technical assistance and other means, further progress toward district objectives will be hampered. Interested districts would benefit from efforts to determine why certain people have aversions to particular conservation practices. Districts could then proceed with measures to meet these reasons with facts, answers and remedies or with alternative practices to achieve district objectives.

### Finding 4

Many farm operators and owners remain unconvinced of the profitableness of particular conservation practices in the farm plans. Farm plans are designed largely for soil erosion control and soil productivity maintenance and enhancement. As such, some farmers may view the plans as incomplete until they are further developed to reveal expected costs and net income.

*Implication:* More consideration should be given to providing cooperators and potential cooperators with an economic analysis of the farm plans—in terms of alternative systems of practices, preferences of farmers and restrictions implicit in the farmer's situation—so that the cooperator may visualize more clearly the income impacts and benefits of the farm plans. With the advent of electronic computers, this forward step in farm planning is well within the range of possibility.

The work-unit conservationist furnishes the farmer cooperator with the relevant technical knowledge in terms of alternatives for controlling erosion on the farm. The farmer makes the final decision in selecting the alternative he desires. In making this decision, the farmer desires additional information on the costs and returns from the alternative erosion-control practices and the capital and risks involved.

# Appraising Your Soil Conservation District

## With the Help of Procedures Developed in the Jasper District<sup>1</sup>

by John F. Timmons and Loyd K. Fischer<sup>2</sup>

Since its inception in 1939, the Iowa Soil Conservation Districts Program has made substantial progress in gaining farmer participation. By program standards, however, the rate of soil erosion loss is still excessive on much of Iowa's land. Why haven't the conservation objectives been more nearly achieved? More specifically, why have some farmers participated and others remained outside 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 some farmers, once in the program, dropped out?

Adjustments in the Soil Conservation Districts Program that are 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.

No previous investigation has dealt specifically with these questions. Although this investigation was limited to the Jasper Soil Conservation District, the information obtained should prove useful in furthering the progress of other districts toward their objectives. Also, the procedures developed in this initial study should serve as guides for analyses by other districts in Iowa and in other states.

### The Iowa Soil Conservation Districts Program

In 1939, the Iowa legislature passed the law under which farmers could organize local soil conservation districts.<sup>3</sup> 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 the east and west Pottawattamie districts which together encompass Pottawattamie County. This makes a total of 100 soil conservation districts in the state.

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.<sup>4</sup> 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 prevent and control soil erosion and to conserve soil resources.

Among the powers of the district commissioners is the right to enter into cooperative agreements with other governmental agencies for the promotion of soil conservation.<sup>5</sup> In this manner, each district has entered into working agreements with the Iowa Cooperative Extension Service and the United States Department of Agriculture and into 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 in 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. In some states, the Soil Conservation Service 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

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<sup>3</sup>Iowa Code, 1958. Sections 467A.1 to 467A.12.

<sup>4</sup>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-operators to vote. (Iowa Code, 1958. Section 467A.5 and 6.) Assistant district commissioners may be designated by the three elected commissioners as necessary to carry out the district program.

<sup>5</sup>Iowa Code, 1958. Section 467A.7.

enter into memoranda of understanding with the Cooperative Extension Service. The Extension Service cooperates with the district commissioners by supplying information and by providing personnel in the development of the educational aspects of the district programs—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 district in coordinating 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 University cooperates with the districts in conducting 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.<sup>6</sup> 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 district in carrying out 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 the Program

According to the Soil Conservation Districts Law of Iowa:

"It is hereby declared to be the policy of the legislature to provide for the restoration and conservation of the soil and soil resources of this state and for the control and prevention of soil erosion and for the prevention of erosion, floodwater, and sediment damages, and, thereby to preserve natural resources, control floods, prevent impairment of dams and reservoirs, assist and maintain the navigability of rivers and harbors, preserve wild life, protect the tax base, protect public lands and promote the health, safety and public welfare of the people of this state."<sup>7</sup>

The Soil Conservation Districts Program is conceived by the legislature to be one means by which

these goals may be achieved. However, these broad ends are subject to continuous modification as the definitions of various terms (e.g., public welfare) change. Furthermore, this quotation 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. . ."<sup>8</sup> From the law and from discussions with administrators of the program, this study has interpreted the primary goal of the districts program to be the attainment of what has been termed a "safe level of erosion loss" on all agricultural land.<sup>9</sup> This end is thought to be consistent with, and a means of approaching, the general objectives presented in the districts law.

Maximum permissible rates of soil loss vary among soil types, however. Estimates for the various soils in Iowa usually range from 2 to 6 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 program farm plans, as revised for this study, serve as the objectives of the program. This goal recognizes that a district's objectives, as applied to each farm, are pointed out to the farm operator and owner by the work-unit conservationist 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 on planned farms will not exceed the district's goal if the recommended land-use practices are applied. Consequently, the emphasis of this study is on discovering and analyzing those factors which impede and those which encourage the application of land-use practices recommended by the district.

An operational objective of the districts program is the desire to bring all agricultural land and land users 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 that 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 Conser-

<sup>6</sup>*Ibid.*, Section 467A.4.

<sup>7</sup>*Ibid.*, Section 467A.2.

<sup>8</sup>*Ibid.*, Section 467A.7.

<sup>9</sup>This end-in-view was given by Jasper district commissioners as the most important and most urgent objective of their district's program.



Table 1. Cumulative numbers and percentages of Jasper County farms planned by the SCD, at the end of each fiscal year, 1942-57, inclusive.

Year	Number of farms planned <sup>a</sup>	Percent of all farms <sup>b</sup>
1942.....	9	0.3
1943.....	34	1.3
1944.....	93	3.4
1945.....	163	6.0
1946.....	214	7.9
1947.....	277	10.3
1948.....	332	12.3
1949.....	378	14.0
1950.....	447	16.6
1951.....	481	17.8
1952.....	529	19.6
1953.....	508 <sup>c</sup>	18.8
1954.....	580	21.5
1955.....	616	22.8
1956.....	636	23.4
1957.....	689	25.4

<sup>a</sup>Excluding plans cancelled for any reason.

<sup>b</sup>Based on U. S. Census of Agriculture. Preliminary report. Jasper County, 1954. Land in farms, 445,689 acres.

<sup>c</sup>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, and only district co-operators with basic plans are reported.

Table 1 shows the number of farms planned by year from the organization of the district in April 1942 to Dec. 31, 1957. The number of acres in the planned farms is also shown. Percentages of all farms and acres in the county which have been planned under the district program are included in the table.

### SELECTED CHARACTERISTICS OF FARMS OF DISTRICT COOPERATORS AND OF OTHER FARMS IN THE COUNTY

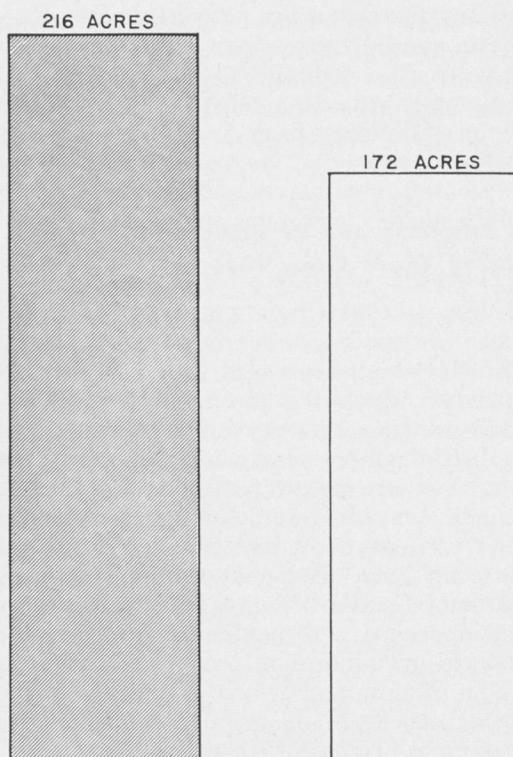
An attempt was made to find out why certain farmers in the county participated in the district program and why other farmers did not. This involved a study of farm characteristics associated with the two groups of farm operators—those participating and those not participating in the district program.

Several important differences stood out. The major differences between the two groups were size of farm, tenure of operator, rental arrangement and kinship between landlord and tenant.

#### Size of Farm

As shown in figs. 2 and 3, farms operated by district cooperators were considerably larger than farms outside the program. Farms of cooperators averaged 216 acres, compared with the 172-acre average of other farms in the county. This is a difference of 44 acres.

Only 35.6 percent of the district cooperator farms were less than 180 acres in size, compared with 62.0 percent of the rest of the farms in the county. On the other hand, 64.4 percent of the district cooperator farms were over 180 acres in size, compared with only 38.0 percent of the remaining farms in the county. Thus, size of farm



■ DISTRICT COOPERATORS □ OTHER FARMS IN COUNTY

Fig. 2. Average size of Jasper district cooperator farms and average size of other farms in the county.

appears to be an important factor associated with whether or not farmers cooperate in the district program.

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

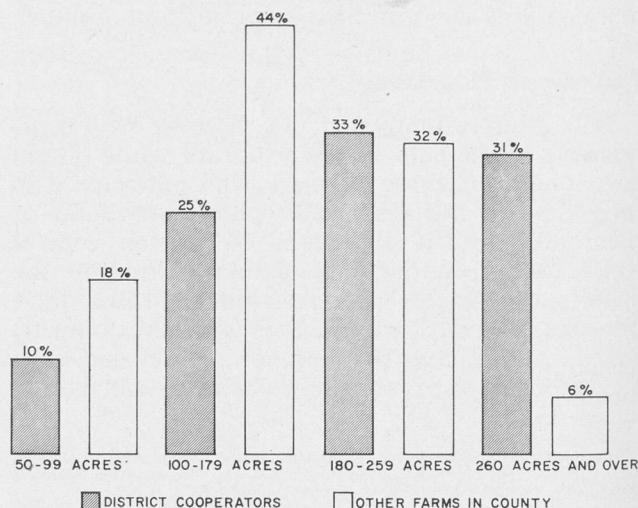


Fig. 3. Percentages of Jasper district cooperator farms in four size groups compared with other farms in county. (Percentages for district cooperators do not total 100 because of rounding errors.)

than owners and operators of small farms. In the first place, larger farms tend to have larger fields that 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 or to finance investments in land. Also, large farms are likely to have roughage-consuming livestock, machinery, buildings and equipment that are better adapted to conservation farming.

Finally, large acreages may permit the attainment of adequate erosion control mainly by a more extensive use of land (e.g., by reducing the proportion of row crops in the cropping sequence). Thus, the use of mechanical practices, such as terracing, which seems to encounter 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.

These findings indicate that districts must eventually recognize that certain adjustments may be necessary to bring smaller farms into the district program. While a district may encounter special resistance characterizing small farms, the extent of soil exploitation on small farms may also be greater than on larger farms.

### Tenure of Operator

Another important characteristic related to district cooperation is tenure of the farm operator. For the Jasper district, 81 percent of the cooperators were owners, part-owners or tenants related to the owners. Only 63 percent of the noncooperators had an ownership interest in their farms. Conversely, 34 percent of the cooperating farms, 50 percent of the noncooperating farms and 42 percent of all farms in Jasper County were tenant operated (see fig. 4).

Farm operators having an ownership interest are apparently more likely to be cooperators than are tenants. 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. These two factors confound each other and thus obscure their full impact.

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

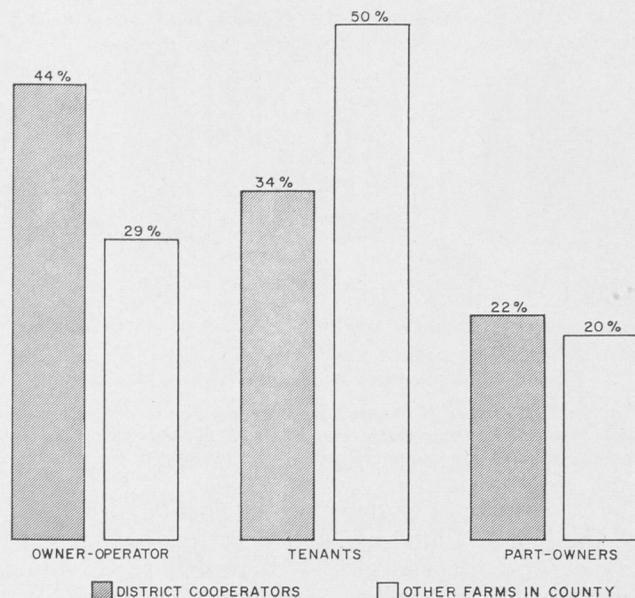


Fig. 4. Percentages of Jasper district cooperators who are owner-operators, tenants and part-owners compared with noncooperators (other farms). (Rounding errors prevent "other farms" adding to 100 percent.)

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 that were sometimes expressed by owners as "obligation to posterity" or "love of the land." Where the farm is operated by a part-owner, the factors just mentioned relative to owners would be equally applicable to the owned part of these farms. Also, part owner-operators may maintain current income by disinvesting rented land and investing in the owned part of the farm.

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

### Rental Arrangements

Apparently, tenants are less likely to ask the districts for help than are the owners or part-owners.

Information presented in fig. 5 indicates that the type of leasing arrangement on rented farms has a definite effect on the decisions of landlords and tenants about participation in the district. Conversely, a leasing arrangement which provides

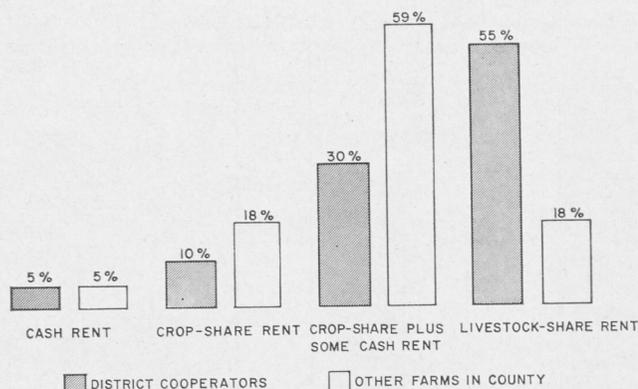


Fig. 5. Percentages of Jasper district cooperator tenants who have cash, crop-share, crop-share plus some cash and livestock-share rental arrangements compared with other tenants in the county.

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 a 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.

On the basis of results of this study, a livestock-share lease is the rental arrangement most likely to encourage compliance with the districts program. Possibly the most important reason for this is that the owner and operator are already working together in the operation of the farm and, as a consequence, are 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. Landlords of these farms are generally local residents and agriculturally oriented, which also might have an important bearing.

Furthermore, livestock-share landlords tend to have a greater personal and 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 propor-

tion of the income of such a farm is usually derived from livestock enterprises; therefore, roughage feeds from grass and legume crops find ready use. Also, large quantities of manure are usually available to help maintain and improve soil resources.

### SELECTED CHARACTERISTICS OF FARMS OPERATED BY DISTRICT COOPERATORS WHO WERE AND WHO WERE NOT CARRYING OUT THEIR FARM PLANS

Among the objectives of this study is the analysis of the strong and weak features of the district's program in relation to farmers who are participating. This section deals with factors affecting the extent to which district cooperators carry out district recommendations.

#### Classification of District Cooperators

A total of 465 cooperator farms had basic farm plans initiated before July 1, 1950 (table 2). 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 had been replanned, the new plans, if initiated before July 1, 1950, would have had an opportunity to come into the study. If a new plan had been initiated after June 30, 1950, the farm would not have been included. These 52 farms are, however, indicative of the dynamic setting of change in which the program operates.

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 as Status I. Of the 465 farms, 232 were placed in this category.

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

Table 2. Classification of farms in Jasper Soil Conservation District.

Group	Number of farms
Total farms (1954 U. S. Census)	2,696
Cooperators in SCD (all, to June 30, 1954)	623 <sup>a</sup>
Cooperators in SCD (all, to June 30, 1950)	465 <sup>b</sup>
Status I	232 <sup>c</sup>
Status II	189 <sup>d</sup>
Status III	44 <sup>e</sup>

<sup>a</sup>Number of basic plans signed prior to July 1, 1954, a few of which were the second agreement for a given farm.

<sup>b</sup>Farms (50 acres or larger) planned by the district prior to July 1, 1950.

<sup>c</sup>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.

<sup>d</sup>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.

<sup>e</sup>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.

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. The operators of Status III farms are cooperators only in the sense that they had received aid from the district in developing plans for their farms. They were not making use of the farm plans nor were they using 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 problem in that the recommended practices deemed necessary by the district to adequately control soil loss have not been applied despite the expenditures of district resources on the farms.

In summary, the three categories of planned farms used throughout this section are:

*Status I*—Satisfactory progress toward district objective.

*Status II*—Some progress but less than satisfactory.

*Status III*—Little or no progress.

The farms which had been planned by the district were classified into these three categories by the district work-unit conservationist on the basis of his inspection, records, knowledge and judgment as to the relative progress of planned farms toward district objectives. Analysis of the farms in the three categories strongly supports the classification as established. Data from the study indicate that district objectives on Status I farms 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 have attained the erosion control norm on only 11 percent of their tillable acres.

The stratification of the cooperators is further verified by the data showing the practices applied and 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.

### Size of Farm

District cooperators operated considerably larger farms than did other farmers in the county (see fig. 3). Once farm operators become cooperators in the district program, however, farm size does not appear to influence their compliance with district land-use recommendations. Statistical tests indicate that the proportions of farms with particular acreages in the three categories of co-

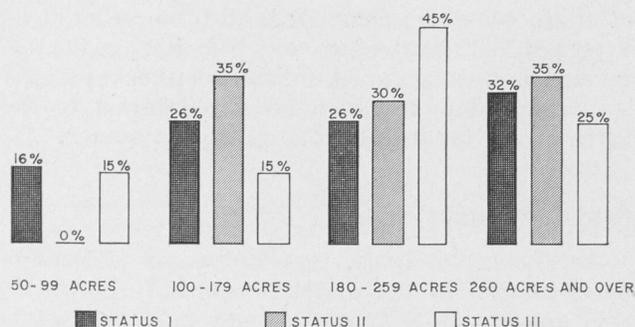


Fig. 6. Percentages of Jasper district cooperators in Status I, II and III having each of four sizes of farms (in acres).

operators, shown in fig. 6, are not significantly different. However, since none of the cooperating farms in Jasper district was under 50 acres in size and all but six of the cooperating farms were over 100 acres in size, it is 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 half, are from Status III (i.e., unsatisfactory cooperators).

### Tenure of Operator

Despite a significant difference in ownership interest between cooperating and noncooperating farms, no similar differentiation exists between the various categories of cooperators. The extent to which plans were carried out on the farms of cooperators was not dependent on the ownership interest of the operator (see fig. 7). 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 or have been overcome on that farm.

The initiation of the farm plan indicates (a) that both the owner and the operator have an interest in conserving the soil on the farm and (b) that the owner and tenant do, in some sense, consider the problem to be a mutual one. In view

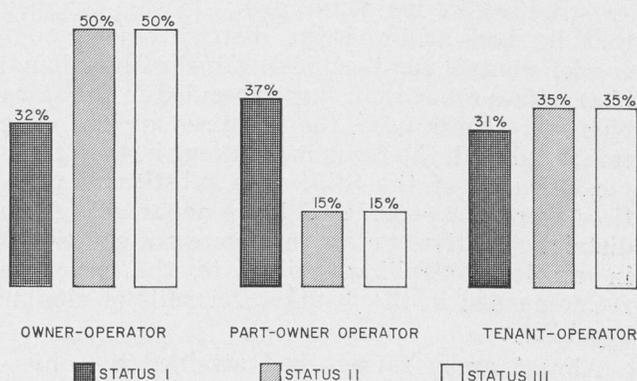


Fig. 7. Percentages of Jasper district cooperators in Status I, II and III who are owner-operators, part-owner operators and tenants.

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.

### Rental Arrangements

As shown in fig. 5, tenancy seems to impede participation in the district program. However, this general statement does not hold for farms operated under livestock-share leases. This study shows that tenants with stock-share leases are cooperators more frequently than are tenants with other types of leases (fig. 8).

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 carrying out 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. This means that rental arrangements continue to affect the district program after tenants become district cooperators.

### COOPERATORS' REASONS FOR AND AGAINST COMPLYING WITH SPECIFIED LAND-USE PRACTICES

Essential parts of the soil conserving 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. District cooperators were questioned as to the land-use practices followed by them on each of their fields. 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 equivalent in erosion-controlling ability to the practices recommended in the "Guide" for soils of similar capability.

Almost every farmer had attained the objectives of the district on at least part of his farm. On the other hand, few farmers had applied ac-

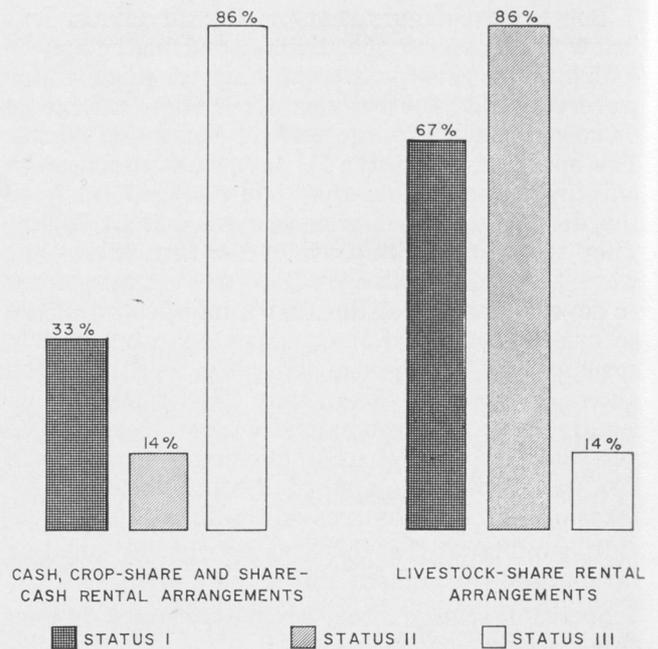


Fig. 8. Percentages of tenant Jasper district cooperators in Status I, II and III who have livestock and other forms of rental arrangements.

ceptable combinations of land-use practices on their entire farms. Consequently, with few exceptions, each cooperator was questioned relative to both his acceptance and his nonacceptance 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 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 that 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.

### Major Practices Studied

Major practices in farm plans of cooperators in the Jasper district were: field layout, cropping sequence, contouring, strip-cropping, terracing, grassed waterways, commercial fertilizer and agricultural lime. The extent to which district cooperators had carried out specific practices in their farm plans is shown in fig. 9. The extent of compliance is grouped according to status of cooperators as previously shown in table 2.

Why have some cooperators carried out these practices on their farms? Also, why haven't other

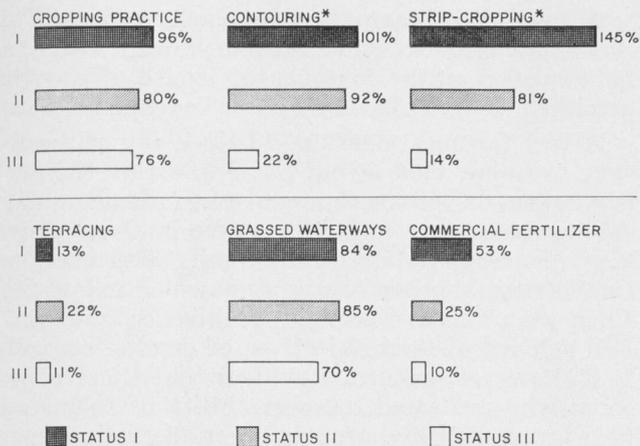


Fig. 9. Percentages of Jasper district cooperators applying each of six specific practices recommended in their farm plans.

\*These two practices exceed 100 percent since more operators were using them than were recommended in farm plans.

cooperators carried out these practices as specified in their farm plans?

Information on these two points seems necessary to understand cooperator behavior and improve cooperator participation in the district program. The following sections summarize reasons given by cooperators in the Jasper district for their compliance or lack of compliance with the recommended 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) similar as to land capability, (d) adaptable to the use of mechanical erosion-control measures and (e) conforming to the preferences of the owner and operator. These goals may not be complementary and could be competitive; as a consequence, the final pattern of fields in the farm plan is usually a compromise among these various objectives. The decision is made by the farmer in light of alternatives presented by the work-unit conservationist.

To gain 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 uniform land capability within the boundaries of each field. Soil uniformity permits the application, throughout each field, of a uniform set of land-use practices that 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, the soils on any individual farm are quite dissimilar as to capability. As a consequence, contiguous tracts of uniform land tend to be relatively small and odd-shaped. Operators then have the alternatives of fields that are small, irregular in shape and of diverse sizes or fields that are larger, regular in shape and of a uniform size but are more or less dissimilar in land capability. If a field is not uniform as to land capability, however, the operator must (a) disinvest the soil of low capability and underfarm the soil of high capability or (b) use more intensive mechanical practices (e.g., terraces) to protect the more erodible part of the dissimilar soil area but treat the whole as a unit from the standpoint of cropping sequences.

Figure 10 shows the reasons most frequently given by the operators of cooperating farms for complying with the field boundary layouts in the conservation plan. The reasons stated are necessarily brief and are an aggregation of a number of related factors.

On many farms on which fields had been laid out according to plans, the present 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. Seldom did a tenant relocate field boundaries without the full cooperation of the landowner. Generally speaking, tenants believe that moving a field boundary, at least where fencing is involved, is the responsibility of the

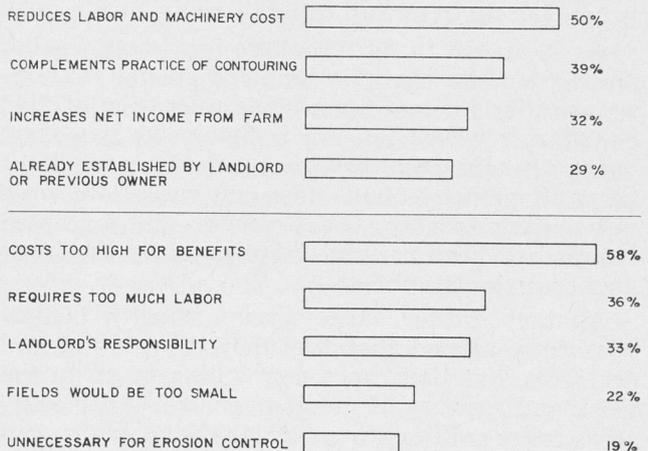


Fig. 10. Major reasons given by Jasper district cooperators for complying (above) and for not complying (below) with field layout specified in their farm plans.

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 fig. 10, 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 substantially reduces 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. As a consequence, there is 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 capability is a necessary condition for maximizing productivity over time. A great many fields in Jasper County 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.

As indicated in fig. 10, there is a strong belief 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 reason had accepted the plans in principle but, with one exception, were not willing to start the practice. The excepted tenant had been refused permission by the landlord to make the change.

Another rather large group, mostly owner-operators, agreed that the plans were valid and desirable, but they were not willing to go to the work and expense of moving fences. Other operators 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 strenuously objected to the small size of fields recommended. When a field is tilled on the contour, the length of rows is not likely to be reduced by contour fencing.

A few farmers mentioned that it is not necessary to follow field layout plans to attain the district norm of soil erosion control. A farmer may follow these plans and still pursue land-use practices that result in serious soil deterioration. Conversely, another operator may not follow the farm plan relative to field boundaries and may 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.

### Cropping Sequence

Possibly the most basic part of the district plan for a farm is the cropping sequence recommended for each of the fields.

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 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 or on soil having little or no erosion hazard. Consequently, planning a 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.

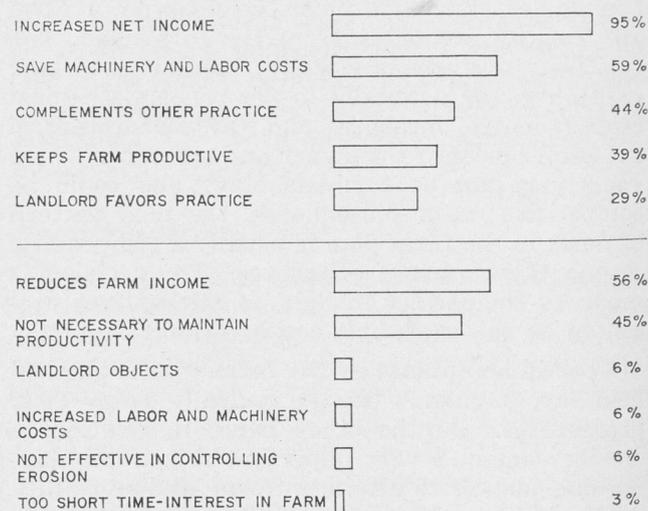


Fig. 11. Major reasons given by Jasper district cooperators for complying (above) and for not complying (below) with cropping sequence specified in their farm plans.

Farm operators, who were complying in some degree with district objectives of erosion control, were asked their reasons for using the land-use practices applied. Figure 11 presents the reasons most frequently given by farm operators for accepting the specified cropping sequences.

The factor that 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, farmers were quick to point out the large yields of high-quality roughages and the value of these crops both for feed and for sale. Meadow crops were cited as being: (a) dependable as to yield, (b) supplementary to corn in labor requirements, (c) high in value when 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 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.

As shown in fig. 11, 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.

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 rental income.

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.

### Contouring

Tilling the soil on the contour is apparently, for many farmers, a radical departure from the straight rows in which they have long taken pride. Many farmers seem to find it difficult to

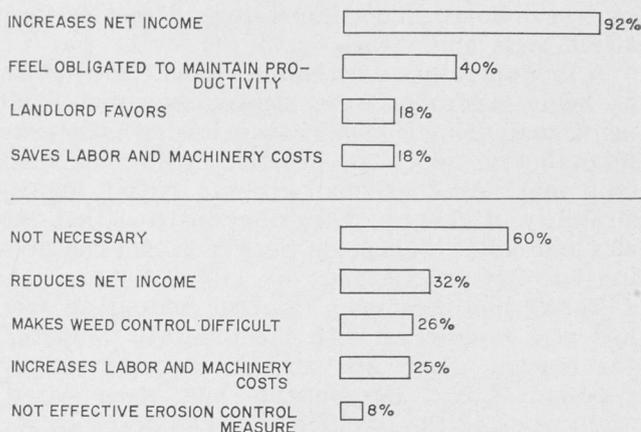


Fig. 12. Major reasons given by Jasper district cooperators for complying (above) and for not complying (below) with contouring specified in their farm plans.

consider the merits and demerits of contour farming from a conservation viewpoint. Rejection often appeared to be on the basis of a general aversion to the whole idea rather than on the basis of specific objections as to the benefits and costs of contouring.

Figure 12 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 who were contour farming 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 the landlord's reasons probably were similar to those just cited.

The most commonly stated reason for rejecting contouring was that the practice is not necessary for conservation. Three-fifths of these 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 given for not farming on the contour was 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 had 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 were intending to apply the practice during 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. Many of the reasons given are suspect as being 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.

### Contour Strip-Cropping

Strip-cropping is closely associated with contouring. 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 also apply to strip-cropping. There are other reasons which apply only to contour strip-cropping, however, and not to contouring as such.

Figure 13 presents the reasons which farm operators have given for using contour strip-cropping. As would be expected, the reasons are

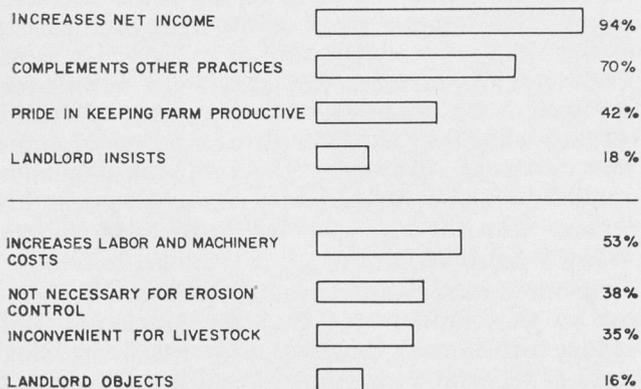


Fig. 13. Major reasons given by Jasper district cooperators for complying (above) and for not complying (below) with strip-cropping specified in their farm plans.

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.

Although many farmers are firmly convinced of the merit of strip-cropping, others stated that the strips were unnecessary to adequately control erosion. 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.

### 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.

Of the district cooperators who practiced terracing, three-fourths felt that the practice would increase their net income over time by permitting them to crop their land more heavily and by helping them to maintain productivity of their soils (fig. 14). About two-fifths of them felt that terraces were necessary complements to other practices in their farm plans. Twenty-five percent felt that terraces were necessary to their farm because of the slope of the land. Pride in maintaining the productivity of the farm also was mentioned by 25 percent.

In contrast to the opinion of the farmers who are using terraces, those who are not terracing were convinced that the practice was neither necessary nor profitable. Almost all of these farmers stated that terracing was not necessary because their present land-use practices were maintaining or increasing soil productivity or

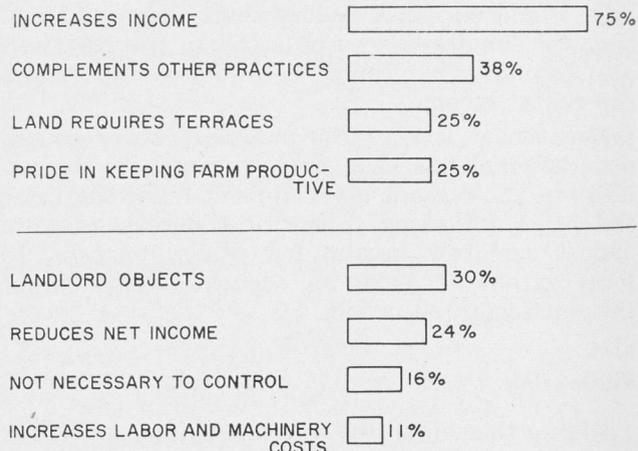


Fig. 14. Major reasons given by Jasper district cooperators for complying (above) and for not complying (below) with terracing specified in their farm plans.

that 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 barring 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.

With possibly one or two exceptions, the farm operators who voiced the objections 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, but perhaps not seriously so.

### Grassed Waterways

Among the operators of the farms in the study, the most widely accepted of all district recommendations is that of preventing gully erosion by establishing grassed waterways. Although the establishment of grassed 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 interview, each farm operator was asked whether all of the waterways, excluding streams and drainage ditches, on his farm were under control (i.e., not cutting out).

Figure 15 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 to machinery and, consequently, well-shaped grassed waterways protected investments in cornpickers, combines and other expensive machinery.

One reason given by a considerable number of the 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. Another substantial group of farmers, mostly from farms with a severe erosion hazard, were convinced that gully erosion, if not controlled, would in a few years make at least part of their land unfit for tillage.

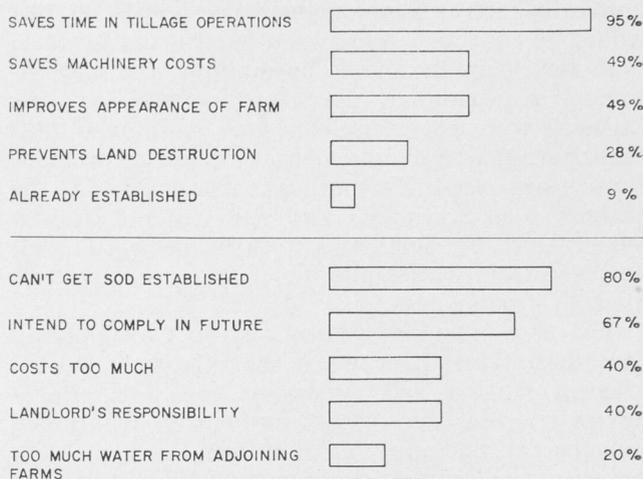


Fig. 15. Major reasons given by Jasper district cooperators for complying (above) and for not complying (below) with grassed waterways specified in their farm plans.

The reasons which 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. Figure 15 presents the 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. Commercial fertilizer apparently is 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 the nonusers intend to apply some fertilizer on a trial basis soon.

Figure 16 presents the reasons given by farm

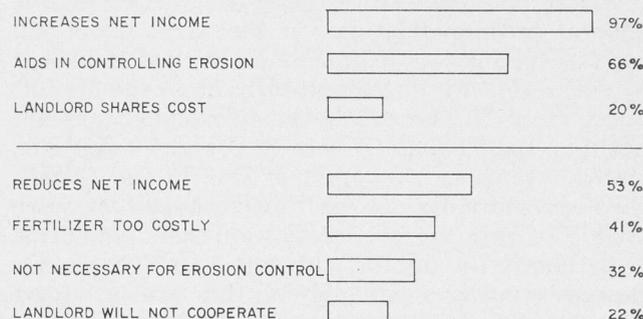


Fig. 16. Major reasons given by Jasper district cooperators for complying (above) and for not complying (below) with using commercial fertilizers specified in their farm plans.

operators for using commercial fertilizer. As would be expected, the reason most often given is that fertilizer increases production and net income. However, a large proportion of the farmers who used fertilizer also mentioned that fertilization was complementary to other erosion-control practices. Farmers often stressed that the extensive root systems and heavy plant growth engendered by fertilizer greatly improved soil permeability, water-holding capacity and resistance to erosion loss.

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 were that the practice (a) reduced net farm income or did not increase income enough to justify the added cost and (b) is not necessary for, or does not contribute to, erosion control (fig. 16).

This divergence of opinion might be accounted for in two ways—as a result either 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.

Those farmers who were 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 appears of most concern for 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. Liming apparently has wide acceptance. Only 10 percent of the farm operators did not lime their soils. Of this 10 percent, two-fifths stated intentions of applying lime in the future. Two operators did not use lime because they were unable to gain the cooperation of their landlords.

As shown in fig. 17, the two most frequently expressed reasons for applying lime are increased income and complementarity to establishing meadow seedings. These two reasons are closely associated since maintaining a planned cropping

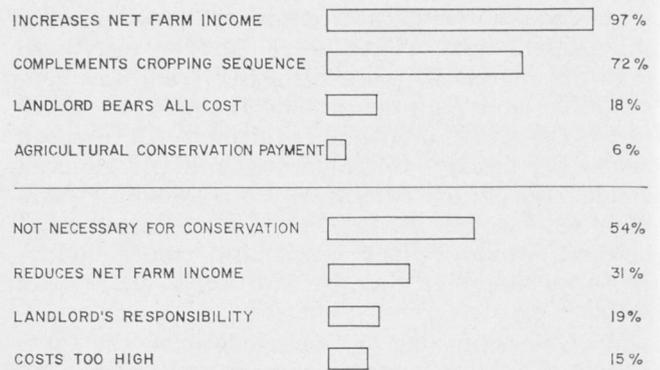


Fig. 17. Major reasons given by Jasper district cooperators for complying (above) and for not complying (below) with agricultural lime specified in their farm plans.

sequence depends on consistently successful attempts in seeding grasses and legumes. These cropping sequences aid in maintaining soil tilth and fertility—factors 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, current specification that applications to qualify for payment must be made according to soil test was a strong inducement to farmers to have their soils tested. Most farmers collected the incentive payments for liming, but only six percent gave the payment as a determining factor in the use of agricultural lime.

A rather small proportion of the farmers interviewed failed to use lime. A few tenant-operators had not applied lime to their soil because they thought 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 to be full compliance with the recommendations.

### SOME SUGGESTIONS FOR IMPROVING DISTRICT PROGRAMS

Obstacles to district progress stem from two sources. First, certain characteristics of farm businesses tend to impede the program. Second, the present level of knowledge of farm operators, as well as their preferences and habits, is reflected in their resistance to comply with district objectives.

Those obstacles which threaten further progress in soil conservation districts in the state and nation must be considered in developing a more effective program of erosion control and improved productivity of our soils. Considering the obstacles discovered in this study, the following suggestions are offered in the interest of improving district programs.

Impediments to district progress and the resultant suggestions for district improvements will necessarily vary from district to district. Therefore, each district should interpret the results of this study in terms of local conditions. However, the results of this study and the interpretations and suggestions relative to district problems and progress should be helpful to any district desiring to study its own situation with the objective of making further progress.

### **Bringing Small Farms Into the Program**

This study indicates that small size of farm is a deterrent to progress toward program objectives. The farms of noncooperators were, on the average, 26 percent smaller than the farms of cooperators. However, the small farms (under 100 acres) for which conservation plans were made were not significantly different from larger farms in the extent to which conservation measures were applied. If these results are representative, perhaps the resistance to initiating plans on small farms is due to misconception on the part of the farmers. In other words, the effect on costs and net income of using recommended conservation practices may not be as unfavorable as the operators of small farms are inclined to believe.

The districts cannot enlarge farms. Where farm size is a problem, however, district officials can point out to prospective cooperators ways to enlarge their farm operations. In some instances, enlargement can be accomplished by renting or buying additional land. 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 to increase the size of farm operations 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 important factors that farm planners must take into account when assisting farmers in developing conservation plans.

Much of the responsibility for public action aimed at encouraging farmers to acquire adequate-sized units must be assumed by agencies other than the soil conservation districts.

### **Extending Planning Horizons of Farm Operators**

All farm operators hold some rights in the land which they occupy. The extent of the rights held by farm operators ranges 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 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 cooperating farms, 41 percent of all Jasper County farms and 50 percent of the noncooperating farms.

In general, if a particular land-use practice is profitable, knowledge and acceptance of that fact would be sufficient to gain its adoption on an owner-operated 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 financial ones.

### **Adjusting Farm Leases to District 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 carry out district recommendations.

Leases would be expected to impede district progress less as they facilitate achievement of goals mutual to both tenant and landlord. In 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 conditions, the best interests of the farm 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.

As indicated earlier, the leasing arrangement which most nearly approaches equal sharing of costs and income is the livestock-share lease. Considerable evidence was provided by this study that such leases do provide good bases for achieving district objectives on rented farms. Over half of the cooperating farms that were tenant-operated had stock-share leases; by contrast, only 18 percent of the noncooperating farms were operated under stock-share leases. Usually, under this type of lease, the tenant's labor, and sometimes his machinery, is balanced against the owner's land. After this initial agreement is reached, it is customary with livestock-share 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 in rental arrangements 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 increases the net product of the land can logically be considered to be a production practice. Following this reasoning, tiling is a production practice that yields returns over a period of perhaps 50 years. Terraces, agricultural limestone, rock phosphate, commercial nitrogen and hybrid seed corn yield the major por-

tion of their benefits over progressively shorter periods of time.

Methods of determining which inputs are to be considered 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. Another 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 after his period of tenure.

The principal means by which the obstacles inherent in tenant operation might be overcome appear to be in research and education. Users of agricultural land need information from which they can make reasonable estimates of the amount and timing of benefits to be realized from a given expenditure on conservation measures. On the basis of such information, soundly conceived leasing arrangements can be devised. In many instances, prospective cooperators will need encouragement and assistance in 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 that certain land-use practices are 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 consider the lease as an integral part of the farm plan. At least, advice and guidance on needed adjustments in rental agreements should be a necessary step in achieving district objectives.

#### **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 educational efforts of the district and other interested agencies fail to reach a large segment of landowners. If such educational programs 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 who are now unwilling to participate in the district program may be pre-

vailed upon to initiate conservation programs on their farms.

### **Adapting District Program to Farmers' Preferences**

The attainment of program objectives on any given soil requires, as a general rule, not just 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 that farm operators have for complying with district recommendations. In general, the farm operator who had applied a given measure did so because he thought (a) that he was 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 should not depart radically from the owner's and operator's preferences. On the other hand, attaining uniform land capability within the boundaries of each field is an important objective in erosion control. Soil uniformity permits the application, throughout each field, of a uniform set of land-use practices that will use the soil of the entire area to the extent of its capabilities without exceeding the capacity of any part.

Often uniform 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 that contain soils of different capabilities. He may then compensate in the farm plan for soil dissimilarity by recommending proportions of tilled crops or intensity of mechanical practices for the entire field that will safeguard the most erosive soils in the field. In some fields, an alternative might be to use more intensive mechanical practices (e.g., terracing in addition to contouring) on the more erosive soils but to treat the entire field as a unit in planning cropping sequences.

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

arrangements is usually complementary to contour tillage. Separating fields on the contour tends to minimize point rows with contour tillage. Educational efforts should stress the possible complementarity of contour tillage and field layout.

The nature of the cropping sequences applied on the various soils is basic to the conservation of land resources. In general, increases in the proportion of meadow crops and decreases in the proportion of row crops will reduce the rate of soil loss on erosive land. Cropping sequences that aid in erosion control and are also productive are 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 more reluctant to apply mechanical erosion-control practices than cropping sequences. With current public programs designed to reduce the production of grain crops, the cropping alternative 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 not only involves a basic change in his ideas of what constitutes good tillage, but also often entails a comprehensive reorganization of his farm. Efficient application of conservation practices usually requires changes in field layout and in cropping sequences. Changes in the quantity of cash crops, feed grains and roughage feeds produced as a result of the changed cropping patterns may necessitate further changes in livestock enterprises for efficient utilization of the crops produced. That there should be resistance to such sweeping changes is not surprising. Still, much of the resistance to the use of mechanical erosion-control measures seems to be unwarranted.

Farm operators often appear to reject conservation measures purely on the basis of inherent prejudice without considering the relative costs and benefits of a given practice. Many times the reasons given by farm operators for failing to apply a land-use practice are in conflict with experimental data and the experience of other farmers who have applied the practice under similar conditions. On the other hand, some con-

ervation practices may not be profitable to an individual farmer. In such a situation, if society wants the practice applied, public investment would seem to be necessary.

#### **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 providing appropriate credit. If the capital rationing is internal (i.e., reluctance of an individual to invest available capital under appropriate terms), however, 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.

#### **Keeping Farm Plans Up-to-Date**

Considerable evidence obtained in this study points to the need for increasing attention to follow-up work with district cooperators 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 that are under new management or ownership in the program, thus protecting the public investment already made in bringing these farms into the program with the attending costs of planning.

Many additional farms with no change in operator or ownership are not kept up to date with the 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 conservation practices stated in their farm plans. About one of each 10 cooperators had cancelled plans or was 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 programs.

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 must be redirected somewhat from bringing new cooperators into the program to servicing present cooperators more adequately. 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.