AN APPLICATION OF LINEAR PROGRAMMING TO
INDIVIDUAL FARM MANAGEMENT DECISIONS
USING AN AREA INFORMATION SYSTEM

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PREFACE

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CHAPTER I

INTRODUCTION

Low net farm income is frequently cited as a symptom of problems existing in the agricultural sector of the United States' economy. In 1967, average annual per capita income for the farm population was $2037 as compared to $2784 for non-farm residents [22, p. 50]. Low net income on some individual farms is caused by a lack of resources. The operators do not possess sufficient land, capital or human resources to make a decent living. Alternatively, other farmers possess sufficient resources, but do not employ them efficiently. The purpose of this study is to provide a means of improving net income through well developed decision making techniques which have had limited application at the farm level.

The tendency in the economic system is toward an equilibrium of returns to a resource in all of its possible uses [17, pp. 291-299]. But, most resources employed in farming are not earning returns comparable to those possible in alternative employments, even if allowances are made for risk and other factors. Thus, a basic problem is that of resource disequilibrium between the farm and non-farm sectors of the economy. Several theories have been advanced in an effort to explain the persistence of this problem [20, Ch. 6, pp. 28-51].

An equalization of returns to resources between the farm and non-farm sectors is the extent of economic justice which farmers may expect in the long run. The farmer with limited resources generally would realize a low income relative to the non-farm level even if returns to resources were equal between the two sectors. Studies and programs relating to the growth of farm firms, adjustments in resource bases and farm organization, and alternatives for farmers displaced as others expand their resource bases have been addressed to the problems of the small farmer.

Aside from the problems of adjustment, both small and large farmers must make decisions regarding the use of the resources which they possess. As pointed out above, the problems of a small farmer may be much broader than efficiency of resource use, but his income may be increased to some degree through more efficient use of his existing resources. Also, adjustment must come about through decisions of individual farmers. If farmers are using decision making techniques which will enable them to use their resources efficiently, they will be more likely to adjust rapidly. If the adjustment involves expansion of the resource base, they would be in a better position to determine the resources which, if added, would be most effective in increasing their income.

If the commercial farmer employs decision making techniques which result in efficient resource use, he may be able to realize an income level comparable to that in the non-farm sector. Macro-economic factors affecting prices of farm outputs and inputs will of course finally affect the level of income which he realizes.

This study is limited to the micro-economic problem of efficient resource use on individual farms. Macro-economic problems, some of which were mentioned above, are recognized but are not within the scope of this study. Prices, government farm program provisions and other parameters which the individual farmer cannot directly affect are treated as given.

Statement of the Problem

Resources employed on Oklahoma farms generally do not earn returns comparable to those possible in alternative employments in other industries. The low return condition is partially due to inefficient resource use on individual farms.

Statement of the Hypothesis

An educational program utilizing existing decision making techniques and input-output data could increase resource use efficiency and returns to resources on individual farms in Oklahoma.

Previous Efforts in This Area

The linear programming model has been used extensively in agricultural economics research during the past decade. Much of its use has been in the determination of profit maximizing farm plans for resource situations typical of those found on individual farms. Also, it has been generally considered that linear programming could help the individual farm operator. It could enable him to select a combination of crop and livestock enterprises which would maximize his expected profit subject to his limited resources. But, few farmers have benefited directly from the use of linear programming. Why?

A primary reason that linear programming has not been employed extensively as an individual farm decision making guide is the large amount of time (expense) which is required per farm. When individual farm linear programming is attempted, inadequate farm records usually necessitate the estimation of most input-output coefficients, such as the labor requirements by time period for an acre of a given crop. Also, much professional staff time is required to assemble the data in proper matrix form. Clerical time is then required to code the matrix for running on a standard linear programming computer routine.

When an optimum farm plan comes from the computer, professional staff time again is required to examine the optimal solution for faulty logic in the matrix or for omitted activities or constraints which would yield information important in farm planning decisions. Additional professional or clerical staff time is required to decode the computer output and transpose it into a form which can be understood by the lay audience, in this case individual farmers. Extensive post-optimal analyses require additional professional and clerical staff time. A general unwillingness of commercial farmers to pay the resulting price has resulted in few firms offering the service and few farmers receiving it.

Typical, or representative, farm linear programming has been employed as an alternative to individual farm linear programming. For example, see Plaxico [19]. Using this approach, a farm is chosen which is representative of others in an area. Since the linear programming results can be generalized from one representative farm to many farms similar to it, considerable expense can be justified in matrix building, data coding, computing and interpreting optimum plans and post-optimal analyses for representative farms.

This approach was used in many farm management studies in the early 1960's. In most cases, the linear programming results were published in bulletin form for general distribution. Two weaknesses of this approach were realized. First, the time lag from the computer to the reader was often six months or longer. Changes in government programs, prices or other factors during this time often made the results obsolete before they reached their intended audience. Also, the capability of revising the linear programming model and publishing a revised set of optimal farm plans was not retained. Second, published optimum plans for representative farms were not usually an integral part of an educational program with farmers, but were the publication of research results. Thus, generalization of the results from representative farms to actual farms was usually the duty of the farmers.

Objectives of This Study

The representative farm approach may serve as an effective technique in guiding individual farm management decisions if the weaknesses mentioned above are eliminated. In addition, the input-output data which are compiled for use in programming representative farms may serve as a data source for individual farm linear programming. If the latter is to be realized, the entry of individual farm resource situations and input-output data revisions into the system must be possible with relative ease.

This study was initiated to develop a pilot system which could serve both purposes efficiently. The specific objectives of this study are:

1. To develop a farm management information system for an economic farming area of Oklahoma which will:

a. Produce optimum organizations of representative farms in the area;

b. Allow rapid evaluation, with respect to organization and income, of actual, predicted and/or proposed changes in;

   (1) Farm product or input prices

   (2) Input-output coefficients

   (3) Government farm program provisions

   (4) Farm resource bases

c. Allow rapid dissemination of the above results to area extension agents, county extension directors and farmers;

d. Produce optimum organizations of actual farms in the area when individual farm resource bases and certain other key data are provided.

2. To explore the use of the information generated in objective one in a farm management education program with farmers.

A Survey of Related Programs in Other States

As noted earlier, linear programming has been used extensively in farm management research. It has also been used in varying degrees in farm management education programs with farmers. A national coordinating committee on the use of electronic data processing in farm management, in cooperation with the Federal Extension Service, surveyed state universities in early 1968 to determine the characteristics of their farm record programs and the manner in which electronic data processing equipment and techniques were employed in their other extension education programs. The publication resulting from this survey indicated that twenty-three states were utilizing electronic data processing techniques in forward planning and decision making programs as a part of their extension farm management efforts [16].

A letter was written to a person in each of fourteen state universities which indicated in the above survey that they used linear programming in their farm management extension program. The following questions were asked in the letter:

1. To what extent is whole farm linear programming used in your extension farm management program? How much emphasis is placed on it? If individual farms are being programmed, how many do you program per year?
2. What is the source of data for your linear programming? Individual farm records? Estimated budgets for similar areas or soils? Other?
3. How are these data used in forming the linear programming model? That is, do professional or clerical personnel code the data for entry into a standard library program, or do you have a special computer program which aids in this process?
4. What is the source of the computer program used in reaching an optimal solution? Is it a library program furnished by a computer company, or has it been written at your institution?

5. What form is the output in when it comes from the computer? Must it be tranposed by clerical personnel before it is ready for consumption by the intended audience?

Twelve replies to the above inquiry were received. In response to the first question, all respondents indicated that they used linear programming primarily as a teaching device in their farm management extension programs. Three respondents indicated that linear programming was used primarily on farms participating in the Tennessee Valley Authority rapid adjustment program. The number of farms programmed per year ranged from twenty-five "over the past few years" to forty-five in one year. In general, the emphasis on linear programming seemingly ranged from a minor role to a position of dominance in the farm management extension programs involved.

In answer to the second question, all respondents but one indicated that they used individual farm data whenever it was possible. One respondent indicated, however, that he attempted to use activity budgets which reflected the level of management that the farmer was striving to attain rather than his present level. In every case, standard budgets and estimates from animal science, agricultural engineering, or agronomy staff members and/or county extension agents were used either as a check on the individual farm data or as a substitute for individual farm data when they were not available.

A uniform response was received to the third question. All of the respondents indicated that professional personnel assemble the data into a linear programming matrix and clerical workers perform the coding and keypunching operations prior to execution of the linear programming routine.

In response to the fourth question, five respondents indicated that they used a linear programming routine which was not furnished by a computer manufacturer. Two of these used the same program, which included an option for a mixed integer solution. All others utilized library programs furnished by a computer company.

All respondents indicated in answer to question five that their computer output must be simplified for presentation to the individual farmer. One respondent indicated that he preferred to transform the output himself while he was interpreting the solution.

In conclusion, none of the responses would indicate that an information system approach to the use of linear programming is being employed by these state universities at this time. One respondent indicated that he had hopes of compiling a large data bank of budgets on magnetic tape so that a matrix could be formed by calling for specific budgets on the tape. Another respondent was developing a procedure for using farm record data in linear programming. The procedure would require professional or clerical staff time for data manipulation and revision, however.

The remainder of this thesis describes the development and discusses the potential use of an area farm management information system. Chapter II describes the development of an area data bank. Chapter III describes the development of an operating system which uses information from the data bank to develop reports and other information for use by farmers, their advisors and educators. Chapter IV discusses the manner in which these reports and other information may be used in a farm management education program with farmers. Chapter V summarizes the development of the system and its uses. In addition, possible future refinements, roles, and developments of systems are discussed.

CHAPTER II

DEVELOPMENT OF AN AREA DATA BANK

An area data bank, for purposes of this study, is that portion of an area information system which stores the data needed for repetitive use by the system. The area data bank and the operating system, which will be discussed in Chapter III, make up the linear programming portion of an area farm management information system. The decision-making model which is employed by the system influences the types of data stored and the manner in which it is organized within the data bank. Consequently, a brief discussion of the decision-making model employed in this study follows.

Linear Programming

Linear programming was selected as the decision-making model for the area information system. Among the operational tools of agricultural economists, for use at the field level, linear programming most efficiently approximates optimal organization decisions of an individual farmer. It chooses a combination of enterprises which will yield maximum net return to a given set of fixed resources, when prices, costs, and production coefficients are specified.

The general linear programming model (in matrix form):

$$\begin{aligned} &\text{Maximize } Z = C'X \\ &\text{Subject to } AX \leq B \\ &\text{and } X \geq 0 \end{aligned}$$

where: Z represents the value of the objective function, which is net return to fixed resources for purposes of this study

C is a $n \times 1$ vector of costs or returns for each of n activities and is commonly referred to as the objective function

X is a $n \times 1$ vector of activity levels for each of n activities

A is a $m \times n$ matrix of input-output coefficients

B is a $m \times 1$ vector of resources and restrictions and is commonly referred to as the right-hand side

For a discussion of the theory of linear programming, see Dantzig [6], Heady and Candler [13] or other linear programming texts.

The standard linear programming tableau for a farm planning problem furnishes a pattern for the efficient organization of a data bank. The A matrix typically contains crop yields, labor requirements of crop and livestock enterprises, livestock feed requirements and their resulting production, general government program provisions, capital requirements and accounting and transfer functions. The C vector, or objective function, contains the costs associated with production activities and prices associated with buy-sell activities. The B vector, or right-hand side, typically contains the resource situation of an actual or representative farm.

The structure of a linear programming model for use in this system differs from the structure of a model designed only for a specific problem and for a single use, however. Ease of changing prices, government program benefits and resource situations in the linear programming model is a prime consideration in its design. Also, numerous accounting vectors must be included in the model to expedite the development of readable, reproducable reports printed by computer. In general, any alternatives which increase the flexibility of the linear programming model should be incorporated if possible.

In the data bank, space for three different objective functions is allowed in an array which is named ALTC. No right-hand sides are stored in the data bank as they are usually different for each run. The A matrix is stored in the data bank in the exact form in which it is used for repeated linear programming runs. In addition to A and ALTC, arrays which contain row and column names, slack variable indicators and the dimensions of A are stored in the data bank. Also, detailed production activity costs and coefficients of variation for crop yields are stored in arrays called COST and YIELD, respectively.

The following sections of this chapter discuss considerations, principles and guidelines for developing an area data bank. The development of an area data bank for north central Oklahoma is discussed concurrently for purposes of exposition.

Delineation of the Area

A basic step in the construction of an area system which will satisfy the objectives stated in Chapter I is the delineation of an economic farming area. Such an area should be relatively homogeneous with respect to soil productivity, weather, feasible cropping enterprises, feasible livestock enterprises, market outlets for products, product prices and the availability and prices of inputs.

In previous studies, which were a part of the Great Plains

Regional Research Project GP-5, "Economic Problems in the Production and Marketing of Great Plains Wheat" and Southern Regional Research Project S-42, "An Economic Appraisal of Farming Adjustment Opportunities in the Southern Region to Meet Changing Conditions", eight generalized economic farming areas were delineated in Oklahoma using the above criteria.

The north central Oklahoma economic farming area was selected for use in this study. The north central Oklahoma area includes all or part of Alfalfa, Blaine, Canadian, Garfield, Grant, Kay, Kingfisher, Logan, Major, Noble, and Woods Counties (Figure 1). As indicated by the objectives, the scope of this study was not only to develop a system for north central Oklahoma, but to explore techniques which could be used in the later development of similar systems for other economic farming areas.

Much of the source data for soils and cropping enterprises used in this study were taken from processed series P-550 [5] and unpublished data also resulting from Oklahoma Agricultural Experiment Station Project 1323. This project was carried out in cooperation with the regional project mentioned above.

Soils considered in this study are the major ones in the Reddish Prairies land resource area in north central Oklahoma. The two classifications of soils used in this study are as follows: (1) Clayey soils, such as the Tabler-Kirkland soil association and (2) Loam soils, such as the Grant-Pond-Creed-Nash soil association. Soils within each of these groups were further divided into productivity classes (designated as CB, CC, CD, LA, LB, LC, and LD for the clayey and loam soils, respectively). Soils in a given productivity class have similar physical characteristics, productivity capabilities, and management

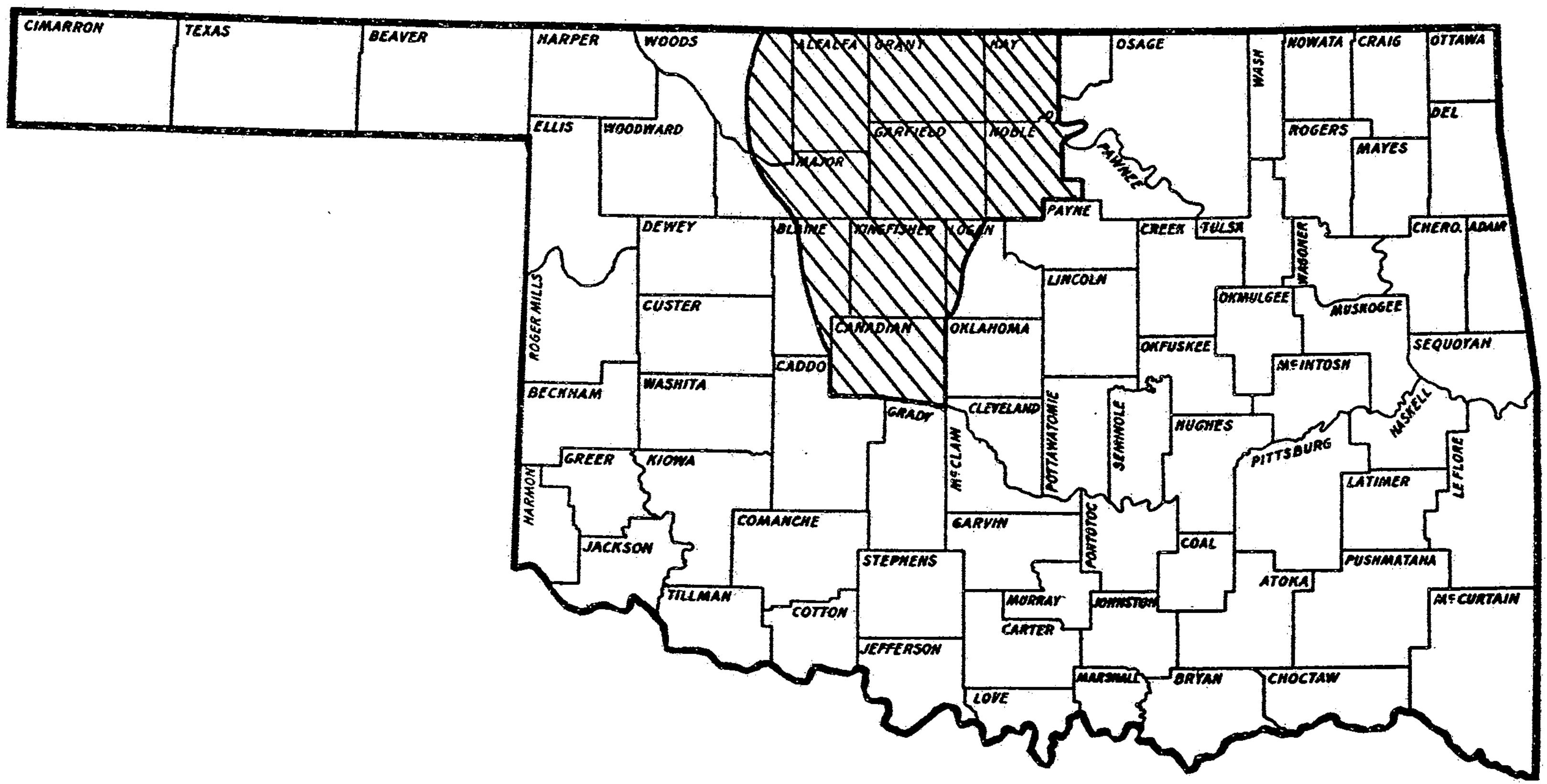

Figure 1. Map of Oklahoma Showing North Central Area Included in This Study

requirements. Mean annual rainfall in the area varies from 36 inches at the eastern edge of the area to 26 inches at the western edge [9, p. 14].

The area traditionally has been a wheat farming area with beef stocker calves utilizing winter wheat pasture. The development of hybrid sorghums and, more recently, a winter-hardy, greenbug resistant barley variety has enabled other enterprises to become competitive with wheat in the area.

Selection of Production Activities

An area model should include enterprises typical of the area as well as enterprises which are not typical, but are feasible in the area. In the operation of the system, as the reader will note in Chapter III, output printing procedures, government program provisions and the necessity of accounting vectors make it easier to delete unwanted enterprises than to add new ones, although the latter will be possible. In the construction of the north central Oklahoma area model, an exhaustive list of enterprises was not included due to the fact that the primary objectives of this study pertain to the development of a system. Additional enterprises would not have aided in reaching these objectives, but would only have expanded the size of the system and increased the number of mechanical details dealt with. A listing of the activities included in the area system and their abbreviations appear in Appendix Table XIV. The numeric portion of the activity abbreviations correspond generally to enterprise codes used in the computerized farm record system at Oklahoma State University.

Crop Activities

The crop enterprises considered for this area are, in general, those listed in Processed Series P-550 [5]. Crops include barley, grain sorghum, wheat, forage sorghum, alfalfa, wheat pasture grazed out by May first, sudan pasture for summer grazing and sudan pasture for winter grazing. All enterprises except alfalfa can be grown on all seven soil classifications noted earlier. Alfalfa is not considered feasible on clay - D or loam - D soils.

Certain modifications were made to the crop budgets appearing in Processed Series P-550 [5] in order to use them in the area model. Machinery ownership cost (taxes, depreciation and insurance) and a charge for interest on capital used to defray variable production costs are deducted from "total specified costs" because interest on variable production costs is charged internally in the model and fixed machinery costs are not desired in the primary objective function. A second objective function does include fixed machinery costs. The "machinery ownership cost" plus a seven per cent interest charge on the "machinery ownership cost" and "machinery capital" are added to the amount which appears in the primary objective function for the respective activities. The use of the second objective function is twofold. When it is not used as an objective function in reaching an optimal solution, it gives a measure of net returns, less fixed machinery costs, for the plan selected. When it is used as an objective function in reaching an optimal solution, the resulting farm plan reflects a longer run planning situation in a period in which machinery decisions must be made. The second objective function is computed only for the crop enterprises, as the livestock enterprises considered for this area are supplementary in nature and do not use significant amounts of machine time.

All production from cropland and native pasture is placed in inventory, or accounting, rows. This feature allows products to be used by livestock enterprises, or to be sold. Nine such rows are used and appear in the explanation of the constraints (Appendix Table XV) and the A matrix (Appendix Table XVI).

The barley, grain sorghum and wheat inventory rows (71BAP., 73GSP., 76WHP.) receive production from those respective activities and make it available for sale. The prairie hay or forage sorghum row (80HAY.) receives production from the forage sorghum production activities and from purchases by a buying activity and makes available hay for use by certain livestock activities. The alfalfa hay row (81HAY.) receives production from the alfalfa activities and makes it available for sale. The "grain sorghum stubble" row (73STB.) is an inventory of dry winter pasture as it receives stubble "production" from the grain sorghum, forage sorghum, alfalfa, and sudan for winter grazing activities and makes it available for use by livestock activities. No sales are made from this inventory row. The October to March small grain pasture inventory row (80MAR.) receives production from the barley, wheat, and small grain graze out activities. This production can be used by livestock or sold. The March to May small grain pasture inventory row (80MAY.) receives production from the small grain graze out activity. Production can be used by livestock or sold. If it is sold, however, an equal amoutn of October to March pasture also must be sold. The livestock enterprises typically use small grain pasture from the two periods in that proportion and it is unlikely that only March to May pasture would be marketable. The native pasture inventory row (86NP..) receives production from the native pasture activities. These activities merely convert acres of native pasture into animal unit months (AUM's) of pasture. Also, production from sudan for summer grazing is placed in the native pasture inventory row. Livestock activities use from this row. No sales are made from it.

Crop Yield Variation

In most areas of Oklahoma, including the area selected for this study, weather is a primary factor affecting crop yield levels [12]. Thus, for a given soil, fertilizer application rate and set of cultural practices, considerable yield variation can result. In order to deal with this problem, an array of coefficients of variation (standard deviations ÷ means) for crop yields was included in the area system. The indicators of yield variation could have been stored as standard deviations, rather than as coefficients of variation. Coefficients of variation were available for crop yields in north central Oklahoma, consequently they were stored in the data bank, avoiding a manual computation of standard deviations. The coefficients of variation for north central Oklahoma crops are given in Table I.

In the initial construction of the crop activities, average, or expected, crop yields were used. The operator of the area system may use the coefficients of variation by indicating on an input card (one per product) the crop, product, number of standard deviations and the direction of yield change desired. The yield adjustment is computed, is made in the A matrix, and harvest costs are adjusted to correspond with the adjusted yield level.

TABLE I

COEFFICIENTS OF VARIATION FOR YIELDS OF SELECTED CROPS IN NORTH CENTRAL OKLAHOMA

Crop	Product	Unit	Coefficient of Variation
Barley	Grain	Bu.	.437
	Winter Pasture (Oct-Mar)	AUM	.473
Grain Sorghum	Grain	Cwt.	.320
	Stubble	AUM	.261
Wheat	Grain	Bu.	.320
	Winter Pasture (Oct-Mar)	AUM	.473
Forage Sorghum	Hay	Ton	.261
	Stubble	AUM	.261
Alfalfa	Hay	Ton	.228
	Stubble	AUM	.228
Small Grain Pasture	Winter Pasture (Oct-Mar)	AUM	.473
	Spring Pasture (Mar-May)	AUM	.231
Sudan	Pasture	AUM	.277
Native Pasture	Pasture	AUM	.385

Source: George Flaskerud, Unpublished data compiled from Experiment Station records, Oklahoma State University, 1968.

The manner in which this feature of the model is used is at the disgression of the user. It is possible to determine optimum farm plans for different weather or yield expectations. The yield variation feature makes possible the comparison of optimum farm plans resulting from various yield levels. Thus, the "cost of a wrong decision" relating to weather outlook could be easily evaluated.

In most cases, it is unlikely that all crop yields would be varied in the same direction and the same number of standard deviations, as certain crops are dependent primarily on winter moisture, while others are primarily dependent on summer moisture. As a result, the crops within each of the following groups would probably be varied together:

1. Wheat and barley.
2. Small grain pasture - March.
3. Small grain pasture - May.
4. Forage sorghum, grain sorghum, sorghum stubble, alfalfa hay, alfalfa stubble, and sudan pasture.
5. Native pasture.

Livestock Activities

Livestock enterprises were selected which are typical of the area and which utilize forage produced by the cropping alternatives. An attempt was not made to include all possible livestock enterprises for reasons noted earlier, which relate to the scope of this study.

Three cow-calf, spring calving, activities are included. Wintering rations of: native pasture (111RTA); native pasture and forage sorghum (112RTA); and native pasture, forage sorghum and small grain pasture (113RTA) are assumed for each of the three activities, respectively. A cow-calf, fall calving, activity which utilizes winter small grain pasture (111VLA) is also included.

Seven stocker steer activities are included. All begin with the purchase of a 450 pound steer calf in mid-October. Three of the activities assume that the calf is kept one year. Wintering rations of: native pasture (141TTA); native pasture and forage sorghum hay (142TTA); and native range and sorghum stubble (143TTA) are used by the three activities, respectively. Two of the stocker enterprises assume that the calf is sold in May from grazed out small grain. Both utilize a basic wintering ration of small grain pasture. One uses forage sorghum hay (144TYA) while the other uses forage sorghum hay and sorghum stubble (145TYA) in addition to the small grain pasture. The remaining two stocker activities assume March sale. One uses forage sorghum hay (146TRA) while the other uses forage sorghum hay and sorghum stubble (147TRA) in addition to wheat pasture as a wintering ration.

The source of data for all of the livestock activities is Processed Series P-459 [11]. Costs for farm produced feed and interest on annual capital were deducted from the cost items appearing in the published budgets. The units of feed, labor, and annual capital required were placed in the appropriate inventory rows of the linear programming model.

All buying and selling of livestock is accomplished by the use of inventory rows and buy-sell activities. An accounting unit of one hundredweight was used to minimize the effort involved in making price changes and expedite the development of output formats which include livestock prices.

Government Farm Program Considerations

Since the establishment of the Agricultural Adjustment Administration in 1933 [20, ch. 10, p. 4], government farm programs have been a factor in farm planning decisions. At the present time in Oklahoma, government farm program provisions apply to all of the major crops of the state, except hay [23, pp. 14, 19]. Also, the existing cost-price relationships of most crops make government program participation a practical necessity for most crop farmers.

Government farm programs administered by the Agricultural Stabilization and Conservation Service are designed to provide price support and stabilization for farm commodities. These programs have been deemed necessary to eliminate wide price fluctuations and extremely low prices which may occur in an economic system that approaches pure competition [17, p. 22]. Each farmer has an insignificant effect on the prices of his products, but as each individual acts in his own interest, the group result has often been excess production and low prices. Yet, it generally is not profitable for an individual farmer to reduce his production in an effort to raise prices, due to his insignificant contribution to the total.

The purpose of the area model is to aid individual farmers in their farm planning decisions, given a government program. Thus, the problem faced by most individual farmers, and the one which the area model is designed to deal with is: How can the individual farmer maximize his profit, given his fixed resources and the set of governmental restrictions and alternatives?

The decision with regard to government programs is not only "participate" or "don't participate", but if participation is chosen, one must decide "how to participate." The farmer must choose a program alternative, the amount of various bases or allotments that will be planted, diversion acres, and the degree of substitution of crops onto other bases. To make these decisions, he needs information such as projected yields, size of bases or allotments, loan rates, price support payment rates and cross-compliance regulations between programs. In the area model, all feasible participation alternatives for farmers in north central Oklahoma were considered.

Frequent changes in program provisions have been primarily responsible for the rapid obselence of published optimal farm plans, as noted in Chapter I. Thus, the inclusion of Government program provisions in the area model is necessary, but they must be included in a manner such that inter year and inter farm-intra year flexibility is maintained. That is, the number of changes in the model due to annual changes in programs and variation in yields and base acreages between farms should be minimized. The linear programming model constructed for this study will accommodate many possible changes in government programs with no changes in the structure of the matrix. In addition, the activities and restrictions pertaining to government programs are grouped in the right and lower portions of the matrix so that major structural changes in this segment, if necessary, will not alter the location of the other activities and restrictions.

The number of crops to which government programs apply and the resulting structure of an area model will vary from area-to-area of Oklahoma. The following discussion relates to those programs for crops feasible in north central Oklahoma, but the general approach may be applied to other programs.

The north central Oklahoma model, as it appears in Appendix Table XVI, reflects the 1969 wheat program [21] and an expected 1969 feed grain program.

The objective of flexibility in construction of the model and the necessity of accounting functions cause the number of rows and activities dealing with government programs in the area model to be greater than the number necessary for a single purpose matrix. For example, minimum diversion activities are present in the area model only to make the output easier to interpret and to simplify the entry of individual farm resource bases.

Although barley is included in the feed grain program, separate barley and grain sorghum bases are maintained due to the fact that additional acreage diversion payments under the feed grain program are based on the crop actually diverted.

Alfalfa, forage sorghum, and sudan pasture help satisfy the conserving base requirement. Sudan for winter grazing and fallow help satisfy the diverted acres requirement. Small grain pasture grazed out by May first can be used to satisfy the conserving acres or diverted acres requirements or if the small grain is wheat, it may be planted on the wheat allotment so that wheat certificates can be collected on that acreage. Special treatment of crops such as this make the initial inclusion of all feasible crops in the model extremely desirable. If a new crop were to be added later, several changes in the matrix and the output format would be required.

As noted earlier, the feed grain program included in the area model is an expected, or anticipated, one. The situation which necessitated this is a special case, but is discussed here as an illustration of the situations which will typically be faced in the field operation of an area information system such as this. The 1969 wheat program announcement stated that barley would not be included in the 1969 feed grain program. The 1969 wheat program included provisions for substituting feed grains for wheat, wheat for feed grains and wheat for barley, oats, and rye. In August, 1968, approximately a month after the announcement of the 1969 wheat program, the program was changed. The new announcement stated that barley was to be included in the feed grain program. This made the former substitution provisions relating to barley obsolete. But, new provisions relating to barley would not be known until the expected feed program announcement in December. Thus, farmers of the area, as well as the operator of the area system were forced to develop expected programs to use in their decision-making processes. The initial decision which farmers had to make related to the acreage of wheat and barley to be planted in September and October.

The above example points out the need for flexibility in relation to government programs. It also points out the need for results from an area system for use in farm planning decisions which are complex, and which must be made quickly.

Three major government program participation alternatives are considered in the area system. They are: non participation; participate in the wheat program; and, participate in the wheat and feed grain programs. Within the wheat program alternative, an optimum level of additional acreage diversion must be selected. Within the wheat and feed grain program alternative, optimum levels of additional acreage diversion for barley, grain sorghum and wheat must be selected. Also, if the substitution of feed grains for wheat or wheat for feed grains is profitable, the optimum amount of substitution must be determined.

Representative Farms

The system developed in this study produces optimal organizations for representative farms as well as actual farms. A discussion of the representative farm approach and a description of the representative farm resource situations selected for north central Oklahoma are presented in this section.

The idea of using a representative or typical farm is not new in farm management education and as an aid to individual farm decision-making. Carter [2] and Conneman [4, p. 49-58] have surveyed the use of representative farms or firms in economics and each trace the development of this approach to Alfred Marshall. Thus, the approach was first used in the explanation of economic theory. Representative farms were used extensively in "type of farming" studies by farm management personnel in the 1920's and 1930's. Here, budgets of typical farms and examples of budgeting methods to show readjustments of typical farms to different prices were presented. For example, see Elliot [7]. Representative farms were also used in early supply response studies where expected responses of individual farms to price changes were determined by budgeting. For example, see Mighell [18]. Budgeting was later replaced by linear programming in various supply response studies of the 1950's and 1960's. Extension farm management specialists over the years have made extensive use of the representative farm approach in their educational programs with farmers. Thus, the representative farm approach has been applied in various ways from the early days of agricultural economics until the present time.

Various criteria have been used in the selection of representative farms or firms. Marshall dealt with an "average" firm in his investigations. The farm management personnel carrying out the "type of farming" studies saw farm organization as an important factor in grouping farms. The researchers working with supply response studies have generally been interested in the land, labor, and capital resources as classification or grouping criteria. Conneman [4, pp. 65-70] categorized three methods of constructing typical farms. These were: the average resource method, the most limiting resource method and the resource ratio method. Carter [2, p. 1454] pointed out that the method of selection should be tied closely to the purpose for which the representative farms are selected.

Delineation of Representative Farm Resource Situations

The role of representative farms, or resource situations, in this study is to provide guides for individual farm decision-making. The selection criteria relate to the efficient dissemination of information. Each representative farm resource situation should be similar to as many individual resource situations as possible. If this is accomplished, information gained from and techniques used on representative farms may be generalized to a large number of actual farms. Unlike the "type of farming" studies, farm organization was not a prominent criterion in the selection of representative farms for this study. Instead, primary emphasis was placed on obtaining representative resource situations. Since most of the feasible alternatives for the north central Oklahoma area are land based, land could be classed as a "most limiting resource" and becomes a prime factor in the selection of representative resource situations in this area.

Three representative farm resource situations were developed for this area in an earlier study [10]. These resource situations were evaluated by extension agricultural economics personnel who were familiar with the area, for use as representative farms in a farm management education program. The extension personnel felt that these farms were representative of the resource situations on many individual farms. They expressed the thought that a second group of farms, similar in resource mix, but larger in size may be desirable. As a result of this suggestion, variable resource programs were run on each of the three resource situations in an effort to determine the effect of increased amounts of land on farm organization. Essentially, no change in farm organization was noted as the soil resource base was varied from its existing size to twice its existing size. From these results, it was concluded that one size group would be sufficient and that proportional changes in optimum plans for farms in this group could be manually computed in order to achieve optimum plans for larger farms.

Acreage bases for crops involved in government farm programs were established from agricultural stabilization and conservation service (ASCS) data for counties in the area. Proportions of base acreage to total crop acreage in each county were computed and applied to the representative soil resource situations. Acreages of clay - E and loam - E are included in the native pasture acreages on the representative farms.

In the computation of projected yields for the representative farms, as in the establishment of acreage bases, it was necessary to consider the cropping plans which have been typical in the area. This was necessary because the ASCS data used in the decision-making process is based on the farm organization and crop productivity over some specified period in the past. Usually, it is a period of 3-4 years prior to the year for which plans are being made. To establish estimated projected yields of barley, grain sorghum, and wheat, for the representative farms, it was assumed that wheat had been planted on the best land. Grain sorghum and barley were given second and third priorities for land, respectively. Due to the small size of grain sorghum bases on farms in the area, grain sorghum and barley received essentially the same quality of land. Individual farm projected yields were then computed from the yields given for the various soil classes as reported in Processed Series P-550 [5].

Previous linear programming results in this area [19] and partial budgets show that alfalfa is profitable in relation to other crops in the area. But, due to moisture limitations and labor acquisition problems during hay harvest periods, alfalfa acreage is absolutely limited to 20 per cent of the cropland on the representative farms.

The representative farm situations selected for this study are shown in Table II. As noted earlier, they are not stored in the data bank. Instead, they are punched on cards and submitted in each computer run in the same manner as actual farms.

Production activities and government program related functions have been discussed in this chapter. Other activities and constraints which serve accounting inventory, transfer or buy-sell functions will not be discussed. The linear programming model as developed in this study is presented in Appendix Table XVI. Explanations of activity

TABLE II

REPRESENTATIVE FARM RESOURCE SITUATIONS
SELECTED FOR NORTH CENTRAL OKLAHOMA

	Unit	Resource Situation Clay	Loam	Clay and Loam
Land - Total	Acre	520	560	560
Clay - B	Acre	114.5		43.6
Clay - C	Acre	183.8		69.8
Clay - D	Acre	74.3		28.2
Clay - Native Pasture	Acre	147.4		122.4
Loam - A	Acre		201.1	85.2
Loam - B	Acre		142.1	60.2
Loam - C	Acre		73.1	31.0
Loam - D	Acre		15.3	6.5
Loam - Native Pasture	Acre		128.4	113.1
Labor - Total	Hour	1858	1858	1727
Jan - April	Hour	538	538	495
May - July	Hour	506	506	473
Aug - Sept	Hour	352	352	330
Oct - Dec	Hour	462	462	429
Alfalfa Acreage Limit	Acre	74.5	86.3	64.9
Government Program Information				
Allotments or Bases				
Barley	Acre	47.9	55.8	41.9
Grain Sorghum	Acre	32.1	37.2	27.9
Wheat	Acre	211.9	246.4	184.9
Conserving	Acre	24.0	27.9	20.9
Projected Yields				
Barley	Bu/A	25.0	30.0	25.4
Grain Sorghum	Cwt/A	12.3	15.7	13.8
Wheat	Bu/A	24.8	27.4	27.1

and constraint abbreviations are presented in Appendix Tables XIV and XV. No B vectors are shown with the model. They are partially read from cards and partially computed as a part of the operating system which is developed in Chapter III.

CHAPTER III

DEVELOPMENT OF AN OPERATING SYSTEM

This chapter describes the development and operation of the computer programs which make up the operating system of the area farm management information model. The operating system provides the link between the linear programming model of Chapter II and the potential farm management education program discussed in Chapter IV.

The objectives of this study required a system which would not only solve the linear programming problem developed in Chapter II, but which would also perform the following functions with a minimum of professional and/or clerical staff time:

1. Print the linear programming results for direct consumption by a lay audience.
2. Allow actual or representative farm resource situations to be entered into the right-hand side.
3. Allow revisions to production costs and product prices.
4. Allow revisions to input-output coefficients.
5. Allow crop yields to be adjusted, using coefficients of variation.
6. Allow constraints to be added.
7. Allow activities to be added or deleted.
8. Make revisions in the objective function and right-hand side resulting from inter farm differences in government

program related data.

9. Make revisions in the objective function and right-hand side to reflect different government program participation alternatives.

Alternative Approaches in Design

The alternatives which will be discussed in this section deal with: (1) methods of addressing activities and constraints in core storage of the computer; (2) methods of attaching verbal descriptions when developing output formats; and (3) the amount and nature of interpretation and report printing which should be done by computer.

Two methods of addressing activities and constraints were considered in this study: (1) addressing by location, i.e., the row and/or column numbers of an array; and (2) addressing by a numeric or alphanumeric code associated with each activity or constraint. The first method is relatively rigid, as an activity or constraint added to the body of the linear programming model would displace all of the activities to the right of it, or all of the constraints below it. Consequently, the former addresses of those columns or rows would no longer be correct. The second method is very flexible, as activities and constraints are identified by code, and their location in an array is immaterial. Thus, structural changes may be made in the model without changing the addresses of existing activities or constraints.

Most standard library linear programs use some version of the more flexible alternative. But when the whole area system is considered, additional factors become involved in the ease of adding activities and constraints and, consequently, in the selection of an addressing system.

A conflict develops between the desire for a highly flexible addressing system and the desire for a model which will perform extensive pre-solution revisions and post-solution report printing. Semi-automatic pre-solution revisions and output format procedures discourage the addition of activities and constraints.

There are several reasons why all feasible activities should be included in an area system at the outset, in an effort to minimize the need for making later additions. As noted in Chapter II, the necessity of inventory rows and buy-sell activities associated with production activities makes the addition of activities a cumbersome process. The inclusion of automatic revision procedures, such as an automatic adjustment in harvesting costs as a result of yield revisions, facilitates the revision of existing activities but complicates the process of adding new activities.

If the programming results are to be presented in a form which is easy to interpret, desirable output formats may vary for different types of enterprises. For example, with a stocker steer enterprise, the dates, weights, and prices of purchase and sale, as well as the feeding ration should be grouped in one section of an output summary. However, if a dairy enterprise were to be added, a different output format would be desired to provide a partial summary of that enterprise. It might include annual milk production per cow, butterfat percentage, and milk price, as well as the dairy ration. As a result, it would be extremely desirable to include a dairy enterprise and provisions for its output format in the development of the system. Otherwise, programming revisions would be necessary in the system.

Other examples exist. Thus, the structure of the model, pre-solution revisions and post-solution report printing discourage the addition of new activities. Either system of addressing could be used, but the addressing system which uses codes would require more extensive and complex programming. Also, the main advantage of a flexible system, the ease of adding new activities and constraints, is diminished by including virtually all feasible activities.

Two methods of attaching verbal descriptions when printing reports were considered: (1) read in each description on a header card or as a card image on magnetic tape, which also contains the location or code of the item in the solution which is to be printed; and (2) store activity and constraint descriptions in core, portions or all of which may be used in the verbal portion of a report. The output sequence may be controlled by header cards or instructions on magnetic tape. The amount of verbal description desired and the amount of core storage available may conflict if the latter method is chosen. Multiple usage of a given item in a solution makes the use of activity descriptions difficult. If a mere listing of activity levels were desired, no difficulty would arise. But, for example, a crop activity level may be used in a summary section of a report where all production activities of that crop are grouped, in a detailed section where crop production is analyzed by soil type and crop yield and it also may be used in a section which analyzes that crop's role in government program participation. Thus, a fairly intricate system of activity and constraint descriptions must be devised to satisfy their multiple uses. The first method allows descriptions to be tailored to each section of the report, but the deck of header cards or the tape must be revised if activities or constraints are changed.

The degree of interpretation and refinement in report printing has been touched upon, as it is a factor in the choice of methods of addressing activities and constraints and of methods for attaching verbal descriptions. The desired function of the area system becomes important here. If individual farm linear programming were the prime purpose of the system, and all programming results were interpreted and explained to farmers by an area or state extension specialist, a highly flexible system with little interpretation could be used. But, additional computerized interpretation and report printing would allow the personnel to operate more efficiently and allow farmers to reread the results in the absence of the specialist. Conversely, if it is desired to make repetitive runs of representative farms which may be photographically reproduced for direct consumption by a lay audience, as much interpretation and report printing as possible should be done by computer.

The above are alternatives in technique which may be considered. The purpose of the system, the characteristics of an individual system and the computer which is available are important determinants in choosing among the alternatives.

Design Characteristics of the Operating System

The system desired would allow efficient, repeated runs of representative farms and produce an output that could be read and interpreted by a lay audience. Individual farm linear programming capabilities were also desired.

The location method of addressing activities and constraints was chosen. In an attempt to make this method more flexible, dummy activities were placed at intervals in the linear programming model (see Appendix Table XVI). The dummy activities allow a limited number of activities to be added without causing the existing activities to be relocated. The dummy activities also allow added activities to be placed adjacent to activities of a similar type to expedite summing of activity levels. For example, all crop activities are located in one portion of the model. Total cropland used may be computed by summing all activity levels in that portion.

Dummy constraints would cause infeasible solutions in the simplex subroutine. Thus, row additions must be made at the bottom of the matrix. Activities and constraints dealing with government programs were placed in the right-hand and lower portions of the linear programming model, respectively. They would be the most probable ones to be deleted or added. An additional alternative for adding activities exists. An activity or a set of existing activities may be deleted and replaced with a new activity or set of activities.

The header card method was chosen for attaching verbal descriptions to items in the optimal solution. Each header card contains the verbal description for one line of a computer-printed report and a code which identifies an activity or constraint and any calculations which must be made prior to printing. A minor modification would allow these descriptions to be read from tape in card image form.

The method of building verbal descriptions in the computer-printed reports from activity descriptions was not selected, as it would not have been possible to store the activity descriptions in core storage of the computer. Further, a direct access peripheral storage unit was not available for use in storing activity descriptions.

The guiding philosophy in designing the reports generated by the system was to ignore programming problems and to develop a report format which the author and extension farm management personnel felt that farmers could understand. This was an attempt to write the report for the audience and not let the customary order or characteristics of computer output influence the order or format of the report. Emphasis was placed on simplicity. Only selected information is chosen from the linear programming results for use in the report which is intended for consumption by farmers. The detailed solution, shadow prices, cost ranges and the A, B, and C arrays all may be printed out in addition to the simplified report. This additional information enables qualified persons to glean more detail from a solution than appears in the simplified reports.

Selection of an Optimizing Program

A standard linear programming routine [15] was utilized in developing the linear programming model presented in Chapter II. This routine became limiting, however, when an attempt was made to develop output format procedures and it did not allow the computation of internal revisions to the matrix. The printing of simplified reports with this routine was possible, but it was tedious in comparison to an alternative method. Also, the standard linear programming routine did not enable cost ranges to be used in simplified report formats or the results of parametric price of resource programs to be placed in a simplified format. As a result of these inadequacies and the availability of an alternative routine, the standard programming routine was not used further, except as a periodic check on solutions computed by the alternative routine.

A FORTRAN subroutine which employs the revised simplex method was selected as the optimizing program for use in this study [3] [6, p. 210]. The selection of this subroutine allowed matrix revisions to be computed and the output to be printed in a readily readable form, using the FORTRAN - IV computer language. Cost ranges were not readily available from the subroutine, but they could be computed in the main FORTRAN program using arrays generated by the subroutine.

The computer used for this study is an IBM 7040/44 with 32,768 words of core storage. The peripheral equipment consists of a printer, a reader-punch and seven magnetic tape units.

Prior to discussing the functions of the programs in the operating system, it is necessary to define certain arrays which are referred to repeatedly. The arrays, their dimensions and contents are given below.

Array	Dimension	Contents
A	65 x 170	Input-output coefficients
B	65 x 1	B Vector or right-hand side -- contains constraint values.
ALTB	65 x 1	An alternate B Vector from which B Vectors for individual runs are constructed.
C	170 X 1	C Vector or objective function -- contains costs for each activity.
ALTC	170 x 3	An alternate C, or cost, vector from which C vectors for individual runs are constructed.
COST	80 x 14	Itemized costs for production activities.
YIELD	65 x 9	Coefficients of variation for yields in crop activities.

The Information Loading Program (INFOLD)

The INFOLD program (Appendix Table XVIII) builds the A, ALTC, COST, and YIELD arrays from card input. These arrays plus arrays and variables containing alphanumeric descriptions of constraints and activities, constraint type identifications and the dimensions of the linear programming model are written on a magnetic tape. The remaining programs all use this type to input the above data. After an initial run, the information loading program is subsequently used only when it is desired to revise the arrays on magnetic tape.

The General Purpose Subroutine (FMPLAN)

The FMPLAN subroutine (Appendix Table XIX) satisfies several of the requirements listed at the beginning of this chapter and is used in each of the main programs. A generalized flow chart of this subroutine is presented in Figure 2. Numbered steps in the flow chart are referred to periodically in the description of the subroutine operation.

Prior to calling this subroutine, a card is read in the main program (Step 1) which determines the objective function (IOBJ) and nature of the right-hand side (IRHS) or B vector which are to be used for the run. The allowable values of these variables and their interpretation by the subroutine are as follows:

IOBJ=1	Use the objective function which includes only variable production costs.
IOBJ=2	Use the objective function which includes variable production costs and fixed machinery costs.
IRHS=1	Non-participation in government programs.

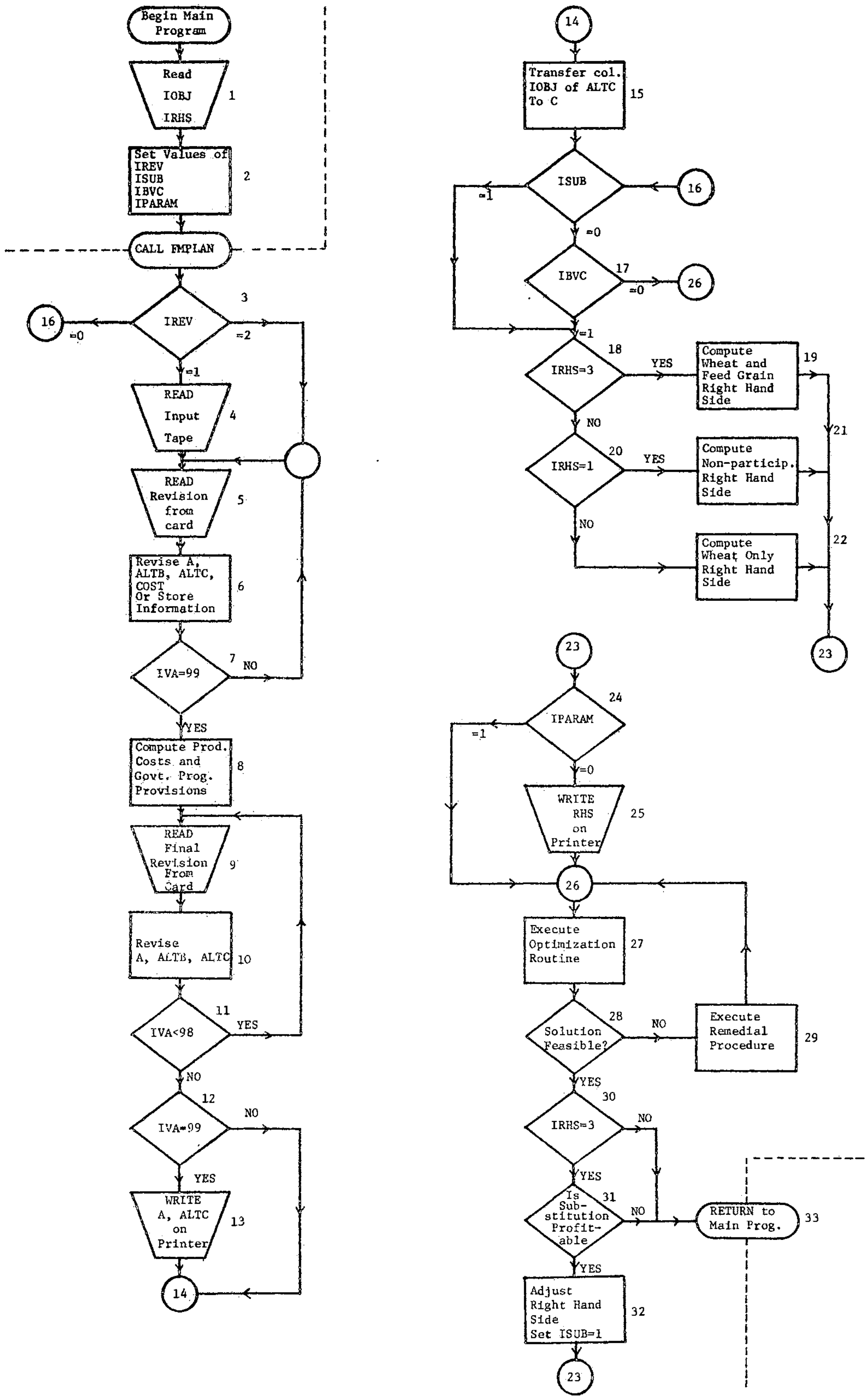

Figure 2. A Generalized Flow Chart of the General Purpose Subroutine

IRHS=2 Participate in the wheat program only.

IRHS=3 Participate in the wheat and feed grain programs. Also, the values of four variables, IREV, IBVC, ISUB, and IPARAM are set before calling the subroutine (Step 2). The interpretation of these variables becomes evident in the description of the subroutine operation.

The Data Revision Routine

If IREV equals zero, the steps described in this section are bypassed. This feature is necessary, as the subroutine may be called repeatedly in a main program such as the parametric price program where matrix revisions are not desired at each solution point. Thus, IREV is set equal to one for the original call and set equal to zero for subsequent calls in the same main program.

If IREV=1, A, ALTC, COST, YIELD and other arrays and variables containing alphanumeric descriptions of constraints and activities, constraint type identifications and the dimensions of the linear programming model are read from magnetic tape (Step 4).

If additional revisions are desired after an initial solution, setting IREV=2 will cause the tape reading step (Step 4) to be bypassed. Thus, the revisions made for the initial solution would not have to be repeated.

A series of cards is then read (Step 5) which revises the A, ALTC, and COST arrays, builds the ALTB vector and provides necessary information relating to government programs (Step 6). The variables read on each card are: IVA, I, J, K, VALUE (1), VALUE (2), and VALUE (3). Variable IVA is used as an indicator to determine the use of the other variables on the card. The last 40 columns of each card are used for an optional verbal description of the revision. The various types of revisions which are possible, the variables necessary to execute them and the card format are summarized in Table III. The title of the run, the revision cards and the optional descriptions are listed at the beginning of each run so that the revisions may be verified easily on the printed output (Table IV). The revisions should be made in order, by the IVA code, as certain revisions destroy information needed in order to make other revisions, override previous revisions, or require information furnished in prior revisions.

Certain of the revision cards must appear in each run, as the B vector is built from data fed into the subroutine at this point. These cards are indicated by a footnote in Table III. Cards with IVA=9 are also required if participation in government programs is desired (IRHS=2 or 3). Following is a more detailed description of the revision options which are possible in steps five through fifteen of this subroutine.

Revisions and Inputs to A, ALTB, and ALTC. Individual input-output coefficients may be replaced in A and costs may be replaced in ALTC. No B vector or right-hand side is read from tape. The values for the physical restrictions and certain government program information must be read from cards on which IVA=2.

Production Cost Computations. When using the model for individual farm linear programming, or for certain experimental runs with representative farms, revisions in crop and livestock production costs are often necessary. Crop yield revisions may cause a change in

TABLE III

THE USER-CONTROLLED FUNCTIONS OF THE GENERAL PURPOSE SUBROUTINE, THE VARIABLES NECESSARY TO EXECUTE THEM AND THE CARD FORMAT

Col. 1-2 IVA	Col. 3-4 I	Col. 5-7 J	Col. 8-10 K	Col. 11-20 VALUE(1)	Col. 21-30 VALUE(2)	Col. 31-40 VALUE(3)	Function
1	x[a]	x		x			Place VALUE(1) in row I and Col. J of 'A'
2[b]	x			x			Place VALUE(1) in row I of 'ALTB'
3	x	x	x[c]	x			Place VALUE(1) in row J and Col. I of 'ALTC' If $K \neq 0$, place VALUE(1) in row J and Col. K of 'ALTC'
4	x	x	x[c]	x[d]	x[d]		If $VALUE(1) \neq 0$, place it in row J and the Col. of 'COST' corresponding to the ti code[e] in I. If $VALUE(2) \neq 0$, the corresponding elements of 'COST' are scaled by a factor of VALUE(2) If $K \neq 0$, rows J through K are adjusted in the above manner, instead of row J only
5[f]				x	x	x	Place VALUE(i) in COMB(i), where i=1,2,3. This is the custom combine rate; VALUE(1)/acre + VALUE(2)/bu. over VALUE(3) bu./acre.
6[g]				x			Place VALUE(1) in COMB(4). This is the custom grain hauling rate per bushel
7[h]				x	x		Place VALUE(i) in BALE(i), where i=1,2. This is the custom rate for baling and hauling hay per ton
8	x	x	x	x			Adjust the crop yield in inventory row I of 'A', from columns J through K the number of standard deviations and the direction specified in VALUE(1)
9		x		x	x	x	Place VALUE(i) in GOV(i,J), where i=1,2,3 J=1 implies projected yields for barley, gr. sorg. and wheat J=2 implies Co. loan rates for barley, gr. sorg. and wheat

10		x	x[c]	Delete columns (activities) J through K of 'A' If K=0, only delete Col. J
11	x			Add a row (constraint). The name of this row is in Col. 41-44 of this card I=the new number of rows in 'A', 'ALTB' and 'B'
12		x	x[c]	Add a column (activity). The name of this column is in Col. 41-44 of this card J=the number of the added column If this column is to be added to the right side of 'A', set K $\neq$ 0, then J= the new number of columns in 'A'
13	x	x	x	Move rows I through K and columns 1-65 of 'A' to 'YIELD', starting in Col. J, after zeroing 'YIELD'
14				Convert yields in Col. I of 'YIELD' from cwt. to bu.
99[b]				End of deck

[a]x's indicate non-zero fields.

[b]These cards must be included in each run.

[c]Optional.

[d]The card should contain only one of these elements.

[e]The ti code is a portion of the coding system used in the Computerized Oklahoma State Farm Income and Detailed Enterprise Record System, Ag. Econ. Dept., Oklahoma State University.

[f]If this card is not included, a custom combine rate of $3.50 per acre plus $.05 per bushel over 20 bu./acre is assumed.

[g]If this card is not included, a custom grain hauling rate of $.05 per bushel is assumed.

[h]If this card is not included, custom hay baling and hauling rates of $4.80 and $2.70 per ton, respectively, are assumed.

TABLE IV

A SAMPLE LISTING OF INPUT INFORMATION FOR THE GENERAL PURPOSE SUBROUTINE

560 ACRE NORTH CENTRAL OKLAHOMA CLAY AND LOAM FARM

RHS ELEMENTS, COST REVISIONS AND'A'MATRIX REVISIONS

IVA	I	J	K	VALUE(1)	VALUE(2)	VALUE(3)	
2	2	-0	-0	43.6000	-0.0000	-0.0000	ACRES OF CB LAND
2	3	-0	-0	69.8000	-0.0000	-0.0000	ACRES OF CC LAND
2	4	-0	-0	28.2000	-0.0000	-0.0000	ACRES OF CD LAND
2	5	-0	-0	122.4000	-0.0000	-0.0000	ACRES OF CP LAND
2	6	-0	-0	85.2000	-0.0000	-0.0000	ACRES OF LA LAND
2	7	-0	-0	60.2000	-0.0000	-0.0000	ACRES OF LB LAND
2	8	-0	-0	31.0000	-0.0000	-0.0000	ACRES OF LC LAND
2	9	-0	-0	6.5000	-0.0000	-0.0000	ACRES OF LD LAND
2	10	-0	-0	113.1000	-0.0000	-0.0000	ACRES OF LP LAND
2	12	-0	-0	495.0000	-0.0000	-0.0000	HOURS OF JAN-APR LABOR
2	13	-0	-0	473.0000	-0.0000	-0.0000	HOURS OF MAY-JUL LABOR
2	14	-0	-0	330.0000	-0.0000	-0.0000	HOURS OF AUG-SEP LABOR
2	15	-0	-0	429.0000	-0.0000	-0.0000	HOURS OF OCT-DEC LABOR
2	11	-0	-0	64.9000	-0.0000	-0.0000	ALFALFA ACREAGE LIMIT
2	37	-0	-0	41.9000	-0.0000	-0.0000	BARLEY BASE
2	38	-0	-0	27.9000	-0.0000	-0.0000	GRAIN SORGHUM BASE
2	39	-0	-0	184.9000	-0.0000	-0.0000	WHEAT ALLOTMENT
2	40	-0	-0	20.9000	-0.0000	-0.0000	CONSERVING BASE
3	1	81	2	-0.8500	-0.0000	-0.0000	REVISE BARLEY PRICE
3	1	82	2	-1.6500	-0.0000	-0.0000	REVISE GRAIN SORGHUM PRICE
3	1	83	2	-1.2000	-0.0000	-0.0000	REVISE WHEAT PRICE
3	1	90	2	-27.0000	-0.0000	-0.0000	REVISE OCT STEER PRICE
3	1	91	2	-25.0000	-0.0000	-0.0000	REVISE OCT HEIFER PRICE
3	1	92	2	-13.0000	-0.0000	-0.0000	REVISE JUN COW PRICE
3	1	93	2	-28.3000	-0.0000	-0.0000	REVISE JUL STEER PRICE
3	1	94	2	-26.3000	-0.0000	-0.0000	REVISE JUL HEIFER PRICE
3	1	95	2	-14.0000	-0.0000	-0.0000	REVISE JAN COW PRICE
3	1	96	2	27.0000	-0.0000	-0.0000	REVISE OCT STEER BUYING PRICE
3	1	97	2	-25.0000	-0.0000	-0.0000	REVISE MAR STEER PRICE
3	1	98	2	-25.0000	-0.0000	-0.0000	REVISE MAY STEER PRICE
3	1	99	2	-24.0000	-0.0000	-0.0000	REVISE OCT STEER PRICE
9	-0	1	-0	25.3800	13.8000	27.1000	PROJECTED YLDS--BARL,SORG,WHEAT
9	-0	2	-0	0.8000	1.6100	1.2500	LOAN RATES --BARL,SORG,WHEAT
13	18	1	22	-0.0000	-0.0000	-0.0000	PLACE ROWS 18-22 IN 'YIELD'
14	2	-0	-0	-0.0000	-0.0000	-0.0000	CONVERT GR SORG YIELDS TO BU.
99	-0	-0	-0	-0.0000	-0.0000	-0.0000	

harvesting costs. Machinery, fertilizer, or seed costs may also require revision. In the linear programming model, these and certain other costs are usually summed and placed in the objective function. If one individual cost item is changed, the adjustment is typically made by adjusting the total figure in the objective function.

This subroutine reads in an array (COST) in which the variable costs for each production activity are listed in nine categories. These expense categories have been assigned TI codes from the computerized farm record system at Oklahoma State University. Cost revision may be made by TI code number and activity when IVA=4.

As indicated in Table III, a revised cost may be placed directly in the array for a specified activity or set of activities. Also, a given cost may be adjusted by a constant factor for an activity, or set of activities. The latter feature is useful when it is desired to adjust all costs of a certain category by a constant factor. An example would be a five per cent increase in machinery operating costs. This could be accomplished for all or part of the production activities by inserting one card in the revision deck.

The array COST is fourteen columns wide and eighty rows long (Table V). The columns correspond to cost categories while the rows correspond to production activities. The first ten columns are occupied by the cost categories previously mentioned. Machine hire occupies two columns, one for grain crops and the other for hay crops. The eleventh column is blank and may be used for additional costs which may not fall into one of the nine categories. It may also be useful in cases where it is desired to add some constant to the cost of an activity or set of activities. A TI code of 00 corresponds to this column.

TABLE V

DETAILED PRODUCTION ACTIVITY COSTS AS PRINTED BY THE GENERAL PURPOSE SUBROUTINE

DETAILED PRODUCTION ACTIVITY COSTS

TI CODE	44	45	46	47 MACHINE HIRE		50	51	42+52	54	58	00			
ACTIVITY	FEED	SEED	FERT-LIME	COMBINE $ 3.50/A + $.05/BU OVER20.BU HAUL $0.05/BU	BALE $ 4.80/T HAUL $ 2.70/T	MISC. OPER. EXPENSE	VET-MED	MACHY OPER. EXPENSE	TAXES (LVSTK ONLY)	FRT. AND MKTG.	-----	TOTAL VARIABLE PRODUCTN COST	FIXED MACHINERY COST	TOTAL
1 71.CBA	-0.00	2.25	7.49	5.70	0.00	-0.00	-0.00	2.75	-0.00	-0.00	0.00	18.19	2.48	20.67
2 71.CCA	-0.00	2.25	7.49	5.00	0.00	-0.00	-0.00	2.75	-0.00	-0.00	0.00	17.49	2.48	19.97
3 71.CDA	-0.00	2.25	7.49	4.50	0.00	-0.00	-0.00	2.75	-0.00	-0.00	0.00	16.99	2.48	19.47
4 71.LAA	-0.00	2.25	7.49	5.90	0.00	-0.00	-0.00	2.75	-0.00	-0.00	0.00	18.39	2.48	20.87
5 71.LBA	-0.00	2.25	7.49	5.50	0.00	-0.00	-0.00	2.75	-0.00	-0.00	0.00	17.99	2.48	20.47
6 71.LCA	-0.00	2.25	7.49	5.10	0.00	-0.00	-0.00	2.75	-0.00	-0.00	0.00	17.59	2.48	20.07
7 71.LDA	-0.00	2.25	7.49	4.70	0.00	-0.00	-0.00	2.75	-0.00	-0.00	0.00	17.19	2.48	19.67
8 73.CBA	-0.00	1.00	5.50	5.50	0.00	-0.00	-0.00	2.63	-0.00	-0.00	0.00	14.63	2.36	16.99
9 73.CCA	-0.00	1.00	5.50	4.70	0.00	-0.00	-0.00	2.63	-0.00	-0.00	0.00	13.83	2.36	16.19
10 73.CDA	-0.00	1.00	5.50	4.30	0.00	-0.00	-0.00	2.63	-0.00	-0.00	0.00	13.43	2.36	15.79
11 73.LAA	-0.00	1.00	1.98	5.70	0.00	-0.00	-0.00	2.63	-0.00	-0.00	0.00	11.31	2.36	13.67
12 73.LBA	-0.00	1.00	1.98	5.30	0.00	-0.00	-0.00	2.63	-0.00	-0.00	0.00	10.91	2.36	13.27
13 73.LCA	-0.00	1.00	1.98	4.90	0.00	-0.00	-0.00	2.63	-0.00	-0.00	0.00	10.51	2.36	12.87
14 73.LDA	-0.00	1.00	1.98	4.45	0.00	-0.00	-0.00	2.63	-0.00	-0.00	0.00	10.06	2.36	12.42
15 76.CBA	-0.00	2.25	7.49	5.30	0.00	-0.00	-0.00	2.75	-0.00	-0.00	0.00	17.79	2.48	20.27
16 76.CCA	-0.00	2.25	7.49	4.60	0.00	-0.00	-0.00	2.75	-0.00	-0.00	0.00	17.09	2.48	19.57
17 76.CDA	-0.00	2.25	7.49	4.30	0.00	-0.00	-0.00	2.75	-0.00	-0.00	0.00	16.79	2.48	19.27
18 76.LAA	-0.00	1.87	7.49	5.30	0.00	-0.00	-0.00	2.75	-0.00	-0.00	0.00	17.41	2.48	19.89
19 76.LBA	-0.00	1.87	7.49	5.00	0.00	-0.00	-0.00	2.75	-0.00	-0.00	0.00	17.11	2.48	19.59
20 76.LCA	-0.00	1.87	7.49	4.70	0.00	-0.00	-0.00	2.75	-0.00	-0.00	0.00	16.81	2.48	19.29
21 76.LDA	-0.00	1.87	7.49	4.40	0.00	-0.00	-0.00	2.75	-0.00	-0.00	0.00	16.51	2.48	18.99
22 803CBA	-0.00	2.40	7.48	0.00	19.50	-0.00	-0.00	3.90	-0.00	-0.00	0.00	33.28	3.12	36.40
23 803CCA	-0.00	2.40	7.48	0.00	15.00	-0.00	-0.00	3.90	-0.00	-0.00	0.00	28.78	3.12	31.90
24 803CDA	-0.00	2.40	7.48	0.00	12.00	-0.00	-0.00	3.90	-0.00	-0.00	0.00	25.78	3.12	28.90
25 803LAA	-0.00	2.40	3.96	0.00	22.50	-0.00	-0.00	3.90	-0.00	-0.00	0.00	32.76	3.12	35.88
26 803LBA	-0.00	2.40	3.96	0.00	19.50	-0.00	-0.00	3.90	-0.00	-0.00	0.00	29.76	3.12	32.88
27 803LCA	-0.00	2.40	3.96	0.00	16.50	-0.00	-0.00	3.90	-0.00	-0.00	0.00	26.76	3.12	29.88
28 803LDA	-0.00	2.40	3.96	0.00	13.50	-0.00	-0.00	3.90	-0.00	-0.00	0.00	23.76	3.12	26.88
29 81.CBA	-0.00	2.50	4.37	0.00	18.75	-0.00	-0.00	6.39	-0.00	-0.00	0.00	32.01	4.34	36.35
30 81.CCA	-0.00	2.50	4.37	0.00	15.00	-0.00	-0.00	6.39	-0.00	-0.00	0.00	28.26	4.34	32.60
31 81.LAA	-0.00	2.50	2.66	0.00	19.50	-0.00	-0.00	6.39	-0.00	-0.00	0.00	31.05	4.34	35.39
32 81.LBA	-0.00	2.50	2.66	0.00	18.00	-0.00	-0.00	6.39	-0.00	-0.00	0.00	29.55	4.34	33.89
33 81.LCA	-0.00	2.50	2.66	0.00	16.50	-0.00	-0.00	6.39	-0.00	-0.00	0.00	28.05	4.34	32.39

34	800CBA	-0.00	2.25	7.49	0.00	0.00	-0.00	-0.00	2.75	-0.00	-0.00	0.00	12.49	2.48	14.97
35	800CCA	-0.00	2.25	7.49	0.00	0.00	-0.00	-0.00	2.75	-0.00	-0.00	0.00	12.49	2.48	14.97
36	800CDA	-0.00	2.25	7.49	0.00	0.00	-0.00	-0.00	2.75	-0.00	-0.00	0.00	12.49	2.48	14.97
37	800LAA	-0.00	2.25	7.49	0.00	0.00	-0.00	-0.00	2.75	-0.00	-0.00	0.00	12.49	2.48	14.97
38	800LBA	-0.00	2.25	7.49	0.00	0.00	-0.00	-0.00	2.75	-0.00	-0.00	0.00	12.49	2.48	14.97
39	800LCA	-0.00	2.25	7.49	0.00	0.00	-0.00	-0.00	2.75	-0.00	-0.00	0.00	12.49	2.48	14.97
40	800LDA	-0.00	2.25	7.49	0.00	0.00	-0.00	-0.00	2.75	-0.00	-0.00	0.00	12.49	2.48	14.97
41	85.CBA	-0.00	5.00	4.78	0.00	0.00	-0.00	-0.00	2.10	-0.00	-0.00	0.00	11.88	1.91	13.79
42	85.CCA	-0.00	5.00	4.78	0.00	0.00	-0.00	-0.00	2.10	-0.00	-0.00	0.00	11.88	1.91	13.79
43	85.CDA	-0.00	5.00	4.78	0.00	0.00	-0.00	-0.00	2.10	-0.00	-0.00	0.00	11.88	1.91	13.79
44	85.LAA	-0.00	5.00	3.96	0.00	0.00	-0.00	-0.00	2.10	-0.00	-0.00	0.00	11.06	1.91	12.97
45	85.LBA	-0.00	5.00	3.96	0.00	0.00	-0.00	-0.00	2.10	-0.00	-0.00	0.00	11.06	1.91	12.97
46	85.LCA	-0.00	5.00	3.96	0.00	0.00	-0.00	-0.00	2.10	-0.00	-0.00	0.00	11.06	1.91	12.97
47	85.LDA	-0.00	5.00	3.96	0.00	0.00	-0.00	-0.00	2.10	-0.00	-0.00	0.00	11.06	1.91	12.97
48	85WCBA	-0.00	5.00	4.78	0.00	0.00	-0.00	-0.00	2.10	-0.00	-0.00	0.00	11.88	1.91	13.79
49	85WCCA	-0.00	5.00	4.78	0.00	0.00	-0.00	-0.00	2.10	-0.00	-0.00	0.00	11.88	1.91	13.79
50	85WCDA	-0.00	5.00	4.78	0.00	0.00	-0.00	-0.00	2.10	-0.00	-0.00	0.00	11.88	1.91	13.79
51	85WLAA	-0.00	5.00	3.96	0.00	0.00	-0.00	-0.00	2.10	-0.00	-0.00	0.00	11.06	1.91	12.97
52	85WLBA	-0.00	5.00	3.96	0.00	0.00	-0.00	-0.00	2.10	-0.00	-0.00	0.00	11.06	1.91	12.97
53	85WLCA	-0.00	5.00	3.96	0.00	0.00	-0.00	-0.00	2.10	-0.00	-0.00	0.00	11.06	1.91	12.97
54	85WLDA	-0.00	5.00	3.96	0.00	0.00	-0.00	-0.00	2.10	-0.00	-0.00	0.00	11.06	1.91	12.97
55	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
56	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
57	3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
58	4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
59	5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
60	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
61	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
62	8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
63	60FALL	-0.00	-0.00	-0.00	0.00	0.00	-0.00	-0.00	2.00	-0.00	-0.00	0.00	2.00	-0.00	2.00
64	86.C1A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
65	86.L1A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
66	111RTA	9.91	-0.00	-0.00	0.00	0.00	1.40	3.36	-0.00	2.09	1.84	0.00	18.60	-0.00	18.60
67	112RTA	9.91	-0.00	-0.00	0.00	0.00	1.40	3.36	-0.00	2.09	1.84	0.00	18.60	-0.00	18.60
68	113RTA	5.11	-0.00	-0.00	0.00	0.00	1.40	3.36	-0.00	2.09	1.84	0.00	13.80	-0.00	13.80
69	111VLA	5.11	-0.00	-0.00	0.00	0.00	1.40	3.36	-0.00	2.56	1.79	0.00	14.22	-0.00	14.22
70	141TTA	8.71	-0.00	-0.00	0.00	0.00	-0.00	2.20	-0.00	1.74	4.90	0.00	17.55	-0.00	17.55
71	142TTA	8.71	-0.00	-0.00	0.00	0.00	-0.00	2.20	-0.00	1.74	4.90	0.00	17.55	-0.00	17.55
72	143TTA	8.71	-0.00	-0.00	0.00	0.00	-0.00	2.20	-0.00	1.74	4.90	0.00	17.55	-0.00	17.55
73	144TYA	1.53	-0.00	-0.00	0.00	0.00	-0.00	1.45	-0.00	1.81	4.66	0.00	9.45	-0.00	9.45
74	145TYA	1.53	-0.00	-0.00	0.00	0.00	-0.00	1.45	-0.00	1.81	4.66	0.00	9.45	-0.00	9.45
75	146TRA	0.98	-0.00	-0.00	0.00	0.00	-0.00	1.25	-0.00	1.78	4.20	0.00	8.21	-0.00	8.21
76	147TRA	7.67	-0.00	-0.00	0.00	0.00	-0.00	1.25	-0.00	1.78	4.20	0.00	14.90	-0.00	14.90
77	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
78	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
79	3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
80	4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

When COST is read from tape, it contains the production costs as derived from circulars P-550 and P-459 [5] [11], with the exception of machine hire expenses. If no revisions are specified, the costs will be used as read from the tape.

Machine hire, or custom rates, are read from cards with IVA equal to 5, 6, or 7. The combine rate is given in terms of a rate per acre plus a rate per bushel, over some minimum yield per acre. Grain hauling, hay baling, and hay hauling rates may also be specified. If custom rates are not specified in the revision deck, rates which are indicated in circular P-550 [5] are used. The custom rates are then applied to crop yields, which may or may not have been revised. Machine hire expenses are computed and placed in the appropriate columns of COST. This feature allows harvest costs to be adjusted automatically if crop yields are revised. The first eleven columns of COST are summed and these sums are placed in column twelve. Column twelve now contains the variable production costs per unit of activity. These costs are then moved to the corresponding activity locations in column 1 of ALTC. Fixed machinery costs are located in column 13 of COST and are also read from the input tape. These fixed costs may also be revised by letting I equal 13 in a COST revision card. The fixed machinery costs are added to the variable costs in column 12 and this total is placed in column 14. The total costs in this column are moved to column 2 of ALTC.

The above computations are made after the last revision card is read (Step 8). Thus, the computed costs for production activities would override any earlier attempt to directly revise production activity costs in ALTC. As will be noted later, an opportunity for final revisions will occur.

Crop Yield Variation. Crop yield variation is a prominent consideration when determining farm plans in north central Oklahoma. Consequently, the ability to revise yields easily was a prominent consideration when designing the system. Yield revisions may be desired in order to reflect moisture outlook for a given season or they may be made for experimental purposes in order to determine the effect of yield changes on farm organization and income. Such experimentation could yield an estimate of the cost of a wrong decision. One might estimate the loss in income due to organization which could result if a farm plan were made on the basis of average yields and below average yields actually occurred. Two methods of adjusting crop yields are possible in this subroutine. First, individual yields may be set at specified levels by making revisions to A on cards with IVA=1. Second, yields may be adjusted any number of standard deviations by using a revision card with IVA=8. The inventory row that contains yields which are to be adjusted, the beginning and ending activity and the sign and number of standard deviations are specified on the revision card. A separate card is necessary for each inventory row. The coefficients of variation used in this routine and the suggested grouping of crops whose yields should be varied together were presented in Chapter II.

Government Program Related Computations. Barley and grain sorghum bases, the wheat allotment and conserving base are entered into ALTB on cards with IVA=2. Projected yields and loan rates are entered on cards with IVA=9. After the last card of the revision deck has been read, several computations relating to government programs are made (Step 8).

In ALTB, the minimum acreage diversion and additional acreage diversion limits are computed. Limits on the amount of production of given crops which are eligible for price support or certificate payments are also computed. In ALTC, the amounts for additional diversion, price support and certificate payments are computed. As with production costs, these computed amounts override previous revisions to ALTC for these activities.

Addition or Deletion of Activities and Constraints. A card in which IVA=10 indicates an activity or group of activities to be deleted.

A card in which IVA=11 adds a constraint by adjusting the dimensions of A, ALTB, and B and assigns a name to the added row. Coefficients in this row must be added separately as revisions to A (IVA=1) and ALTB (IVA=2). Up to five rows may be added. More than five may be added by redimensioning the FORTRAN source program.

Similarly, activities may be added using a card on which IVA=12. But, since several blank columns exist in A, activities may be added without adjusting the dimensions of A, ALTC, and C. If, however, it becomes necessary to add activities to the right side of A, K is set at some positive number, and the new columnar dimension of A must be given in J. Twenty-two activities may be added without changing the dimensions of A. Three activities may be added to the right side of A. Again, more may be added by redimensioning the FORTRAN source program. As indicated in an earlier section of this chapter, activities to be added should be placed adjacent to similar activities. Crop production activities should be contained in columns 1 through 65 of A and livestock production activities should be contained in columns 66 through 80. These restrictions are necessary if the production costs are to be computed as described earlier.

Miscellaneous Functions. A card in which IVA equals 13 causes YIELD to be zeroed. This array formerly contained the coefficients of variation for crop yields. Crop yields from specified rows of A are moved into YIELD for later use in machine hire computations. Since grain sorghum yields, or yields of other crops, may be hundredweight, a card with IVA equal to 14 names a column of YIELD in which the yields must be converted to bushels prior to machine hire computations. Custom combining and hauling rates are in terms of bushels only.

Finally, a card with IVA equal to 99 signals the end of the revision deck, and the various computations mentioned above are executed.

Final Revisions (Steps 9-10). The user of the system is given an opportunity to make final revisions to A, ALTB, and ALTC before the optimizing routine is executed. These revisions override any previous revisions or computed values in these arrays. This feature is desirable for experimental purposes and for individual farm runs. For example, the additional wheat diversion limit is automatically computed as fifty per cent of the wheat allotment. But, in some cases the user may wish to explore the result of limiting the amount of additional diversion to thirty per cent of the wheat allotment. In this case, the desired numeric limit would be computed by the user and placed in the appropriate row of ALTB. In other instances, the user may wish to place costs on certain activities which would be different from the computed ones.

A card with IVA equal to 98 or 99 signals the end of this second possible revision deck (Step 11). This card is necessary even if no final revisions are desired. If IVA equals 99, the A and ALTC arrays are printed (Steps 12-13). If IVA equals 98, the arrays are not printed.

Subsequently, the costs in the column of ALTC corresponding to the value of IOBJ specified by the user are transferred to C (Step 15).

Construction of a Right-Hand Side

As stated at the beginning of the discussion of the FMPLAN subroutine, if IREV=0, no revisions will be made. Thus, the subroutine operations described up to this point would be bypassed. The option of bypassing the revisions is used when repeated solutions are required, but only right-hand side changes or a single price change is made after the initial solution is reached.

When execution of the FMPLAN subroutine reaches this point (Step 16), either after making revisions or after bypassing them, the value of ISUB is checked. If ISUB=1, this indicates that the B vector, or right-hand side, was altered by substitutions between the feed grain and wheat bases on a previous run, and that the B vector must be reconstructed (Steps 18-23) as it was originally, before the substitutions.

Alternatively, if ISUB=0, IBVC is then checked (Step 17). If IBVC=1, this indicates an initial run and it is necessary to construct a B vector. IBVO=0 indicates a repetitive run and it is not necessary to construct a B vector.

If construction of a B vector is required, it is built from ALTB in accordance with the government farm program participation alternative specified by the user in his choice of a value for IRHS (Steps 18-23).

After the B vector construction is completed or bypassed, IPARAM is checked (Step 24). If IPARAM=1, a parametric price program is indicated and no B vectors are printed. If IPARAM=0, a B vector is printed (Step 25) each time one is constructed or changed to accommodate substitutions.

Execution of the Optimizing Subroutine and Subsequent Checks on the Solution

The optimizing subroutine is executed (Step 27). When an optimal solution is determined, the FMPLAN subroutine checks the solution for infeasibility (Step 28). If the solution is infeasible, remedial measures are applied automatically (Step 29) and the optimizing subroutine is executed again (Step 27). If the solution remains infeasible after three such cycles the FMPLAN subroutine is terminated. Infeasible solutions occur rather infrequently, thus this remedial process is not usually activated.

When a feasible solution results from the optimizing routine, and if IRHS=1 or 2 (Step 30), the subroutine is terminated (Step 33). IRHS=3 (Step 30), indicates participation in the government wheat and feed grain programs and a check must be made to determine if substitution between bases is profitable (Step 31). If any type of substitution is profitable, revisions are made to B, and ISUB is set equal to 1 (Step 32). The optimizing routine is then executed again (Step 27). The resulting solution is again checked for infeasibility and the profitability of other substitutions. When a feasible optimum solution is achieved and no further substitutions are profitable, the subroutine is terminated (Step 33). Upon termination of the subroutine, control returns to the main program which uses the optimum solution in developing a report.

The Individual Farm Data Form

The individual farm data form provides a systematic guide for gathering the data required to linear program an actual or representative farm. These data are, of course, the data required for the FMPLAN subroutine. The data form, as presented in Table VI, has been precoded on pages 1 through 3. The revision deck for the FMPLAN subroutine is punched directly onto cards from the form.

This form may be thought of as having four "stages". Page 1 comprises the first "stage" of the form. This page, with the exception of the interest rate and wage rates must be completed. But, this is the extent of the mandatory items on the form. A farm can be linearly programmed with only the information presented on page 1.

The completion of further items or "stages", on the form is optional. They allow the data bank information to be revised to fit an individual situation more closely. Page 2, "Stage" two, lists the crop and livestock enterprises in the data bank, with reference to their data sources. Enterprises which are to be deleted are merely crossed out. Page 3, "Stage" three, allows the user to specify crop and livestock prices and custom rates if those in the data bank do not fit an individual situation.

Page 4 of the form, "Stage" four, provides space for the user to list additional revisions. In order to make these additional revisions,

TABLE VI

THE INDIVIDUAL FARM DATA FORM

TITLE:

	UNIT	CODE IVA	I	J	K	VALUE( )	AMOUNT
LAND							
CLAY-B	ACRE	2	2			1	___.___
CLAY-C	ACRE	2	3			1	___.___
CLAY-D	ACRE	2	4			1	___.___
CLAY-NATIVE PASTURE	ACRE	2	5			1	___.___
LOAM-A	ACRE	2	6			1	___.___
LOAM-B	ACRE	2	7			1	___.___
LOAM-C	ACRE	2	8			1	___.___
LOAM C	ACRE	2	9			1	___.___
LOAM-NATIVE PATURE	ACRE	2	10			1	___.___
LABOR							
OPERATOR AND FAMILY LABOR AVAILABLE							
JAN-APR	HOUR	2	12			1	___.___
MAY-JUL	HOUR	2	13			1	___.___
AUG-SEP	HOUR	2	14			1	___.___
OCT-DEC	HOUR	2	15			1	___.___
HIRED LABOR (CROSS OUT LINES WHICH DO NOT APPLY)							
JAN-APR YES--Give wage rate per hour		3	1	103	2	1	___.___
NO--		10		103			XXXXXX
MAY-JUL YES--Give wage rate per hour		3	1	104	2	1	___.___
NO--		10		104			XXXXXX
AUG-SEP YES--Give wage rate per hour		3	1	105	2	1	___.___
NO--		10		105			XXXXXX
OCT-DEC YES--Give wage rate per hour		3	1	106	2	1	___.___
NO--		10		106			XXXXXX
CAPITAL							
AVAILABLE (INTEREST FREE)	DOLLAR	2	16			1	___.___
SHORT-TERM INTEREST RATE	DOLLAR	3	1	110	2	1	___.___
ALFALFA ACREAGE LIMIT	ACRE	2	11			1	___.___
GOVERNMENT PROGRAM INFORMATION							
BARLEY BASE	ACRE	2	37			1	___.___
GRAIN SORGHUM BASE	ACRE	2	38			1	___.___
WHEAT ALLOTMENT	ACRE	2	39			1	___.___
CONSERVING BASE	ACRE	2	40			1	___.___
PROJECT YIELDS							
BARLEY	ACRE	9		1		1	___.___
GRAIN SORGHUM	ACRE	9		1		2	___.___
WHEAT	ACRE	9		1		3	___.___
LOAN RATES							
BARLEY	ACRE	9		2		1	___.___
GRAIN SORGHUM	ACRE	9		2		2	___.___
WHEAT	ACRE	9		2		3	___.___

TABLE VI (Continued)

LIVESTOCK ENTERPRISES (CROSS OUT THOSE NOT TO BE CONSIDERED)

	RATION[1]	REFERENCE[2] (Page of P-459)	CODE IVA	I	J	K
COW-CALF, SPRING CALVING	1	32	10		66	
COW-CALF, SPRING CALVING	1,2	34	10		67	
COW-CALF, SPRING CALVING	1,2,3	35	10		68	
COW-CALF, FALL CALVING	1,2,3,5	36	10		69	
STOCKERS, BUY OCT-SELL OCT	1	24	10		70	
STOCKERS, BUY OCT-SELL OCT	1,2	25	10		71	
STOCKERS, BUY OCT-SELL OCT	1,5	26	10		72	
STOCKERS, BUY OCT-SELL MAY	1,2,3,4	28	10		73	
STOCKERS, BUY OCT-SELL MAY	1,2,3,4,5	29	10		74	
STOCKERS, BUY OCT-SELL MAR	1,2,3	30	10		75	
STOCKERS, BUY OCT-SELL MAR	1,2,5	31	10		76	

[1]Native Pasture-1; forage sorghum or prairie hay-2; Small grain pasture Oct-Mar 3; Small grain pasture Mar-May 4; Sorghum or alfalfa stubble-5.

[2]Oklahoma State University Processed Series P-459, July, 1963.

CROP ENTERPRISES (CROSS OUT THOSE NOT TO BE CONSIDERED)

	REFERENCE[1] (Page of P-550)	CODE IVA	I	J	K
BARLEY	6,15	10		1	7
GRAIN SORGHUM	9,18	10		8	14
WHEAT	5,14	10		15	21
FORAGE SORGHUM	10,19	10		22	28
ALFALFA	8,17	10		29	33
WHEAT PASTURE-GRAZE OUT BY MAY 1	11,20	10		34	40
SUDAN PASTURE	13,22	10		41	47
SUDAN FOR WINTER GRAZING	13,22	10		48	54

ALLOW "WHEAT-GRAZE OUT BY MAY 1" TO SATISFY DIVERTED ACRES REQUIREMENT? Yes /__/ No /__/ (10 0 121 0)

[1]Oklahoma State University Processed Series P-550, Oct., 1966.

TABLE VI (Continued)

PRICES TO BE USED[1]

CROPS	TRANSACTION	TIME	UNIT	CODE IVA	I	J	K	VALUE( )	
BARLEY	SELL		BU	3	1	81	2	1	___.___
GRAIN SORGHUM	SELL		CWT	3	1	82	2	1	___.___
WHEAT	SELL		BU	3	1	83	2	1	___.___
WHEAT PASTURE	SELL	OCT-MAR	AUM	3	1	85	2	1	___.___
WHEAT PASTURE	SELL	OCT-MAY	AUM	3	1	84	2	1	___.___
ALFALFA HAY	SELL		TON	3	1	86	2	1	___.___
PRAIRIE HAY	BUY		TON	3	1	87	2	1	___.___
LIVESTOCK									
COW-CALF SYSTEMS									
SPRING CALVING									
STEERS-485 lbs	SELL	OCT	CWT	3	1	90	2	1	___.___
HEIFERS-460 lbs	SELL	OCT	CWT	3	1	91	2	1	___.___
CUL COWS	SELL		CWT	3	1	92	2	1	___.___
FALL CALVING									
STEERS-500 lbs	SELL	JUL	CWT	3	1	93	2	1	___.___
HEIFERS-460 lbs	SELL	JUL	CWT	3	1	94	2	1	___.___
CUL COWS	SELL		CWT	3	1	95	2	1	___.___
STOCKER SYSTEMS									
STEERS-450 lbs	BUY	OCT	CWT	3	1	96	2	1	___.___
STEERS-600 lbs	SELL	MAR	CWT	3	1	97	2	1	___.___
STEERS-715 lbs	SELL	MAY	CWT	3	1	98	2	1	___.___
STEERS-775 lbs	SELL	OCT	CWT	3	1	99	2	1	___.___
CUSTOM HIRE RATES									
COMBINE	HIRE		ACRE	5				1	___.___
(Plus a per bu. rate			BU	5				2	___.___
for yields over ____ bu./acre)				5				3	___.___
HAUL GRAIN	HIRE		BU	6				1	___.___
BALE HAY	HIRE		TON	7				1	___.___
HAUL HAY	HIRE		TON	7				2	___.___

[1]If prices are not specified here, those appearing in Oklahoma State University Processed Series P-550 are used for crops and those appearing in Processed Series P-459 are used for livestock.

TABLE VI (Continued)

OTHER REVISIONS

CODE						
IVA	I	J	K	VALUE ( )	AMOUNT	COMMENTS
					.	
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the user must be familiar with the activity and constraint locations in A and the TI cost codes in COST. Any of the revisions listed in Table III which are desired and which are not provided for on pages 1 through 3 of this form are to be indicated on page 4. Thus, as one moves from "stage" 1 to "stage" 4, the amount of information available for an individual farm and the sophistication of the user with respect to the system must increase. It is expected that "stage four" revisions would be coded and/or checked by a professional staff member. It would be possible, however, for the desired revisions to be indicated in the comment portion of a line for later coding by someone who was familiar with the system.

The Government Program Comparison Report (GOVPRO)

As noted in Chapter II, government farm programs have been an important factor in farm planning decisions for several years. Changes in program provisions have been relatively frequent. On occasion these changes have been announced only a short time before the crops involved were to be planted. The problems involved with choosing among government program participation alternatives were deemed significant enough to merit a separate output report format from the system. This report aids the user in selecting a government program participation alternative. Once an alternative is selected, the detailed report, which is discussed in the next section, may be run.

Part I

The report format is shown in Table VII. The clay and loam representative farm was used in this illustration. Part I lists the

TABLE VII

THE GOVERNMENT PROGRAM COMPARISON REPORT

560 ACRE NORTH CENTRAL OKLAHOMA CLAY AND LOAM FARM

PART I--RESOURCES AND RESTRICTIONS	UNIT	AMOUNT
LAND - TOTAL	ACRE	560.0
CLAY-B	ACRE	43.6
CLAY-C	ACRE	69.8
CLAY-D	ACRE	28.2
CLAY-NATIVE PASTURE	ACRE	122.4
LOAM-A	ACRE	85.2
LOAM-B	ACRE	60.2
LOAM-C	ACRE	31.0
LOAM-D	ACRE	6.5
LOAM-NATIVE PASTURE	ACRE	113.1
LABOR - TOTAL	HOUR	1727.0
JAN-APR	HOUR	495.0
MAY-JUL	HOUR	473.0
AUG-SEP	HOUR	330.0
OCT-DEC	HOUR	429.0
CAPITAL		
INTEREST-FREE CAPITAL	DOLLAR	0.00
SHORT-TERM INTEREST RATE	PERCENT	7.0
GOVERNMENT PROGRAM INFORMATION		
BARLEY BASE	ACRE	41.9
GRAIN SORGHUM BASE	ACRE	27.9
WHEAT ALLOTMENT	ACRE	184.9
CONSERVING BASE	ACRE	20.9
PROJECTED YIELDS		
BARLEY	BU/A	25.4
GRAIN SORGHUM	CWT/A	13.8
WHEAT	BU/A	27.1
LOAN RATES		
BARLEY	$/BU	0.80
GRAIN SORGHUM	$/CWT	1.61
WHEAT	$/BU	1.25
ALFALFA ACREAGE LIMIT	ACRE	64.9

TABLE VII (Continued)

PART II--SUMMARY OF OPTIMUM FARM PLANS FOR THREE GOVERNMENT PROGRAM PARTICIPATION ALTERNATIVES

	UNIT	PARTICIPATION ALTERNATIVES NON-PARTICIPATION	WHEAT ONLY	WHEAT AND FEED GRAIN
NET RETURN TO FIXED RESOURCES	DOLLAR	7254.	11286.	11323.
CROPS				
BARLEY	ACRE	0.0	36.3	20.9
GRAIN SORGHUM	ACRE	0.0	6.3	13.9
WHEAT	ACRE	153.2	92.5	101.9
FORAGE SORGHUM	ACRE	13.2	4.3	0.0
ALFALFA	ACRE	64.9	64.9	63.0
WHEAT PASTURE--GRAZE OUT BY MAY 1	ACRE	93.2	86.8	83.3
SUDAN PASTURE--FOR WINTER GRAZING	ACRE	0.0	33.4	41.4
NATIVE PASTURE	ACRE	235.5	235.5	235.5
TOTAL	ACRE	560.0	560.0	560.0
LIVESTOCK				
COWS--SPRING CALVING	HEAD	15.	16.	16.
STEERS--BUY OCT-SELL MAY	HEAD	102.	95.	91.
LABOR (HIRED)				
MAY-JULY	HOUR	61.9	38.1	27.4
CAPITAL				
TOTAL REQUIRED	DOLLAR	20578.	19613.	19086.
ADJUSTED TO AN ANNUAL BASIS	DOLLAR	11792.	11327.	11081.
GOVERNMENT PROGRAM INFORMATION				
MINIMUM DIVERSION				
BARLEY	ACRE	0.0	0.0	8.4
GRAIN SORGHUM	ACRE	0.0	0.0	5.6
WHEAT	ACRE	0.0	27.7	27.7
ADDITIONAL DIVERSION				
WHEAT	ACRE	0.0	92.4	83.0
SUBSTITUTIONS				
NONE				
SOURCES OF GROSS INCOME				
CROP SALES				
BARLEY	DOLLAR	0.	1051.	605.
GRAIN SORGHUM	DOLLAR	0.	162.	383.
WHEAT	DOLLAR	4832.	3106.	3424.
ALFALFA	DOLLAR	3483.	3436.	3354.
LIVESTOCK SALES				
COW-CALF SYSTEMS	DOLLAR	1626.	1652.	1668.
STOCKER STEERS OCT-MAY	DOLLAR	18059.	16867.	16140.
GOVERNMENT PROGRAMS				
BARLEY PRICE SUPPORT PAYMENT	DOLLAR	0.	0.	106.
SORGHUM PRICE SUPPORT PAYMENT	DOLLAR	0.	0.	102.
WHEAT CERTIFICATES	DOLLAR	0.	2930.	2930.
ADDITIONAL WHEAT DIVERSION	DOLLAR	0.	1566.	1405.

TABLE VII (Continued)

PART III--PRICES USED	TRANSACTION	TIME	UNIT	$
CROPS				
BARLEY	SELL		BU	0.85
GRAIN SORGHUM	SELL		CWT	1.65
WHEAT	SELL		BU	1.20
WHEAT PASTURE	SELL	OCT-MAR	AUM	7.00
WHEAT PASTURE	SELL	OCT-MAY	AUM	7.00
ALFALFA	SELL		TON	22.50
PRAIRIE HAY	BUY		TON	17.00
LIVESTOCK				
COW-CALF SYSTEMS				
SPRING CALVING				
STEERS-485 POUNDS	SELL	OCT	CWT	27.00
HEIFERS-460 POUNDS	SELL	OCT	CWT	25.00
CULL COWS	SELL	JUN	CWT	13.00
FALL CALVING				
STEERS-500 POUNDS	SELL	JUL	CWT	28.30
HEIFERS-460 POUNDS	SELL	JUL	CWT	26.30
CULL COWS	SELL	JAN	CWT	14.00
STOCKER SYSTEMS				
STEERS--450 POUNDS	BUY	OCT	CWT	27.00
-600 POUNDS	SELL	MAR	CWT	25.00
-715 POUNDS	SELL	MAY	CWT	25.00
-775 POUNDS	SELL	OCT	CWT	24.00
LABOR				
	HIRE	JAN-APR	HOUR	1.50
	HIRE	MAY-JUL	HOUR	1.50
	HIRE	AUG-SEP	HOUR	1.50
	HIRE	OCT-DEC	HOUR	1.50
GOVERNMENT PROGRAMS				
BARLEY PRICE SUP PMT	(MAXIMUM=	21.0 A)	ACRE	5.08
SORG PRICE SUP PMT	(MAXIMUM=	14.0 A)	ACRE	7.31
WHEAT CERTIFICATES	(MAXIMUM=	79.5 A)	ACRE	36.86
ADDITIONAL DIVERSION PAYMENTS				
BARLEY	(MAXIMUM=	12.6 A)	ACRE	11.42
GRAIN SORGHUM	(MAXIMUM=	8.4 A)	ACRE	13.29
WHEAT	(MAXIMUM=	92.4 A)	ACRE	16.94

resources and restrictions used in the programming problem. This part displays the information utilized from page 1 of the individual farm data form shown in Table VI. This part of the report enables the reader to verify that the resource base was correctly entered into the system. In the case of representative farms, the reader may use Part I to determine the similarities and differences between an actual farm and a programmed representative farm.

Part II

A summary of three optimal farm plans is presented in Part II of the report. These three optimal plans result from three different participation alternatives. They are the alternatives which are generally feasible for north central Oklahoma.

The non-participation alternative may not appear feasible from a financial point of view, but it is included as an alternative and as a benchmark for use in evaluating other alternatives. More than three alternatives may be feasible in other areas of Oklahoma. If so, the number of optimal plans included in the comparison could be increased. The participation alternatives include only combinations of commodity programs. Optimal levels of participation in and substitutions between programs are determined within each major alternative.

If an integer or mixed integer linear programming routine were available for "trouble free" use at the field level, an optimum participation alternative could be selected by running only one optimal solution. The comparison-type report being discussed here has some advantages over a single optimal solution, however. In some cases the income difference is so small between two alternatives that a farmer would be indifferent between the two, from the standpoint of net return. This would not be apparent if the integer programming approach were used. Also, the latter approach would not enable a comparison of the selected alternative with the non-participation alternative, if it were not selected. From the standpoint of computer time, it is likely that the alternative optimal solutions may be computed as rapidly as a single integer solution. The computation of additional solutions, after the initial one, utilizes data already in core storage of the computer and the optimal basis of the previous solution. Thus, additional solutions require relatively little computer time.

The comparison of alternatives in Part II includes only information which would be of interest to most farmers. As aid to brevity of the report, only non-zero lines are printed. "Net return to fixed resources" allows a financial comparison of the alternatives. Crop acreages, summed over soil types, are presented next. Livestock types and numbers, hired labor required and capital required are then listed. Levels of minimum diversion, additional diversion and substitutions are listed in the government program information section. Finally, the sources of gross income are presented. These sources allow a farmer to determine what enterprises will contribute most to gross income, given that farm plan. Also, the sources of income which relate to government programs allow him to determine how much of his net returns will be likely to come from government program payments. The receipt of government payments considered here is contingent on planting the indicated acreages only. Thus, the government payments do have a "crop insurance" feature which should be considered in an evaluation of the relative levels of risk associated with each participation alternative.

Part III

The prices used in determining the optimal plans are presented in Part III. This part may be used to verify that the prices specified on page 3 of the individual farm data form (Table VI) were correctly entered into the system. Also, this section aids in the generalization of representative farm results.

Other Information

In addition to the report described above, a detailed list of activity levels and shadow prices for each of the three solutions is printed (Table VIII). The output from the FMPLAN subroutine also appears on the output from each run. This additional, detailed information may be used by qualified personnel in gleaning additional information from the run and in answering questions which may arise after studying the government program comparison report. As an example, only total wheat acreage is given in Part II of the report. If wheat acreage by soil type is desired, it may be obtained from the detailed solution.

Mechanics

The report in Table VII is printed by using a deck of header, or format, cards (Appendix Table XXI). The functions performed by each type of card and the card format are presented in Table IX. If desired, these instructions could be read from magnetic tape instead of cards.

Execution time for this program on an IBM 7040 computer is approximately nine minutes per farm. A source listing of this program appears in Appendix Table XX.

TABLE VIII

A PARTIAL LISTING OF THE DETAILED SOLUTIONS AND SHADOW PRICES AS PRINTED WITH THE GOVERNMENT PROGRAM COMPARISON REPORT

SOLUTIONS

ACTIVITY	IRHS=1	IRHS=2	IRHS=3
1 71.CBA	0.0000	0.0000	0.0000
2 71.CCA	0.0000	0.0000	0.0000
3 71.CDA	0.0000	0.0000	0.0000
4 71.LAA	0.0000	36.3496	20.9500
5 71.LBA	0.0000	0.0000	0.0000
6 71.LCA	0.0000	0.0000	0.0000
7 71.LDA	0.0000	0.0000	0.0000
8 73.CBA	0.0000	0.0000	0.0000
9 73.CCA	0.0000	0.0000	0.0000
10 73.CDA	0.0000	0.0000	0.0000
11 73.LAA	0.0000	0.0000	5.9305
12 73.LBA	0.0000	6.2723	8.0195
13 73.LCA	0.0000	0.0000	0.0000
14 73.LDA	0.0000	0.0000	0.0000
15 76.CBA	43.5999	43.6000	43.6001
16 76.CCA	37.6357	0.0000	0.0000
17 76.CDA	0.0000	0.0000	0.0000
18 76.LAA	71.9811	48.8512	58.3195
19 76.LBA	0.0000	0.0000	0.0000
20 76.LCA	0.0000	0.0000	0.0000
21 76.LDA	0.0000	0.0000	0.0000
22 803CBA	0.0000	0.0000	0.0000
23 803CCA	0.0000	0.0000	0.0000
24 803CDA	0.0000	0.0000	0.0000
25 803LAA	13.2193	0.0000	0.0000
26 803LBA	0.0000	4.3432	0.0000
27 803LCA	0.0000	0.0000	0.0000
28 803LDA	0.0000	0.0000	0.0000
29 81.CBA	0.0000	0.0000	0.0000
30 81.CCA	0.0000	0.0000	0.0000
31 81.LAA	0.0000	0.0000	0.0000
32 81.LBA	60.2000	49.5845	52.1802
33 81.LCA	4.7001	15.3154	10.8245
34 800CBA	0.0000	0.0000	0.0000
35 800CCA	32.1643	69.8000	69.8000
36 800CDA	28.2001	0.0000	0.0000
37 800LAA	0.0000	0.0000	0.0000
38 800LBA	0.0000	0.0000	0.0000
39 800LCA	26.3000	15.6846	13.5073
40 800LDA	6.5000	1.2818	0.0000
41 85.CBA	0.0000	0.0000	0.0000
42 85.CCA	0.0000	0.0000	0.0000
43 85.CDA	0.0000	0.0000	0.0000
44 85.LAA	0.0000	0.0000	0.0000
45 85.LBA	0.0000	0.0000	0.0000
46 85.LCA	0.0000	0.0000	0.0000
47 85.LDA	0.0000	0.0000	0.0000
48 85WCBA	0.0000	0.0000	0.0000
49 85WCCA	0.0000	0.0000	0.0000
50 85WCDA	0.0000	28.2000	28.2000
51 85WLAA	0.0000	0.0000	0.0000
52 85WLBA	0.0000	0.0000	0.0000
53 85WLCA	0.0000	0.0000	6.6683
54 85WLDA	0.0000	5.2182	6.4999
55 1	0.0000	0.0000	0.0000
56 2	0.0000	0.0000	0.0000
57 3	0.0000	0.0000	0.0000
58 4	0.0000	0.0000	0.0000
59 5	0.0000	0.0000	0.0000
60 6	0.0000	0.0000	0.0000
61 7	0.0000	0.0000	0.0000
62 8	0.0000	0.0000	0.0000
63 60FALL	0.0000	0.0004	0.0000
64 86.C1A	122.4000	122.4000	122.4000
65 86.L1A	113.1000	113.1000	113.1000
66 111RTA	15.4557	15.7069	15.8602
67 112RTA	0.0000	0.0000	0.0000
68 113RTA	0.0000	0.0000	0.0000
69 111VLA	0.0000	0.0000	0.0000
70 141TTA	0.0000	0.0000	0.0000
71 142TTA	0.0000	0.0000	0.0000
72 143TTA	0.0000	0.0000	0.0000
73 144TYA	86.4022	20.0404	0.0000
74 145TYA	15.6239	75.2558	91.1874
75 146TRA	0.0000	0.0000	0.0000
76 147TRA	0.0000	0.0000	0.0000
77 1	0.0000	0.0000	0.0000
78 2	0.0000	0.0000	0.0000
79 3	0.0000	0.0000	0.0000
80 4	0.0000	0.0000	0.0000

SHADOW PRICES

CONSTRAINT	IRHS=1	IRHS=2	IRHS=3
1 9TO..	7.6727	6.5031	14.3059
2 9CB..	11.3029	12.3162	10.1785
3 9CC..	2.1157	4.0054	3.2593
4 9CD..	-0.0000	2.2182	2.0136
5 9CP..	5.2494	5.2499	5.2489
6 9LA..	11.7018	12.7151	10.5774
7 9LB..	7.8597	8.1839	7.2814
8 9LC..	4.8597	5.1839	4.2814
9 9LD..	2.7441	3.0592	2.8545
10 9LP..	6.2993	6.2999	6.2987
11 81HLIM	6.1014	6.9231	0.0000
12 11LJA.	-0.0000	-0.0000	-0.0000
13 11LMJ.	1.5525	1.5525	1.5525
14 11LAS.	-0.0000	-0.0000	-0.0000
15 11LOD.	-0.0000	-0.0000	-0.0000
16 3CO..	0.0000	0.0000	-0.0000
17 3CDA.	0.0700	0.0700	0.0700
18 71BAP.	0.8500	0.8500	0.8500
19 73GSP.	1.7024	1.6500	1.6500
20 76WHP.	1.2000	1.2000	1.2000
21 80HAY.	17.3347	17.0540	17.5950
22 81HAY.	22.5000	22.5000	22.5000
23 73STB.	7.3673	7.2480	7.1342
24 80MAR.	7.4363	15.3543	16.2082
25 80MAY.	13.7203	5.8924	5.1103
26 86NP..	5.2494	5.2499	5.2489
27 11CS1.	27.0000	27.0000	27.0000
28 11CH1.	25.0000	25.0000	25.0000
29 11CC1.	13.0000	13.0000	13.0000
30 11CS2.	28.3000	28.3000	28.3000
31 11CH2.	26.3000	26.3000	26.3000
32 11CC2.	22.8855	14.0000	14.0000
33 14S8..	27.0000	27.0000	27.0000
34 14SS1.	26.7185	25.0000	25.0000
35 14SS2.	25.0000	25.0000	25.0000
36 14SS3.	24.1158	24.0000	24.0000
37 61B...	-0.0000	-0.0000	0.0000
38 63S...	-0.0000	-0.0000	0.0000
39 66W...	-0.0000	5.6989	0.6316
40 60CA..	-0.0000	-0.0000	-0.0000
41 61DMB.	-0.0000	-8.5031	-16.3059
42 63DMS.	-0.0000	-8.5031	-16.3059
43 66DMW.	-0.0000	-8.5031	-16.3059
44 61DAB.	11.4210	2.9179	0.0000
45 63DAS.	13.2894	4.7863	-0.0000
46 66DAW.	16.9375	2.7355	-0.0000
47 61BP..	4.3500	0.0000	5.0673
48 61BPL.	0.7260	5.0760	0.0087
49 63SP..	-0.0000	0.0000	6.9231
50 63SPL.	7.3140	7.3140	0.3909
51 66WC..	0.0000	-0.0000	0.0000
52 66WCL.	36.8560	36.8560	36.8560
53 60FAL.	-0.0000	-8.5031	-16.3059
54 60DLM.	0.0000	8.5030	16.3058
55 60BFSL	-0.0000	0.0000	0.0000
56 60BFWL	-0.0000	0.0000	0.0000
57 60SFBL	-0.0000	0.0000	0.0000
58 60SFWL	-0.0000	0.0000	0.0000
59 60WFBL	-0.0000	5.6988	0.6315
60 60WFSL	-0.0000	5.6988	0.6315

TABLE VIII (Continued)

	ACTIVITY	SOLUTIONS IRHS=1	IRHS=2	IRHS=3
81	710SBA	0.0000	1235.8853	712.2999
82	730SSA	0.0000	98.3493	232.0203
83	760SWA	4026.6080	2588.5998	2853.7471
84	800WPS	0.0000	0.0000	0.0000
85	800WPW	0.0000	0.0000	0.0000
86	810SHA	154.8200	152.6969	149.0470
87	801BHA	0.0000	0.0000	2.6762
88	1	0.0000	0.0000	0.0000
89	2	0.0000	0.0000	0.0000
90	110S1A	32.9826	33.5184	33.8456
91	110H1A	19.9070	20.2304	20.4279
92	110C1A	18.2687	18.5655	18.7467
93	110S2A	0.0000	0.0000	-0.0000
94	110H2A	0.0000	0.0000	-0.0000
95	110C2A	0.0000	0.0000	-0.0000
96	141STA	459.1172	428.8330	410.3431
97	140S1A	0.0000	0.0000	-0.0000
98	140S2A	722.3444	674.6973	645.6064
99	140S3A	0.0000	0.0000	-0.0000
100	1	0.0000	0.0000	0.0000
101	2	0.0000	0.0000	0.0000
102	3	0.0000	0.0000	0.0000
103	111JAA	0.0000	0.0000	0.0000
104	111MJA	61.8501	38.0611	27.3512
105	111ASA	0.0000	0.0000	0.0000
106	111ODA	0.0000	0.0000	0.0000
107	1	0.0000	0.0000	0.0000
108	2	0.0000	0.0000	0.0000
109	331BCA	20577.9597	19613.0706	19085.7969
110	321BCA	11792.3502	11326.8473	11081.0260
111	61MOBA	0.0000	0.0000	8.3800
112	63MOSA	0.0000	0.0000	5.5800
113	66MOWA	0.0000	27.7350	27.7350
114	61BDCA	0.0000	0.0000	0.0000
115	63SDCA	0.0000	0.0000	0.0000
116	66WDCA	0.0000	92.4500	82.9804
117	610BCA	0.0000	0.0000	20.9500
118	630SCA	0.0000	0.0000	13.9500
119	660WCA	0.0000	79.5070	79.5070
120	60TCA.	0.0000	86.7664	83.3072
121	60TCAW	0.0000	0.0000	0.0000
122	60BFS.	0.0000	0.0000	0.0000
123	60BFW.	0.0000	0.0000	0.0000
124	60SFB.	0.0000	0.0000	0.0000
125	60SFW.	0.0000	0.0000	0.0000
126	60WFB.	0.0000	0.0000	-0.0000
127	60WFS.	0.0000	0.0000	-0.0000
128	000000	0.0000	0.0000	0.0000
129	000000	0.0000	0.0000	0.0000
130	000000	0.0000	0.0000	0.0000
131	9CB..	0.0000	0.0000	0.0000
132	9CC..	0.0000	0.0000	0.0000
133	9CD..	0.0000	0.0000	0.0000
134	9LA..	0.0000	0.0000	0.0000
135	9LB..	0.0000	0.0000	0.0000
136	9LC..	0.0000	0.0000	0.0000
137	9LO..	0.0000	0.0000	0.0000
138	81HLIM	0.0000	0.0000	1.8950
139	11LJA.	172.6380	170.0742	170.6762
140	11LMJ.	0.0000	0.0000	0.0000
141	11LAS.	87.4301	104.4595	111.6765
142	11LOD.	229.6209	259.0573	271.9942
143	73STB.	0.0000	0.0000	0.0000
144	80MAR.	0.0000	0.0000	0.0000
145	80MAY.	0.0000	0.0000	0.0000
146	86NP..	0.0000	0.0000	0.0000
147	61B...	9958.9995	9962.6499	12.5700
148	63S...	9999.0000	9992.7272	8.3700
149	66W...	9845.7833	0.0000	0.0000
150	60CA..	171.2836	48.3431	42.1049
151	61DAB.	0.0000	0.0000	12.5700
152	63DAS.	0.0000	0.0000	8.3700
153	66DAW.	0.0000	0.0000	9.4695
154	61BP..	0.0000	36.3496	0.0000
155	61BPL.	0.0000	0.0000	0.0000
156	63SP..	0.0000	6.2723	0.0000
157	63SPL.	0.0000	0.0000	0.0000
158	66WC..	153.2163	12.9430	22.4125
159	66WCL.	0.0000	0.0000	0.0000
160	60FAL.	0.0000	0.0000	0.0000
161	60DLM.	93.1643	0.0000	0.0000
162	60BFSL	0.0000	0.0000	-0.0000
163	60BFWL	0.0000	0.0000	-0.0000
164	60SFBL	0.0000	0.0000	-0.0000
165	60SFWL	0.0000	0.0000	-0.0000
166	60WFBL	0.0000	0.0000	0.0000
167	60WFSL	0.0000	0.0000	0.0000

TABLE IX

THE USER-CONTROLLED FUNCTIONS OF THE GOVERNMENT PROGRAM COMPARISON REPORT, THE VARIABLES NECESSARY TO EXECUTE THEM AND THE CARD FORMAT

Col. 1-72 Verbal Description	Col. 73-75 IVA	Col. 76-78 IWA	Col. 79-80 IXA	Function
			0	Print verbal description only
			1	Not used in this program
			2	Turn to new page
	x[a]	x[b]	3	Print row IVA of ALTB (Rows IVA through IWA if IWA $\neq$ 0)
	x		4	Print interest rate
	x	x	5	Print government program information IWA=1 for projected yields 2 for Co. loan rates IVA=1 for barley 2 for grain sorghum 3 for wheat
			6	Print heading for Part II of the report
	x	x	7	Sum activity levels IVA through IWA. If sum = 0, print the verbal description on this card. If sum $\neq$ 0, pass to next card
	x	x[b]	8	Print activity level IVA with no decimal places (IVA through IWA if IWA $\neq$ 0)
	x	x[b]	9	Print activity level IVA with one decimal place (IVA through IWA if IWA $\neq$ 0)

TABLE IX (Continued)

Col. 1-72 Verbal Description	Col. 73-75 IVA	Col. 76-78 IWA	Col. 79-80 IXA	Function
	x		10	Print the price of activity IVA
	x	x[b]	11	Print the product of activity level times price for activity IVA (IVA through IWA if IWA $\neq$ 0)
	x	x	12	Print the government program payment rate (price of activity IVA) and the level to which it is limited (constraint value in row IWA)
	999			End of deck

[a]x's indicate non-zero fields.

[b] optional.

The Individual Farm Detailed Report (DETREP)

The detailed report contains an analysis of a single linear programming solution for an actual or representative farm. An attempt was made to present the elements of the linear programming problem and the solution in a manner which would enable an individual farmer to read them. The report appears in three parts (Table X). Part I lists the resources and restrictions used in the problem. Part II presents a brief summary of the optimal solution. Part III contains a detailed analysis of the optimal solution. The clay and loam representative farm is used to illustrate the report in Table X.

The farm title appears at the beginning of the report, exactly as indicated on the individual farm data form and as read from the title card which preceded the revision cards for the farm (these were discussed in the FMPLAN subroutine section). Next, the government program participation alternative specified for this run is printed.

Part I

The resources and restrictions employed in the programming problem are shown in Part I. This part of the report is identical to Part I of the government program comparison report (Table VII) and displays the information which was utilized from page 1 of the individual farm data form (Table VI). This part of the report enables the reader to verify that the resource base was correctly entered into the system. In the case of representative farms, the reader can use Part I to establish the relationship between an actual farm and a programmed representative farm.

TABLE X

THE INDIVIDUAL FARM DETAILED REPORT

560 ACRE NORTH CENTRAL OKLAHOMA CLAY AND LOAM FARM
PARTICIPATE IN WHEAT AND FEED GRAIN PROGRAMS

PART I--RESOURCES AND RESTRICTIONS	UNIT	AMOUNT
LAND - TOTAL	ACRE	560.0
CLAY-B	ACRE	43.6
CLAY-C	ACRE	69.8
CLAY-D	ACRE	28.2
CLAY-NATIVE PASTURE	ACRE	122.4
LOAM-A	ACRE	85.2
LOAM-B	ACRE	60.2
LOAM-C	ACRE	31.0
LOAM-D	ACRE	6.5
LOAM-NATIVE PASTURE	ACRE	113.1
LABOR - TOTAL	HOUR	1727.0
JAN-APR	HOUR	495.0
MAY-JUL	HOUR	473.0
AUG-SEP	HOUR	330.0
OCT-DEC	HOUR	429.0
CAPITAL		
INTEREST-FREE CAPITAL	DOLLAR	0.
SHORT-TERM INTEREST RATE	PERCENT	7.0
GOVERNMENT PROGRAM INFORMATION		
BARLEY BASE	ACRE	41.9
GRAIN SORGHUM BASE	ACRE	27.9
WHEAT ALLOTMENT	ACRE	184.9
CONSERVING BASE	ACRE	20.9
PROJECTED YIELDS		
BARLEY	BU/A	25.4
GRAIN SORGHUM	CWT/A	13.8
WHEAT	BU/A	27.1
LOAN RATES		
BARLEY	$/BU	0.80
GRAIN SORGHUM	$/CWT	1.61
WHEAT	$/BU	1.25
ALFALFA ACREAGE LIMIT	ACRE	64.9

TABLE X (Continued)

PART II--SUMMARY OF THE OPTIMUM FARM PLAN

NET RETURN TO FIXED RESOURCES	DOLLAR	11323.
CROPS		
BARLEY	ACRE	20.9
GRAIN SORGHUM	ACRE	13.9
WHEAT	ACRE	101.9
ALFALFA	ACRE	63.0
WHEAT PASTURE--GRAZE OUT BY MAY 1	ACRE	83.3
SUDAN PASTURE--FOR WINTER GRAZING	ACRE	41.4
NATIVE PASTURE	ACRE	235.5
TOTAL	ACRE	560.0
LIVESTOCK		
COWS--SPRING CALVING	HEAD	16.
STEERS--BUY OCT-SELL MAY	HEAD	91.
LABOR (HIRED)		
MAY-JULY	HOUR	27.4
CAPITAL		
TOTAL REQUIRED	DOLLAR	19086.
ADJUSTED TO AN ANNUAL BASIS	DOLLAR	11081.

PART III--DETAILED OPTIMUM FARM PLAN

A. LAND USE

CROP	ACRES	SOIL PRODUCTIVITY CLASS	PERCENT USED	YIELD/ACRE UNIT	AMOUNT
BARLEY	20.9	LA	24.6	BU	34.0
GRAIN SORGHUM	5.9	LA	7.0	CWT	17.9
GRAIN SORGHUM	8.0	LB	13.3	CWT	15.7
WHEAT	43.6	CB	100.0	BU	28.0
WHEAT	58.3	LA	68.5	BU	28.0
ALFALFA	52.2	LB	86.7	TON	2.4
ALFALFA	10.8	LC	34.9	TON	2.2
WHEAT PAST-GRAZE OUT-MAY	69.8	CC	100.0	AUM	2.0
WHEAT PAST-GRAZE OUT-MAY	13.5	LC	43.6	AUM	2.2
SUDAN PAST--WINTER GRAZE	28.2	CD	100.0	AUM	1.8
SUDAN PAST--WINTER GRAZE	6.7	LC	21.5	AUM	2.0
SUDAN PAST--WINTER GRAZE	6.5	LD	100.0	AUM	1.8
NATIVE PASTURE	122.4	C	100.0	AUM	1.0
NATIVE PASTURE	113.1	L	100.0	AUM	1.2
TOTAL LAND	560.0				

TABLE X (Continued)

B. LIVESTOCK

TYPE	HEAD	RATION *	CALVED OR BOUGHT DATE	WEIGHT	PRICE	SOLD	DATE	WEIGHT	PRICE
COWS	16.	1	MAR			STEERS	OCT 1	485	27.00
						HEIFERS	OCT 1	460	25.00
STEERS	91.	1,2,3,4,5	OCT 15	450	27.00		MAY 1	700	25.00

* 1-NATIVE PASTURE
2-FORAGE SORGHUM OR PRAIRIE HAY
3-SMALL GRAIN PASTURE OCT-MAR
4-SMALL GRAIN PASTURE MAR-MAY
5-SORGHUM OR ALFALFA STUBBLE

C. LABOR

	HIRED (HOURS)	UNUSED OPER. AND FAMILY LABOR (HOURS)
JAN-APR	0.0	170.7
MAY-JUL	27.4	0.0
AUG-SEP	0.0	111.7
OCT-DEC	0.0	272.0

D. CAPITAL

	DOLLARS
TOTAL REQUIRED	19086.
ADJUSTED TO AN ANNUAL BASIS	11081.

E. GOVERNMENT PROGRAM PARTICIPATION

	ACRES	DIVERTED ACRE CHECK	PER CENT OF ALLOTMENT OR BASE: BARLEY	GRAIN SORGHUM	WHEAT	CONSERV-ING
BARLEY	20.9	0.0	50.0	0.0	0.0	0.0
GRAIN SORGHUM	13.9	0.0	0.0	50.0	0.0	0.0
WHEAT	101.9	0.0	-0.0	-0.0	55.1	0.0
ALFALFA	63.0	0.0	0.0	0.0	0.0	301.5
WHEAT PAST(GR-OUT)	83.3	83.3	0.0	0.0	0.0	0.0
SUDAN PAST(WINTER)	41.4	41.4	0.0	0.0	0.0	0.0
ACRES DIVERTED						
MINIMUM						
BARLEY		-8.4	20.0	0.0	0.0	0.0
GRAIN SORGHUM		-5.6	0.0	20.0	0.0	0.0
WHEAT		-27.7	0.0	0.0	0.0	0.0
ADDITIONAL						
WHEAT		-83.0	0.0	0.0	44.9	0.0
TOTAL	324.5	-0.0	70.0	70.0	100.0	301.5

SUBSTITUTIONS
NONE

TABLE X (Continued)

F. FINANCIAL SUMMARY				PRICE RANGE	
		UNIT	LOWER LIMIT	PRICE USED	UPPER LIMIT
GROSS INCOME $					
CROP SALES					
BARLEY	605.45	BU	0.85	0.85	1.00
GRAIN SORGHUM	382.83	CWT	1.63	1.65	1.66
WHEAT	3424.50	BU	1.15	1.20	1.20
ALFALFA HAY	3353.56	TON	21.46	22.50	22.50
LIVESTOCK SALES					
STEER CALVES-OCTOBER	913.83	CWT	26.16	27.00	27.33
HEIFER CALVES-OCTOBER	510.70	CWT	23.62	25.00	25.55
CULL COWS-SPRING CALVING	243.71	CWT	11.49	13.00	13.60
STOCKER STEERS-MAY	16140.16	CWT	25.00	25.00	25.27
GOVERNMENT PAYMENTS					
BARLEY PRICE SUPPORT PMT	106.34	ACRE	5.07	5.08	******
SORGHUM PRICE SUPPORT PT	102.03	ACRE	6.92	7.31	******
WHEAT CERTIFICATES	2930.31	ACRE	0.00	36.86	******
ADDITNL WHEAT DIVERSION	1405.48	ACRE	16.92	16.94	21.27
TOTAL $	30118.91				
OPERATING EXPENSES $					
STOCKER STEERS PCH-OCT	11079.26	CWT	26.80	27.00	27.01
HIRED LABOR	41.03				
INTEREST	775.67	DOLLAR	0.05	0.07	0.07
FEED	342.19				
SEED	820.04				
FERTILIZER AND LIME	1976.42				
MACHINE HIRE	1857.93				
MISC.OPERATING EXPENSE	22.20				
VETERINARY AND MEDICINE	185.51				
MACHINERY OPERATING EXP.	1093.15				
TAXES (LIVESTOCK ONLY)	198.20				
FREIGHT AND MARKETING	454.12				
TOTAL $	18795.71				
NET RETRN TO FIXED RESOURCES	11323.20				
OVERHEAD EXPENSES * $	896.68				
NET RETURN TO LAND, FAMILY LABOR AND MANAGEMENT $	10426.51				

* INCLUDES DEPRECIATION, INTEREST, TAXES AND INSURANCE FOR MACHINERY AND EQUIPMENT. DOES NOT INCLUDE TAXES AND INTEREST ON LAND OR A CHARGE FOR FAMILY LABOR AND MANAGEMENT.

Part II

This part of the report contains a summary of the optimal solution which is somewhat similar in format to Part II of the government program comparison report (Table VII). The summary appearing here does not contain government program information or sources of gross income, however. These two types of information appear in Part III, the detailed section of this report. Part II was included in the report to give the reader a quick, "thumbnail", sketch of the optimal plan. Thus, an over-all view of the optimal farm plan may be made before studying the details associated with it. In some cases, after reviewing the summary, the reader may not wish to pursue the details associated with a given farm plan.

Part III

Part III of the individual farm detailed report is divided into six sub-parts. A discussion of each follows.

A. Land Use. Crop and native pasture acreages are listed by soil productivity class in this part of the report. The percentage of a soil productivity class which is utilized by each crop is also listed. Thus, the reader may determine which crops are to be planted on each soil productivity class and arrive at general conclusions such as which crops are planted on the best land, the poorest, etc.

Crop yields, by soil productivity class, are also listed. They, of course, reflect any yield revisions made for the farm which is being programmed.

B. Livestock. The activity levels for individual livestock activities are listed in this section. A key to the general type of ration used is also listed. For cow-calf activities, the calving date and the selling date, weight, and price for steer and heifer calves are presented. For stocker activities, the buying and selling dates, weights, and prices are listed.

C. Labor. Hired labor and unused operator and family labor are listed by time periods in this section of the report.

D. Capital. Total operating capital required is shown in this section. In addition, the operating capital adjusted to an annual basis is listed. For an example of the adjustment, capital required for steers which are held for only six months is divided by two. Interest is charged on the latter amount at the annual rate specified in Part I of the report.

E. Government Programs. This section shows the role that each crop plays in government program participation. It also indicates the manner in which the diverted acres requirement and the conserving base are satisfied. Substitutions between bases are indicated in two ways. For an example of a substituion, assume that wheat is being substituted for barley. In this case, 100 per cent of the wheat allotment is utilized. In addition, the percentage of the barley base which is planted to wheat will appear on the wheat row and in the column corresponding to the barley base. Second, the substitution would be listed in acres immediately below this table.

The row entitled "total" gives total cropland, a total of the "diverted acre check" column and totals for each of the percentage columns. The diverted acre check should be zero or positive, indicating that the diverted acre requirement is satisfied. The totals of the percentage columns for the barley, grain sorghum, and wheat bases indicate the percentage which the respective bases are utilized through cropping, substitution, minimum diversion, and additional diversion. The total of the conserving base percentage column must be equal to or greater than 100 per cent, indicating that the conserving base requirement has been met.

The manner in which each of the crop enterprises is considered in terms of government program provisions was discussed in the "government program considerations" section of Chapter II. The government program section of the individual farm detailed report is printed even when the non-participation alternative is specified. In the case of non-participation, the reader may still interpret the solution in terms of the various bases for the farm.

F. Financial Summary. This section of the report provides a detailed breakdown of income and expenses associated with the optimum farm plan. The total dollars of income or expense, by source, the unit in which the item is bought or sold, the unit price used in the problem and a price range are given for categories in which no aggregation is involved. Where aggregation is involved, only the total dollars are given. An example of an aggregated item is hired labor expense. Only a total labor expense figure is desired in the report format, while each time period has a wage rate. Thus, a meaningful unit price and price range cannot be listed with the aggregated total.

"Net return to fixed resources" is the result of subtracting total variable production costs from gross income and it agrees with the similarly titled amount in Part II of this report. An estimate of fixed machinery costs is then deducted and the result is shown as "Net return to land, family labor, and management".

Other Information

The information printed during the execution of the FMPLAN subroutine appears as a part of each run of the individual farm detailed report. In addition, the detailed solution and shadow prices are printed, in a similar manner to those in the government program comparison report which appear in Table VIII. A listing of the activities, the price or cost used in the problem for each activity, the price ranges for basis activities and incoming prices for non-basis activities is also listed (Table XI). Again, this additional information allows qualified personnel to provide additional interpretation of the results and answer questions which may be raised when studying the report.

Mechanics

A source listing of the DETREP program appears in Appendix Table XXII. The format of the report is governed by a header, or formatting, deck (Appendix Table XXIII). The card format and an explanation of the general functions of each type of card are given in Table XII.

Execution time required for this program on an IBM 7040 computer is approximately twelve minutes.

The Parametric Price Report (PARAMP)

This report is intended as a supplementary or optional report. It is not intended that farmers be able to interpret it without prior instruction.

TABLE XI

A PARTIAL LISTING OF THE PRICE RANGES, INCOMING PRICES AND PRICES USED FOR THE LINEAR PROGRAMMING PROBLEM, AS PRINTED WITH THE INDIVIDUAL FARM DETAILED REPORT

ACTIVITY	LOWER LIMIT	PRICE USED	UPPER LIMIT
71.CBA	17.0889	18.1900	0.0000
71.CCA	14.8164	17.4900	0.0000
71.CDA	10.1914	16.9900	0.0000
* 71.LAA	13.3227	18.3900	18.3987
71.LBA	16.6652	17.9900	0.0000
71.LCA	14.6444	17.5900	0.0000
71.LDA	11.0504	17.1900	0.0000
73.CBA	9.7587	14.6300	0.0000
73.CCA	9.2859	13.8300	0.0000
73.CDA	4.9877	13.4300	0.0000
* 73.LAA	11.2912	11.3100	11.6060
* 73.LBA	10.6140	10.9100	10.9288
73.LCA	10.2140	10.5100	0.0000
73.LDA	7.0208	10.0600	0.0000
* 76.CBA	-9981.2100	17.7900	18.8911
76.CCA	13.0675	17.0900	0.0000
76.CDA	6.6925	16.7900	0.0000
* 76.LAA	17.3937	17.4100	18.7695
76.LBA	15.4852	17.1100	0.0000
76.LCA	13.2644	16.8100	0.0000
76.LDA	8.2704	16.5100	0.0000
803CBA	21.2434	33.2800	0.0000
803CCA	17.6056	28.7800	0.0000
803CDA	11.8134	25.7800	0.0000
803LAA	27.9854	32.7600	0.0000
803LBA	24.2434	29.7600	0.0000
803LCA	20.2054	26.7600	0.0000
803LDA	14.5943	23.7600	0.0000
81.CBA	28.8077	32.0100	0.0000
81.CCA	24.4769	28.2600	0.0000
81.LAA	30.7540	31.0500	0.0000
* 81.LBA	29.5312	29.5500	29.8460
* 81.LCA	28.0337	28.0500	28.3460
800CBA	9.8345	12.4900	0.0000
* 800CCA	-9986.5099	12.4900	13.0224
800CDA	11.6039	12.4900	0.0000
800LAA	10.4577	12.4900	0.0000
800LBA	11.6219	12.4900	0.0000
* 800LCA	11.8833	12.4900	12.5222
800LDA	11.7850	12.4900	0.0000
85.CBA	0.0000	11.8800	-14.4098
85.CCA	0.0000	11.8800	-8.5404
85.CDA	0.0000	11.8800	-7.8195
85.LAA	0.0000	11.0600	-13.2130
85.LBA	0.0000	11.0600	-10.9668
85.LCA	0.0000	11.0600	-9.0166
85.LDA	0.0000	11.0600	-8.6395
85WCBA	5.8553	11.8800	0.0000
85WCCA	11.3476	11.8800	0.0000

TABLE XI (Continued)

*	85WCDA	-9987.1200	11.8800	12.7661
	85WLAA	7.6177	11.0600	0.0000
	85WLBA	9.4868	11.0600	0.0000
*	85WLCA	10.2670	11.0600	11.0929
*	85WLDA	-9987.9399	11.0600	11.7650
	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000
	5	0.0000	0.0000	0.0000
	6	0.0000	0.0000	0.0000
	7	0.0000	0.0000	0.0000
	8	0.0000	0.0000	0.0000
*	60FALL	-0.0135	2.0000	10001.0000
*	86.C1A	-9999.0000	0.0000	9999.0000
*	86.L1A	-9999.0000	0.0000	9999.0000
*	111RTA	17.8903	18.6000	20.3824
	112RTA	16.3415	18.6000	0.0000
	113RTA	0.0000	13.8000	-18.4218
*	111VLA	-20.5530	14.2200	10013.2200
*	141TTA	16.6588	17.5500	20.9436
	142TTA	13.3619	17.5500	0.0000
	143TTA	14.1564	17.5500	0.0000
	144TYA	9.1064	9.4500	0.0000
*	145TYA	2.1696	9.4500	9.4765
	146TRA	0.0000	8.2100	-7.1606
*	147TRA	-1.0756	14.9000	30.2706
	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	4	0.0000	0.0000	0.0000
*	710SBA	-0.9990	-0.8500	-0.8497
*	730SSA	-1.6584	-1.6500	-1.6251
*	760SWA	-1.2006	-1.2000	-1.1514
	800WPS	0.0000	-7.0000	-10.6593
	800WPW	0.0000	-7.0000	-16.2082
*	810SHA	-22.5038	-22.5000	-21.4553
*	801BHA	16.1997	17.0000	18.1003
	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
*	110S1A	-27.3326	-27.0000	-26.1648
*	110H1A	-25.5510	-25.0000	-23.6162
*	110C1A	-13.6004	-13.0000	-11.4921
*	110S2A	-45.6865	-28.3000	9970.7000
	110H2A	0.0000	-26.3000	-53.2977
*	110C2A	-43.4188	-14.0000	9985.0000
*	141STA	26.8020	27.0000	27.0059
	140S1A	0.0000	-25.0000	-27.6895
*	140S2A	-25.2655	-25.0000	-24.9963
	140S3A	0.0000	-24.0000	-24.1162
	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000
	3	0.0000	0.0000	0.0000
	111JAA	0.0000	1.5000	-0.0525
*	111MJA	1.4942	1.5000	3.0820
	111ASA	0.0000	1.5000	-0.0525
	111ODA	0.0000	1.5000	-0.0525
	1	0.0000	0.0000	0.0000
	2	0.0000	0.0000	0.0000

TABLE XI (Continued)

*	331BCA	-0.0123	0.0000	0.0005
*	321BCA	0.0474	0.0700	0.0704
*	61MDBA	-9999.0000	0.0000	9999.0000
*	63MDSA	-9999.0000	0.0000	9999.0000
*	66MDWA	-9999.0000	0.0000	9999.0000
	61BDCA	0.0000	-11.4210	-16.3059
	63SDCA	0.0000	-13.9104	-16.3059
*	66WDCA	-21.2722	-16.9375	-16.9212
*	610BCA	-10004.0759	-5.0760	-5.0673
*	630SCA	-10006.3140	-7.3140	-6.9231
*	660WCA	-10035.8560	-36.8560	-0.0000
*	60TCA.	-2.2827	0.0001	0.0323
	60TCAW	0.0000	0.0001	-16.9374
	60BFS.	0.0000	0.0001	0.0000
	60BFW.	0.0000	0.0001	-0.6316
	60SFB.	0.0000	0.0001	0.0000
	60SFW.	0.0000	0.0001	-0.6316
*	60WFB.	-9998.9999	0.0001	0.6316
*	60WFS.	-9998.9999	0.0001	0.6316
	000000	0.0000	0.0000	0.0000
	000000	0.0000	0.0000	0.0000
	000000	0.0000	0.0000	0.0000
	9CB..	0.0000	0.0000	-10.1785
	9CC..	0.0000	0.0000	-3.2593
	9CD..	0.0000	0.0000	-2.0135
	9LA..	0.0000	0.0000	-10.5774
	9LB..	0.0000	0.0000	-7.2814
	9LC..	0.0000	0.0000	-4.2814
	9LD..	0.0000	0.0000	-2.8545
*	81HLIM	-2.3955	0.0000	0.0087
*	11LJA.	-0.0173	0.0000	0.8558
	11LMJ.	0.0000	0.0000	-1.5525
*	11LAS.	-1.5525	0.0000	0.0085
*	11LOD.	-0.0191	0.0000	0.5902
	73STB.	0.0000	0.0000	-7.1342
	80MAR.	0.0000	0.0000	-16.2082
	80MAY.	0.0000	0.0000	-5.1103
	86NP..	0.0000	0.0000	-5.2489
*	61B...	-0.0001	0.0000	0.0001
*	63S...	-0.0001	0.0000	0.0001
	66W...	0.0000	0.0000	-0.6316
*	60CA..	-0.0087	0.0000	2.3955
*	61DAB.	-9999.0000	0.0000	4.8849
*	63DAS.	-9999.0000	0.0000	2.3955
*	66DAW.	-0.0163	0.0000	4.3347
	61BP..	0.0000	0.0000	-5.0673
	61BPL.	0.0000	0.0000	-0.0087
	63SP..	0.0000	0.0000	-6.9231
	63SPL.	0.0000	0.0000	-0.3909
*	66WC..	-0.0163	0.0000	1.3595
	66WCL.	0.0000	0.0000	-36.8560
	60FAL.	0.0000	0.0000	-16.3059
	60DLM.	0.0000	0.0000	-16.3058
*	60BFSL	-9999.0000	0.0000	0.0001
*	60BFWL	-9999.0000	0.0000	0.6317
*	60SFBL	-9999.0000	0.0000	0.0001
*	60SFWL	-9999.0000	0.0000	0.6317
	60WFBL	0.0000	0.0000	-0.6315
	60WFSL	0.0000	0.0000	-0.6315

TABLE XII

THE USER-CONTROLLED FUNCTIONS OF THE INDIVIDUAL FARM DETAILED REPORT, THE VARIABLES NECESSARY TO EXECUTE THEM AND THE CARD FORMAT

Col. 1-72 Verbal Description	Col. 73-75 IVA	Col. 76-78 IWA	Col. 79-80 IXA	Function
			0	Print verbal description only
		x[a]	1	Print government program participation alternative if IWA = the Right-Hand Side number being executed
			2	Turn to new page
	x	x[b]	3	Print row IVA of ALTB (Rows IVA through IWA if IWA $\neq$ 0)
	x		4	Print interest rate
	x	x	5	Print government program information IWA=1 for projected yields 2 for Co. loan rates IVA=1 for barley 2 for grain sorghum 3 for wheat
			6	Print net return to fixed resources
	x	x	7	Sum activity levels IVA through IWA. If sum = 0, print the verbal description on this card. If sum $\neq$ 0, pass to next card
	x	x[b]	8	Print activity level IVA, no decimal places (IVA through IWA if IWA $\neq$ 0)

x	x[b]	9	Print activity level IVA, one decimal place (IVA through IWA if IWA $\neq$ 0)
		10	Not used in this program
		11	Switch to alternate read format for Part III-A, Land Use.
x	x	12	Total land computation
		13	Switch to alternate read format for Part III-B, Livestock
x	x	14	Print hired labor from activity IVA and unused operator and family labor from activity IWA
x		15	Print capital required from activity IVA
		16	Switch to alternate read format for Part III-E, Government Program Participation
		17	Switch to alternate read format for Part III-F, Financial Summary
999			End of deck

[a]x's indicate non-zero fields.

[b]optional.

When linear programming with a large number of closely related activities, price ranges as listed in the individual farm detailed report are narrower than ones which would appear in a problem with no closely related activities. In many cases, if a price is used for another programming run which is slightly beyond the range shown, only a minor change in the farm organization may occur. For example, a few acres of wheat may be switched to a more productive land class. In practice, a change such as this is not significant to the farm manager. Thus, the practical price ranges which a manager may consider are probably much wider than those shown in the individual farm detailed report.

Thus, after viewing the government program comparison and/or individual farm detailed reports for a farm, an area farm management agent may wish to see the farm plans and incomes which result if the price of one or more major commodities are varied. In this case, one or more parametric price runs may be made to give him this information. The purpose of the parametric price report, then, is to allow a quick comparison of farm plans which reflect different prices of a commodity. The report format allows ten solutions per page. The report is shown in Table XIII. The clay and loam representative farm was used in this example. The wheat selling price was varied from \$1.15 to \$1.40 per bushel and participation in both the wheat and feed grain programs was assumed. The activity levels for a given activity may be read across the page as they appear in each separate solution. Thus, inter-solution comparisons for given activities may be made quickly. In the heading of the report, the name of the activity which is being parametrically priced, the beginning price, the ending price, the constant price, and the minimum increment are listed. The price for the named

TABLE XIII

THE PARAMETRIC PRICE REPORT

560 ACRE NORTH CENTRAL OKLAHOMA CLAY AND LOAM FARM
OBJ= 1 RHS= 3 ACTIVITY=760SWA FROM= -1.15 TO= -1.40 CONSTANT= -1.25 MIN INCREMENT= 0.010

760SWA	-1.15	-1.16	-1.21	-1.26	-1.29	-1.33	-1.36	-1.39	-1.42
NET RT	11180.54	11209.07	11353.70	11490.19	11595.89	11735.88	11828.27	11937.48	12036.33
-1.25	11463.45	11465.91	11467.31	11467.57	11456.49	11453.93	11427.14	11421.71	11379.58
71.LAA	20.95	20.95	19.06	19.06	10.68	9.43	0.00	0.00	0.00
71.LBA	0.00	0.00	0.00	0.00	0.00	1.25	10.69	10.68	0.00
73.LAA	6.81	5.93	6.81	2.92	0.00	0.00	0.00	0.00	0.00
73.LBA	7.14	8.02	7.14	11.03	13.95	13.95	13.95	13.95	13.95
76.CBA	43.60	43.60	43.60	43.60	43.60	43.60	43.60	43.60	43.60
76.LAA	57.44	58.32	59.33	63.23	74.51	75.77	85.20	85.20	85.20
76.LBA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.67	12.35
81.LBA	53.06	52.18	53.06	49.17	46.25	45.00	35.57	33.90	33.90
81.LCA	11.84	10.82	11.84	15.73	18.65	19.90	29.33	31.00	31.00
800CCA	69.80	69.80	69.80	69.80	69.80	69.80	69.80	69.80	69.80
800CDA	0.00	0.00	0.00	0.00	0.00	0.00	16.97	19.97	19.97
800LCA	12.99	13.51	12.99	15.27	12.35	11.10	1.67	0.00	0.00
800LDA	0.00	0.00	0.00	0.00	4.62	6.50	6.50	6.50	6.50
85WCDA	28.20	28.20	28.20	28.20	28.20	28.20	11.23	8.23	8.23
85WLCA	6.17	6.67	6.17	0.00	0.00	0.00	0.00	0.00	0.00
85WLDA	6.50	6.50	6.50	6.50	1.88	0.00	0.00	0.00	0.00
86.CIA	122.40	122.40	122.40	122.40	122.40	122.40	122.40	122.40	122.40
86.LIA	113.10	113.10	113.10	113.10	113.10	113.10	113.10	113.10	113.10
111RTA	15.88	15.86	15.88	15.78	15.72	15.69	15.49	15.45	15.45
144TYA	0.00	0.00	0.00	15.09	25.14	29.16	65.23	71.60	71.61
145TYA	90.56	91.19	90.56	78.23	69.92	66.53	35.98	30.58	30.58
710SBA	712.30	712.30	647.87	647.87	363.29	358.27	320.55	320.55	0.00
730SSA	233.99	232.02	233.99	225.27	218.74	218.74	218.74	218.74	218.74
760SWA	2829.10	2853.75	2882.16	2991.23	3307.20	3342.39	3606.39	3648.03	3915.19
810SHA	153.39	149.05	153.39	152.61	152.03	151.78	149.89	149.56	149.56
801BHA	2.66	2.68	2.66	9.14	13.45	15.18	30.64	33.37	33.37
110SIA	33.90	33.85	33.90	33.68	33.54	33.49	33.05	32.97	32.97
110HIA	20.46	20.43	20.46	20.33	20.24	20.21	19.95	19.90	19.90
110CIA	18.77	18.75	18.77	18.65	18.58	18.55	18.30	18.26	18.26
141STA	407.54	410.34	407.54	419.95	427.76	430.59	455.44	459.83	459.83
140S2A	641.19	645.61	641.19	660.73	673.01	677.46	716.56	723.47	723.47
111MJA	30.22	27.35	30.22	36.56	40.98	42.71	58.12	60.84	60.85
331BCA	19053.48	19085.81	19051.63	19474.76	19739.67	19842.54	20733.43	20890.99	20881.73
321BCA	11040.43	11081.03	11039.92	11269.02	11414.98	11470.72	11959.08	12045.36	12042.54
61MDBA	8.38	8.38	8.38	8.38	8.38	8.38	8.38	8.38	8.38
63MDSA	5.58	5.58	5.58	5.58	5.58	5.58	5.58	5.58	5.58
66MDWA	27.73	27.73	27.73	27.73	27.73	27.73	27.73	27.73	27.73
61BDCA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.69
63SDCA	0.00	0.00	0.00	0.00	8.37	8.37	8.37	8.37	8.37
66WDCA	81.97	82.98	81.97	78.07	66.79	65.53	56.10	54.43	43.75
610BCA	20.95	20.95	19.06	19.06	10.68	10.68	10.69	10.68	0.00
630SCA	13.95	13.95	13.95	13.95	13.95	13.95	13.95	13.95	13.95
660WCA	79.51	79.51	79.51	79.51	79.51	79.51	79.51	79.51	79.51
60TCA.	82.79	83.31	82.79	85.07	86.77	87.39	94.94	96.27	96.27
81HLIM	0.00	1.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11LJA.	171.63	170.68	171.63	170.18	169.76	169.68	169.18	169.09	169.09
11LAS.	109.73	111.68	109.73	106.19	103.54	102.45	92.68	90.96	90.95
11LDO.	272.86	271.99	272.86	267.53	263.99	262.63	250.56	248.42	248.42
61B...	12.57	12.57	14.46	14.46	22.84	22.84	22.83	22.84	22.83
63S...	8.37	8.37	8.37	8.37	0.00	0.00	0.00	0.00	0.00
66W...	1.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
60CA..	44.00	42.11	44.00	44.00	44.00	44.00	44.00	44.00	44.00
61DAB.	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	1.88
63DAS.	8.37	8.37	8.37	8.37	0.00	0.00	0.00	0.00	0.00
66DAW.	10.48	9.47	10.48	14.38	25.66	26.92	36.35	38.02	48.70
61BPL.	0.00	0.00	1.89	1.89	10.27	10.27	10.26	10.27	20.95
66WC..	21.53	22.41	23.43	27.32	38.61	39.86	49.29	50.96	61.64

activity is varied from the beginning price to the ending price in increments no smaller than the minimum increment specified by the user. At each solution point, the price of the named activity used for that solution, the value of the objective function using that price and the value of the objective function using the constant price are listed. Only activities which come into one or more of the solutions at a non-zero level are listed in this report.

Constant Price Comparisons

The determination of effective price ranges as outlined above is only one of the possible functions of the parametric price program. Parametric price results are sometimes presented showing the relationship between the value of the objective function and the price being varied. The value of the objective function used in a parametric price program, if compared at two solution points, shows the difference in net return due to the change in farm organization and due to the change in the price being varied. If a value of the objective function is computed using a constant price at each solution point, a comparison of these values between two solution points will show the change in net return due to the change in farm organization only. This latter comparison can be very important when interpreting linear programming results to farmers. First, if a change in the farm plan results in only a small change in net income (at constant prices) he may be indifferent between the original and a revised plan.

The "cost of a wrong decision" in farm planning with respect to the price of a major commodity produced on the farm may also be evaluated. For example, if wheat is the commodity in question and the "constant" price is \$1.25 per bushel, the difference between the net return figured at a constant price, in a solution computed using \$1.25 wheat and one with \$1.40 wheat represents the loss in income which would be incurred if the farm organization were based on a wheat price of \$1.25 per bushel, and a price of \$1.40 per bushel was realized. In Table XIII, one would use the row in which "\$1.25" appears in the left margin (the row which shows net return computed at a constant wheat price of \$1.25) and the columns headed by "\$1.21" and "\$1.39". By subtracting \$11,467.31 from \$11,421.71, it is found that the estimated "cost" of employing a farm plan based on \$1.25 wheat when a wheat price of \$1.40 is actually realized would only be \$45.60.

A set of solutions may also be treated as a set of alternative plans for a farmer to choose from, if the differences in net return due to farm organization are small. For example, the farm plans in Table XIII resulting from wheat prices of \$1.15 to \$1.42 per bushel only produce an eighty-four dollar variation in net return due to farm organization. This is a relatively small proportion of the net return. Thus, a farmer may view these nine plans as alternatives which will all produce about the same net return, given a wheat price of \$1.25 per bushel.

Mechanics

This program requires one card in addition to that input required for the FMPLAN subroutine. On this card, the activity whose price is to be varied is named (see activity abbreviations in Appendix Table XIV). The beginning price, ending price, constant price, and the minimum increment are also specified.

The source listing of the parametric price program appears in Appendix Table XXIV. In this program, the input tape is read in the main program rather than in the FMPLAN subroutine. This is necessary in order to locate the activity and place the beginning price on it before calling the subroutine. When the subroutine is executed, all revisions are made as usual, except for the price of the activity being parametrically priced. It remains at the beginning price. If the activity to be parametrically priced does not appear in the basis of the initial solution, its incoming price is computed for use during the next execution of the optimizing routine.

Execution speed of this program on an IBM 7040 computer is approximately one solution per minute.

Summary

The above programs comprise the operating system. The report formats present information which was thought to be of most interest to farmers of north central Oklahoma. The programs were designed to fulfill several of the objectives of this study in an efficient manner. The applications of the reports and other data generated by the system are discussed in the following chapter.

CHAPTER IV

APPLICATIONS OF AN AREA FARM MANAGEMENT INFORMATION SYSTEM

Previous chapters have described the development of the system. The collection and storage of data were discussed in Chapter II. The operating system and reports generated by the system were discussed in Chapter III. The uses of the system, their relevance in a farm management education program and suggestions for administering the system are discussed in this chapter.

The applications of the system are, of course, the methods by which the real objectives of the system may be achieved. Specific uses of the system involve area farm management agents, county extension directors and staff members of the agricultural economics department. Success depends on using the system as an integral part of an educational program. The reports generated by the system may be read by farmers. But, if farmers have not been taught how to interpret them, improper use of the system may result. Therefore, an educational effort must precede or accompany the introduction of such a system to an area. Proper employment of the system could increase the efficiency and effectiveness of educators who work with farmers on problems of management.

Application Techniques

The uses of the system may be divided into two separable but related areas. One area of use involves representative farm resource situations. The other area of use involves actual farm resource situations. The two uses will be discussed separately although in some cases one may support the other, or they may be used jointly.

Representative Farms

Representative farm resource situations may be used in various ways through the system. These uses may be broadly grouped as repetitive runs for publication and as experimental runs.

Repetitive Runs. The output formats of the government program comparison report and the individual farm detailed report were designed for direct photographic reproduction in a farm management publication. These reports could be published, reflecting current or expected prices, yields, government program provisions, and other parameters. The frequency of publication could be governed by changes in the parameters. Thus, when a change in prices, for example, made previously published farm plans obsolete, a new set could be run, using revised prices. Price ranges or parametric pricing runs could be used to establish ranges over which a set of plans were valid. Some cost ranges may also be interpreted as yield ranges [8, pp. 65-73]. This option could further aid in establishing the stability of a set of plans, or in generalizing results from them.

The optimal plans could be published under their own title, or as a part of the "O. S. U. Fact Sheet" series. A standard explanation of the reports could be printed by computer so that no professional staff time would be required in writing the publication. Emphasis would be placed on timliness. Professional personnel would detect needed revisions. A new set of reports would be run, checked by a member of the professional staff, photographically reproduced and mailed within a few days.

These published reports would be most effective in answering general questions with which all of the farmers in an area may be faced. Such general questions may be caused by a change in government program provisions, an area-wide drouth or a significant change in the price of a major commodity produced in the area. The area agent or county extension director should find the reports useful as background information and as examples for use in meetings, newspaper articles, radio programs, and television programs.

The published reports could also serve a useful role in the individual consultation with farmers by area agents, as representative farm results may be used to answer questions relating to an individual farmer's situation. Three techniques for accomplishing this are mentioned here. First, if the individual's situation is somewhat comparable to that of a representative farm a quick generalization may be possible. Second, the representative farm results may be used as a guide for budgeting an alternative plan for an individual farm. The result may not be an optimal plan for the individual farm, but it may be near-optimal and it can be found more quickly through the use of a representative farm plan as a guide.

The third technique involves the use of simplified programming [14]. This technique may be used when an individual farm is not directly comparable to a representative farm, but it is similar to some combination of two or more representative farm resource situations [1, pp. 69-84]. This technique involves the linear interpolation of optimal representative farm plans. The optimal plans of representative farms are used as activities in the simplified program. The optimal plans are entered on a per unit basis of some basic resource, such as acres of total cropland. Other resource requirements are entered in terms of their relationship to the base resource. The simplified programming computations may be made in the field by an area agent. The resulting composite plan should be checked by budgeting to insure that it is an improvement over the present plan. This technique allows representative farm optimal plans to be extremely useful in answering individual farm planning questions. The technique has not been used extensively at the field level, however. One reason for its limited use is the unavailability of current optimal organizations for representative farms. Thus, as these optimal organizations are made available by the system, use of the simplified programming technique may be expected to increase.

Experimental Runs. Representative farm resource situations may also be used in answering specific questions which relate to the response or adjustment of farms in an area. Questions may arise in the field use of published reports. For example, an area agent may wish to see the farm plans and incomes which result from various wheat prices, or various cattle prices. In this case, parametric pricing runs may be made, or one of the simplified reports may be run at several alternative prices. Other persons may wish to explore the capital requirements associated with various farm plans. Through the matrix revision techniques described in Chapter III, the analysis may be accomplished by forcing certain activities into the solution and blocking others from entering the solution.

The effect of moisture conditions on farm plans may be evaluated by adjusting the yields of one or more crops upward or downward one or two standard deviations. The effect of alternative government programs or alternative government program payment rates on the organization and income of farms in an area may also be estimated with relative ease.

The above are examples. Many more possible uses exist for optimal representative farm plans produced by the system. The above examples were presented to demonstrate the usefulness of this aspect of the system and how it may increase the effectiveness of a farm management education program.

Actual Farms

As indicated in Chapter I, actual farm linear programming is expensive in terms of professional staff time. In states where linear programming is used in extension farm management education, only a limited number of farms have been programmed. The system developed in this study should allow actual farms to be linear programmed at a reasonable cost. This cost may vary with the degree of sophistication desired. As indicated in the discussion of the individual farm data form (Table VI) in Chapter III, a farm may be linear programmed with only the information required for the first page of that form. These data, relating to the resource base, should be readily available for most farms. After approximately twenty-five cards are punched from the pre-coded form, a computer run may be made. The output, including the simplified reports could be mailed directly to the area agent who collected the data. The agent, in turn, would relate the information to the farmer.

If more precision were desired, additional information may be collected from the farmer, or estimates may be made and used in place of certain data bank coefficients. Even if extensive revisions are made, the system offers many advantages over building individual matrices for each farm.

In the replies received from personnel at state universities who do individual farm linear programming, as noted in Chapter I, individual farm data were used where possible. In most cases, however, standard budgets or estimates by agricultural college personnel were used where individual farm data were not available. The system developed in this study essentially does the same thing. If individual farm data are not available for revising the data bank coefficients, the standard coefficients are used. These standard coefficients have been prepared for a given area and given soil types by agricultural college personnel.

In addition, the system offers a framework which remains the same from one farm to another. In conventional individual farm programming, a large portion of the matrix, relating to government programs, buy-sell activities and inventories remains the same from farm-to-farm, but it must be rebuilt for each farm. This duplication of effort is eliminated or reduced by the system. When a user of the system becomes acquainted with it, he may think only in terms of a few revisions to the system for each farm, rather than starting over for each farm.

As noted earlier, the system is flexible in that it allows as much individual farm information to be used as is available. This information may be entered directly into the system in terms which are familiar to the user, such as fertilizer cost, machine hire rate, etc.

If the user wishes to adjust the activities for a given level of management, he may lower or raise crop yields, production cost items, or other coefficients by a uniform factor.

The manner in which individual farm linear programming may be carried out may vary. Four possible approaches are suggested.

Special Problems. First, certain individual farm planning problems which arise during consultations of farmers with an area farm management agent may best be solved by linear programming. In this case, the area agent may provide the required information and request that a program be run.

Seven such runs were made during August and September, 1968, while testing the system, particularly the government program comparison report. Data was collected by the area agent in north central Oklahoma on a preliminary version of the individual farm data form and mailed to the author. The programs were run, reviewed, and mailed back to the area agent who discussed the results with the farmers. In each case, the agent felt that the farmer viewed the information as relevant and important in his planning decisions relating to the 1969 wheat program.

Workshop Participants. The system may be utilized in various types of farm management worshops. For example, the first workshop session may deal with an evaluation of available resources, and the first page of the individual farm data form may be filled out. Other sessions may deal with crop and livestock budgets, and revisions may be made to data bank coefficients on the basis of an individual's computations. Prices may be studied in another session, and the expected prices may be indicated on the individual farm data form. Basic economic principles may also be studied, showing the methods of choosing enterprises which will tend to maximize returns to the resource base. When the linear programming runs are returned, several sessions may be held on the interpretation of the results and rerun requests may be accepted from those participants who wish to explore alternative prices, yields, etc.

Farm Record Project Cooperators. It is possible that individual farm linear programs may be run for individuals participating in a farm record project, using information which is currently on file at the records processing center. If this information is not on file, forms and procedures for obtaining information may be revised so that it will be collected in the future. Thus, the system may serve as a guide for the collection of data which is necessary in farm decision making. As input-output data become available from enterprise records on an individual farm, they may be substituted for the standard data. The information system then serves as a backup data source, filling in where necessary until individual farm data becomes available. Farmers may be motivated to keep more detailed production records on their various enterprises if they are able to see the manner in which these data may be used in decision making. In summary, the information system could serve as a guide for the collection, classification and storage of farm record data needed for farm decision making.

Fee Service. Individual farms could also be programmed on a fee basis. The mechanics would be similar to the "special problem" example discussed above, only the farmer would pay a fee to cover the cost of computer and clerical time. Many farmers participating in farm record projects currently pay such a fee. Due to the need for an accompanying educational effort, an area farm management agent or some other educator with similar knowledge and training should administer the program at the local level.

A "package" could be offered in this type of program. The government program comparison report could be run first and shown to the farmer. He would then select a government program participation alternative on which he desired a more detailed report. The detailed report could then be shown to him. A limited number of parametric price runs could also be offered to answer questions which were raised in his discussion of the first two reports with the area agent. A fixed fee might be charged for one run of each of the simplified reports and a given number of parametric price runs.

Administrative Recommendations

The recommendations appearing in this section are based on the assumption that an area farm management information system would be developed for each economic type of farming area of Oklahoma which is served by an area farm management agent. These may be separate systems or they may be combined so that activities common between one or more areas would not be duplicated.

Development

Area farm management agents would be heavily involved in the development and maintenance of a system or series of systems such as the one developed in this study. The operation of the system would make them more effective in their educational efforts which involve farm planning, but in order that they realize a benefit from the fixed commitment of time necessary for the construction and maintenance of the system, they should probably spend at least one-half of their time working on educational activities related to it. Thus, it is important that their supervisors and extension administrators be committed to an intensive extension program in farm decision making. They should also feel that the area information system approach is the most feasible way in which that program may be executed.

The personnel required in the development of systems for the various areas of the state will depend on the rate at which development is desired. For rapid development, an agricultural economics staff member should spend full time on this project and would require programming and clerical assistance. This person would, of course, work closely with the area agents whose areas were under development. Development would be slowed considerably if crop and livestock budgets were not previously available in each area. Even with a slower rate of development, a point will be reached when the maintenance requirements of previously developed systems will require the services of such a person as mentioned above.

Maintenance

An item of prime importance when anticipating the development of a series of area systems should be maintenance. Efforts spent in developing a system as discussed in this thesis would be spent in vain if budget and personnel allowances were not made for maintenance of the system. The applications of the system discussed earlier in this chapter are based on the assumption that the data bank and operating system are revised immediately when changes occur which make any part of either obsolete. As mentioned above, it is suggested that a full time staff member in agricultural economics be assigned the responsibility of maintenance and operation of the system or series of systems.

The area farm management agents should also play a key role in sensing needed revisions, such as cost revisions in standard budgets, additional activities needed or yield revisions as a result of an improved crop variety. The area agent should be familiar with the linear programming matrix so that he can recognize its potential as well as its limitations.

CHAPTER V

SUMMARY AND CONCLUSIONS

The objective of this study was to develop an area information system which would produce optimum farm organizations for representative farms, allow rapid evaluation of changes in the farm decision making environment and allow rapid dissemination of these results to farmers and their advisors. In addition, the capability of producing optimal plans for actual farms and an exploration of the use of information generated by the system in a farm management education program were desired.

The foundation of an area farm management information system was presented in Chapter II. An area data bank was developed for north central Oklahoma. The decision making model employed by the system governs the design of the data bank. Linear programming was selected as the decision making model for the system developed in this study. The standard linear programming tableau furnishes a pattern for the efficient organization of a data bank.

Accounting functions, government program provisions and output format procedures are factors which favor the initial inclusion of all feasible activities for an area in the area data bank. For example, a crop which requires specialized treatment in relation to government program provisions could cause numerous revisions in the data bank, if it were to be added to an existing system.

Costs for production activities are itemized in the data bank and may be revised individually. Coefficients of variation for crop yields are also stored in the data bank and may be used to adjust crop yields in the linear programming tableau.

In Chapter III, an operating system was developed to directly fulfill several of the objectives of this study. Alternative techniques were discussed regarding the development and use of an operating system. When developing a system, activities and constraints may be addressed in the computer by location or by alphanumeric description. Verbal descriptions which are used in output formats may be read line-by-line as the report is being printed or they may be constructed from verbal activity descriptions. The amount of interpretation and the degree of refinement in report formats must also be determined when a system is being developed.

A conflict exists between the desire for a flexible addressing system and refined output formats. The alphanumeric addressing system allows activities and constraints to be added easily, but in order to design specialized output formats for each type of enterprise, all feasible enterprises must be anticipated or included in the system when it is initially constructed. In addition, features which expedite the revision of existing activities make the addition of new activities more cumbersome. Such features are automatic cost changes when yields are revised, detailed cost revisions for production activities and yield adjustments which use coefficients of variation. Thus, as noted in the above discussion of the data bank, the initial inclusion of all feasible activities in an area data bank is desirable. When all feasible activities are included in the system, the need for a flexible addressing system is diminished and the location addressing system becomes more efficient.

The intended use of a system should govern its design, however. In a system which is intended for actual farm programming, a flexible addressing system may be chosen so that activities and constraints could be added easily. The detail in the output formats would be sacrificed by such a choice, however. In a system which is intended for repetitive representative farm programming, a location addressing system and refined output formats would be desirable.

Applications of a farm management information system were discussed in Chapter IV. The discussion was in terms of potential applications. A limited field test of the system was conducted, but most applications involve the initiation of new educational programs related to farm decision making.

Representative farm plans produced by the system may be published periodically, reflecting the current decision making environment affecting farmers in an area. The plans may be used as examples and as general information, or they may be generalized to actual farms. Budgeting or simplified programming may be employed to generalize a representative farm plan to an actual farm.

Actual farms may be programmed as special problems, as a fee service, as a part of a farm record service, or as an educational aid in a farm management workshop.

An educational program should precede or accompany the use of this system. The implementation of the system in an area, or state, would require a new educational program with supporting budget and personnel. A staff member, with programming assistance, should be able to maintain and operate the system for several areas of a state. Area farm management agents play a key role in the operation and maintenance of the system, which increases their effectiveness as educators.

Thus, an area farm management information system was developed for north central Oklahoma which could serve as a pattern for the development of systems for other areas. However, this study was an experiment, the methods and findings of which are reported in this thesis. The alternatives in design and development discussed in this thesis should be viewed with more importance than the system which was actually developed.

The person who is responsible for the development of a series of area systems or a single statewide farm management information system should set out clearly the purposes of the system and establish priorities for these purposes. He should then study alternative designs and select the one which will best meet these purposes. As an example, the relative importance of repetitive representative farm programming versus actual farm programming should influence the data addressing and report printing techniques employed in the system.

The role of linear programming should possibly be mentioned. At the outset, this study was viewed as an application of linear programming -- one in which the computer output would be printed in a readily readable form. As the study progressed, however, linear programming assumed the role of an optimizing technique which was used at one stage in the operation of the system. Data storage, classification, and manipulation became a major part of the system's operation. This points out the need for computer programs which allow the combination of functions such as data revision and manipulation with models such as linear programming. This multiple function ability is important if these models are to be utilized efficiently in research and if they are to benefit individual farmers.

The system developed in this study may also serve as a starting point in the development of a more comprehensive agricultural information system. The framework here could be extended to include many other types of organizational decisions. Crop yields could be carried as unharvested inventories. Alternate harvesting, storage, and marketing methods reflecting different costs, product losses, and nutrient losses could be present in the system. Livestock feeding methods which reflected various labor and capital requirements as well as nutrient losses and various types of purchased feed could all be included as alternatives. Livestock feed requirements could be listed in terms of nutrient elements. The system could then select a cropping plan, a set of machinery, harvesting and storage methods, feeding methods, and livestock rations. Alternate crop activities could allow the selection of an optimum level of fertilizer application as well as a least cost fertilizer mix. The list of such examples can be extended to include virtually every management decision which a farmer makes.

The development of such a system would require the efforts of all disciplines in a college of agriculture. The system could serve as a guide for the coordination and direction of research. Each discipline, in the development of their contribution to the system would be developing material which they could use independently in their educational efforts. The system could serve as a pattern for the organization, coordination, storage and use of information emanating from a college of agriculture. As the volume of available data for farm decision making increases and as farm management decisions become more complex, the need for such a system is increasing.

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APPENDIX

TABLE XIV

EXPLANATION OF THE ACTIVITY ABBREVIATIONS USED IN THE LINEAR PROGRAMMING MODEL

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     CROP ACTIVITIES
71.CBA--GROW 1 ACRE OF BARLEY ON CLAY-B SOILS
71.CAA--GROW 1 ACRE OF BARLEY ON CLAY-C SOILS
71.CDA--GROW 1 ACRE OF BARLEY ON CLAY-D SOILS
71.LAA--GROW 1 ACRE OF BARLEY ON LOAM-A SOILS
71.LBA--GROW 1 ACRE OF BARLEY ON LOAM-B SOILS
71.LCA--GROW 1 ACRE OF BARLEY ON LOAM-C SOILS
71.LDA--GROW 1 ACRE OF BARLEY ON LOAM-D SOILS

73.CBA--GROW 1 ACRE OF GRAIN SORGHUM ON CLAY-B SOILS
73.CCA--GROW 1 ACRE OF GRAIN SORGHUM ON CLAY-C SOILS
73.CDA--GROW 1 ACRE OF GRAIN SORGHUM ON CLAY-D SOILS
73.LAA--GROW 1 ACRE OF GRAIN SORGHUM ON LOAM-A SOILS
73.LBA--GROW 1 ACRE OF GRAIN SORGHUM ON LOAM-B SOILS
73.LCA--GROW 1 ACRE OF GRAIN SORGHUM ON LOAM-C SOILS
73.LDA--GROW 1 ACRE OF GRAIN SORGHUM ON LOAM-D SOILS

76.CBA--GROW 1 ACRE OF WHEAT ON CLAY-B SOILS
76.CCA--GROW 1 ACRE OF WHEAT ON CLAY-C SOILS
76.CDA--GROW 1 ACRE OF WHEAT ON CLAY-D SOILS
76.LAA--GROW 1 ACRE OF WHEAT ON LOAM-A SOILS
76LBAA--GROW 1 ACRE OF WHEAT ON LOAM-B SOILS
76.LCA--GROW 1 ACRE OF WHEAT ON LOAM-C SOILS
76.LDA--GROW 1 ACRE OF WHEAT ON LOAM-D SOILS

803CBA--GROW 1 ACRE OF FORAGE SORGHUM ON CLAY-B SOILS
803CCA--GROW 1 ACRE OF FORAGE SORGHUM ON CLAY-C SOILS
803CDA--GROW 1 ACRE OF FORAGE SORGHUM ON CLAY-D SOILS
803LAA--GROW 1 ACRE OF FORAGE SORGHUM ON LOAM-A SOILS
803LBA--GROW 1 ACRE OF FORAGE SORGHUM ON LOAM-B SOILS
803LCA--GROW 1 ACRE OF FORAGE SORGHUM ON LOAM-C SOILS
803LDA--GROW 1 ACRE OF FORAGE SORGHUM ON LOAM-D SOILS

81.CBA--GROW 1 ACRE OF ALFALFA ON CLAY-B SOILS
81.CCA--GROW 1 ACRE OF ALFALFA ON CLAY-C SOILS
81.LAA--GROW 1 ACRE OF ALFALFA ON LOAM-A SOILS
81.LBA--GROW 1 ACRE OF ALFALFA ON LOAM-B SOILS
81.LCA--GROW 1 ACRE OF ALFALFA ON LOAM-C SOILS

800CBA--GROW 1 ACRE OF SMALL GRAIN PASTURE (GRAZE OUT BY MAY 1) ON CLAY-B SOILS
800CCA--GROW 1 ACRE OF SMALL GRAIN PASTURE (GRAZE OUT BY MAY 1) ON CLAY-C SOILS
800CDA--GROW 1 ACRE OF SMALL GRAIN PASTURE (GRAZE OUT BY MAY 1) ON CLAY-D SOILS
800LAA--GROW 1 ACRE OF SMALL GRAIN PASTURE (GRAZE OUT BY MAY 1) ON LOAM-A SOILS
800LBA--GROW 1 ACRE OF SMALL GRAIN PASTURE (GRAZE OUT BY MAY 1) ON LOAM-B SOILS
800LCA--GROW 1 ACRE OF SMALL GRAIN PASTURE (GRAZE OUT BY MAY 1) ON LOAM-C SOILS
800LDA--GROW 1 ACRE OF SMALL GRAIN PASTURE (GRAZE OUT BY MAY 1) ON LOAM-D SOILS

85.CBA--GROW 1 ACRE OF SUDAN PASTURE ON CLAY-B SOILS
85.CCA--GROW 1 ACRE OF SUDAN PASTURE ON CLAY-C SOILS
85.CDA--GROW 1 ACRE OF SUDAN PASTURE ON CLAY-D SOILS
85.LAA--GROW 1 ACRE OF SUDAN PASTURE ON LOAM-A SOILS
85.LBA--GROW 1 ACRE OF SUDAN PASTURE ON LOAM-B SOILS
85.LCA--GROW 1 ACRE OF SUDAN PASTURE ON LOAM-C SOILS
85.LDA--GROW 1 ACRE OF SUDAN PASTURE ON LOAM-D SOILS
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TABLE XIV (Continued)

85WCBA--GROW 1 ACRE OF SUDAN FOR WINTER GRAZING ON CLAY-B SOILS
85WCCA--GROW 1 ACRE OF SUDAN FOR WINTER GRAZING ON CLAY-C SOILS
85WCDA--GROW 1 ACRE OF SUDAN FOR WINTER GRAZING ON CLAY-D SOILS
85WLAA--GROW 1 ACRE OF SUDAN FOR WINTER GRAZING ON LOAM-A SOILS
85WLBA--GROW 1 ACRE OF SUDAN FOR WINTER GRAZING ON LOAM-B SOILS
85WLCA--GROW 1 ACRE OF SUDAN FOR WINTER GRAZING ON LOAM-C SOILS
85WLDA--GROW 1 ACRE OF SUDAN FOR WINTER GRAZING ON LOAM-D SOILS

60FALL--FALLOW IDLE CROPLAND--MAY OR MAY NOT BE DIVERTED ACRES

86.C1A--GROW 1 ACRE OF NATIVE PASTURE ON CLAY SOILS
86.L1A--GROW 1 ACRE OF NATIVE PASTURE ON LOAM SOILS

LIVESTOCK ACTIVITIES

111RTA--PRODUCE ONE COW-CALF UNIT--CALF BORN MARCH 1, NOT CREEP FED, COWS WINTERED ON COTTON SEED CAKE AND NATIVE RANGE, CALF SALABLE OCT. 1 AS A GOOD-CHOICE FEEDER

112RTA--PRODUCE ONE COW-CALF UNIT--CALF BORN MARCH 1, NOT CREEP FED, COWS WINTERED ON COTTON SEED CAKE, NATIVE RANGE AND FORAGE SORGHUM, CALF SALABLE OCT. 1 AS A GOOD-CHOICE FEEDER

113RTA--PRODUCE ONE COW-CALF UNIT--CALF BORN MARCH 1, NOT CREEP FED, COWS WINTERED ON NATIVE RANGE, FORAGE SORGHUM AND SMALL GRAIN PASTURE (WINTER ONLY), CALF SALABLE OCT. 1 AS A GOOD-CHOICE FEEDER

111VLA--PRODUCE ONE COW-CALF UNIT--CALF BORN NOV. 1, NOT CREEP FED, COWS WINTERED ON NATIVE RANGE, SMALL GRAIN PASTURE(WINTER ONLY), AND GRAIN SORGHUM STUBBLE WITH FORAGE SORGHUM AND COTTON SEED CAKE, CALF SALABLE JULY 20 AS A GOOD-CHOICE FEEDER

141TTA--PRODUCE ONE GOOD FEEDER STEER--BOUGHT OCT. 15, WINTERED ON NATIVE RANGE AND COTTON SEED CAKE, SALABLE OCT. 15

142TTA--PRODUCE ONE GOOD FEEDER STEER--BOUGHT OCT. 15, WINTERED ON NATIVE RANGE, COTTON SEED CAKE AND NATIVE RANGE, SALABLE OCT. 15

143TTA--PRODUCE ONE GOOD FEEDER STEER--BOUGHT OCT. 15, WINTERED ON NATIVE RANGE, GRAIN SORGHUM STUBBLE AND COTTON SEED CAKE, SALABLE OCT. 15

144TYA--PRODUCE ONE GOOD FEEDER STEER--BOUGHT OCT. 15, WINTERED ON SMALL GRAIN PASTURE WITH FORAGE SORGHUM AND COTTON SEED CAKE WHEN OFF SMALL GRAIN, SALABLE MAY 1 FROM GRAZED OUT SMALL GRAIN

145TYA--PRODUCE ONE GOOD FEEDER STEER--BOUGHT OCT. 15, WINTERED ON SMALL GRAIN PASTURE AND GRAIN SORGHUM STUBBLE WITH FORAGE SORGHUM AND COTTON SEED CAKE WHEN OFF SMALL GRAIN, SALABLE MAY 1 FROM GRAZED-OUT SMALL GRAIN

146TRA--PRODUCE ONE GOOD FEEDER STEER--BOUGHT OCT. 15, WINTERED ON SMALL GRAIN PASTURE WITH FORAGE SORGHUM AND COTTON SEED CAKE WHEN OFF SMALL GRAIN, SALABLE MARCH 1

147TRA--PRODUCE ONE GOOD FEEDER STEER--BOUGHT OCT. 15, WINTERED ON GRAIN SORGHUM STUBBLE AND NATIVE RANGE WITH FORAGE SORGHUM AND COTTON SEED CAKE WHEN OFF GRAIN SORGHUM STUBBLE, SALABLE MARCH 1

BUY-SELL ACTIVITIES

710SBA--SELL 1 BU. BARLEY
730SSA--SELL 1 CWT. GRAIN SORGHUM
760SWA--SELL 1 BU. WHEAT
800WPS--SELL 1 AUM SMALL GRAIN PASTURE(WINTER AND GRAZE OUT)
800WPW--SELL 1 AUM SMALL GRAIN PASTURE(WINTER ONLY)

TABLE XIV (Continued)

810SHA--SELL 1 TON ALFALFA HAY
801BHA--BUY 1 TON PRAIRIE HAY OR FORAGE SORGHUM

110S1A--SELL 1 CWT. OF GOOD-CHOICE FEEDER STEER OCT. 1
110H1A--SELL 1 CWT. OF GOOD-CHOICE FEEDER HEIFER OCT. 1
110C1A--SELL 1 CWT. OF CULL COW FROM SPRING CALVING ACTIVITY
110S2A--SELL 1 CWT. OF GOOD-CHOICE FEEDER STEER JULY 20
110H2A--SELL 1 CWT. OF GOOD-CHOICE FEEDER HEIFER JULY 20
110C2A--SELL 1 CWT. OF CULL COW FROM FALL CALVING ACTIVITY

141STA--BUY 1 CWT. OF GOOD FEEDER STEER OCT. 15
140S1A--SELL 1 CWT. OF GOOD FEEDER STEER MARCH 1
140S2A--SELL 1 CWT. OF GOOD FEEDER STEER MAY 1
140S3A--SELL 1 CWT. OF GOOD FEEDER STEER OCT. 15

111JAA--HIRE 1 HOUR JAN.-APRIL LABOR
111MJA--HIRE 1 HOUR MAY-JULY LABOR
111ASA--HIRE 1 HOUR AUG.-SEPT. LABOR
111ODA--HIRE 1 HOUR OCT.-DEC. LABOR

331BCA--COUNT 1 DOLLAR OF TOTAL CAPITAL
321BCA--BORROW 1 DOLLAR OF ANNUAL CAPITAL

GOVERNMENT PROGRAM ACTIVITIES
61MDBA--DIVERT 1 ACRE OF MINIMUM BARLEY DIVERSION
63MDSA--DIVERT 1 ACRE OF MINIMUM GRAIN SORGHUM DIVERSION
66MDWA--DIVERT 1 ACRE OF MINIMUM WHEAT DIVERSION
61BDCA--DIVERT 1 ACRE OF ADDITIONAL BARLEY DIVERSION
63SDCA--DIVERT 1 ACRE OF ADDITIONAL GRAIN SORGHUM DIVERSION
66WDCA--DIVERT 1 ACRE OF ADDITIONAL WHEAT DIVERSION

610BCA--COLLECT PRICE SUPPORT PAYMENT ON 1 ACRE OF BARLEY
630SCA--COLLECT PRICE SUPPORT PAYMENT ON 1 ACRE OF GRAIN SORGHUM
660WCA--COLLECT WHEAT CERTIFICATES ON 1 ACRE OF WHEAT

60TCA.--ALLOW 1 ACRE OF SMALL GRAIN PASTURE TO SATISFY 1 ACRE OF THE DIVERTED ACREAGE REQUIREMENT
60TCAW--ALLOW WHEAT CERTIFICATES TO BE COLLECTED ON 1 ACRE OF GRAZED-OUT WHEAT

60BFS.--SUBSTITUTE 1 ACRE OF BARLEY FOR 1 ACRE OF GRAIN SORGHUM
60BFW.--SUBSTITUTE 1 ACRE OF BARLEY FOR 1 ACRE OF WHEAT
60SFB.--SUBSTITUTE 1 ACRE OF GRAIN SORGHUM FOR 1 ACRE OF BARLEY
60SFW.--SUBSTITUTE 1 ACRE OF GRAIN SORGHUM FOR 1 ACRE OF WHEAT
60WFB.--SUBSTITUTE 1 ACRE OF WHEAT FOR 1 ACRE OF BARLEY
60WFS.--SUBSTITUTE 1 ACRE OF WHEAT FOR 1 ACRE OF GRAIN SORGHUM

TABLE XV

EXPLANATION OF THE CONSTRAINT ABBREVIATIONS USED IN THE LINEAR PROGRAMMING MODEL

LAND
9TO..--ACRES OF TOTAL CROPLAND
9CB..--ACRES OF CLAY-B LAND
9CC..--ACRES OF CLAY-C ALND
9CD..--ACRES OF CLAY-D LAND
9CP..--ACRES OF CLAY NATIVE PASTURE
9LA..--ACRES OF LOAM-A LAND
9LB..--ACRES OF LOAM-B LAND
9LC..--ACRFS OF LOAM-C LAND
9LD..--ACRES OF LOAM-D LAND
9LP..--ACRES OF LOAM NATIVE PASTURE

81HLIM--ACRES OF ALFALFA PERMITTED BY THE FARM OPERATOR

LABOR
11LJA.--HOURS OF JANUARY-APRIL LABOR
11LMJ.--HOURS OF MAY-JULY LABOR
116AS.--HOURS OF AUGUST-SEPTEMBER LABOR
11LOD.--HOURS OF OCTOBER-DECEMBER LABOR

CAPITAL
3CO..--DOLLARS OF TOTAL CAPITAL
3COA.--DOLLARS OF CAPITAL ADJUSTED TO AN ANNUAL BASIS

CROP INVENTORIES
71BAP.--BUSHELS OF BARLEY
73GSP.--CWT. OF GRAIN SORGHUM
76WHP.--BUSHELS OF WHEAT
80HAY.--TONS OF PRAIRIE HAY OR FORAGE SORGHUM
81HAY.--TONS OF ALFALFA HAY
73STB.--AUM'S OF OF GRAIN SORGHUM STUBBLE
80MAR.--AUM'S OF OCT-MAR SMALL GRAIN PASTURE
80MAY.--AUM'S OF MAR-MAY SMALL GRAIN PASTURE
86NP..--AUM'S OF NATIVE PASTURE

LIVESTOCK INVENTORIES
11CS1.--CWT. OF GOOD-CHOICE 485 POUND FEEDER STEERS SOLD OCT. 1
11CH1.--CWT. OF GOOD-CHOICE 460 POUND FEEDER HEIFERS SOLD OCT. 1
11CC1.--CWT. OF CULL COWS FROM SPRING CALVING ACTIVITY
11CS2.--CWT. OF GOOD-CHOICE 485 POUND FEEDER STEERS SOLD JULY 20
11CH2.--CWT. OF GOOD-CHOICE 460 POUND FEEDER HEIFERS SOLD JULY 20
11CC2.--CWT. OF CULL COWS FROM FALL CALVING ACTIVITY

14SB..--CWT. OF GOOD FEEDER STEERS BOUGHT OCT. 15
14SS1.--CWT. OF GOOD FEEDER STEERS SOLD MARCH 1
14SS2.--CWT. OF GOOD FEEDER STEERS SOLD MAY 1
14SS3.--CWT. OF GOOD FEEDFR STEERS SOLD OCT. 15

GOVERNMENT PROGRAMS
61B...--ACRES OF BARLEY BASE
63S...--ACRES OF GRAIN SORGHUM BASE
66W...--ACRES OF WHEAT ALLOTMENT
60CA..--ACRES OF CONSERVING BASE

TABLE XV (Continued)

61DMB.--ACRES OF MINIMUM BARLEY DIVERSION
63DMS.--ACRES OF MINIMUM GRAIN SORGHUM DIVERSION
66DMW.--ACRES OF MINIMUM WHEAT DIVERSION

61DAB.--ACRES OF ADDITIONAL BARLEY DIVERSION
63DAS.--ACRES OF ADDITIONAL GRAIN SORGHUM DIVERSION
66DAW.--ACRES OF ADDITIONAL WHEAT DIVERSION

61BP..--ACRES OF BARLEY GROWN
61BPL.--ACRES OF BARLEY WHICH QUALIFY FOR PRICE SUPPORT PAYMENT
63SP..--ACRES OF GRAIN SORGHUM GROWN
63SPL.--ACRES OF GRAIN SORGHUM WHICH QUALIFY FOR PRICE SUPPORT PAYMENT
66WC..--ACRES OF WHEAT GROWN
66WCL.--ACRES OF WHEAT WHICH QUALIFY FOR WHEAT CERTIFICATES

60FAL.--ACRES OF IDLE AND/OR DIVERTED LAND
60DLM.--ACRES OF WHEAT GRAZE-OUT (CAN BE USED AS CONSERVING ACRES, DIVERTED ACRES OR WHEAT FOR PURPOSES OF COLLECTING CERTIFICATES)

60BFSL--ACRES OF BARLEY WHICH CAN BE SUBSTITUTED FOR GRAIN SORGHUM
60BFWL--ACRES OF BARLEY WHICH CAN BE SUBSTITUTED FOR WHEAT
60SFBL--ACRES OF GRAIN SORGHUM WHICH CAN BE SUBSTITUTED FOR BARLEY
60SFWL--ACRES OF GRAIN SORGHUM WHICH CAN BE SUBSTITUTED FOR WHEAT
60WFBL--ACRES OF WHEAT WHICH CAN BE SUBSTITUTED FOR BARLEY
60WFSL--ACRES OF WHEAT WHICH CAN BE SUBSTITUTED FOR GRAIN SORGHUM

TABLE XVI

THE A MATRIX AND THE OBJECTIVE FUNCTIONS USED IN THE LINEAR PROGRAMMING MODEL

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	71.CBA	71.CCA	71.CDA	71.LAA	71.LBA	71.LCA	71.LDA	73.CBA	73.CCA	73.CDA	73.LAA	73.LBA	73.LCA	73.LDA	76.CBA
OBJ= 1	18.19	17.49	16.99	18.39	17.99	17.59	17.19	14.63	13.83	13.43	11.31	10.91	10.51	10.06	17.79
OBJ= 2	20.67	19.97	19.47	20.87	20.47	20.07	19.67	16.99	16.19	15.79	13.67	13.27	12.87	12.42	20.27
1 9TO..	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2+ 9CB..	1.00							1.00							1.00
3+ 9CC..		1.00							1.00						
4+ 9CD..			1.00							1.00					
5 9CP..															
6+ 9LA..				1.00							1.00				
7+ 9LB..					1.00							1.00			
8+ 9LC..						1.00							1.00		
9+ 9LD..							1.00							1.00	
10 9LP..															
11+81HLIM															
12+11LJA.	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.12
13+11LMJ.	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.95
14+11LAS.	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.58
15+11LOD.	0.18	0.18	0.18	0.18	0.18	0.18	0.18								0.18
16 3CO..	18.19	17.49	16.99	18.39	17.99	17.59	17.19	14.65	13.83	13.43	11.31	10.91	10.51	10.06	17.79
17 3COA.	8.07	8.07	8.07	8.07	8.07	8.07	8.07	5.25	5.25	5.25	3.79	3.79	3.79	3.79	8.07
18 71BAP.	-32.00	-25.00	-20.00	-34.00	-30.00	-26.00	-22.00								
19 73GSP.								-16.80	-12.32	-8.96	-17.92	-15.68	-13.44	-10.64	
20 76WHP.															-28.00
21 80HAY.															
22 81HAY.															
23+73STB.								-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	
24+80MAR.	-0.70	-0.50	-0.40	-0.70	-0.60	-0.50	-0.40								-0.70
25+80MAY.															
26+86NP..															
27 11CS1.															
28 11CH1.															
29 11CC1.															
30 11CS2.															
31 11CH2.															
32 11CC2.															
33 14SB..															
34 14SS1.															
35 14SS2.															
36 14SS3.															
37+61B...	1.00	1.00	1.00	1.00	1.00	1.00	1.00								
38+63S...								1.00	1.00	1.00	1.00	1.00	1.00	1.00	
39+66W...															1.00
40-60CA..															
41 61DMB.															
42 63DMS.															
43 66DMW.															
44+61DAB.															
45+63DAS.															
46+66DAW.															
47+61BP..	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00								
48+61BPL.															
49+63SP..								-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	
50+63SPL.															
51+66WC..															-1.00
52+66WCL.															
53-60FAL.															
54+60DLM.															
55+60BFSL															
56+60BFWL															
57+60SFBL															
58+60SFWL															
59+60WFBL															
60+60WFSL															

TABLE XVI (Continued)

	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
	76.CCA	76.CDA	76.LAA	76.LBA	76.LCA	76.LDA	803CBA	803CCA	803CDA	803LAA	803LBA	803LCA	803LDA	81.CBA	81.CCA
OBJ= 1	17.09	16.79	17.41	17.11	16.81	16.51	33.28	28.78	25.78	32.76	29.76	26.76	23.76	32.01	28.26
OBJ= 2	19.57	19.27	19.89	19.59	19.29	18.99	36.40	31.90	28.90	35.88	32.88	29.88	26.88	36.35	32.60
1 9TO..	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2+ 9CB..							1.00							1.00	
3+ 9CC..	1.00							1.00							1.00
4+ 9CD..		1.00							1.00						
5 9CP..															
6+ 9LA..			1.00							1.00					
7+ 9LB..				1.00							1.00				
8+ 9LC..					1.00							1.00			
9+ 9LD..						1.00							1.00		
10 9LP..															
11+61HLIM														1.00	1.00
12+11LJA.	0.12	0.12	0.12	0.12	0.12	0.12	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.15	0.15
13+11LMJ.	0.95	0.95	0.95	0.95	0.95	0.95	0.66	0.66	0.66	0.66	0.66	0.66	0.66	2.63	2.63
14+11LAS.	0.58	0.58	0.58	0.58	0.58	0.58								1.45	1.45
15+11LBD.	0.18	0.18	0.18	0.18	0.18	0.18	1.20	1.20	1.20	1.20	1.20	1.20	1.20		
16 3CO..	17.09	16.79	17.41	17.11	16.81	16.51	26.26	23.38	21.46	24.66	22.74	20.82	18.90	32.01	28.26
17 3COA.	8.07	8.07	7.80	7.80	7.80	7.80	6.02	6.02	6.02	4.55	4.55	4.55	4.55	4.31	4.31
18 71BAP.															
19 73GSP.															
20 76WHP.	-21.00	-16.00	-28.00	-25.00	-22.00	-18.00									
21 80HAY.							-2.60	-2.00	-1.60	-3.00	-2.60	-2.20	-1.80		
22 81HAY.														-2.50	-2.00
23+73STB.							-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20
24+80MAR.	-0.50	-0.40	-0.70	-0.60	-0.50	-0.40									
25+80MAY.															
26+86NP..															
27 11CS1.															
28 11CH1.															
29 11CC1.															
30 11CS2.															
31 11CH2.															
32 11CC2.															
33 14SB..															
34 14SS1.															
35 14SS2.															
36 14SS3.															
37+61B...															
38+63S...															
39+66W...	1.00	1.00	1.00	1.00	1.00	1.00									
40-60CA..							1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
41 61DMB.															
42 63DMS.															
43 66DMW.															
44+61DAB.															
45+63DAS.															
46+66DAW.															
47+61BP..															
48+61BPL.															
49+63SP..															
50+63SPL.															
51+66WC..	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00									
52+66WCL.															
53-60FAL.															
54+60DLM.															
55+60BFSL															
56+60BFWL															
57+60SFBL															
58+60SFWL															
59+60WFBL															
60+60WFSL															

TABLE XVI (Continued)

	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
	81.LAA	81.LBA	81.LCA	800CBA	800CCA	800CDA	800LAA	800LBA	800LCA	800LDA	85.CBA	85.CCA	85.CDA	85.LAA	85.LBA
OBJ= 1	31.05	29.55	28.05	12.49	12.49	12.49	12.49	12.49	12.49	12.49	11.88	11.88	11.88	11.06	11.06
OBJ= 2	35.39	33.89	32.39	14.97	14.97	14.97	14.97	14.97	14.97	14.97	13.79	13.79	13.79	12.97	12.97
1 9TO..	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2+ 9CB..				1.00							1.00				
3+ 9CC..					1.00							1.00			
4+ 9CD..						1.00							1.00		
5 9CP..															
6+ 9LA..	1.00						1.00							1.00	
7+ 9LB..		1.00						1.00							1.00
8+ 9LC..			1.00						1.00						
9+ 9LD..										1.00					
10 9LP..															
11+81HLIM	1.00	1.00	1.00												
12+11LJA.	0.15	0.15	0.15	0.12	0.12	0.12	0.12	0.12	0.12	0.12	1.02	1.02	1.02	1.02	1.02
13+11LMJ.	2.63	2.63	2.63	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.36	0.36	0.36	0.36	0.36
14+11LAS.	1.45	1.45	1.45	0.58	0.58	0.58	0.58	0.58	0.58	0.58					
15+11LOD.				0.18	0.18	0.18	0.18	0.18	0.18	0.18					
16 3CO..	31.05	29.55	28.05	12.49	12.49	12.49	12.49	12.49	12.49	12.49	11.88	11.88	11.88	11.06	11.06
17 3COA.	2.95	2.95	2.95	7.79	7.79	7.79	7.79	7.79	7.79	7.79	5.56	5.56	5.56	5.26	5.26
18 71BAP.															
19 73GSP.															
20 76WHP.															
21 80HAY.															
22 81HAY.	-2.60	-2.40	-2.20												
23+73STB.	-0.20	-0.20	-0.20												
24+80MAR.				-0.70	-0.50	-0.40	-0.70	-0.60	-0.50	-0.40					
25+80MAY.				-1.70	-1.50	-1.40	-1.90	-1.80	-1.70	-1.60					
26+86NP..											-2.10	-1.90	-1.80	-2.40	-2.20
27 11CS1.															
28 11CH1.															
29 11CC1.															
30 11CS2.															
31 11CH2.															
32 11CC2.															
33 14SB..															
34 14SS1.															
35 14SS2.															
36 14SS3.															
37+61B...															
38+63S...															
39+66W...															
40-60CA..	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
41 61DMB.															
42 63DMS.															
43 66DMW.															
44+61DAB.															
45+63DAS.															
46+66DAW.															
47+61BP..															
48+61BPL.															
49+63SP..															
50+63SPL.															
51+66WC..															
52+66WCL.															
53-60FAL.															
54+60DLM.				-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00					
55+60BFSL															
56+60BFWL															
57+60SFBL															
58+60SFWL															
59+60WFBL															
60+60WFSL															

TABLE XVI (Continued)

	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
	85.LCA	85.LDA	85WCBA	85WCCA	85WCDA	85WLAA	85WLBA	85WLCA	85WLDA	1	2	3	4	5	6
OBJ= 1	11.06	11.06	11.88	11.88	11.88	11.06	11.06	11.06	11.06						
OBJ= 2	12.97	12.97	13.79	13.79	13.79	12.97	12.97	12.97	12.97						
1 9TO..	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00						
2+ 9CB..			1.00												
3+ 9CC..				1.00											
4+ 9CD..					1.00										
5 9CP..															
6+ 9LA..						1.00									
7+ 9LB..							1.00								
8+ 9LC..	1.00							1.00							
9+ 9LD..		1.00							1.00						
10 9LP..															
11+81HL1M															
12+11LJA.	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02						
13+11LMJ.	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36						
14+11LAS.															
15+11LOD.															
16 3CD..	11.06	11.06	11.88	11.88	11.88	11.06	11.06	11.06	11.06						
17 3COA.	5.26	5.26	5.56	5.56	5.56	5.26	5.26	5.26	5.26						
18 71BAP.															
19 73GSP.															
20 76WHP.															
21 80HAY.															
22 81HAY.															
23+73STB.			-2.10	-1.90	-1.80	-2.40	-2.20	-2.00	-1.80						
24+80MAR.															
25+80MAY.															
26+86NP..	-2.00	-1.80													
27 11CS1.															
28 11CH1.															
29 11CC1.															
30 11CS2.															
31 11CH2.															
32 11CC2.															
33 14SB..															
34 14SS1.															
35 14SS2.															
36 14SS3.															
37+61B...															
38+63S...															
39+66W...															
40-60CA..	1.00	1.00													
41 61DMB.															
42 63DMS.															
43 66DMW.															
44+61DAB.															
45+63DAS.															
46+66DAW.															
47+61BP..															
48+61BPL.															
49+63SP..															
50+63SPL.															
51+66WC..															
52+66WCL.															
53-60FAL.			1.00	1.00	1.00	1.00	1.00	1.00	1.00						
54+60DLM.															
55+60BFSL															
56+60BFWL															
57+60SFBL															
58+60SFWL															
59+60WFBL															
60+60WFSL															

TABLE XVI (Continued)

	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
	7	8	60FALL	86.C1A	86.L1A	111RTA	112RTA	113RTA	111VLA	141TTA	142TTA	143TTA	144TYA	145TYA	146TRA
OBJ= 1			2.00			18.60	18.60	13.80	14.22	17.55	17.55	17.55	9.45	9.45	8.21
OBJ= 2			2.00			18.60	18.60	13.80	14.22	17.55	17.55	17.55	9.45	9.45	8.21
1 9TO..			1.00												
2+ 9CB..															
3+ 9CC..															
4+ 9CD..															
5 9CP..				1.00											
6+ 9LA..															
7+ 9LB..															
8+ 9LC..															
9+ 9LD..															
10 9LP..					1.00										
11+81HLIM															
12+11LJA.						8.10	9.53	8.10	4.94	2.80	3.60	2.80	1.50	1.20	1.62
13+11LMJ.						1.12	1.12	1.12	1.04	1.50	1.50	1.50	1.02	1.02	
14+11LAS.						0.36	0.36	0.36	1.00	1.00	1.00	1.00			
15+11LOD.						1.58	1.58	1.58	5.78	2.30	2.40	2.30	1.14	1.04	1.14
16 3CO..						205.27	205.27	200.46	200.46	118.10	118.10	118.10	110.17	110.17	109.42
17 3COA.						201.00	201.00	197.42	197.42	114.07	114.07	114.07	63.17	63.17	40.08
18 71BAP.															
19 73GSP.															
20 76WHP.															
21 80HAY.						0.02	0.75	0.28	0.42	0.02	0.80	0.02	0.45	0.02	0.33
22 81HAY.															
23+73STB.									1.70			1.80		1.00	
24+80MAR.								2.80	2.80				1.40	1.40	2.40
25+80MAY.													1.40	1.40	
26+86NP..				-1.00	-1.20	13.40	11.40	11.00	9.00	6.70	4.90	4.90	0.50	0.50	0.50
27 11CS1.						-2.13	-2.13	-2.13							
28 11CH1.						-1.29	-1.29	-1.29							
29 11CC1.						-1.18	-1.18	-1.18							
30 11CS2.									-2.00						
31 11CH2.									-1.29						
32 11CC2.									-1.18						
33 14SB..										4.50	4.50	4.50	4.50	4.50	4.50
34 14SS1.															-5.94
35 14SS2.													-7.08	-7.08	
36 14SS3.										-7.67	-7.67	-7.67			
37+61B...															
38+63S...															
39+66W...															
40-60CA..															
41 61OMB.															
42 63OMS.															
43 66OMW.															
44+61DAB.															
45+63DAS.															
46+66DAW.															
47+61BP..															
48+61BPL.															
49+63SP..															
50+63SPL.															
51+66WC..															
52+66WCL.															
53-60FAL.			1.00												
54+60DLM.															
55+60BFSL															
56+60BFWL															
57+60SFBL															
58+60SFWL															
59+60WFBL															
60+60WFSL															

TABLE XVI (Continued)

	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
	147TRA	1	2	3	4	710SBA	730SSA	760SWA	800WPS	800WPW	810SHA	801BHA	1	2	110S1A
OBJ= 1	14.90					-0.85	-1.65	-1.20	-7.00	-7.00	-22.50	17.00			-27.00
OBJ= 2	14.90					-0.85	-1.65	-1.20	-7.00	-7.00	-22.50	17.00			-27.00
1 9TO..															
2+ 9CB..															
3+ 9CC..															
4+ 9CD..															
5 9CP..															
6+ 9LA..															
7+ 9LB..															
8+ 9LC..															
9+ 9LD..															
10 9LP..															
11+81HLIM															
12+11LJA.	2.12														
13+11LMJ.															
14+11LAS.															
15+11LOD.	2.30														
16 3CO..	116.11											17.00			
17 3COA.	41.36											8.50			
18 71BAP.						1.00									
19 73GSP.							1.00								
20 76WHP.								1.00							
21 80HAY.	0.02											-1.00			
22 81HAY.											1.00				
23+73STB.	3.10														
24+80MAR.									0.50	1.00					
25+80MAY.									0.50						
26+86NP..	0.50														
27 11CS1.															1.00
28 11CH1.															
29 11CC1.															
30 11CS2.															
31 11CH2.															
32 11CC2.															
33 14S8..	4.50														
34 14SS1.	-5.94														
35 14SS2.															
36 14SS3.															
37+61B...															
38+63S...															
39+66W...															
40-60CA..															
41 61DMB.															
42 63DMS.															
43 66DMW.															
44+61DAB.															
45+63DAS.															
46+66DAW.															
47+61BP..															
48+61BPL.															
49+63SP..															
50+63SPL.															
51+66WC..															
52+66WCL.															
53-60FAL.															
54+60DLM.															
55+60BFSL															
56+60BFWL															
57+60SFBL															
58+60SFWL															
59+60WFBL															
60+60WFSL															

TABLE XVI (Continued)

	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105
	110H1A	110C1A	110S2A	110H2A	110C2A	141STA	140S1A	140S2A	140S3A	1	2	3	111JAA	111MJA	111ASA
OBJ= 1	-25.00	-13.00	-28.30	-26.30	-14.00	27.00	-25.00	-25.00	-24.00				1.50	1.50	1.50
OBJ= 2	-25.00	-13.00	-28.30	-26.30	-14.00	27.00	-25.00	-25.00	-24.00				1.50	1.50	1.50
1 9TO..															
2+ 9CB..															
3+ 9CC..															
4+ 9CD..															
5 9CP..															
6+ 9LA..															
7+ 9LB..															
8+ 9LC..															
9+ 9LD..															
10 9LP..															
11+81HLIM															
12+11LJA.													-1.00		
13+11LMJ.														-1.00	
14+11LAS.															-1.00
15+11LOD.															
16 3CO..													1.50	1.50	1.50
17 3COA.													0.75	0.75	0.75
18 71BAP.															
19 73GSP.															
20 76WHP.															
21 80HAY.															
22 81HAY.															
23+73STB.															
24+80MAR.															
25+80MAY.															
26+86NP..															
27 11CS1.															
28 11CH1.	1.00														
29 11CC1.		1.00													
30 11CS2.			1.00												
31 11CH2.				1.00											
32 11CC2.					1.00										
33 14SB..						-1.00									
34 14SS1.							1.00								
35 14SS2.								1.00							
36 14SS3.									1.00						
37+61B...															
38+63S...															
39+66W...															
40-60CA..															
41 61DMB.															
42 63DMS.															
43 66DMW.															
44+61DAB.															
45+63DAS.															
46+66DAW.															
47+61BP..															
48+61BPL.															
49+63SP..															
50+63SPL.															
51+66WC..															
52+66WCL.															
53-60FAL.															
54+60DLM.															
55+60BFSL															
56+60BFWL															
57+60SFBL															
58+60SFWL															
59+60WFBL															
60+60WFSL															

TABLE XVI (Continued)

	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
	111ODA	1	2	3318CA	3218CA	61MDBA	63MDSA	66MDWA	618DCA	63SDCA	66WDCA	610BCA	630SCA	660WCA	60TCA.
OBJ= 1	1.50				0.07				-11.42	-13.91	-16.94	-5.08	-7.31	-36.86	0.00
OBJ= 2	1.50				0.07				-11.42	-13.91	-16.94	-5.08	-7.31	-36.86	
1 9TO..															
2+ 9CB..															
3+ 9CC..															
4+ 9CD..															
5 9CP..															
6+ 9LA..															
7+ 9LB..															
8+ 9LC..															
9+ 9LD..															
10 9LP..															
11+81HLIM															
12+11LJA.															
13+11LMJ.															
14+11LAS.															
15+11LOD.	-1.00														
16 3CO..	1.50			-1.00											
17 3COA.	0.75				-1.00										
18 71BAP.															
19 73GSP.															
20 76WHP.															
21 80HAY.															
22 81HAY.															
23+73STB.															
24+80MAR.															
25+80MAY.															
26+86NP..															
27 11CS1.															
28 11CH1.															
29 11CC1.															
30 11CS2.															
31 11CH2.															
32 11CC2.															
33 14SB..															
34 14SS1.															
35 14SS2.															
36 14SS3:															
37+618...						1.00			1.00						
38+63S...							1.00			1.00					
39+66W...											1.00				
40-60CA..															-1.00
41 61DMB.						1.00									
42 63DMS.							1.00								
43 66DMW.								1.00							
44+61DAB.									1.00						
45+63DAS.										1.00					
46+66DAW.											1.00				
47+61BP..												1.00			
48+61BPL.												1.00			
49+63SP..													1.00		
50+63SPL.													1.00		
51+66WC..														1.00	
52+66WCL.														1.00	
53-60FAL.						-1.00	-1.00	-1.00	-1.00	-1.00	-1.00				1.00
54+60DLM.															1.00
55+60BFSL															
56+60BFWL															
57+60SFBL															
58+60SFWL															
59+60WFBL															
60+60WFSL															

TABLE XVI (Continued)

	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135
	60TCAW	60BFS.	60BFW.	60SFB.	60SFW.	60WFB.	60WFS.	000000	000000	000000	9CB..	9CC..	9CD..	9LA..	9LB..
OBJ= 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00								
OBJ= 2															
1 9TO..															
2+ 9CB..											1.00				
3+ 9CC..												1.00			
4+ 9CD..													1.00		
5 9CP..															
6+ 9LA..														1.00	
7+ 9LB..															1.00
8+ 9LC..															
9+ 9LD..															
10 9LP..															
11+81HLIM															
12+11LJA.															
13+11LMJ.															
14+11LAS.															
15+11LOD.															
16 3CO..															
17 3COA.															
18 71BAP.															
19 73GSP.															
20 76WHP.															
21 80HAY.															
22 81HAY.															
23+73STB.															
24+80MAR.															
25+80MAY.															
26+86NP..															
27 11CS1.															
28 11CH1.															
29 11CC1.															
30 11CS2.															
31 11CH2.															
32 11CC2.															
33 14SB..															
34 14SS1.															
35 14SS2.															
36 14SS3.															
37+61B...		-1.00	-1.00	1.00		1.00									
38+63S...		1.00		-1.00	-1.00		1.00								
39+66W...	1.00		1.00		1.00	-1.00	-1.00								
40-60CA..	-1.00														
41 61DMB.															
42 63DMS.															
43 66DMW.															
44+61DAB.															
45+63DAS.															
46+66DAW.															
47+61BP..															
48+61BPL.															
49+63SP..															
50+63SPL.															
51+66WC..	-1.00														
52+66WCL.															
53-60FAL.															
54+60DLM.	1.00														
55+60BFSL		1.00													
56+60BFWL			1.00												
57+60SFBL				1.00											
58+60SFWL					1.00										
59+60WFBL						1.00									
60+60WFSL							1.00								

TABLE XVI (Continued)

	136 9LC..	137 9LD..	138 81HLIM	139 11LJA.	140 11LMJ.	141 11LAS.	142 11LOD.	143 73STB.	144 80MAR.	145 80MAY.	146 86NP..	147 61B...	148 63S...	149 66W...	150 60CA..
OBJ= 1															
OBJ= 2															
1 9TO..															
2+ 9CB..															
3+ 9CC..															
4+ 9CD..															
5 9CP..															
6+ 9LA..															
7+ 9LB..															
8+ 9LC..	1.00														
9+ 9LD..		1.00													
10 9LP..															
11+81HLIM			1.00												
12+11LJA.				1.00											
13+11LMJ.					1.00										
14+11LAS.						1.00									
15+11LOD.							1.00								
16 3CO..															
17 3COA.															
18 71BAP.															
19 73GSP.															
20 76WHP.															
21 80HAY.															
22 81HAY.															
23+73STB.								1.00							
24+80MAR.									1.00						
25+80MAY.										1.00					
26+86NP..											1.00				
27 11CS1.															
28 11CH1.															
29 11CC1.															
30 11CS2.															
31 11CH2.															
32 11CC2.															
33 14SB..															
34 14SS1.															
35 14SS2.															
36 14SS3.															
37+61B...												1.00			
38+63S...													1.00		
39+66W...														1.00	
40-60CA..															-1.00
41 61DMB.															
42 63DMS.															
43 66DMW.															
44+61DAB.															
45+63DAS.															
46+66DAW.															
47+61BP..															
48+61BPL.															
49+63SP..															
50+63SPL.															
51+66WC..															
52+66WCL.															
53-60FAL.															
54+60DLM.															
55+60BFSL															
56+60BFWL															
57+60SFBL															
58+60SFWL															
59+60WFBL															
60+60WFSL															

TABLE (XVI (Continued)

	151 61DAB.	152 63DAS.	153 66DAW.	154 61BP..	155 61BPL.	156 63SP..	157 63SPL.	158 66WC..	159 66WCL.	160 60FAL.	161 60DLM.	162 60BFSL	163 60BFWL	164 60SFBL	165 60SFWL
OBJ= 1															
OBJ= 2															
1 9TO..															
2+ 9CB..															
3+ 9CC..															
4+ 9CD..															
5 9CP..															
6+ 9LA..															
7+ 9LB..															
8+ 9LC..															
9+ 9LD..															
10 9LP..															
11+81HLIM															
12+11LJA.															
13+11LMJ.															
14+11LAS.															
15+11LOD.															
16 3CO..															
17 3COA.															
18 71BAP.															
19 73GSP.															
20 76WHP.															
21 80HAY.															
22 81HAY.															
23+73STB.															
24+80MAR.															
25+80MAY.															
26+86NP..															
27 11CS1.															
28 11CH1.															
29 11CC1.															
30 11CS2.															
31 11CH2.															
32 11CC2.															
33 14SB..															
34 14SS1.															
35 14SS2.															
36 14SS3.															
37+61B...															
38+63S...															
39+66W...															
40-60CA..															
41 61DMB.															
42 63DMS.															
43 66DMW.															
44+61DAB.	1.00														
45+63DAS.		1.00													
46+66DAW.			1.00												
47+61BP..				1.00											
48+61BPL.					1.00										
49+63SP..						1.00									
50+63SPL.							1.00								
51+66WC..								1.00							
52+66WCL.									1.00						
53-60FAL.										-1.00					
54+60DLM.											1.00				
55+60BFSL												1.00			
56+60BFWL													1.00		
57+60SFBL														1.00	
58+60SFWL															1.00
59+60WFBL															
60+60WFSL															

TABLE XVI (Continued)

	166 60WFBL	167 60WFSL
OBJ= 1		
OBJ= 2		
1 9TO..		
2+ 9CB..		
3+ 9CC..		
4+ 9CD..		
5 9CP..		
6+ 9LA..		
7+ 9LB..		
8+ 9LC..		
9+ 9LD..		
10 9LP..		
11+81HLIM		
12+11LJA.		
13+11LMJ.		
14+11LAS.		
15+11LOD.		
16 3CO..		
17 3COA.		
18 71BAP.		
19 73GSP.		
20 76WHP.		
21 80HAY.		
22 81HAY.		
23+73STB.		
24+80MAR.		
25+80MAY.		
26+86NP..		
27 11CS1.		
28 11CH1.		
29 11CC1.		
30 11CS2.		
31 11CH2.		
32 11CC2.		
33 14SR..		
34 14SS1.		
35 14SS2.		
36 14SS3.		
37+61B...		
38+63S...		
39+66W...		
40-60CA..		
41 61DMB.		
42 63DMS.		
43 66DMW.		
44+61DAB.		
45+63DAS.		
46+66DAW.		
47+61BP..		
48+61BPL.		
49+63SP..		
50+63SPL.		
51+66WC..		
52+66WCL.		
53-60FAL.		
54+60DLM.		
55+60BFSL		
56+60BFWL		
57+60SFBL		
58+60SFWL		
59+60WFBL	1.00	
60+60WFSL		1.00

TABLE XVII

AN EXAMPLE OF THE RIGHT-HAND SIDES COMPUTED FOR THREE GOVERNMENT PROGRAM PARTICIPATION ALTERNATIVES

Constraint Abbreviation	Non-Participation	Wheat Only	Wheat and Feed Grain
9TO..	324.5	324.5	324.5
9CB..	43.6	43.6	43.6
9CC..	69.8	69.8	69.8
9CD..	28.2	28.2	28.2
9CP..	122.4	122.4	122.4
9LA..	85.2	85.2	85.2
9LB..	60.2	60.2	60.2
9LC..	31.0	31.0	31.0
9LD..	6.5	6.5	6.5
9LP..	113.1	113.1	113.1
81HLIM	64.9	64.9	64.9
11LJA.	495.0	495.0	495.0
11LMJ.	473.0	473.0	473.0
11LAS.	330.0	330.0	330.0
11LOD.	429.0	429.0	429.0
3CO..	0.0	0.0	0.0
3COA.	0.0	0.0	0.0
71BAP.	0.0	0.0	0.0
73GSP.	0.0	0.0	0.0
76WHP.	0.0	0.0	0.0
80HAY.	0.0	0.0	0.0
81HAY.	0.0	0.0	0.0
73STB.	0.0	0.0	0.0
80MAR.	0.0	0.0	0.0
80MAY.	0.0	0.0	0.0
86NP..	0.0	0.0	0.0
11CS1.	0.0	0.0	0.0
11CH1.	0.0	0.0	0.0
11CC1.	0.0	0.0	0.0
11CS2.	0.0	0.0	0.0
11CH2.	0.0	0.0	0.0
11CC2.	0.0	0.0	0.0
14SB..	0.0	0.0	0.0
14SS1.	0.0	0.0	0.0
14SS2.	0.0	0.0	0.0
14SS3.	0.0	0.0	0.0
61B...	9999.0	9999.0	41.9
63S...	9999.0	9999.0	27.9
66W...	9999.0	184.9	184.9
60CA..	0.0	20.9	20.9
61DMB.	0.0	0.0	8.38
63DMS.	0.0	0.0	5.58
66DMW.	0.0	27.735	27.735
61DAB.	0.0	0.0	12.57

TABLE XVII (Continued)

Constraint Abbreviation	Non-Participation	Wheat Only	Wheat and Feed Grain
63DAS.	0.0	0.0	8.37
66DAW.	0.0	92.45	92.45
61BP..	0.0	0.0	0.0
61BPL.	0.0	0.0	20.95
63SP..	0.0	0.0	0.0
63SPL.	0.0	0.0	13.95
66WC..	0.0	0.0	0.0
66WCL.	0.0	79.507	79.507
60FAL.	0.0	0.0	0.0
60DLM.	0.0	0.0	0.0
60BFSL	0.0	0.0	0.0
60BFWL	0.0	0.0	0.0
60SFBL	0.0	0.0	0.0
60SFWL	0.0	0.0	0.0
60WFBL	0.0	0.0	0.0
60WFSL	0.0	0.0	0.0

TABLE XVIII

FORTRAN SOURCE LISTING FOR THE INFORMATION LOADING PROGRAM (INFOLD)

```
        SOURCE STATEMENT

 $IBFTC INFOLD
       DIMENSION SIG(3),SEG(10),ND(65,2),NF(170,2),ALTC(170,3),
      1ALTB(65),SIGNN(65),COST(80,14),COST1(12),YIELD(65,9),NCOST(5,2)
       DIMENSION A(65,170),B(65),C(170),KO(6),X(170),P(65),JH(65),XX(65),
      1Y(65),PE(65),E(4225)
       DATA SIG(1),SIG(2),SIG(3)/1H+,1H-,1H /
       DATA SEG(1),SFG(2),SEG(3),SEG(4),SEG(5),SEG(6)/4HROW.,2HID,4H...C,
      12HON,4HMATR,2HIX/
       DATA SEG(7),SEG(8),SEG(9),SEG(10)/4HRHSV,2HEC,4HEND*,2H**/
       DATA NALT,NALT1/4HZZZZ,2HZZ/
       DO 1 I=1,65
       DO 1 J=1,170
     1 A(I,J)=0.
       DO 2 I=1,65
     2 ALTB(I)=0.0
       DO 3 I=1,170
       DO 3 J=1,3
     3 ALTC(I,J)=0.
     4 READ(5,5) SG,SG1,NME,NME1
     5 FORMAT(A4,A2,6X,A4,A2)
       IF(SG.EQ.SEG(1).AND.SG1.EQ.SEG(2)) GO TO 6
       GO TO 4
     6 LD=0
     7 READ (5,5) SG,SG1,NME,NME1
       IF(SG.EQ.SEG(3).AND.SG1.EQ.SEG(4)) GO TO 8
       LD=LD+1
       NCOST(LD,1)=NME
       NCOST(LD,2)=NME1
       GO TO 7
     8 M=0
C      LOAD SLACK VECTORS BEGINNING IN COL. 131
       N=130
     9 READ(5,10) SG,SG1,SN,NME,NME1
    10 FORMAT(A4,A2,5X,A1,A4,A2)
       IF(SG.EQ.SEG(5).AND.SG1.EQ.SEG(6)) GO TO 19
       M=M+1
       ND(M,1)=NME
       ND(M,2)=NME1
       SIGNN(M)=SN
       IF(SN.EQ.SIG(3))GO TO 9
       N=N+1
       NF(N,1)=NME
       NF(N,2)=NME1
       IF(SN.EQ.SIG(1)) A(M,N)=1.0
       IF(SN.EQ.SIG(2)) A(M,N)=-1.0
       N2=N
       GO TO 9
    19 N=0
    11 READ(5,12) SG,SG1,NM,NM1,NME,NME1,XA,XAA
    12 FORMAT(3(A4,A2),2F10.4)
       IF(SG.EQ.SEG(7).AND.SG1.EQ.SEG(8)) GO TO 15
       IF(NF(N,1).EQ.NM.AND.NF(N,2).EQ.NM1) GO TO 122
       N=N+1
   122 NF(N,1)=NM
       NF(N,2)=NM1
       DO 13 LD=1,5
       IF(NME.EQ.NCOST(LD,1).AND.NME1.EQ.NCOST(LD,2))ALTC(N,LD)=XA
    13 CONTINUE
       DO 14 I=1,M
       IF(NME.EQ.ND(I,1).AND.NME1.EQ.ND(I,2)) GO TO 123
       GO TO 14
   123 A(I,N)=XA
       IF(XAA.EQ.0.0) GO TO 14
       IF(N.GT.65) GO TO 14
       IN=I-17
       IF(IN.GT.9) GO TO 14
       YIELD(N,IN)=XAA
    14 CONTINUE
       GO TO 11
    15 N=N2
       LD=0
    16 I=0
       READ(5,12) SG,SG1,NM,NM1,NME,NME1,XA
       IF(SG.EQ.SEG(9).AND.SG1.EQ.SEG(10)) GO TO 18
       IF(NALT.EQ.NM.AND.NALT1.EQ.NM1) GO TO 124
       LD=LD+1
   124 NALT=NM
       NALT1=NM1
       IF(LD.GT.1) GO TO 18
    17 I=I+1
       IF(I.GT.65) GO TO 18
       IF(ND(I,1).EQ.NME.AND.ND(I,2).EQ.NME1) ALTB(I)=XA
       IF(ND(I,1).EQ.NME.AND.ND(I,2).EQ.NME1) GO TO 16
       GO TO 17
    18 CONTINUE
       WRITE(6,141)
       DO 132 I=1,170
   132 WRITE(6,131) I,(NF(I,J),J=1,2),(ALTC(I,J),J=1,3)
   131 FORMAT(1X,I6,4X,A4,A2,3F15.4)
       WRITE(6,141)
   141 FORMAT(1H1)
       IPR1=1
       IPR2=15
   135 WRITE(6,142)(I,I=IPR1,IPR2)
   142 FORMAT(1H1,10X,15(3X,I3,2X))
       WRITE(6,136) ((NF(I,J),J=1,2),I=IPR1,IPR2)
   136 FORMAT(1X,10X,15(2X,A4,A2))
       WRITE(6,143)(ALTC(I,1),I=IPR1,IPR2)
   143 FORMAT(1X,6HOBJ= 1,4X,15F8.3)
       WRITE(6,144)(ALTC(I,2),I=IPR1,IPR2)
   144 FORMAT(1X,6HOBJ= 2,4X,15F8.3)
       DO 137 I=1,M
   137 WRITF(6,138) I,SIGNN(I),(ND(I,J),J=1,2),(A(I,J),J=IPR1,IPR2)
   138 FORMAT(1X,I2,1X,A1,A4,A2,15F8.3)
       IF(IPR2.GE.N) GO TO 27
       IPR1=IPR1+15
       IPR2=IPR2+15
       IF(IPR2.GT.N) IPR2=N
       GO TO 135
    27 READ(5,500) NM,NM1,(COST1(I),I=1,12)
```

TABLE XVIII (Continued)

```
ISN        SOURCE STATEMENT

325   500 FORMAT(A4,A2,12F6.2)
326       IF(COST1(1).GE.99.0) GO TO 31
331       I=0
332    28 I=I+1
333       IF(I.GT.80) GO TO 27
336       IF(NM.EQ.NF(I,1).AND.NM1.EQ.NF(I,2)) GO TO 125
341       GO TO 28
342   125 DO 29 J=1,3
343    29 COST(I,J)=COST1(J)
345       DO 30 J=6,10
346       J1=J-1
347    30 COST(I,J)=COST1(J1)
351       COST(I,13)=COST1(11)
352       GO TO 27
353    31 WRITE(6,501)
354   501 FORMAT(1H1,15X,2H44,6X,2H45,6X,2H46,10X,2H47,10X,2H50,6X,2H51,
         14X,5H42+52,5X,2H54,6X,2H58,/)
355       WRITE(6,502) (I,(NF(I,J),J=1,2),(COST(I,J),J=1,14),I=1,80)
372   502 FORMAT(1X,I3,1X,A4,A2,14F8.2)
373       WRITE(6,503)
374   503 FORMAT(1H1,25HCOEFFICIENTS OF VARIATION,/)
375       WRITE(6,504) ((ND(I,J),J=1,2),I=18,26)
406   504 FORMAT(1X,15X,9(2X,A4,A2,2X))
407       WRITE(6,505) (I,(NF(I,J),J=1,2),(YIELD(I,J),J=1,9),I=1,65)
424   505 FORMAT(1X,I3,1X,A4,A2,4X,9F10.4)
425       WRITE(4) A,ALTC,ND,NF,M,N,SIGNN,COST,YIELD
426       WRITE(6,506)
427   506 FORMAT(1H0,12HTAPE WRITTEN)
430       REWIND 4
431       STOP
432       END
```

TABLE XIX

FORTRAN SOURCE LISTING FOR THE GENERAL PURPOSE SUBROUTINE (FMPLAN)

```
ISN        SOURCE STATEMENT

  0 $IBFTC FMPLAN  NODECK
  1         SUBROUTINE FMPLAN
    C       FMPLAN GENERAL PURPOSE SUBROUTINE
    C
  2         COMMON A(65,170),B(65),C(170),KO(6),X(170),P(65),JH(65),XX(65),
           1Y(65),PE(65),E(4225),II,M,N,IOBJ,IRHS,IREV,IBVC,ISUB,SIGNN(65),
           2ALTB(65),ALTC(170,3),ND(65,2),NF(170,2),COST(80,14),YIELD(65,9),
           3FMM(18),GOV(3,2),INFS,IDD,IPARAM,VL,IP
  3         DIMENSION FMT(15),VALUE(3),COMB(4),BALE(2)
  4         INDX=0
  5         INDXX=0
  6         INFS=0
  7         ADD=0.001
 10         COMB(1)=3.50
 11         COMB(2)=0.05
 12         COMB(3)=20.0
 13         COMB(4)=0.05
 14         BALE(1)=4.80
 15         BALE(2)=2.70
    C       IF IREV=0 DO NOT REVISE THE A,ALTB, AND C VECTORS
 16         IF(IREV.EQ.0) GO TO 5400
    C       IF IREV=2 REVISE WITHOUT READING TAPE
 21         IF(IREV.EQ.2) GO TO 5000
 24         READ (4) A,ALTC,ND,NF,M,N,SIGNN,COST,YIELD
 31         REWIND 4
    C       READ AND WRITE FARM TITLE
 32  5000 READ(5,5801) (FMM(I),I=1,18)
 37  5801 FORMAT(18A4)
 40         WRITE(6,5901) (FMM(I),I=1,18)
 45  5901 FORMAT(1H1,18A4)
 46         WRITE(6,5902)
 47  5902 FORMAT(1H0,51HRHS ELEMENTS, COST REVISIONS AND'A'MATRIX REVISIONS,
           1//3X, 44HIVA  I    J    K   VALUE(1)   VALUE(2)   VALUE(3),/)
    C       READ AND WRITE RHS ELEMENTS, COST AND MATRIX REVISIONS
 50  5001 READ(5,5802) IVA,I,J,K,(VALUE(L),L=1,3),(FMT(L),L=1,10)
 65  5802 FORMAT(2I2,2I3,3F10.4,10A4)
 66         WRITE(6,5903)IVA,I,J,K,(VALUE(L),L=1,3),(FMT(L),L=1,10)
 77  5903 FORMAT(1X,4I4,3F10.4,2X,10A4)
100         IF(IVA.GT.14) GO TO 5200
103         GO TO (5010,5020,5030,5040,5050,5060,5070,5080,5090,5100,5110,5120
           1,5130,5140),IVA
104  5010 A(I,J)=VALUE(1)
105         GO TO 5001
106  5020 ALTB(I)=VALUE(1)
107         GO TO 5001
110  5030 ALTC(J,I)=VALUE(1)
111         IF(K.EQ.0) GO TO 5001
114         ALTC(J,K)=VALUE(1)
115         GO TO 5001
116  5040 IF(I.EQ.44) I=1
121         IF(I.EQ.45)I=2
124         IF(I.EQ.46)I=3
127         IF(I.EQ.50)I=6
132         IF(I.EQ.51)I=7
135         IF(I.EQ.42.OR.I.EQ.52)I=8
```

```
ISN        SOURCE STATEMENT

140         IF(I.EQ.54) I=9
143         IF(I.EQ.58)I=10
146         IF(I.EQ.0) I=11
151         IF(I.GT.14) GO TO 5001
154         IF(K.NE.0) GO TO 5041
157         IF(VALUE(1).NE.0.0) COST(J,I)=VALUE(1)
162         IF(VALUE(2).NE.0.0) COST(J,I)=COST(J,I)+COST(J,I)*VALUE(2)
165         GO TO 5001
166  5041 DO 5042 IA=J,K
167         IF(VALUE(1).NE.0.0) COST(IA,I)=VALUE(1)
172  5042 IF(VALUE(2).NE.0.0) COST(IA,I)=COST(IA,I)+COST(IA,I)*VALUE(2)
176         GO TO 5001
177  5050 DO 5051 IA=1,3
200  5051 COMB(IA)=VALUE(IA)
202         GO TO 5001
203  5060 COMB(4)=VALUE(1)
204         GO TO 5001
205  5070 DO 5071 IA=1,2
206  5071 BALE(IA)=VALUE(IA)
210         GO TO 5001
211  5080 DO 5081 JA=J,K
212         IA=I-17
213         A(I,JA)=A(I,JA)+(A(I,JA)* YIELD(JA,IA)*VALUE(1))
214  5081 IF(A(I,JA).GT.0.0) A(I,JA)=0.0
220         GO TO 5001
    C       PROJ YIELDS AND LOAN RATES
221  5090 DO 5091 IA=1,3
222  5091 GOV(IA,J)=VALUE(IA)
224         GO TO 5001
    C       DELETE ACTIVITIES J THRU K     (ONLY J IS DELETED IF K=0)
225  5100 IF(K.NE.0) GO TO 5102
230         JA=J
231         GO TO 5104
232  5102 DO 5103 JA=J,K
233  5104 ALTC(JA,1)=0.0
234         ALTC(JA,2)=0.0
235         DO 5101 IA=1,65
236  5101 A(IA,JA)=0.0
240  5103 CONTINUE
242         GO TO 5001
    C       ADD A CONSTRAINT
243  5110 M=I
244         ND(I,1)=FMT(1)
245         GO TO 5001
    C       ADD AN ACTIVITY. IF K IS NON-ZERO N=J
246  5120 IF(K.NE.0) N=J
251         NF(J,1)=FMT(1)
252         GO TO 5001
    C       PLACE YIELDS OF MACHINE-HARVESTED CROPS IN YIELD(65,5) AFTER
    C       ZEROING YIELD(65,9)
    C       COLUMNS 1-3 ARE GRAIN CROPS
    C       COLUMNS 4-5 ARE FORAGE CROPS
253  5130 DO 5132 N1=1,65
254         DO 5132 N2=1,9
255  5132 YIELD(N1,N2)=0.0
```

TABLE XIX (Continued)

```
ISN       SOURCE STATEMENT

260            DO 5133 IA=I,K
261            DO 5131 JA=1,65
262       5131 YIELD(JA,J)=YIELD(JA,J)+A(IA,JA)*(-1.0)
264       5133 J=J+1
266            GO TO 5001
        C      CONVERT CWT TO BU FOR CUSTOM RATE COMPUTATION--COLUMN I'OF'YIELD'
267       5140 DO 5141 JA=1,65
270       5141 YIELD(JA,I)=YIELD(JA,I)*1.78571
272            GO TO 5001
        C      COMPUTE MACHINE HIRE EXPENSE AND PLACE COLS 4 AND 5 OF 'COST'
        C      COMBINE RATE USED FOR COLUMNS 1-3 OF YIELD
273       5200 DO 5201 IA=1,3
274            DO 5201 JA=1,65
275            IF(YIELD(JA,IA).EQ.0.0) GO TO 5201
300            CBU=0.0
301            IF(YIELD(JA,IA).LE.COMB(3)) GO TO 5202
304            CBU=(YIELD(JA,IA)-COMB(3))*COMB(2)
305       5202 COST(JA,4)=COST(JA,4)+COMB(1)+CBU+YIELD(JA,IA)*COMB(4)
306       5201 CONTINUE
        C      BALE AND HAUL RATE USED FOR COLUMNS  4-5 OF  YIELD
311            DO 5203 IA=4,5
312            DO 5203 JA=1,65
313            IF(YIELD(JA,IA).EQ.0.0) GO TO 5203
316            COST(JA,5)=COST(JA,5)+BALE(1)*YIELD(JA,IA)+BALE(2)*YIELD(JA,IA)
317       5203 CONTINUE
        C      TOTAL VARIABLE COSTS AND PLACE IN COL 12 OF 'COST' AND COL 1'ALTC'
322            DO 5206 JA=1,80
323            DO 5205 IA=1,11
324       5205 COST(JA,12)=COST(JA,12)+COST(JA,IA)
326       5206 ALTC(JA,1)=COST(JA,12)
        C      ADD IN FIXED MACHINERY COST AND PLACE IN COL 14 OF 'COST',2 'ALTC'
330            DO 5208 JA=1,80
331            DO 5207 IA=12,13
332       5207 COST(JA,14)=COST(JA,14)+COST(JA,IA)
334       5208 ALTC(JA,2)=COST(JA,14)
        C      WRITE 'COST'
336            WRITE(6,5917)
337       5917 FORMAT(1H1,34HDETAILED PRODUCTION ACTIVITY COSTS,/)
340            WRITE(6,5904)
341       5904 FORMAT(1X,2X,7HTI CODE,5X,2H44,6X,2H45,6X,2H46,12X,2H47,13X,2H50,
              16X,2H51,5X,5H42+52,4X,2H54,6X,2H58,6X,2H00,/39X,12HMACHINE HIRE,/
              235X,20H--------------------,/ 36X,7HCOMBINE)
342            WRITE(6,5905) (COMB(I),I=1,2),BALE(1),COMB(3)
347       5905 FORMAT(1X,35X,1H$,F5.2,2H/A,4X,4HBALE,/35X,3H+ $,F3.2,3H/BU,2X,
              11H$,F5.2,2H/T,40X,12X,5HTOTAL,/35X,4HOVER,F3.0,2HBU,14X,5HMISC.,
              211X,5HMACHY,3X,5HTAXES,4X,4HFERT.,9X,8HVARIABLE,4X,5HFIXED)
350            WRITE(6,5906)
351       5906 FORMAT(1X,29X,65HFERT-    HAUL        HAUL        OPER.      VET-     OPER.
              1    (LVSTK    AND , 9X,26HPRODUCTN  MACHINERY  TOTAL)
352            WRITE(6,5907) COMB(4),BALE(2)
353       5907 FORMAT(2X,8HACTIVITY,4X,23HFEED       SEED       LIME    $,F4.2,3H/BU,2X,
              11H$,F5.2,43H/T    EXPENSE    MED    EXPENSE    ONLY)  MKTG.,3X,
              25H-----,3X,14HCOST        COST,/)
354            WRITE(6,5908) (I,(NF(I,J),J=1,2),(COST(I,J),J=1,14),I=1,80)
371       5908 FORMAT(1X,I2,1X,A4,A2,3F8.2,F9.2,2F10.2,6F8.2,F9.2,F10.2)
```

```
ISN       SOURCE STATEMENT

        C      COMPUTE ADDITIONAL DIVERSION PAYMENTS
372       5250 ALTC(114,1)=(0.20+GOV(1,2))*.45*GOV(1,1)*(-1.0)
373            ALTC(114,2)=ALTC(114,1)
374            ALTC(115,1)=(0.53+GOV(2,2))*.45*GOV(2,1)*(-1.0)
375            ALTC(115,2)=ALTC(115,1)
376            ALTC(116,1)=GOV(3,2)*.5*GOV(3,1)*(-1.0)
377            ALTC(116,2)=ALTC(116,1)
        C      COMPUTE PRICE SUPPORT AND CERTIFICATE PAYMENTS
400            ALTC(117,1)=.20*GOV(1,1)*(-1.0)
401            ALTC(117,2)=ALTC(117,1)
402            ALTC(118,1)=.53*GOV(2,1)*(-1.0)
403            ALTC(118,2)=ALTC(118,1)
404            ALTC(119,1)=1.36*GOV(3,1)*(-1.0)
405            ALTC(119,2)=ALTC(119,1)
        C      COMPUTE ELEMENTS OF'ALTB' FOR GOVERNMENT PROG-RELATED ROWS
406            ALTB(41)=ALTB(37)*.2
407            ALTB(42)=ALTB(38)*.2
410            ALTB(43)=ALTB(39)*.15
411            ALTB(44)=ALTB(37)*.3
412            ALTB(45)=ALTB(38)*.3
413            ALTB(46)=ALTB(39)*.5
414            ALTB(48)=ALTB(37)*.5
415            ALTB(50)=ALTB(38)*.5
416            ALTB(52)=ALTB(39)*.43
        C      COMPUTE TOTAL CROPLAND
417            TOT=0.0
420            DO 5251 I=2,4
421       5251 TOT=TOT+ALTB(I)
423            DO 5252 I=6,9
424       5252 TOT=TOT+ALTB(I)
426            ALTB(1)=TOT
        C      READ AND WRITE FINAL CHANGES TO 'A','ALTB' AND 'ALTC'
427            WRITE(6,5909)
430       5909 FORMAT(1H1,15HFINAL REVISIONS)
431       5334 READ(5,5802) IVA,I,J,K,(VALUE(L),L=1,3),(FMT(L),L=1,10)
446            WRITE(6,5903)IVA,I,J,K,(VALUE(L),L=1,3),(FMT(L),L=1,10)
457            IF(IVA.GT.3) GO TO 5340
462            GO TO (5335,5336,5337),IVA
463       5335 A(I,J)=VALUE(1)
464            GO TO 5334
465       5336 ALTB(I)=VALUE(1)
466            GO TO 5334
467       5337 ALTC(J,I)=VALUE(1)
470            IF(K.EQ.0) GO TO 5334
473            ALTC(J,K)=VALUE(1)
474            GO TO 5334
        C      WRITE MATRIX IF IVA IN TRAIL CARD=99
475       5340 IF(IVA.NE.99) GO TO 5343
500            IPR1=1
501            IPR2=15
502       5341 WRITE(6,5910)(I,I=IPR1,IPR2)
507       5910 FORMAT(1H1,10X,15(3X,I3,2X))
510            WRITE(6,5911) ((NF(I,J),J=1,2),I=IPR1,IPR2)
521       5911 FORMAT(1X,10X,15(2X,A4,A2))
522            IA=1
```

TABLE XIX (Continued)

```
ISN        SOURCE STATEMENT

523           WRITE(6,5912) IA,(ALTC(I,1),I=IPR1,IPR2)
530     5912  FORMAT(1X,4HOBJ=,I2,4X,15F8.3)
531           IA=2
532           WRITE(6,5912) IA,(ALTC(I,2),I=IPR1,IPR2)
537           DO 5342 I=1,M
540     5342  WRITE(6,5913) I,(ND(I,J),J=1,2),(A(I,J),J=IPR1,IPR2)
552     5913  FORMAT(1X,I2,1X,A4,A2,1X,15F8.3)
553           IF(IPR2.GE.N) GO TO 5343
556           IPR1=IPR1+15
557           IPR2=IPR2+15
560           IF(IPR2.GT.N) IPR2=N
563           GO TO 5341
        C     MOVE ALTC(I,IOBJ) TO C(I)
564     5343  DO 5344 I=1,170
565     5344  C(I)=ALTC(I,IOBJ)
567           IF(IPARAM.EQ.1) C(IP)=VL
        C     BUILD B VECTOR
572     5400  IF(ISUB.EQ.1) GO TO 5406
575           IF(IBVC.EQ.0) GO TO 5410
600     5406  ISUB=0
601           IF(IRHS.EQ.3) GO TO 5404
604           DO 5401 I=1,65
605     5401  B(I)=0.0
607           DO 5402 I=1,36
610     5402  B(I)=ALTB(I)
612           DO 5403 I=37,39
613     5403  B(I)=9999.
615           IM=M+1
616           DO 5407 I=IM,65
617     5407  B(I)=ALTB(I)
621           IF(IRHS.EQ.1) GO TO 5412
624           B(39)=ALTB(39)
625           B(40)=ALTB(40)
626           B(43)=ALTB(43)
627           B(46)=ALTB(46)
630           B(52)=ALTB(52)
631           GO TO 5412
632     5404  DO 5405 I=1,65
633     5405  B(I)=ALTB(I)
        C     WRITE B VECTOR  IF PARAM=0
635     5412  IF(IPARAM.EQ.1) GO TO 5410
640           WRITE(6,5915) IRHS
641     5915  FORMAT(1H1,18HB VECTOR FOR IRHS=,I2)
642           WRITE(6,5916)(I,SIGNN(I),(ND(I,J),J=1,2),B(I),I=1,M)
653     5916  FORMAT(1X,I3,2X,A2,A4,A2,F15.4)
        C     SET  II  AND CALL SIMPLEX SUBROUTINE
654     5410  IF(IDD.GT.0)  II=1
657     5411  CALL SIMPLE
660           IDD=1
661           WRITE(6,5914) (KO(I),I=1,6)
666     5914  FORMAT(1H0,6I6)
667           IF(KO(1).EQ.0) GO TO 5415
        C     INFEASIBLE SOLUTION ROUTINE
672           INFS=INFS+1
673           IF(INFS.GT.3) RETURN

ISN        SOURCE STATEMENT

676           DO 5414 I=1,M
677           IF(P(I).GT.0.0001) GO TO 5413
702           IF(P(I).LT.(-0.0001)) GO TO 5413
705           GO TO 5414
706     5413  B(I)=B(I)+ADD
707           ADD=ADD+0.001
710     5414  CONTINUE
712           GO TO 5410
        C     CHECK WHEAT AND FEED GRAIN SOLUTION FOR ALLOTMENT LIMITS
713     5415  IF(IRHS.NE.3) RETURN
716           IF(B(37).LT.0.05) GO TO 5417
721           TOT=0.0
722           DO 5416 I=1,7
723     5416  TOT=TOT+X(I)
725           IF(TOT.LT.B(37)-B(41)-0.5) GO TO 5417
730           IF(TOT.GT.B(37)-B(41)+0.5) GO TO 5417
733           B(44)=0.0
734           B(55)=9999.
735           B(56)=9999.
736           INDX=1
737           INDXX=INDXX+1
740     5417  IF(B(38).LT.0.05) GO TO 5420
743           TOT=0.0
744           DO 5419 I=8,14
745     5419  TOT=TOT+X(I)
747           IF(TOT.LT.B(38)-B(42)-0.5) GO TO 5420
752           IF(TOT.GT.B(38)-B(42)+0.5) GO TO 5420
755           B(45)=0.0
756           B(57)=9999.
757           B(58)=9999.
760           INDX=1
761           INDXX=INDXX+1
762     5420  IF(B(39).LT.0.05) GO TO 5422
765           TOT=0.0
766           DO 5421 I=15,21
767     5421  TOT=TOT+X(I)
771           IF(TOT.LT.B(39)-0.5) GO TO 5422
774           IF(TOT.GT.B(39)+0.5) GO TO 5422
777           B(46)=0.0
1000          B(59)=9999.
1001          B(60)=9999.
1002          INDX=1
1003          INDXX=INDXX+1
1004    5422  IF(INDX.EQ.0) RETURN
1007          IF(INDXX.GT.3) RETURN
1012          INDX=0
1013          ISUB=1
1014          GO TO 5412
1015    5423  RETURN
1016          END
```

TABLE XX

FORTRAN SOURCE LISTING FOR THE GOVERNMENT PROGRAM COMPARISON REPORT (GOVPRO)

```
ISN        SOURCE STATEMENT

  0 $IBFTC GOVPRO  NODECK
   C       GOVPRO  GOVERNMENT PROGRAM COMPARISON REPORT
  1        COMMON A(65,170),B(65),C(170),KO(6),X(170),P(65),JH(65),XX(65),
          1Y(65),PE(65),E(4225),II,M,N,IOBJ,IRHS,IREV,IBVC,ISUB,SIGNN(65),
          2ALTB(65),ALTC(170,3),ND(65,2),NF(170,2),COST(80,14),YIELD(65,9),
          3FMM(18),GOV(3,2),INFS,IDD,IPARAM,VL,IP
  2        DIMENSION XALT(171,3),SUM(3),PALT(65,3)
   C       IF IREV=0 DO NOT REVISE MATRIX             IF IBVC=0 DO NOT BUILDB
   C       IF IREV=1 READ TAPE AND REVISE MATRIX      IF IBVC=1 BUILD B VECTR
   C       IF IREV=2 DO NOT READ TAPE BUT DO REVISE MATRIX
  3        IREV=1
  4        IBVC=1
  5        ISUB=0
  6        IPARAM=0
  7        II=0
 10        IDD=0
 11     10 READ(5,1000) IOBJ,IRHS
 14   1000 FORMAT(2(4X,I2))
   C
 15     12 DO 20 I=1,171
 16        DO 20 J=1,3
 17     20 XALT(I,J)=0.0
 22        IND=1
 23        IRHS=1
 24     21 CALL FMPLAN
 25        IF(INFS.GT.3) CALL EXIT
 30        DO 22 I=1,170
 31        XALT(I,IND)=X(I)
 32     22 XALT(171,IND)=XALT(171,IND)+X(I)*C(I)*(-1.0)
 34        DO 27 I=1,65
 35     27 PALT(I,IND)=P(I)
 37        IND=IND+1
 40        IF(IND.GT.3) GO TO 28
 43        IREV=0
 44        IRHS=IRHS+1
 45        GO TO 21
 46     28 WRITE(6,1001)
 47        WRITE(6,23)
 50     23 FORMAT(1X,22X,9HSOLUTIONS,48X,13HSHADOW PRICES,/)
 51        WRITE(6,24)
 52     24 FORMAT(1X,1X,8HACTIVITY,4X,6HIRHS=1,6X,6HIRHS=2,6X,6HIRHS=3,16X,
          110HCONSTRAINT,4X,6HIRHS=1,6X,6HIRHS=2,6X,6HIRHS=3,/)
 53        WRITE(6,25) (I,(NF(I,J),J=1,2),(XALT(I,J),J=1,3),I,(ND(I,J),J=1,2)
          1,(PALT(I,J),J=1,3),I=1,M)
100     25 FORMAT(1X,I3,1X,A4,A2,F10.4,2F12.4,14X,I3,1X,A4,A2,3F12.4)
101        IA=M+1
102        WRITE(6,26) (I,(NF(I,J),J=1,2),(XALT(I,J),J=1,3),I=IA,N)
117     26 FORMAT(1X,I3,1X,A4,A2,F10.4,2F12.4)
   C       BEGIN OUTPUT FORMATING
120        WRITE(6,1001)
   C       IF IXA= 0 OR BLANK, PRINT CONTENTS OF CARD
121    100 WRITE(6,1004) (FMM(J),J=1,18)
126     70 READ(5,2005) (FMM(J),J=1,18),IVA,IWA,IXA
136        IF(IVA.EQ.999) GO TO 999
141        IXAA=IXA+1

ISN        SOURCE STATEMENT

142        IF(IXA.GT.12) GO TO 70
145        GO TO (100,110,120,130,140,150,160,170,180,180,200,210,220),IXAA
   C       IXA=1 NOT USED IN THIS PROGRAM
146    110 GO TO 70
   C       IXA=2 TURN TO NEW PAGE
147    120 WRITE(6,1001)
150        GO TO 70
   C       IXA=3 PRINT FROM ALTB
151    130 TOT=ALTB(IVA)
152        IF(IWA.EQ.99) GO TO 151
155        IF(IWA.NE.0) GO TO 132
160        GO TO 134
161    132 TOT=0.0
162        DO 133 I=IVA,IWA
163    133 TOT =TOT+ALTB(I)
165    134 WRITE(6,1005) (FMM(J),J=1,12),TOT
172        GO TO 70
   C       IXA=4 PRINT INTEREST RATE
173    140 TOT=C(IVA)*100.0
174        GO TO 134
   C       IXA=5 PRINT GOVERNMENT PROGRAM INFORMATION
175    150 TOT=GOV(IVA,IWA)
176        IF(IWA.EQ.1) GO TO 134
201    151 WRITE(6,1017) (FMM(J),J=1,12),TOT
206        GO TO 70
   C       IXA=6 PRINT HEADING FOR PART II
207    160 WRITE(6,101)
210    101 FORMAT(1X,40X,16X,26HPARTICIPATION ALTERNATIVES)
211        WRITE(6,102)
212    102 FORMAT(1X,40X,12X,34H----------------------------------)
213        WRITE(6,103)
214    103 FORMAT(1X,40X,17X,4HNON-,6X,5HWHEAT,4X,9HWHEAT AND)
215        WRITE(6,104)
216    104 FORMAT(1X,40X, 4X,4HUNIT,4X,13HPARTICIPATION,3X,4HONLY,3X,10HFEED
          1GRAIN)
217        GO TO 70
   C       IXA=7 SUM X FROM IVA TO IWA. PRINT CARD IF SUM IS LT 0.05
220    170 TOT=0.0
221        DO 171 J=1,3
222        DO 171 I=IVA,IWA
223    171 TOT=TOT+XALT(I,J)
226        IF(TOT.GT.0.05) GO TO 70
231        GO TO 100
   C       IXA=8 PRINT FROM X USING F9.0
   C       IXA=9 PRINT FROM X USING F10.1
232    180 DO 181 I=1,3
233    181 SUM(I)=0.0
235        IF(IWA.NE.0) GO TO 187
240        I=IVA
241        GO TO 188
242    187 DO 182 I=IVA,IWA
243    188 DO 182 J=1,3
244    182 SUM(J)=SUM(J)+XALT(I,J)
247    183 TOT=0.0
250        DO 184 I=1,3
```

TABLE XX (Continued)

```
ISN        SOURCE STATEMENT

251    184 TOT=TOT+SUM(I)
253        IF(TOT.LT.0.05) GO TO 70
256        IF(IXA.EQ.9) GO TO 186
261    185 WRITE(6,1007) (FMM(J),J=1,12),(SUM(I),I=1,3)
272        GO TO 70
273    186 WRITE(6,1008)(FMM(J),J=1,12),(SUM(I),I=1,3)
304        GO TO 70
     C     IXA=10 PRINT FROM C (PRICES)
305    200 CWA=IWA
306        TOT=C(IVA)*CWA
307        WRITE(6,1009) (FMM(J),J=1,14),TOT
314        GO TO 70
     C     IXA=11 PRINT SOURCES OF GROSS INCOME
315    210 DO 211 I=1,3
316    211 SUM(I)=0.0
320    214 DO 212 I=IVA,IWA
321    215 DO 212 J=1,3
322    212 SUM(J)=SUM(J)+C(I)*XALT(I,J)*(-1.0)
325        IXA=8
326        GO TO 183
     C     IXA=12 PRINT GOVT PROG PMT RATES AND LIMITS
327    220 TOT=C(IVA)*(-1.0)
330        WRITE(6,1018) (FMM(J),J=1,9),B(IWA),(FMM(J),J=12,14),TOT
341        GO TO 70
342   1001 FORMAT(1H1)
343   1004 FORMAT(1X,18A4)
344   1005 FORMAT(1X,12A4,F15.1)
345   1007 FORMAT(1X,12A4,4X,3(F9.0,2X))
346   1008 FORMAT(1X,12A4,4X,3(F10.1,1X))
347   1009 FORMAT(1X,14A4,F8.2)
350   1017 FORMAT(1X,12A4,F16.2)
351   1018 FORMAT(1X,9A4,F7.1,1X,3A4,F8.2)
352   2005 FORMAT(18A4,2I3,I2)
353    999 STOP
354        END
```

TABLE XXI

HEADER CARD LISTING FOR THE GOVERNMENT PROGRAM COMPARISON REPORT

PART I--RESOURCES AND RESTRICTIONS	UNIT	AMOUNT			
LAND - TOTAL	ACRE		2	10	3
CLAY-B	ACRE		2		3
CLAY-C	ACRE		3		3
CLAY-D	ACRE		4		3
CLAY-NATIVE PASTURE	ACRE		5		3
LOAM-A	ACRE		6		3
LOAM-B	ACRE		7		3
LOAM-C	ACRE		8		3
LOAM-D	ACRE		9		3
LOAM-NATIVE PASTURE	ACRE		10		3
LABOR - TOTAL	HOUR		12	15	3
JAN-APR	HOUR		12		3
MAY-JUL	HOUR		13		3
AUG-SEP	HOUR		14		3
OCT-DEC	HOUR		15		3
CAPITAL					
INTEREST-FREE CAPITAL	DOLLAR		17	99	3
SHORT-TERM INTEREST RATE	PERCENT		110		4
GOVERNMENT PROGRAM INFORMATION					
BARLEY BASE	ACRE		37		3
GRAIN SORGHUM BASE	ACRE		38		3
WHEAT ALLOTMENT	ACRE		39		3
CONSERVING BASE	ACRE		40		3
PROJECTED YIELDS					
BARLEY	BU/A		1	1	5
GRAIN SORGHUM	CWT/A		2	1	5
WHEAT	BU/A		3	1	5
LOAN RATES					
BARLEY	$/BU		1	2	5
GRAIN SORGHUM	$/CWT		2	2	5
WHEAT	$/BU		3	2	5
ALFALFA ACREAGE LIMIT	ACRE		11		3
					2
PART II--SUMMARY OF OPTIMUM FARM PLANS FOR THREE GOVERNMENT PROGRAM PARTICIPATION ALTERNATIVES					
					6
NET RETURN TO FIXED RESOURCES	DOLLAR		171		8
CROPS					
BARLEY	ACRE		1	7	9

TABLE XXI (Continued)

GRAIN SORGHUM	ACRE	8 14 9
WHEAT	ACRE	15 21 9
FORAGE SORGHUM	ACRE	22 28 9
ALFALFA	ACRE	29 33 9
WHEAT PASTURE--GRAZE OUT BY MAY 1	ACRE	34 40 9
SUDAN PASTURE	ACRE	41 47 9
SUDAN PASTURE--FOR WINTER GRAZING	ACRE	48 54 9
OTHER CROPS	ACRE	55 62 9
IDLE CROPLAND	ACRE	63 9
NATIVE PASTURE	ACRE	64 65 9
TOTAL	ACRE	1 65 9
LIVESTOCK		
COWS--SPRING CALVING	HEAD	66 68 8
COWS--FALL CALVING	HEAD	69 8
STEERS--BUY OCT-SELL OCT	HEAD	70 72 8
STEERS--BUY OCT-SELL MAY	HEAD	73 74 8
STEERS--BUY OCT-SELL MAR	HEAD	75 76 8
LABOR (HIRED)		
JANUARY-APRIL	HOUR	103 9
MAY-JULY	HOUR	104 9
AUGUST-SEPTEMBER	HOUR	105 9
OCTOBER-DECEMBER	HOUR	106 9
NO HIRED LABOR REQUIRED		103106 7
CAPITAL		
TOTAL REQUIRED	DOLLAR	109 8
ADJUSTED TO AN ANNUAL BASIS	DOLLAR	110 8
GOVERNMENT PROGRAM INFORMATION		
MINIMUM DIVERSION		
BARLEY	ACRE	111 9
GRAIN SORGHUM	ACRE	112 9
WHEAT	ACRE	113 9
ADDITIONAL DIVERSION		
BARLEY	ACRE	114 9
GRAIN SORGHUM	ACRE	115 9
WHEAT	ACRE	116 9
NONE		114116 7
SUBSTITUTIONS		
BARLEY FOR SORGHUM	ACRE	122 9
BARLEY FOR WHEAT	ACRE	123 9
SORGHUM FOR BARLEY	ACRE	124 9
SORGHUM FOR WHEAT	ACRE	125 9
WHEAT FOR BARLEY	ACRE	126 9
WHEAT FOR SORGHUM	ACRE	127 9
NONE		122127 7
SOURCES OF GROSS INCOME		
CROP SALES		
BARLEY	DOLLAR	81 8111
GRAIN SORGHUM	DOLLAR	82 8211
WHEAT	DOLLAR	83 8311

TABLE XXI (Continued)

WHEAT PASTURE OCT-MAR	DOLLAR	85 8511
WHEAT PASTURE OCT-MAY	DOLLAR	84 8411
ALFALFA	DOLLAR	86 8611
LIVESTOCK SALES		
COW-CALF SYSTEMS	DOLLAR	90 9511
STOCKER STEERS OCT-MAR	DOLLAR	97 9711
STOCKER STEERS OCT-MAY	DOLLAR	98 9811
STOCKER STEERS OCT-OCT	DOLLAR	99 9911
GOVERNMENT PROGRAMS		
BARLEY PRICE SUPPORT PAYMENT	DOLLAR	11711711
SORGHUM PRICE SUPPORT PAYMENT	DOLLAR	11811811
WHEAT CERTIFICATES	DOLLAR	11911911
ADDITIONAL BARLEY DIVERSION	DOLLAR	11411411
ADDITIONAL SORGHUM DIVERSION	DOLLAR	11511511
ADDITIONAL WHEAT DIVERSION	DOLLAR	11611611
		2

PART III--PRICES USED	TRANSACTION	TIME	UNIT	
CROPS				
BARLEY	SELL		BU	81 -110
GRAIN SORGHUM	SELL		CWT	82 -110
WHEAT	SELL		BU	83 -110
WHEAT PASTURE	SELL	OCT-MAR	AUM	85 -110
WHEAT PASTURE	SELL	OCT-MAY	AUM	84 -110
ALFALFA	SELL		TON	86 -110
PRAIRIE HAY	BUY		TON	87 +110
LIVESTOCK				
COW-CALF SYSTEMS				
SPRING CALVING				
STEERS-485 POUNDS	SELL	OCT	CWT	90 -110
HEIFERS-460 POUNDS	SELL	OCT	CWT	91 -110
CULL COWS	SELL	JUN	CWT	92 -110
FALL CALVING				
STEERS-500 POUNDS	SELL	JUL	CWT	93 -110
HEIFERS-460 POUNDS	SELL	JUL	CWT	94 -110
CULL COWS	SELL	JAN	CWT	95 -110
STOCKER SYSTEMS				
STEERS--450 POUNDS	BUY	OCT	CWT	96 +110
-600 POUNDS	SELL	MAR	CWT	97 -110
-715 POUNDS	SELL	MAY	CWT	98 -110
-775 POUNDS	SELL	OCT	CWT	99 -110
LABOR				
	HIRE	JAN-APR	HOUR	103 +110
	HIRE	MAY-JUL	HOUR	104 +110
	HIRE	AUG-SEP	HOUR	105 +110
	HIRE	OCT-DEC	HOUR	106 +110
GOVERNMENT PROGRAMS				
BARLEY PRICE SUP PMT	(MAXIMUM=	A)	ACRE	117 4812
SORG PRICE SUP PMT	(MAXIMUM=	A)	ACRE	118 5012
WHEAT CERTIFICATES	(MAXIMUM=	A)	ACRE	119 5212
ADDITIONAL DIVERSION PAYMENTS				

TABLE XXI (Continued)

BARLEY	(MAXIMUM=	A)	ACRE	114 4412
GRAIN SORGHUM	(MAXIMUM=	A)	ACRE	115 4512
WHEAT	(MAXIMUM=	A)	ACRE	116 4612
				999

TABLE XXII

FORTRAN SOURCE LISTING FOR THE INDIVIDUAL FARM DETAILED REPORT (DETREP)

```
ISN       SOURCE STATEMENT

  0 $IBFTC DETREP
     C       DETREP  INDIVIDUAL FARM DETAILED REPORT
  1          COMMON A(65,170),B(65),C(170),KO(6),X(170),P(65),JH(65),XX(65),
            1Y(65),PE(65),E(4225),II,M,N,IOBJ,IRHS,IREV,IBVC,ISUB,SIGNN(65),
            2ALTB(65),ALTC(170,3),ND(65,2),NF(170,2),COST(80,14),YIELD(65,9),
            3FMM(18),GOV(3,2),INFS,IDD,IPARAM
  2          DIMENSION PTEMP(170),PNT(20,6)
     C       IF IREV=0 DO NOT REVISE MATRIX           IF IBVC=0 DO NOT BUILDB
     C       IF IREV=1 READ TAPE AND REVISE MATRIX    IF IBVC=1 BUILD B VECTR
     C       IF IREV=2 DO NOT READ TAPE BUT DO REVISE MATRIX
  3          IREV=1
  4          IBVC=1
  5          ISUB=0
  6          IPARAM=0
  7          II=0
 10          IDD=0
 11       10 READ(5,1001) IOBJ,IRHS
 14     1001 FORMAT(2(4X,I2))
 15          CALL FMPLAN
 16          IF(INFS.GT.3) CALL EXIT
     C
     C       COMPUTE NET RETURNS
 21      488 YINC=0.0
 22          YINC2=0.0
 23          DO 49 I=1,N
 24          YINC=YINC+ X(I)*C(I)
 25       49 YINC2=YINC2+X(I)*ALTC(I,2)
 27          YINC=YINC*(-1.0)
 30          YINC2=YINC2*(-1.0)
     C       PRINT X AND P VECTORS
 31       50 WRITE(6,58)
 32       58 FORMAT(1H1,3X,8HACTIVITY,6X,8HSOLUTION,20X,10HCONSTRAINT,3X,
            112HSHADOW PRICE,/)
 33          WRITE(6,1008) (I,(NF(I,J),J=1,2),X(I),I,SIGNN(I),(ND(I,J),J=1,2),
            1P(I),I=1,M)
 50          MM=M+1
 51          WRITE(6,1009) (I,(NF(I,J),J=1,2),X(I),I=MM,N)
     C       COST RANGING AND INCOMING PRICE ROUTINE
     C
     C       COMPUTE Z-C ROW --(PTEMP),  BASIS ACTIVITIES ARE IGNORED
 62       51 DO 52 J=1,N
 63       52 PTEMP(J)=0.0
 65          DO 56 J=1,N
 66          I=0
 67       53 I=I+1
 70          IF(I.GT.M) GO TO 54
 73          IF(J.EQ.JH(I)) GO TO 56
 76          GO TO 53
 77       54 PTEMP(J)=C(J)
100          DO 55 I=1,M
101       55 PTEMP(J)=PTEMP(J)+P(I)*A(I,J)
103       56 CONTINUE
105          DO 57 I=1,170
106          DO 57 J=1,3
107       57 ALTC(I,J)=0.0
```

```
ISN       SOURCE STATEMENT

     C       THE'JH'VECTOR CONTAINS THE NUMBERS OF THE ACTIVITIES IN THE BASIS.
     C       'FINAL TABLEAU' ROWS ARE COMPUTED,ELEMENT BY ELEMENT (PIVOT),AND
     C       DIVIDED INTO THE Z-C OF THE RESPECTIVE COLUMNS, GIVING THE CHANGE
     C       IN THE COST OF THE ACTIVITY BEING CONSIDERED  (JH(I)) WHICH WOULD
     C       INDUCE A PARTICULAR NON-SELECTED ACTIVITY TO COME INTO THE BASIS
     C       (CB) THESE ARE COMPARED,AND THOSE TWO (ONE POS,ONE NEG) WHICH
     C       GIVE THE SMALLEST RANGE FORM THE COST RANGE.
112          DO 70 I=1,M
113          J=JH(I)
114          CBN=-9999.
115          CBP=+9999.
116          DO 69 JJ=1,N
117          PIVOT=0.0
120          DO 61 II=1,M
121          IE=M*(II-1)+I
122       61 PIVOT=PIVOT+A(II,JJ)*E(IE)
124          IF(PTEMP(JJ).EQ.0.0) GO TO 69
127          IF(PIVOT.LT.(-0.0001))GO TO 62
132          IF(PIVOT.GT.0.0001) GO TO 62
135          GO TO 69
136       62 CB=PTEMP(JJ)/PIVOT
137          IF(CB)63,69,64
140       63 IF(CB.GT.CBN) CBN=CB
143          GO TO 69
144       64 IF(CB.LT.CBP) CBP=CB
147       69 CONTINUE
151          ALTC(J,1)=CBN +C(J)
152          ALTC(J,3)=CBP+C(J)
153       70 CONTINUE
155          DO 71 J=1,N
156       71 ALTC(J,2)=C(J)
     C       COMPUTE THE INCOMING PRICE FO NON-BASIS ACTIVITIES--PLACE IN ALTC
160          DO 76 J=1,N
161          I=0
162       72 I=I+1
163          IF(I.GT.M) GO TO 73
166          IF(J.EQ.JH(I)) GO TO 76
171          GO TO 72
172       73 CI=C(J)-PTEMP(J)
173          IF(CI)74,75,75
174       74 ALTC(J,3)=CI
175          GO TO 76
176       75 ALTC(J,1)=CI
177       76 CONTINUE
201          WRITE(6,77)
202       77 FORMAT(1H1,95HPRICE RANGES FOR BASIS ACTIVITIES (*), INCOMING PRIC
            1ES FOR NON-BASIS ACTIVITIES AND PRICES USED)
203          WRITE(6,78)
204       78 FORMAT(1H0,4X,8HACTIVITY,3X,11HLOWER LIMIT,5X,10HPRICE USED,4X,
            111HUPPER LIMIT,/)
205          DO 85 J=1,N
206          IB=0
207       79 IB=IB+1
210          IF(IB.GT.M) GO TO 82
213          IF(J.EQ.JH(IB)) GO TO 80
```

TABLE XXII (Continued)

```
ISN        SOURCE STATEMENT

216          GO TO 79
217       80 WRITE(6,81) (NF(J,IA),IA=1,2),(ALTC(J,I),I=1,3)
230       81 FORMAT(1X,3X,1H*,1X,A4,A2,3F15.4)
231          GO TO 85
232       82 WRITE(6,83) (NF(J,IA),IA=1,2),(ALTC(J,I),I=1,3)
243       83 FORMAT(1X,5X,A4,A2,3F15.4)
244       85 CONTINUE
      C      BEGIN OUTPUT FORMATTING ROUTINE
246          WRITE(6,1000)
      C      IF IXA=0 OR BLANK, PRINT CONTENTS OF CARD
247       99 WRITE(6,1010)(FMM(I),I=1,18)
254      100 READ(5,2004) (FMM(I),I=1,18),IVA,IWA,IXA
264          IF(IVA.EQ.999) CALL EXIT
267          IF(IXA.EQ.0) GO TO 99
272          GO TO(110,120,130,140,150,160,170,180,180,200,210,220,230,240,250,
            1260,270),IXA
      C      IXA=1  SELECT AND PRINT GOVT PROG PARTICIPATION TITLE
273      110 IF(IWA.EQ.IRHS) GO TO 99
276          GO TO 100
      C      IXA=2  TURN TO NEW PAGE
277      120 WRITE(6,1000)
300          GO TO 100
      C      IXA=3  PRINT FROM ALTB
301      130 IF(IWA.EQ.0) GO TO 101
304          IF(IWA.EQ.99) GO TO 102
307          TOT=0.0
310          DO 131 I=IVA,IWA
311      131 TOT=TOT+ALTB(I)
313          GO TO 103
314      101 TOT=ALTB(IVA)
315          GO TO 103
316      102 TOT=ALTB(IVA)
317          GO TO 104
320      103 WRITE(6,1011)(FMM(I),I=1,13),TOT
325          GO TO 100
326      104 WRITE(6,1012)(FMM(I),I=1,13),TOT
333          GO TO 100
334      105 WRITE(6,1024)(FMM(I),I=1,13),TOT
341     1024 FORMAT(1X,13A4,F11.2)
342          GO TO 100
      C      IXA=4  PRINT INTEREST RATE
343      140 TOT=C(IVA)*(+100.0)
344          GO TO 103
      C      IXA=5  PRINT GOVERNMENT PROGRAM INFORMATION
345      150 TOT=GOV(IVA,IWA)
346          IF(IWA.EQ.1) GO TO 103
351          GO TO 105
      C      IXA=6  PRINT NET RETURNS
352      160 TOT=YINC
353          GO TO 104
      C      IXA=7  IF SUM OF X(I) FROM IVA TO IWA IS LT 0.05 PRINT CARD
354      170 TOT=0.0
355          DO 171 I=IVA,IWA
356      171 TOT=TOT+X(I)
360          IF(TOT.LT.0.05) GO TO 99

ISN        SOURCE STATEMENT

363          GO TO 100
      C      ACTIVITY LEVELS IXA=8 IMPLIES F9.0   IXA=9 IMPLIES F10.1
364      180 IF(IWA.EQ.0) TOT=X(IVA)
367          IF(IWA.EQ.0) GO TO 184
372          TOT=0.0
373          DO 181 I=IVA,IWA
374      181 TOT=TOT+X(I)
376      184 IF(TOT.LT.0.05) GO TO 100
401          IF(IXA-8)104,104,103
      C      IXA=10  NOT USED IN THIS PROGRAM
402      200 GO TO 100
      C      IXA=11 SWITCH TO ALTERNATE USE OF IXA FOR PART III--LAND USE
403      210 TOTL=0.0
404      211 READ(5,2004)(FMM(I),I=1,18),IVA,IWA,IXA
414          IF(IVA.EQ.999) GO TO 100
417          IF(IXA.EQ.0) GO TO 214
422          IF(IXA.EQ.99) GO TO 212
425          IF(IXA.EQ.98) GO TO 215
430          IF(X(IVA).LT.0.05) GO TO 211
433          PCNT=(X(IVA)/B(IXA))*100.
434          YLD=A(IWA,IVA)*(-1.0)
435          IF(IWA.NE.25) GO TO 2111
440          YLD=YLD+A(24,IVA)*(-1.0)
441     2111 TOTL=TOTL+X(IVA)
442          WRITE(6,1014) (FMM(I),I=2,8),X(IVA),(FMM(I),I=10,11),PCNT,
            1(FMM(I),I=14,16),YLD
457          IP=0
460          GO TO 211
461      212 TOT=0.0
462          DO 213 I=IVA,IWA
463      213 TOT=TOT+X(I)
465          IF(TOT.LT.0.05) GO TO 211
470          WRITE(6,1015)(FMM(I),I=2,8),TOT
475          IP=0
476          GO TO 211
477      215 IF(IP.GE.1) GO TO 211
502      214 WRITE(6,1010)(FMM(I),I=1,18)
507          IP=1
510          GO TO 211
      C      IXA=12  TOTAL LAND COMPUTATION
511      220 TOT=0.0
512          DO 221 I=IVA,IWA
513      221 TOT=TOT+X(I)
515          WRITE(6,1015)(FMM(I),I=1,7),TOT
522          GO TO 100
      C      IXA=13  SWITCH TO ALTERNATE USE OF IXA FOR PART III--LIVESTOCK
523      230 READ(5,2004)(FMM(I),I=1,18),IVA,IWA,IXA
533          IF(IVA.EQ.999) GO TO IOC
536          IF(IVA.EQ.0) GO TO 231
541          IF(X(IVA).LT.0.05) GO TO 230
544          GO TO 232
545      231 WRITE(6,1010)(FMM(I),I=1,18)
552          GO TO 230
553      232 IF(IXA.NE.0) GO TO 233
556          TOT=C(IWA)*(-1.0)
```

TABLE XXII (Continued)

```
ISN         SOURCE STATEMENT

557            WRITE(6,1016)(FMM(I),I=1,3),X(IVA),(FMM(I),I=5,16),TOT
570            GO TO 230
571       233  TOT=C(IWA)*(-1.0)
572            WRITE(6,1017)(FMM(I),I=1,3),X(IVA),(FMM(I),I=5,10),C(IXA),
              1(FMM(I),I=13,16),TOT
607            GO TO 230
          C    IXA=14  PART III--LABOR
610       240  WRITE(6,1018)(FMM(I),I=1,6),X(IVA),(FMM(I),I=9,13),X(IWA)
621            GO TO 100
          C    IXA=15  PART III--CAPITAL
622       250  WRITE(6,1019)(FMM(I),I=1,13),X(IVA)
627            GO TO 100
          C    IXA=16  PART III--GOVT PROGRAMS
630       260  IND=0
631            INDD=0
632            INDE=0
633            INDX=0
634       261  READ(5,2004)(FMM(I),I=1,18),IVA,IWA,IXA
644            IF(IVA.EQ.999) GO TO 100
647            IF(IVA.GT.0) GO TO 262
652      2611  WRITE(6,1010)(FMM(I),I=1,18)
657            GO TO 261
660       262  IND=IND+1
661            IF(IXA.LT.30) GO TO 268
664            IA=IVA+6
665            TOT=0.0
666            DO 263 I=IVA,IA
667       263  TOT=TOT+X(I)
671            IF(TOT.LT.0.05) GO TO 261
674            PNT(IND,1)=TOT
675            GO TO(264,265,266),IND
676       264  PNT(IND,3)=(TOT/ALTB(IXA))*100.0
677            IF(IRHS.NE.3) GO TO 267
702            IF(PNT(IND,3).GT.80.05)  PNT(IND,3)=80.0
705            IX1=IXA+1
706            PNT(IND,4)=(X(IWA)/B(IX1))*100.0
707            IX1=IX1+1
710            IW1=IWA+1
711            PNT(IND,5)=(X(IW1)/B(IX1))*100.0
712            GO TO 267
713       265  PNT(IND,4)=(TOT/ALTB(IXA))*100.0
714            IF(IRHS.NE.3) GO TO 267
717            IF(PNT(IND,4).GT.80.05)  PNT(IND,4)=80.0
722            IX1=IXA-1
723            PNT(IND,3)=(X(IWA)/B(IX1))*100.0
724            IX1=IXA+1
725            IW1=IWA+1
726            PNT(IND,5)=(X(IW1)/B(IX1))*100.0
727            GO TO 267
730       266  PNT(IND,5)=(TOT/ALTB(IXA))*100.0
731            IF(IRHS.LT.2) GO TO 267
734            IF(PNT(IND,5).GT.100.05) PNT(IND,5)=100.0
737            IX1=IXA-2
740            PNT(IND,3)=(X(IWA)/B(IX1))*100.0
741            IX1=IXA-1
```

```
ISN         SOURCE STATEMENT

742            IW1=IWA+1
743            PNT(IND,4)=(X(IW1)/B(IX1))*100.0
744            GO TO 267
745       267  WRITE(6,1020)(FMM(I),I=1,5),(PNT(IND,J),J=1,6)
756            GO TO 261
757       268  IF(IXA.EQ.6) GO TO 2695
762            IF(IXA.EQ.7) GO TO 2696
765            IF(IXA.EQ.8) GO TO 2699
770            IF(IXA.EQ.10) GO TO 2697
773            TOT=0.0
774            IV1=IVA+6
775              IF(IXA.EQ.2) IV1=IVA+4
1000           DO 2691 I=IVA,IV1
1001     2691  TOT=TOT+X(I)
1003           IF(TOT.LT.0.05) GO TO 261
1006           PNT(IND,1)=TOT
1007           IF(IXA.EQ.3) GO TO 2693
1012           IF(IXA.EQ.5) GO TO 2694
1015           PNT(IND,6)=(TOT/ALTB(IWA))*100.0
1016           GO TO 267
1017     2693  IW1=IWA+1
          C    THE FOLLOWING CARD MUST BE REVISED IF CONSTRAINT LOCATIONS ARE CHG
1020           PNT(IND,5)=(X(IW1)/B(39))*100.0
1021           TOT1=TOT-X(IWA)-X(IW1)
          C    THE FOLLOWING CARD MUST BE REVISED IF CONSTRAINT LOCATIONS ARE CHG
1022           PNT(IND,6)=(TOT1/B(40))*100.0
1023           PNT(IND,2)=X(IWA)
1024           GO TO 267
1025     2694  PNT(IND,2)=TOT
1026           GO TO 267
1027     2695  PNT(IND,1)=X(IVA)
1030           PNT(IND,2)=X(IVA)
1031           IF(X(IVA).LT.0.05) GO TO 261
1034           GO TO 267
1035     2696  IF(INDE.EQ.0.AND.IVA.EQ.1) GO TO 2611
1040           IF(IVA.EQ.1) GO TO 261
1043           INDD=INDD+1
1044           IF(X(IVA).LT.0.05) GO TO 261
1047           PNT(IND,2)=X(IVA)*(-1.0)
1050           GO TO (26961,26962,26967,26961,26962,26963),INDD
1051    26961  PNT(IND,3)=(X(IVA)/B(IWA))*100.0
1052           GO TO 26967
1053    26962  PNT(IND,4)=(X(IVA)/B(IWA))*100.0
1054           GO TO 26967
1055    26963  PNT(IND,5)=(X(IVA)/B(IWA))*100.0
1056    26967  WRITE(6,1025)(FMM(I),I=1,5),(PNT(IND,J),J=2,6)
1067     1025  FORMAT(1X,5A4,6X,5F9.1)
1070           INDE=1
1071           GO TO 261
1072     2697  DO 2698 I=1,19
1073           DO 2698 J=1,6
1074     2698  PNT(20,J)=PNT(20,J)+PNT(I,J)
1077           IND=20
1100           GO TO 267
1101     2699  IF(IWA.EQ.1.AND.INDX.EQ.0) GO TO 2611
```

TABLE XXII (Continued)

```
 ISN        SOURCE STATEMENT

1104        IF(IWA.EQ.1) GO TO 261
1107        IF(X(IVA).LT.0.05) GO TO 261
1112        WRITE(6,1021)(FMM(I),I=1, 5),X(IVA)
1117        INDX=1
1120        GO TO 261
      C     IXA=17  PART III--FINANCIAL SUMMARY
1121    270 TOTL=0.0
1122    271 READ(5,2004)(FMM(I),I=1,18),IVA,IWA,IXA
1132        IF(IVA.EQ.999) GO TO 100
1135        IF(IVA.GT.0) GO TO 272
1140        WRITE(6,1010)(FMM(I),I=1,18)
1145        GO TO 271
1146    272 GO TO(274,275,276,278,2791,2792,2793,2794),IXA
1147    274 TOT=X(IVA)*C(IVA)*(-1.0)
1150        IF(TOT.LT.0.05) GO TO 271
1153        TOTL=TOTL+TOT
1154        DO 279 I=1,3
1155    279 ALTC(IVA,I)=ALTC(IVA,I)*(-1.0)
1157    273 WRITE(6,1022)(FMM(I),I=1,7),TOT,(FMM(I),I=11,12),ALTC(IVA,3),
           1ALTC(IVA,2),ALTC(IVA,1)
1170        GO TO 271
1171    275 WRITE(6,1023)(FMM(I),I=1,7),TOTL
1176        TOTLI=TOTL
1177        TOTL=0.0
1200        GO TO 271
1201    276 TOT=0.0
1202        DO 277 I=IVA,IWA
1203    277 TOT=TOT+X(I)*C(I)
1205        IF(TOT.LT.0.05) GO TO 271
1210        TOTL=TOTL+TOT
      C     THE FOLLOWING CARD MUST BE REVISED IF ACTIVITY LOCATIONS ARE CHNGD
1211        IF(IVA.EQ.103) GO TO 2777
1214        WRITE(6,1022)(FMM(I),I=1,7),TOT,(FMM(I),I=11,12),(ALTC(IVA,J),J=1,
           13)
1231        GO TO 271
1232   2777 WRITE(6,1022) (FMM(I),I=1,7),TOT
1237        GO TO 271
1240    278 TOT=0.0
1241        DO 2781 J=IVA,IWA
1242        DO 2781 I=1,80
1243   2781 TOT=TOT+COST(I,J)*X(I)
      C     THE FOLLOWING CARD MUST BE REVISED IF ACTIVITY LOCATIONS ARE CHNGD
1246        IF(IVA.EQ.1) TOT=TOT+C(87)*X(87)
1251        IF(TOT.LT.0.05) GO TO 271
1254        TOTL=TOTL+TOT
1255        WRITE(6,1023)(FMM(I),I=1,7),TOT
1262        GO TO 271
1263   2791 WRITE(6,1023)(FMM(I),I=1,7),TOTL
1270        GO TO 271
1271   2792 TOTL=TOTLI-TOTL
1272        TOTLN=TOTL
1273        GO TO 2791
1274   2793 TOTL=YINC-YINC2
1275        GO TO 2791
1276   2794 TOTL=TOTLN-TOTL
```

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 ISN        SOURCE STATEMENT

1277        GO TO 2791
1300   2003 FORMAT(18A4)
1301   2004 FORMAT(18A4,2I3,I2)
1302   1000 FORMAT(1H1)
1303   1008 FORMAT(1X,I3,1X,A4,A2,F15.4,20X,I2,1X,A1,A4,A2,F15.4)
1304   1009 FORMAT(1X,I3,1X,A4,A2,F15.4)
1305   1010 FORMAT(1X,18A4)
1306   1011 FORMAT(1X,13A4,F10.1)
1307   1012 FORMAT(1X,13A4,F9.0)
1310   1014 FORMAT(1X,7A4,F7.1,1X,2A4,F8.1,3A4,F8.1)
1311   1015 FORMAT(1X,7A4,F7.1)
1312   1016 FORMAT(1X,3A4,F4.0,12A4,F8.2)
1313   1017 FORMAT(1X,3A4,F4.0,6A4,F8.2,4A4,F8.2)
1314   1018 FORMAT(1X,6A4,F8.1,5A4,F8.1)
1315   1019 FORMAT(1X,13A4,F8.0)
1316   1020 FORMAT(1X,5A4,F6.1,5F9.1)
1317   1021 FORMAT(1X,5A4,F6.1)
1320   1022 FORMAT(1X,7A4,F12.2,2A4,1X,F6.2,2X,F6.2,2X,F6.2)
1321   1023 FORMAT(1X,7A4,F12.2)
1322   9999 STOP
1323        END
```

TABLE XXIII

HEADER CARD LISTING FOR THE INDIVIDUAL FARM DETAILED REPORT

NO PARTICIPATION IN GOVERNMENT PROGRAMS			1 1
PARTICIPATE IN WHEAT PROGRAM			2 1
PARTICIPATE IN WHEAT AND FEED GRAIN PROGRAMS			3 1
PART I--RESOURCES AND RESTRICTIONS	UNIT	AMOUNT	
LAND - TOTAL	ACRE		2 10 3
CLAY-B	ACRE		2 3
CLAY-C	ACRE		3 3
CLAY-D	ACRE		4 3
CLAY-NATIVE PASTURE	ACRE		5 3
LOAM-A	ACRE		6 3
LOAM-B	ACRE		7 3
LOAM-C	ACRE		8 3
LOAM-D	ACRE		9 3
LOAM-NATIVE PASTURE	ACRE		10 3
LABOR - TOTAL	HOUR		12 15 3
JAN-APR	HOUR		12 3
MAY-JUL	HOUR		13 3
AUG-SEP	HOUR		14 3
OCT-DEC	HOUR		15 3
CAPITAL			
INTEREST-FREE CAPITAL	DOLLAR		17 99 3
SHORT-TERM INTEREST RATE	PERCENT		110 4
GOVERNMENT PROGRAM INFORMATION			
BARLEY BASE	ACRE		37 3
GRAIN SORGHUM BASE	ACRE		38 3
WHEAT ALLOTMENT	ACRE		39 3
CONSERVING BASE	ACRE		40 3
PROJECTED YIELDS			
BARLEY	BU/A		1 1 5
GRAIN SORGHUM	CWT/A		2 1 5
WHEAT	BU/A		3 1 5
LOAN RATES			
BARLEY	$/BU		1 2 5
GRAIN SORGHUM	$/CWT		2 2 5
WHEAT	$/BU		3 2 5
ALFALFA ACREAGE LIMIT	ACRE		11 3
			2
PART II--SUMMARY OF THE OPTIMUM FARM PLAN			
NET RETURN TO FIXED RESOURCES	DOLLAR		6
CROPS			
BARLEY	ACRE		1 7 9
GRAIN SORGHUM	ACRE		8 14 9
WHEAT	ACRE		15 21 9

TABLE XXIII (Continued)

FORAGE SORGHUM	ACRE	22 28 9
ALFALFA	ACRE	29 33 9
WHEAT PASTURE--GRAZE OUT BY MAY 1	ACRE	34 40 9
SUDAN PASTURE	ACRE	41 47 9
SUDAN PASTURE--FOR WINTER GRAZING	ACRE	48 54 9
OTHER CROPS	ACRE	55 62 9
IDLE CROPLAND	ACRE	63 63 9
NATIVE PASTURE	ACRE	64 65 9
TOTAL	ACRE	1 65 9
LIVESTOCK		
COWS--SPRING CALVING	HEAD	66 68 8
COWS--FALL CALVING	HEAD	69 69 8
STEERS--BUY OCT-SELL OCT	HEAD	70 72 8
STEERS--BUY OCT-SELL MAY	HEAD	73 74 8
STEERS--BUY OCT-SELL MAR	HEAD	75 76 8
LABOR (HIRED)		
JANUARY-APRIL	HOUR	103 9
MAY-JULY	HOUR	104 9
AUGUST-SEPTEMBER	HOUR	105 9
OCTOBER-DECEMBER	HOUR	106 9
NO HIRED LABOR REQUIRED		103106 7
CAPITAL		
TOTAL REQUIRED	DOLLAR	109 8
ADJUSTED TO AN ANNUAL BASIS	DOLLAR	110 8

BEGIN ALT READ 11

PART III--DETAILED OPTIMUM FARM PLAN

A. LAND USE

CROP	ACRES	SOIL PRODUCTIVITY CLASS	PERCENT USED	YIELD/ACRE UNIT	AMOUNT	
BARLEY		CB		BU		1 18 2
BARLEY		CC		BU		2 18 3
BARLEY		CD		BU		3 18 4
BARLEY		LA		BU		4 18 6
BARLEY		LB		BU		5 18 7
BARLEY		LC		BU		6 18 8
BARLEY		LD		BU		7 18 9
						98
GRAIN SORGHUM		CB		CWT		8 19 2
GRAIN SORGHUM		CC		CWT		9 19 3
GRAIN SORGHUM		CD		CWT		10 19 4
GRAIN SORGHUM		LA		CWT		11 19 6
GRAIN SORGHUM		LB		CWT		12 19 7
GRAIN SORGHUM		LC		CWT		13 19 5
GRAIN SORGHUM		LD		CWT		14 19 9
						98
WHEAT		CB		BU		15 20 2
WHEAT		CC		BU		16 20 3

TABLE XXIII (Continued)

WHEAT	CD	BU	17 20 4
WHEAT	LA	BU	18 20 6
WHEAT	LB	BU	19 20 7
WHEAT	LC	BU	20 20 8
WHEAT	LD	BU	21 20 9
			98
FORAGE SORGHUM	CB	TON	22 21 2
FORAGE SORGHUM	CC	TON	23 21 3
FORAGE SORGHUM	CD	TON	24 21 4
FORAGE SORGHUM	LA	TON	25 21 6
FORAGE SORGHUM	LB	TON	26 21 7
FORAGE SORGHUM	LC	TON	27 21 8
FORAGE SORGHUM	LD	TON	28 21 9
			98
ALFALFA	CB	TON	29 22 2
ALFALFA	CC	TON	30 22 3
ALFALFA	LA	TON	31 22 6
ALFALFA	LB	TON	32 22 7
ALFALFA	LC	TON	33 22 8
			98
WHEAT PAST-GRAZE OUT-MAY	CB	AUM	34 25 2
WHEAT PAST-GRAZE OUT-MAY	CC	AUM	35 25 3
WHEAT PAST-GRAZE OUT-MAY	CD	AUM	36 25 4
WHEAT PAST-GRAZE OUT-MAY	LA	AUM	37 25 6
WHEAT PAST-GRAZE OUT-MAY	LB	AUM	38 25 7
WHEAT PAST-GRAZE OUT-MAY	LC	AUM	39 25 8
WHEAT PAST-GRAZE OUT-MAY	LD	AUM	40 25 9
			98
SUDAN PASTURE	CB	AUM	41 26 2
SUDAN PASTURE	CC	AUM	42 26 3
SUDAN PASTURE	CD	AUM	43 26 4
SUDAN PASTURE	LA	AUM	44 26 6
SUDAN PASTURE	LB	AUM	45 26 7
SUDAN PASTURE	LC	AUM	46 26 8
SUDAN PASTURE	LD	AUM	47 26 9
			98
SUDAN PAST--WINTER GRAZE	CB	AUM	48 23 2
SUDAN PAST--WINTER GRAZE	CC	AUM	49 23 3
SUDAN PAST--WINTER GRAZE	CD	AUM	50 23 4
SUDAN PAST--WINTER GRAZE	LA	AUM	51 23 6
SUDAN PAST--WINTER GRAZE	LB	AUM	52 23 7
SUDAN PAST--WINTER GRAZE	LC	AUM	53 23 8
SUDAN PAST--WINTER GRAZE	LD	AUM	54 23 9
			98
IDLE CROPLAND			63 6399
			98
NATIVE PASTURE	C	AUM	64 26 5
NATIVE PASTURE	L	AUM	65 2610
			999
TOTAL LAND			1 6512
			2

B. LIVESTOCK	CALVED OR BOUGHT	SOLD
	* ------	

TABLE XXIII (Continued)

TYPE	HEAD	RATION	DATE	WEIGHT	PRICE		DATE		WEIGHT	PRICE	
											13
COWS		1	MAR			STEERS	OCT	1	485		66 90
						HEIFERS	OCT	1	460		66 91
COWS		1,2	MAR			STEERS	OCT	1	485		67 90
						HEIFERS	OCT	1	460		67 91
COWS		1,2,3	MAR			STEERS	OCT	1	485		68 90
						HEIFERS	OCT	1	460		68 91
COWS		1,2,3,5	NOV			STEERS	JUL	20	500		69 93
						HEIFERS	JUL	20	460		69 94
STEERS		1	OCT 15	450			OCT	15	775		70 9996
STEERS		1,2	COT 15	450			OCT	15	775		71 9996
STEERS		1,5	OCT 15	450			OCT	15	775		72 9996
STEERS		1,2,3,4	OCT 15	450			MAY	1	700		73 9896
STEERS		1,2,3,4,5	OCT 15	450			MAY	1	700		74 9896
STEERS		1,2,3	OCT 15	450			MAR	1	600		75 9796
STEERS		1,2,5	OCT 15	450			MAR	1	600		76 9796
											999

* 1-NATIVE PASTURE
2-FORAGE SORGHUM OR PRAIRIE HAY
3-SMALL GRAIN PASTURE OCT-MAR
4-SMALL GRAIN PASTURE MAR-MAY
5-SORGHUM OR ALFALFA STUBBLE

C. LABOR	HIRED (HOURS)	UNUSED OPER. AND FAMILY LABOR (HOURS)	
JAN-APR			10313914
MAY-JUL			10414014
AUG-SEP			10514114
OCT-DEC			10614214

D. CAPITAL	DOLLARS		
TOTAL REQUIRED		109	15
ADJUSTED TO AN ANNUAL BASIS		110	15

E. GOVERNMENT PROGRAM PARTICIPATION

	ACRES	DIVERTED ACRE CHECK	PER CENT OF ALLOTMENT OR BASE --------- BARLEY	GRAIN SORGHUM	WHEAT	CONSERV-ING	
							16
BARLEY							112237
GRAIN SORGHUM							812438
WHEAT							1512639
FORAGE SORGHUM							22 40 1
ALFALFA							29 40 2
WHEAT PAST(GR-OUT)							34120 3

TABLE XXIII (Continued)

SUDAN PASTURE	41	40	4
SUDAN PAST(WINTER)	48		5
FALLOW	63		6
ACRES DIVERTED			
MINIMUM			
BARLEY	111	37	7
GRAIN SORGHUM	112	38	7
WHEAT	113	39	7
NONE	1		7
ADDITIONAL			
BARLEY	114	37	7
GRAIN SORGHUM	115	38	7
WHEAT	116	39	7
NONE	1		7
TOTAL	90		10
SUBSTITUTIONS			
BARLEY FOR SORG	122		8
BARLEY FOR WHEAT	123		8
SORG FOR BARLEY	124		8
SORG FOR WHEAT	125		8
WHEAT FOR BARLEY	126		8
WHEAT FOR SORG	127		8
NONE	1	1	8
	999		
			2
			17

F. FINANCIAL SUMMARY

			PRICE RANGE				
		UNIT	LOWER LIMIT	PRICE USED	UPPER LIMIT		
GROSS INCOME	$						
CLOP SALES							
BARLEY		PU				81	1
GRAIN SORGHUM		CWT				82	1
WHEAT		BU				83	1
WHEAT PASTURE--OCT-MAR		AUM				85	1
WHEAT PASTURE--OCT-MAY		AUM				84	1
ALFALFA HAY		TON				86	1
LIVESTOCK SALES							
STEER CALVES-OCTOBER		CWT				90	1
HEIFER CALVES-OCTOBER		CWT				91	1
CULL COWS-SPRING CALVING		CWT				92	1
STEER CALVES-JULY		CWT				93	1
HEIFER CALVES-JULY		CWT				94	1
CULL COWS-FALL CALVING		CWT				95	1
STOCKER STEERS-MARCH		CWT				97	1
STOCKER STEERS-MAY		CWT				98	1
STOCKER STEERS-OCTOBER		CWT				99	1
GOVERNMENT PAYMENTS							
BARLEY PRICE SUPPORT PMT		ACRE				117	1
SORGHUM PRICE SUPPORT PT		ACRE				118	1

TABLE XXIII (Continued)

WHEAT CERTIFICATES		ACRE	119	1
ADDITNL BARLEY DIVERSION		ACRE	114	1
ADDITNL SORG DIVERSION		ACRE	115	1
ADDITNL WHEAT DIVERSION		ACRE	116	1
TOTAL	$		1	2
OPERATING EXPENSES	$			
STOCKER STEERS PCH-OCT		CWT	96 96	3
HIRED LABOR		HOUR	103106	3
INTEREST		DOLLAR	110110	3
FEED			1 1	4
SEED			2 2	4
FERTILIZER AND LIME			3 3	4
MACHINE HIRE			4 5	4
MISC.OPERATING EXPENSE			6 6	4
VETERINARY AND MEDICINE			7 7	4
MACHINERY OPERATING EXP.			8 8	4
TAXES (LIVESTOCK ONLY)			9 9	4
FREIGHT AND MARKETING			10 10	4
--			11 11	4
TOTAL	$		1	5
NET RETRN TO FIXED RESOURCES			1	6
OVERHEAD EXPENSES *	$		1 67	7
NET RETURN TO LAND,FAMILY LABOR AND MANAGEMENT	$		1	8
			999	

* INCLUDES DEPRECIATION, INTEREST, TAXES AND INSURANCE FOR MACHINERY AND EQUIPMENT. DOES NOT INCLUDE TAXES AND INTEREST ON LAND OR A CHARGE FOR FAMILY LABOR AND MANAGEMENT.

999

TABLE XXIV

FORTRAN SOURCE LISTING FOR THE PARAMETRIC PRICE REPORT (PARAMP)

```
ISN        SOURCE STATEMENT

  0 $IBFTC PARAMP  NODECK
    C      PARAMP  PARAMETRIC PRICE PROGRAM
  1        COMMON A(65,170),B(65),C(170),KO(6),X(170),P(65),JH(65),XX(65),
          1Y(65),PE(65),E(4225),II,M,N,IOBJ,IRHS,IREV,IBVC,ISUB,SIGNN(65),
          2ALTB(65),ALTC(170,3),ND(65,2),NF(170,2),COST(80,14),YIFLD(65,9),
          3FMM(18),GOV(3,2),INFS,IOB,IPARAM,VL,IP
  2        DIMENSION XALT(170,10),UT(3,20)
  3        IREV=2
  4        IBVC=1
  5        ISUB=0
  6        IPARAM=1
  7        II=0
 10        IDD=0
 11        READ(4) A,ALTC,ND,NF,M,N,SIGNN,COST,YIELD
 16        REWIND 4
 17     10 READ(5,1000) IOBJ,IRHS
 22     11 READ(5,1001) NFP,NFP1,VL,VH,VA,VM
 25        IP=0
 26     12 IP=IP+1
 27        IF(NFP.EQ.NF(IP,1).AND.NFP1.EQ.NF(IP,2)) GO TO 13
 32        IF(IP.GT.N) CALL EXIT
 35        GO TO 12
 36     13 CONTINUE
 37     17 IND=1
 40        DO 14 I=1,170
 41        DO 14 J=1,10
 42     14 XALT(I,J)=0.0
 45        DO 15 I=1,3
 46        DO 15 J=1,20
 47     15 UT(I,J)=0.0
 52     16 CALL FMPLAN
 53        IF(INFS.GT.3) CALL EXIT
 56     50 UT(1,IND)=C(IP)
 57        DO 51 I=1,N
 60        XALT(I,IND)=X(I)
 61     51 UT(2,IND)=UT(2,IND)+X(I)*C(I)*(-1.0)
 63        UT(3,IND)=UT(2,IND)+C(IP)*X(IP)-VA*X(IP)
    C      COMPUTE PRICE RANGE
 64        IF(VH)60,61,61
 65     60 IF(C(IP).LE.VH) GO TO 71
 70        GO TO 63
 71     61 IF(C(IP).GE.VH) GO TO 71
 74     63 IB=0
 75    121 IB=IB+1
 76        IF(IB.GT.M) GO TO 122
101        IF(JH(IB).EQ.IP) GO TO 100
104        GO TO 121
105    122 CTMP=0.
106        IF(IND-1) 128,128,129
107    129 CBP=9999.1
110        GO TO 71
111    128 DO 123 I=1,M
112    123 CTMP=CTMP-P(I)*A(I,IP)
114        C(IP)=CTMP-0.01
115        IREV=0
```

```
ISN        SOURCE STATEMENT

116        IBVC=0
117        IND=IND+1
120        IPARAM=1
121        GO TO 16
122    100 CBN=-9999.0
123        CBP=+9999.0
124        DO 105 J=1,N
125        I=0
126    120 I=I+1
127        IF(I.GT.M) GO TO 124
132        IF(J.EQ.JH(I)) GO TO 105
135        GO TO 120
136    124 PTEMP=C(J)
137        DO 103 I=1,M
140    103 PTEMP=PTEMP+P(I)*A(I,J)
142        PIVOT=0.
143        IA=IB
144        DO 102 I=1,M
145        IE=M*(I-1)+IA
146    102 PIVOT=PIVOT+A(I,J)*E(IE)
150        IF(PTEMP.EQ.0.0) GO TO 105
153    101 IF(PIVOT.LT.(-0.0001)) GO TO 112
156        IF(PIVOT.GT.0.0001) GO TO 112
161        GO TO 105
162    112 CB=PTEMP/PIVOT
163        IF(CB)113,114,114
164    113 IF(CB.GT.CBN) CBN=CB
167        GO TO 105
170    114 IF(CB.LT.CBP) CBP=CB
173    105 CONTINUE
175        CLD=C(IP)
176        IF(VH)115,116,116
177    115 IF(CBN+VM)125,126,126
200    126 C(IP)=C(IP)-VM
201        GO TO 127
202    125 C(IP)=C(IP)+CBN-0.01
203        GO TO 127
204    116 IF(CBP-VM)117,118,118
205    117 C(IP)=C(IP)+VM
206        GO TO 127
207    118 C(IP)=C(IP)+CBP+0.01
210    127 IF(IND.EQ.1) WRITE(6,1003)
213        WRITE(6,79) (NF(IP,J),J=1,2),CLD,C(IP),VH,IND
220     79 FORMAT(1H ,A4,A2,3F15.4,I6)
221        IF(VH) 97,98,98
222     97 IF(CBN.LE.(-9999.0)) GO TO 71
225        GO TO 99
226     98 IF(CBP.GE.9999.) GO TO 71
231     99 IND=IND+1
232        IF(IND.GT.10) GO TO 71
235        IREV=0
236        IBVC=0
237        IPARAM=1
240        GO TO 16
241     71 IPR1=1
```

TABLE XXIV (Continued)

```
ISN      SOURCE STATEMENT

242          IF(IND-10) 81,81,82
243       81 IPR2=IND
244          GO TO 77
245       82 IPR2=10
246       77 WRITE(6,771) (FMM(I),I=1,18)
253      771 FORMAT(1H1,18A4)
254          WRITE(6,72) IOBJ,IRHS,NFP,NFP1,VL,VH,VA,VM
255       72 FORMAT(1X,4HOBJ=,I2,2X,4HRHS=,I2,18X,9HACTIVITY=,A4,A2,3X,5HFROM=,
            1F6.2,3X,3HTO=,F6.2,8X,9HCONSTANT=,F6.2,8X,14HMIN INCREMENT=,F7.3,
            2/)
256       83 WRITE(6,73) (NF(IP,J),J=1,2),(UT(1,I),I=IPR1,IPR2)
267       73 FORMAT(1H ,A4,A2,10F12.2)
270          WRITE(6,74) (UT(2,I),I=IPR1,IPR2)
275       74 FORMAT(1H ,6HNET RT,10F12.2)
276          WRITE(6,75) VA,(UT(3,I),I=IPR1,IPR2)
303       75 FORMAT(1H ,F6.2,10F12.2)
304          WRITE (6,76)
305       76 FORMAT(1H )
306          DO 86 I=1,N
307          DO 84 IS=1,IND
310       84 SUM=SUM+XALT(I,IS)
312          IF(SUM.LT.0.01) GO TO 86
315          WRITE(6,85) (NF(I,J),J=1,2),(XALT(I,J),J=IPR1,IPR2)
326       85 FORMAT(1H ,A4,A2,10F12.2)
327       86 SUM=0.
331          IF(IND.LE.IPR2) GO TO 87
334          IPR1=IPR1+10
335          IPR2=IPR2+10
336          IF(IPR2.GT.IND) IPR2=IND
      C      IF THERE IS SUFFICIENT CORE SPACE XALT TO BE WIDER THAN TEN COL.
      C      THEN THE FOLLOWING CARD SHOULD BE ---  GO TO 77
341          GO TO 17
342       87 IF(KO(1).NE.0) CALL EXIT
345          IF(VH) 94,95,95
346       94 IF(C(IP).LE.VH) CALL EXIT
351          IF(CBN.LE.(-9999.0)) CALL EXIT
354          GO TO 17
355       95 IF(C(IP).GE.VH) CALL EXIT
360          IF(CBP.GE.9999.0) CALL EXIT
363          GO TO 17
364     1000 FORMAT(2(4X,I2))
365     1001 FORMAT(A4,A2,4F10.4)
366     1003 FORMAT(1H1)
367       89 STOP
370          END
```

VITA

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