# AN ECONOMIC ANALYSIS OF ENERGY USE AND AGRICULTURAL OUTPUT FOR REPRESENTATIVE FARMS IN THE OKLAHOMA PANHANDLE

By

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AN ECONOMIC ANALYSIS OF ENERGY USE AND
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# CHAPTER I

# PROBLEM DEFINITION

## Introduction

The increased demand for agricultural products in both domestic and foreign markets has led to very favorable prices during 1973 and 1974. These high prices encourage farmers to expand their output. However, the price of many inputs has increased greatly during the same period, resulting in increasing farm expenses and great fluctuations in the net returns farmers receive.

One of the most important factors increasing farm expenses during this period is the change in the price of fossil fuels such as diesel, gas, liquified petroleum (LP), and general petroleum products. The increase in petroleum prices also increases the cost of other inputs that use petroleum in the production, processing and transportation phases of getting the input to the farmers. Thus it affects the cost of almost every input the farmer uses. These price increases in fossil fuels and related inputs indicate that some shifts in output or production adjustments are needed. These shifts are necessary for producers to maximize returns to their fixed resources. Because farmers operate in a market that approximates pure competition, such shifts also result in lower consumer food cost.

Although farmers are expected to use an increasing amount of petroleum products the proportion of the nation's requirements is projected to remain approximately the same. Approximately 2.6 million U. S. farmers spent about $1.9 million for 6.5 billion gallons of petroleum fuel in 1969. This accounted for three percent of all petroleum fuel used. Economic projections indicate that petroleum needs for agriculture will increase to about nine billion gallons by 1980. This is slightly less than three percent of the projected total petroleum use because of the increase in non-farm activities (9).

A recent publication of the Bureau for Business and Economic Research ranked Oklahoma energy users by amounts of energy used in 1973. Agriculture ranked fifth out of seven reported users, followed only by all others and Government. The Bureau projected the amount of energy used by each category in 1990 and found agriculture had dropped to sixth followed only by Government. Table I shows the ranking of energy users by amounts of energy used in 1973 and projected use for 1990.

TABLE I

RANKING OF USERS BY AMOUNTS OF ENERGY USED IN OKLAHOMA IN 1973 AND 1990[A/]

| User | 1973 Rank | 1990 Rank |
|---|---|---|
| Industrial | 1 | 1 |
| Transportation | 2 | 2 |
| Residential | 3 | 3 |
| Commercial | 4 | 4 |
| Agriculture | 5 | 6 |
| All other uses | 6 | 5 |
| Government | 7 | 7 |

[A/]Source: Oklahoma Energy Advisory Council, Oklahoma's Energy Needs For The Future, An Interim Report, Bureau of Business and Economic Research, University of Oklahoma (October, 1973).

The amount of energy (excluding electricity) used by the agricultural sector of Oklahoma's economy declined slightly between 1965 and 1972, but is projected to increase thereafter. In 1965, agriculture required about five percent of the energy used in the state, but by 1973, this proportion was expected to decline to slightly more than three percent. The upturn in total use projected to begin in 1973, will cause successive increase through 1990, but the total energy requirement by the agricultural sector will represent about two percent of Oklahoma's total energy requirement for 1990 (12).

A British Thermal Unit (BTU) is a measure of heat energy given off by a substance. It is a standard measure for fuels such as gas, diesel and LP. It was reported that agriculture required 29,539 billion BTU's of fuel energy which is made up of gas, diesel and LP. The number of BTU's increased steadily to 29,947 billion in 1973, while projected BTU's for the Oklahoma Agricultural sector for 1990 is approximately 41,759 billion (12).

TABLE II

BTU'S PER GALLON OF FOSSIL FUEL

| Fuel | Gallon | BTU's |
|---|---|---|
| LPG | 1 | 91,500 |
| Gasoline | 1 | 119,000 |
| Diesel | 1 | 138,000 |

Another farm input, fertilizer, is very much affected by the present energy situation. Total fertilizer tonage has increased constantly over the past few years due to the increased acreage fertilized and higher application rates per acre. The major types of energy required for fertilizer production are electricity and natural gas. With the increased fertilizer tonage demanded there is also an increase in BTU's of electricity and natural gas required for production of fertilizers. Table III shows the electricity, natural gas and total BTU's required to produce the fertilizer output for 1965 and 1973 as well as the output projected for 1990 (12).

TABLE III

BTU REQUIREMENTS OF NATURAL GAS AND ELECTRICITY FOR FERTILIZER PRODUCTION, 1965, 1973 and 1990
(Billions of BTU's)

| Year | Electricity[A/] | Natural Gas[B/] | Total | Ton Produced[C/] |
|---|---|---|---|---|
| 1965 | 132 | 1,499 | 1,631 | 489,853 |
| 1973 | 209 | 1,990 | 2,199 | 770,030 |
| 1990 | 823 | 4,045 | 4,868 | 1,582,100 |

[A/] 3,413 BTU equals 1 KWH.

[B/] 1,000 BTU equals 1 cubic foot of natural gas.

[C/] Source: Oklahoma State Department of Agriculture, Tonnage Distribution of Fertilizer in Oklahoma Counties, Oklahoma City, Oklahoma (1965, 1973).

The agricultural sector does use a higher proportion of the total U. S. LP gas production than of other petroleum fuels. In 1972, the U. S. farmers purchased 2.7 billion gallons of LP gas products, about 18 percent of total U. S. usage. Of the total 1.45 billion gallons were used to heat farm homes. Only 1.26 billion gallons, about 8 percent of the U. S. consumption, were used for farm production. Of the LP gas production used in farm production, 54 percent was used in motors while 46 percent was used for non-motor purposes such as crop drying, livestock and poultry brooders.

Another farm energy source is electricity which in 1972 made up about 2.7 percent of the 40 billion KWH of the total U. S. electricity usage. The percent of the total electricity consumption that is used on farms has actually declined from 4.6 percent in 1950 to 2.7 percent in 1972 (12).

Irrigated agriculture requires a large input of fossil fuel energy per acre of land farmed. A major reason for the increased energy required per acre is the fuel (primarily natural gas, electricity, LP, and diesel) required to pump the irrigation water. In Oklahoma the number of irrigation wells has increased from 4,102 in 1965 to 5,927 in 1973, while the irrigated acreage increased from 418,373 acres to 758,036 acres in 1973. With this rate of increase it is increasingly important to improve the efficiency of energy used in the agricultural sector. The number of LP powered irrigation pumps has declined from 2,144 in 1965 to 1,454 in 1973 while the number of natural gas systems increased from 751 to 2,813, and the number of diesel systems increased from 259 to 416 (17). The number of pumping systems using electricity for fuel also declined from 1,503 in 1969 to 1,249 in 1971. However, in considering the present energy situation in 1973 and 1974, a major percentage of the new wells being developed is using electricity as the power source, due to the availability of electricity compared to natural gas. Although large quantities of fuel are required to pump irrigation water, the efficiency varies by type of fuel, with diesel being the most efficient. A typical well in the Oklahoma Panhandle uses about 6.7 gallons of LP to pump one acre-inch of water while it takes about 604 cubic feet of natural gas to pump the same acre-inch of water. Therefore, if twelve inches are applied per acre, this amounts to 80.4 gallons of LP per acre. If the same twelve inches were put on per acre using natural gas, it would require 7,249 cubic feet. In contrast, because a gallon of diesel fuel contains more energy than a gallon of LP, irrigating with twelve inches of water using diesel would require only about fifty gallons of diesel (9).

Applying 36 acre inches requires 240 gallons of LP fuel, while the same 36 acre inches requires 150 gallons of diesel fuel. These figures show the varying amounts of fuel needed to pump the same amount of irrigation water (9).

The trend for several years has been to larger tractor and equipment and to increased use of diesel powered tractors. In 1972, the average new U. S. tractor produced 80 horsepower, with over 30 percent of all sales at 100 horsepower or greater. The number of diesel powered tractors has increased from 18 percent in 1964 to 39 percent in 1972. As in the irrigation engines, the diesel tractor engine is a much more efficient user of its fuel. It is estimated that the work done by a diesel tractor requires 1.0 gallon of fuel while the same work done by a gasoline tractor would require 1.34 gallons of fuel and a LP tractor would require 1.64 gallons of fuel (9).

## The Problem

Agriculture uses a relatively small amount of the total U. S. fossil fuel energy. However, as energy supplies become more limiting and prices increase, producers must adjust the use of each input. Some adjustments such as the increased number of diesel tractors purchased from 1964 to 1972, have already taken place. A wide range of additional adjustment to increased energy prices can be expected.

There are many ways by which valuable energy can be saved, such as: (1) matching equipment to tractor size, (2) consolidation of as many operations as possible to reduce the number of trips across the field, (3) continue to replace LP and gasoline tractors with more efficient diesel tractors, and (4) substituting lower energy requiring methods of production for current practices. Adopting minimum tillage, which is a combination of several new management strategies, may be one method of reducing energy used in producing agricultural products. Minimum tillage is both challenging and paradoxical. It requires top agricultural chemists, top agricultural machinery designers, and above all progressive farm managers. The farm manager must utilize every dollar of cost and every hour of labor to maximize economic efficiency. The major underlying issue is to reduce energy requirements whereby net returns remain the same or tend to rise above conventional tillage methods. Minimum tillage is made up of two major elements: (1) Use of chemicals to reduce and replace tillage operations and (2) the combination of two or more tillage operations in one trip over a field. This technique can in many cases conserve moisture and carry-over for fertilizers, thereby reducing irrigation and fertilizer requirements in future years.

Frequently, reduced tillage methods involve growing crops in a specific sequence, making multiple cropping and rotation practices common.

The study area selected for this project is the Oklahoma Panhandle made up of Cimarron, Texas and Beaver counties; as shown in Figure 1. This area has large acreages of extensive, low input, low yield dryland crop production. Large acreages have been converted to intensive irrigated production with high yield levels, and high input levels. Thus a wide range of production methods, ranging from extensive dryland production to intensive irrigated production are adapted for use in the area. Reduced tillage is a definite possibility in the Oklahoma Panhandle.

The purpose of this study is to determine the effect of reduced tillage practices on net income of farmers and to determine the most efficient crops and tillage techniques in terms of energy input and output.

The following set of objectives are pursued to determine the effects of alternative tillage methods on net incomes and energy efficiency.

## Objectives

1. Develop enterprise budgets for reduced tillage methods of producing irrigated crops in the Oklahoma Panhandle
2. Estimate the quantities of fossil fuel energy required for conventional and reduced tillage methods, and convert these values to a common basis.
3. Determine the profit maximizing ortanization for representative farms in the Oklahoma Panhandle and estimate the amount of fossil fuel

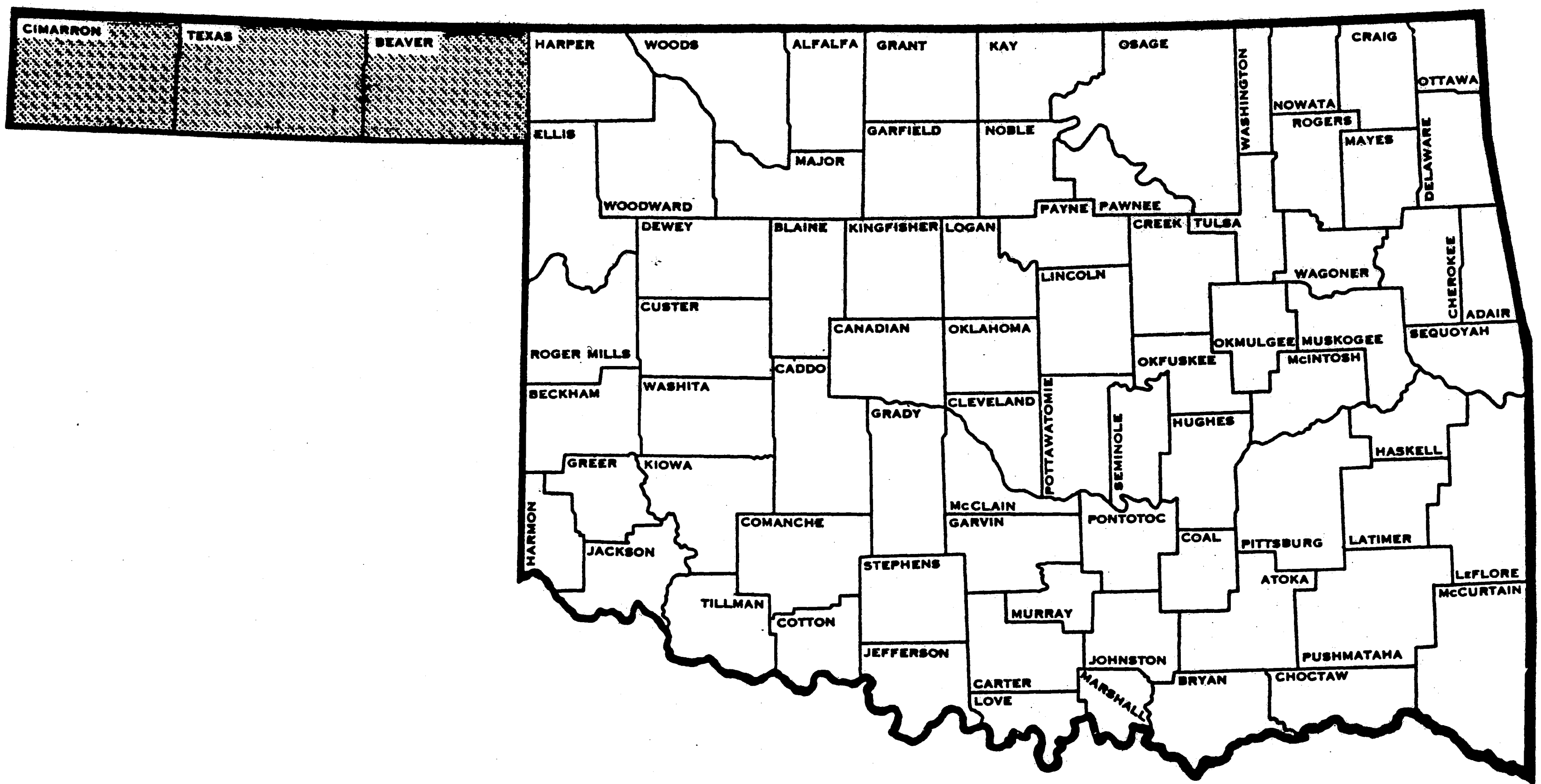


Figure 1. Map of Oklahoma Showing the Area of Study

energy required by the specified organizations.

4. Determine the organization for representative farms in the Oklahoma Panhandle that maximizes net energy output and compare it with the profit maximizing organization.

## Thesis Organization

The remainder of this thesis is divided into five chapters. Chapter II presents the theoretical concepts of marginal analysis compared to linear programming. In addition to the general form of the linear programming model, Chapter III explains the budget construction for the alternative methods of reduced and conventional tillage. In addition, the amount of fossil fuel energy inputs and the amount of energy produced is calculated for each method of production. Chapter IV describes the representative farms and the specific linear programming constraints and activities of the model used. Chapter V explains the optimum organization of the representative farms and compares the solution sets. Chapter VI summarizes the previous four chapters, draws conclusions and discusses the need for further study.

# CHAPTER II

# CONCEPTUAL DEVELOPMENT

## Theory of the Firm

A firm is a technical unit in which commodities are produced. Its entrepreneur (owner and/or manager) decides what to produce, how much to produce and the types and amount of inputs to use. Then he gains the profits or bears the loss which results from his decisions. An entrepreneur transforms inputs into outputs, subject to the technical rules specified by his production function. The difference between his revenue from the sale of outputs and the cost of inputs is his profits, if positive, or his loss, if negative (8). The flow chart in Figure 2 provides a convenient graphical device for depicting the decision process of the firm (11).

## Economic Tools of Analysis

The development of the electronic computer has led to the development and use of a number of important, yet conceptually different, analytical approaches to the economic theory of the firm. Two of these tools of analysis, marginal analysis and linear programming, are of interest in this study.

Since most of the differences underlying the assumptions of marginal analysis and linear programming models of the firm stem from differences in their assumptions regarding the production function, it

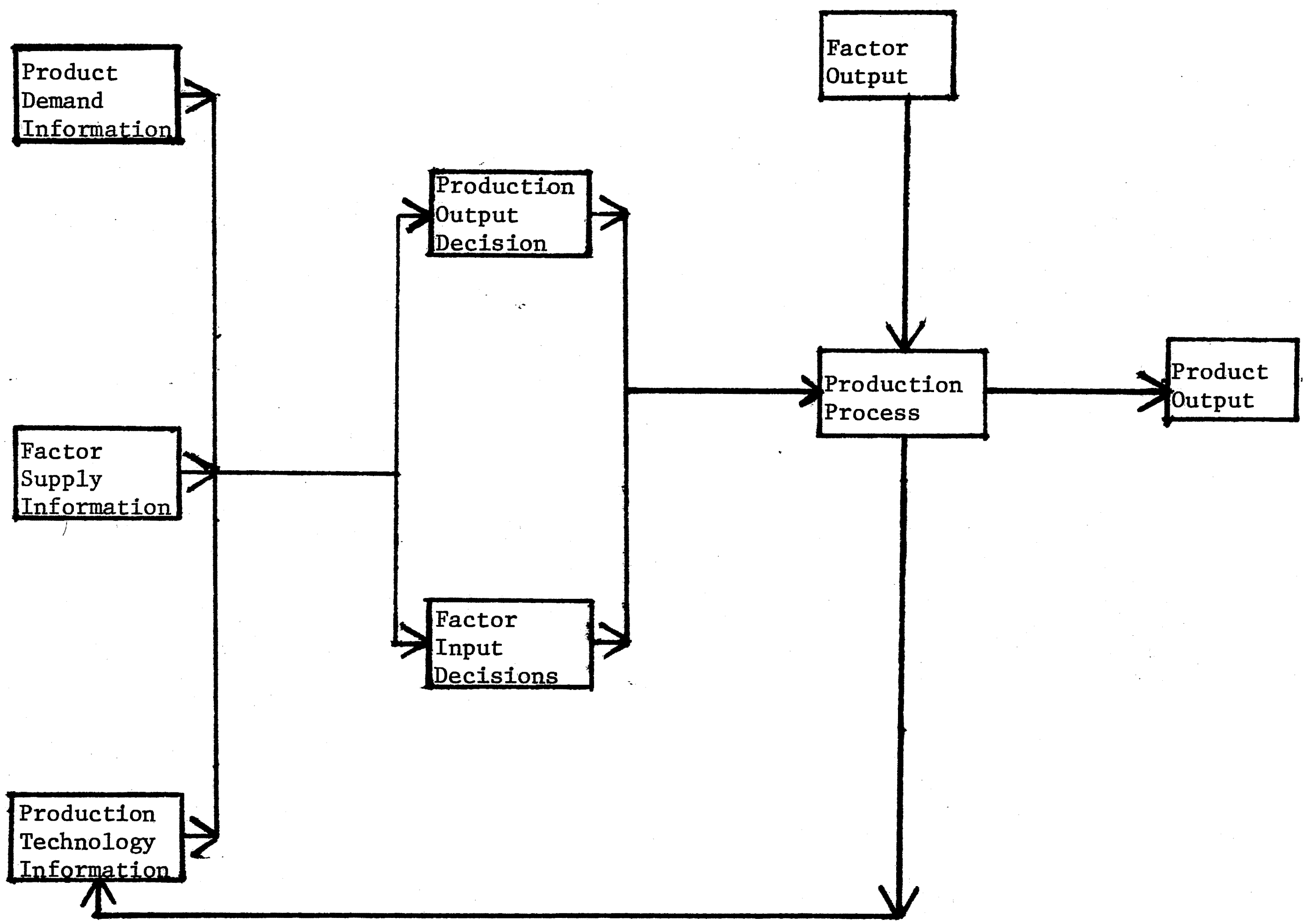


Figure 2. The Decision Process of a Firm

is appropriate to include a digression on "the production function." The use of the production function as a schedule of technological possibilities has provided economists with an extensive amount of information concerning the behavior of profit-maximizing firms. Under the assumptions of conventional marginal analysis, the firm's production function is said to be a function of the quantities of fixed and variable factors which are used in the firm's production process. For any given factor quantities, the dependent variable represented by the function is usually defined as the maximum quantity of the particular product that can be produced in a given state of technology, from the specified factor quantities. In the case of the multi-product, multi-factor firm, all products and factors are considered to be independent variables of the production functions. The dependent variable is then defined as the maximum quantity of output attainable from the specified input quantities. In a summation statement, the production function represents the results of the solution of an entire set of technical suboptimization problems (10).

## Marginal Analysis

Marginal analysis is concerned primarily with the process of making choices between alternative factor-product combinations considering infinitesimal changes in the value of the objective function of the firm resulting from infinitesimal change in factor-product combinations. In order to apply marginal analysis to the economic theory of the firm, it is necessary to reduce the problem of the firm to one of finding the optimal (maximum or minimum) values of some objective function subject to a set of constraints. By comparison with linear programming in which the objective function and the constraints must both be linear, the objective function of the firm under marginal analysis must be concave and differentiable throughout. The constraints may be either linear or nonlinear so long as they are concave.

The neoclassical model of the multi-product, multi-factor firm developed by J. R. Hicks is fairly typical of a broad classification of models of the firm for which marginal analysis is a suitable tool of analysis. The assumptions of marginal analysis are listed by Naylor (11).

(1) The firm possesses a production process which is capable of transforming a maximum of m variable factors of production into p products. (There are no limitations on the availability of the factors.)

(2) The prices of the firm's factors and products are fixed and known (that is, perfect competition is assumed).

(3) The objective of the firm is to maximize profit subject to the technical constraints imposed by its production function.

(4) A continuous production function exists (with nonzero first and second order partial derivatives) which relates the set of independent factor variables to the set of independent product variables.

(5) The exact nature of the firm's production function has been predetermined by a set of technical decisions by the firm's engineers and technicians.

(6) The firm's production function is characterized by a decreasing marginal rate of technical substitution between any two factors, a decreasing marginal product for all factor-product combinations, and an increasing marginal rate of product transformation between any two products.

(7) All of the firm's factors and products are perfectly divisible.

(8) Neither the factor prices, the product prices, nor the parameters which determine the firm's production function will change over the time period which is being considered. (This is a static model.)

(9) Neither the factor prices, the product prices, nor the parameters which determine the production function are permitted to be random variables. (Complete certainty is assumed.)

The assumption of perfect competition in both the product and the factor markets is by no means a necessary assumption for the use of marginal analysis in treating the theory of the firm. In fact, the only restriction imposed on the degree of competition in either the product or the factor markets is that the profit function must be concave. A concave profit function implies that the firm's revenue function is concave and that the firm's cost function behaves in a certain prescribed manner. Assuming perfect competition the firm's revenue function is concave only if increases in output yield diminishing marginal returns. That is, the firm possesses a decreasing marginal revenue function. The firm's marginal costs may either increase or decrease with increasing output.

The solution or optimality conditions for the Hicksian model of the firm may be derived in a straightforward manner. These optimality conditions take the form of the following three economic decision rules:

(1) The price ratio of any two products must equal the marginal rate of product transformation between the two products.

(2) The price ratio of any two factors must equal the marginal rate of technical substitution between the two factors.

(3) The price ratio of any factor product combination must be equal to the marginal product for the particular factor-product combination.

It is easy enough to derive a set of optimal conditions of the type listed for a theoretical model of the firm as Hicks'. However, it would be very difficult if not impossible to estimate an empirical production function showing the relationships between all products a firm in the study are could produce and the amount and timing of each input, since the study incorporates a combination of eight crops. Furthermore, the data necessary to estimate such a function is not available for the study area. Designing experiments to provide the data would be very expensive and require several years to complete. Even if it were possible to formulate a continuous production function for this study and estimate its parameters, the problem of finding the optimal solution for the model using marginal analysis would be a difficult task. These difficulties can be avoided by using linear programming as the tool of analysis.

Linear Programming

Linear programming is a planning method that is helpful in decisions requiring a choice among a large number of alternatives (2). The method, which grew out of applied mathematics, may be defined as a technique for solving problems involving the maximization of a linear objective function subject to a set of linear constraints imposed on the variables of the objective function. From a mathematical standpoint, linear programming is merely a special case of the calculus of maxima and minima in which both the objective function and the constraints are assumed to be linear. It is constantly being refined so that it can be applied with greater precision to a wider range of problems. Like many innovations, its usefulness would have been limited without a parallel technological development, the electronic computer.

When applied to the economic theory of the firm, the differences between linear programming and marginal analysis are pronounced. To begin with the assumptions which must be made about the firm's production function in formulating a linear programming model are very different from the assumptions underlying the production function in marginal analysis models of the firm. Next, the computational techniques available for obtaining solutions to linear programming problems are much simpler than those of marginal analysis and lastly, the economic interpretation of the optimality conditions of linear programming models of the firm differ considerably from the economic interpretation of the optimality conditions of marginal analysis models.

In order to present a comparison with marginal analysis, the following assumptions formulated for a linear programming model of the firm by Naylor are used. Naylor formulates the model in such a manner as to make it as nearly compatible with the Hicksian model of the multiproduct, multifactor firm as possible. Therefore, the linear programming model of the firm is based on the following set of assumptions given by Naylor (11).

(1) The firm has p independet processes or activities available, where an activity is defined as a particular way of combining a maximum of m variable factors with a maximum of n fixed factors for production of a unit of output. (A unit of output is analogous to a unit of product.).

(2) The prices of the firm's variable factors and products are fixed and know (Perfrect Competition).

(3) The objective of the firm is to maximize profit subject to the constraints imposed by the nature of its activities and the amounts of fixed factors which are available.

(4) Each activity is characterized by a set of ratios of the quantities of the factors to the levels of each of the outputs. These ratios are constant and independent of the extent to which each activity is used. (Thus homogenity of degree one or constant returns to scale are assumed.)

(5) The firm is constrained in its selection of activity levels by its fixed endowment of certain resources (fixed factors) required to support the p activities.

(6) Two or more activities can be used simultaneously, subject to the limitations of the fixed factors available to the firm, and if this is done the quantities of the outputs and inputs are the arithmetic sums of the quantities which would result if the activities are used separately.

(7) The exact nature of the firm's activities is predetermined by a set of technical decisions by the firm's manager.

(8) All of the firm's factors and products are perfectly divisible.

(9) Neither the factor prices, the product prices, nor the coefficients which determine the firm's activities (input-output coefficients) change over the time period which is being considered. (This is a static model.)

(10) Neither the factor prices, the product prices, nor the coefficients which determine the firm's activities are permitted to be random variables. (Complete certainty is assumed.)

In the comparison of marginal analysis and linear programming, one of the apparent differences is in the production function the firm possess. Figure 3 shows the production function assumed in marginal analysis, concave and differentiable throughout. The production function assumed in linear programming is also shown composed of linear segments making it discontineous. Assume an activity is defined for each of the four points shown in Figure 3, A, B, C, and D and included in the linear programming model. Each activity represents a method of production having its own input-output ratio. Thus the production function is represented by straight line segments because linear programming can use any combination of activities in the solution. A more precise representation of the "true" production function would result by including more activities, thus including more and shorter straight

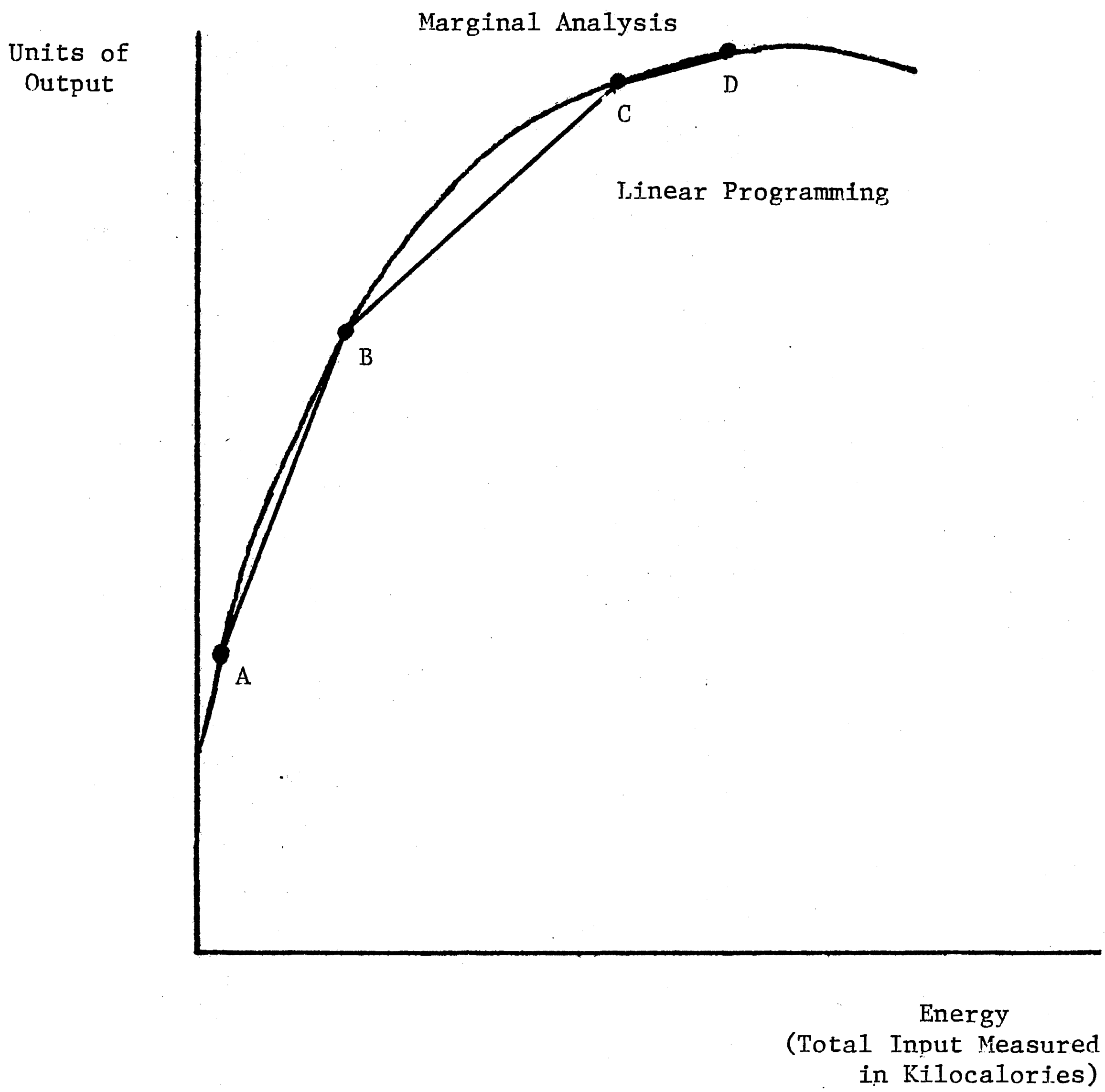


Figure 3. Marginal Analysis and Linear Programming Production Functions

line segments. Assume the variable input is kilocalories of fossil fuel energy. Consider point A as dryland production, and point B as moderate irrigation, while point C is reduced tillage under heavy irrigation. Depending on the input-output price ratio any one of these activities could be optimal.

In contrast with marginal analysis, the number of processes or activities which the firm has at its disposal in the linear programming model is finite. Furthermore, resources are not perfectly adaptable and factor proportions are completely fixed.

Linear programming holds a large advantage over marginal analysis in ease of obtaining a solution. Computer codes capable of solving linear programming problems with in excess of 2000 equations and an almost unlimited number of variables are widely used. This means linear programming is an operational tool of analysis for studies involving a number of equations and variables. There are no computer codes capable of solving the same problem formulated using marginal analysis.

The optimal conditions for the linear programming model are expressed in the following rules:

(1) The unit price of each activity must be less than or equal to the sum of the imputed cost of the fixed and variable factors used to produce one unit of the activity.

(2) For each variable factor-activity combination the unit price of the given variable factor must be greater than or equal to the marginal value imputed to the variable factor with regard to the given activity.

(3) The firm's total profit after paying the cost of its scarce resources (fixed factors) must be equal to zero.

(4) The total value imputed to the scarce resources available to the firm must be equal to the imputed value of the scarce resources used by the firm in manufacturing operations.

The optimal conditions for the linear programming model does not mention marginal rate of product transformation, marginal rate of substitution, and marginal product, the terms used in the marginal analysis model. This absence stems from the fact that major emphasis is placed on the concept of the activity rather than the particular products (11). These optimality conditions imply the same equilibrium conditions between marginal products, input substitution, product transformation and price ratios as marginal analysis except that inequalities rather than equalities are involved (7).

## Components of the Linear Programming Model

The information needed to develop a farm plan by linear programming consist of four major components: activities, production coefficients, product and input prices, and restraints or restrictions. These may also be referred to as building blocks and are used in much the same manner in budgeting except that in linear programming the restraints are more explicit and the input-output data more detailed.

The first major component to be considered, the activities, are very precisely defined. For example, in this study the wheat-fallow-sorghum requiring heavy irrigation is one, while a completely separate activity is defined for wheat-fallow-sorghum with moderate irrigation of sorghum. Other production activities include other reduced tillage cropping schemes, conventional tillage production methods and dryland cropping schemes.

In addition to production activities other activities are included for buying inputs and selling products. For example activities are included in the model for this study for buying diesel, oil, nitrogen and natural gas, while a selling activity is included for each crop produced such as wheat, soybeans, corn and grazing. A model can contain as many or as few activities as the planner specifies.

The next building block to consider is the production coefficients which are always stated in terms of the amount of input required per unit of the activity. The crop coefficients for programming parallel the resource requirements used in budgeting. An activity unit of crop production is typically defined as one acre. Thus the programming model requires estimates of the output per acre and the amount of water, labor, capital and other resources used to produce that yield.

The accuracy of the solution depends not only on accurate input-output data, but also on the input and product prices used. The most important consideration is that of accurate relative prices. Inaccurate price predictions may result in a poor estimate of net income for the farm, but the organization selected would be the most profitable if the proper relative prices are used. The output prices were adjusted for the month of sale using seasonal price indicies. The third component, product and input prices, varies a little from that of predicting prices for budgets. The input prices are those charged by dealers in the study area in 1974 as determined by the area extension personnel. The product prices are based on the government program target prices.

The final element used in programming is the restraint or restriction concept. They are used to include institutional, technical, and operator restraints. They are used to impose limits on available land which is divided into monthly requirements and capital which is also divided into two types for the study. Restrictions are also included to impose institutional restraints and operator preferences.

## Procedure for Completing the Objectives

Objective one is satisfied by developing enterprise budgets from the information obtained from the Southwestern Great Plains Research Center for the reduced tillage cropping schemes and by updating budgets for conventional tillage methods that are already available for the area of study. The second objective, that of determining the fossil fuel energy required for the tillage methods, is taken directly from these budgets and converted to kilocalories of fossil fuel energy.

Objective three uses a linear programming model to select the profit maximizing combination of reduced and conventional tillage production methods for each of several representative farms. Fossil fuel requirements are determined in both common units (gallons, pounds, cubic feet) and kilocalories of energy, directly from the optimum organization in each case. The final objective is satisfied using the same linear programming model to select plans for each representative farm that maximize the net kilocalories of output.

# CHAPTER III

## BUDGET DEVELOPMENT AND ENERGY CALCULATIONS

### Enterprise Budgets

This chapter presents the estimated resource requirements, costs, returns and energy estimates per acre of the individual cropping schemes. Reduced and conventional tillage methods are considered. The reduced tillage budgets are based on agronomic data obtained from the Southwestern Great Plains Research Center in Bushland, Texas, while the conventional tillage alternatives are an updating of budget developed through previous research in the study area. All of these budgets present the returns to land, overhead, risk and management on a per acre basis which is used later in the linear programming model for generating optimum whole farm organizations.

The enterprise budgets were developed using a computer program known as the budget generator. The budget generator utilizes data on input requirements, yields and prices, performs the necessary computations, prints the information in a standard format, and stores the budget in a permanent file for future reference and retrieval (19).

#### Dryland Budgets

The cost and return estimates for dryland crop production are based on input levels and machinery operations specified by the area extension personnel. Research and extension personnel consider the production methods described to include the minimum practical number of tillage operations. Thus no distinction is made between conventional and reduced tillage for dryland production. The inputs considered are judged to be those used by efficient producers in the area under consideration. The number of crops that can be grown under dryland conditions is limited due to the climatic conditions in the study area. The major dryland crops produced in the area are wheat, grain sorghum and small grain grazing. All three are included in this study. A budget is developed for each of the three crops on both sandy loam and clay loam soils, making a total of six dryland budgets. Detailed budgets can be found in Appendix A.

## Irrigated Budgets

Conventional Tillage Budgets. The term conventional tillage is used to refer to a wide range of tillage and machinery techniques. However, it is defined in this study as those operations typically used by the more efficient producers in the Oklahoma Panhandle. The machinery operations and other input levels used were specified by the area extension personnel. The major components that make up the operations are the preparation of the seed bed and the control of weeds that emerge.

Production of the commonly grown crops in the area is considered under irrigation with conventional tillage. Corn grain, wheat, corn silage, grain sorghum, rye graze-out, grazed wheat, sudan for hay and soybeans are considered with alternative irrigation levels and distribution systems. The crops listed are by no means the only suitable ones for the area. However, they represent the most commonly produced crops, Agricultural experts feel they will also include the major crops produced in the foreseeable future. Detailed budgets may be found in Appendix A.

Reduced Tillage Budgets. The term, minimum tillage may also carry a variety of definitions. "Minimum tillage" as a descriptive term is misleading. It has many different meanings depending on the purpose of the tillage, or the degree to which the tillage operations are performed. A formal definition of minimum tillage might be reducing tillage to only those operations that are timely and essential to produce the crop and avoiding damage to the soil. Compared to conventional tillage of a decade ago, a farmer now using herbicides to reduce the number of cultivations is practicing a form of reduced tillage (13). Thus, some may claim the conventional tillage budgets that incorporate the tillage process specified by the extension personnel already represent some degree of minimum tillage. In this study the term reduced tillage is used to refer to the methods of production requiring somewhat less tillage than the conventional tillage budgets in this study.

Alternative methods of producing irrigated crops and eliminating some tillage operations were identified. They are referred to as: continuous corn, corn silage-rye grazing double crop, two-year wheat rotation, wheat-grain sorghum double crop, three-year rotation of wheat-fallow-sorghum under heavy and moderate irrigation, grazed wheat-sudan for hay double crop and wheat-soybeans double crop. An explanation of each including a discussion of the machinery and irrigation requirements by month is given below to further define the method of production.

The first scheme is a continuous corn reduced tillage operation under a circular sprinkler distribution system on sandy loam soils. The annual machinery operations include the shredding of stalks in November which eliminates any grazing, but also insures against infestation of corn bore . This is immediately followed by a single discing, which is followed in March by the application of 1.5 pounds of Aatrex herbicide. In April 100 pounds of nitrogen and 50 pounds of phosphate are applied with a dry fertilizer spreader. The crop is planted later that month. The remaining operations are spraying one pint of Parquat per acre in May followed by a side dressing of fifty pounds of nitrogen and a single cultivation in June. Side dressing an additional fifty pounds of nitrogen is the final machinery operation. Table IV shows the machinery requirements and irrigation applications by month.

TABLE IV

MONTHLY MACHINERY AND IRRIGATION REQUIREMENTS FOR CONTINUOUS CORN ON SANDY LOAM UNDER CIRCULAR SPRINKLER USING REDUCED TILLAGE

| Machinery Requirements | Times Over[A/] | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|
| | Mar | Apr | May | June | July | Aug | Nov | |
| Stalk Shredder | | | | | | | 1 | 1 |
| Offset Disk | | | | | | | 1 | 1 |
| Sprayer | 1 | | | | | | | 1 |
| Dry Fert Spread | | 1 | | | | | | 1 |
| Cultibedder Plant | | 1 | | | | | | 1 |
| Sprayer | | | 1 | | | | | 1 |
| Anhydrous Application | | | | 1 | 1 | | | 2 |
| Row Cultivator | | | | 1 | | | | 1 |
| ACIN IRRIG WATER | | 4.0 | | 7.2 | 7.2 | 5.6 | | 24 |

[A/]Those months not listed contain no tillage or irrigation requirements.

The next cropping scheme begins with corn silage followed by rye grazing, a double cropping technique. Any manager using a double croppign system must consider if enough time is available to harvest one crop and reestablish the second crop. However, with proper management double cropping can in some cases be very beneficial. Both crops are raised under a circular sprinkler system on sandy loam soils. The season begins with the application of 100 pounds and 50 pounds of nitrogen and phosphate, respectively, in May. This is followed by the spraying of Aatrex and then the planting of the corn. The next operation to be performed is the application of insecticide in June and July. One hundred pounds of nitrogen is side dressed along with the second insecticide application. After the silage is harvested in September eighty pounds of nitrogen is applied with a machine known as the cultibedder anhydrous implement. This piece of machiner consists of a disc bedder and a set of anhydrous chisels. Both operations take place at once where the beds are reshaped and anhydrous is applied. The nurse tank is pulled through the field behind the bedder to reduce the number of stops required to refill the smaller rig tank. The ground speed for this operation is somewhat slower than for the disc bedder alone. This difference has been accounted for in the machinery cost computations. The final operation is the drilling of the rye. Grazing occurs from October to May. Table V shows the monthly machinery and irrigation requirements.

The third cropping scheme considered is a two-year wheat rotation. This consists of one year of conventional tillage followed by a year of reduced tillage - and a return the third year to conventional tillage. This budget assumes surface irrigation (furrow irrigation) on a clay loam soil. The conventional tillage operations are shown in the table but are not discussed since they include the usual machinery requirements. In year two, the reduced tillage year, one disking is completed in June. This is followed by a spraying in July and August of one-half pound of 2,4-D and one-half pound of Paraquat. The final two operations are the application of 100 pounds of nitrogen and the planting of the wheat in September. Monthly details of machinery and irrigation requirements can be found in Table VI.

TABLE V

MONTHLY MACHINERY AND IRRIGATION REQUIREMENTS FOR CORN SILAGE AND RYE GRAZING DOUBLE CROP ON SANDY LOAM UNDER CIRCULAR SPRINKLER USING REDUCED TILLAGE

| Machinery Requirements | Times Over[A/] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Mar | Apr | May | June | July | Aug | Sep | Nov | Total |
| Dry Fert Spread | | | 1 | | | | | | 1 |
| Cultibedder Plant | | | 1 | | | | | | 1 |
| Sprayer | | | 1 | | | | | | 1 |
| Anhydrous Application | | | | | 1 | | | | 1 |
| Cultibedder Anhydrous | | | | | | | 1 | | 1 |
| Drill | | | | | | | 1 | | 1 |
| ACIN IRRIG WATER | 3.0 | 3.0 | 3.0 | 3.6 | 7.2 | 7.2 | 3.0 | 4.0 | 34 |

A/ Those months not listed contain no tillage or irrigation requirements.

TABLE VI

MONTHLY MACHINERY AND IRRIGATION REQUIREMENTS FOR A TWO-YEAR WHEAT ROTATION OF CONVENTION TILLAGE YEAR ONE AND REDUCED TILLAGE YEAR TWO ON CLAY LOAM WITH SURFACE IRRIGATION

| Machinery Requirements | Times Over[A/] | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|
| | Apr | May | Jun | Jul | Aug | Sep | Nov | |
| Offset Disk | | | 1 | | .5 | | | 1.5 |
| Land Plane | | | | | .25 | | | .25 |
| Cultibedder Anhydrous | | | | | .5 | | | .5 |
| Cultibedder Tiller | | | | | | .5 | | .5 |
| Drill | | | | | | .5 | | .5 |
| Offset Disk | | | .5 | | | | | .5 |
| Sprayer | | | | .5 | .5 | | | 1.0 |
| Cultibedder Anhydrous | | | | | | .5 | | .5 |
| Drill | | | | | | .5 | | .5 |
| ACIN IRRIG WATER | 4 | 6 | | | | 3 | 4 | 17 |

[A/]Those months not shown contain no tillage or irrigation requirements. Figures are the average per year over the two year rotation.

The next cropping possibility is a wheat-grain sorghum double crop under surface irrigation on a clay loam soil. This double cropping scheme is one of the more demanding for harvesting the wheat and reestablishing the sorghum in the given time period. This scheme begins with the shredding of sorghum stalks in early October, immediately after harvest. The cultibedder anhydrous operation applies 120 pounds of nitrogen and reshapes the furrows. Then the wheat is drilled. The sorghum crop is planted in June immediately after wheat harvest. Then 1.5 pounds of Aatrex and 100 pounds of anhydrous are applied. This method conserves soil moisture from the wheat increasing the sorghum yield approximately 600 pounds per acre (15). Table VII indicates monthly requirements for both machinery and irrigation.

TABLE VII

MONTHLY MACHINERY AND IRRIGATION REQUIREMENTS FOR WHEAT SORGHUM DOUBLE CROP ON CLAY LOAM UNDER SURFACE IRRIGATION USING REDUCED TILLAGE

| Machinery Requirements | Times Over[A/] | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | Mar | Apr | May | Jun | Jul | Sep | Oct | Nov | |
| Stalk Shredder | | | | | | | 1 | | 1 |
| Cultibedder Anhydrous | | | | | | | 1 | | 1 |
| Drill | | | | | | | 1 | | 1 |
| Cultibedder Plant | | | | 1 | | | | | 1 |
| Sprayer | | | | 1 | | | | | 1 |
| Anhydrous Application | | | | 1 | | | | | 1 |
| ACIN IRRIG WATER | 3.0 | 3.0 | 3.0 | 6.0 | 5.0 | 3.0 | 3.0 | 3.0 | 29 |

[A/] Those months not listed contain no tillage or irrigation requirements.

The next cropping scheme is somewhat unusual in that it involves a three-year rotation. It is labeled wheat-fallow-sorghum under surface irrigation on a clay loam soil. This process begins in year one with wheat production. A rod weeding is completed in June and July, and 120 pounds of nitrogen are applied with a sweep anhydrous rig in August. This machine, like the cultibedder anhydrous rig, is developed specifically for reduced tillage farming. It consists of an ordinary sweep frame and large sweeps with tubular outlets for anhydrous. The nitrogen is applied through the sweeps at a depth of approximately six inches. This serves two purposes, to break up the soil and apply the nitrogen at a depth to prevent an excessive amount of leaching. Again harvesting the wheat and planting the second crop, sorghum, within a few days is important to achieve the efficiency accounted for in the budgets. The drilling of the wheat takes place in September. The only machinery operation in year two is a single spraying of three pounds of Aatrex in July. Grain sorghum is produced the third year. The first operation is planting the sorghum in June. This is followed by the application of 125 pounds of nitrogen. The only additional tillage is cultivation of the sorghum in August. The three year rotation of wheat-fallow-sorghum can be used with either moderate or heavy irrigation. Only the yield of the sorghum and the amount of irrigation water change. The machinery requirements remain the same. Table VIII shows machinery requirements and irrigation specifications for both wheat-fallow-sorghum situations.

Grazed wheat to sudan for hay double crop is the next budget presented. The analysis assumes surface irrigation is used on a clay loam soil. After grazing of wheat has ceased in May, 100 pounds of dry nitrogen is applied and the sudan is planted in June.

One-half pound of 2,4-D is sprayed to control broadleaf weeds. The preparation to establish the wheat crop begins in September with the reshaping of the beds and application of eighty pounds of nitrogen with the cultibedder anhydrous rig.

The wheat also is drilled in September. The monthly machinery and irrigation requirements are presented in Table IX.

The next cropping scheme uses the same crops as an earlier discussed process, grazed wheat to corn silage double crop. However, this method of production is for surface irrigation on clay loam soil rather than

TABLE VIII

MONTHLY MACHINERY AND IRRIGATION REQUIREMENTS FOR WHEAT-FALLOW-SORGHUM THREE YEAR ROTATION ON CLAY LOAM UNDER SURFACE IRRIGATION USING REDUCED TILLAGE

| Machinery Requirements | Times Over[A/] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Total |
| Rod Weeder | | | | .33 | .33 | | | | | .66 |
| Sweep Anhydrous | | | | | | .33 | | | | .33 |
| Drill | | | | | | | .33 | | | .33 |
| Sprayer | | | | | .33 | | | | | .33 |
| Cultibedder Plant | | | | .33 | | | | | | .33 |
| Sweep Anhydrous | | | | .33 | | | | | | .33 |
| Cultibedder Tiller | | | | | | .17 | | | | .17 |
| ACIN IRRIG WATER[B/] | 1 | 1 | 2.7 | 1.2 | 2.4 | 2.4 | | | 1.3 | 12 |
| ACIN IRRIG WATER[C/] | | 1 | 2.7 | 1 | 1.3 | 1.3 | | 1.3 | | 8.6 |

[A/] Those months not listed contain no tillage or irrigation requirements. Figures are the average per year over the three year rotation.

[B/] Heavy Irrigation

[C/] Moderate Irrigation

TABLE IX

MONTHLY MACHINERY AND IRRIGATION REQUIREMENTS FOR GRAZED WHEAT TO SUDAN HAY DOUBLE CROP ON CLAY LOAM SOIL WITH SURFACE IRRIGATION USING REDUCED TILLAGE

| Machinery Requirements | Times Over[A/] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Total |
| Dry Fert Spread | | | 1 | | | | | | 1 |
| Cultibedder Plant | | | | 1 | | | | | 1 |
| Sprayer | | | | 1 | | | | | 1 |
| Cultibedder Anhydrous | | | | | | | 1 | | 1 |
| Drill | | | | | | | 1 | | 1 |
| ACIN IRRIG WATER | 4.0 | 4.0 | 4.0 | 4.0 | 8.0 | 4.0 | 4.0 | 4.0 | 36 |

[A/] Those months not shown contain no tillage or irrigation requirements.

circular sprinkler on sandy loam. The difference in soil and water distribution system requires a completely different set of machinery operations. During September, eighty pounds of nitrogen are applied with the cultibedder anhydrous rig and the rye is drilled. Grazing continues from the time sufficient growth is available in October through April or until all rye foliage is gone. In May the corn is planted and 100 pounds of nitrogen are applied via the sweep anhydrous rig. During June one-fourth pound of Banvel D is sprayed, 100 pounds of nitrogen is side dressed and the corn is cultivated one time. Table X shows detailed machinery and irrigation requirements by months.

TABLE X

MONTHLY MACHINERY AND IRRIGATION REQUIREMENT FOR GRAZED RYE TO CORN SILAGE DOUBLE CROP ON CLAY LOAM UNDER SURFACE IRRIGATION USING REDUCED TILLAGE

| Machinery Requirements | Times Over[A/] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Mar | Apr | May | Jun | Jul | Aug | Sep | Nov | Total |
| Cultibedder Anhydrous | | | | | | | 1 | | 1 |
| Drill | | | | | | | 1 | | 1 |
| Cultibedder Plant | | | 1 | | | | | | 1 |
| Sweep Anhydrous | | | 1 | | | | | | 1 |
| Sprayer | | | | 1 | | | | | 1 |
| Anhydrous Application | | | | 1 | | | | | 1 |
| Row Cultivator | | | | 1 | | | | | 1 |
| ACIN IRRIG WATER | 4.0 | 8.0 | 4.0 | | 8.0 | 8.0 | 4.0 | 4.0 | 40 |

[A/]Those months not listed contain no tillage or irrigation requirements.

The eighth and final budget to be evaluated under the reduced tillage heading is a wheat-soybean double crop system under circular sprinkler on sandy loam soil. Again these two combinations require exact timing in harvesting of one crop and reestablishment of the second. The first machinery operation is to apply 120 pounds of nitrogen and 50 pounds of phosphate. Then the land is disc, tilled with a cultibedder and is drilled, all during October. Immediately after the wheat is harvested and the straw removed, soybeans are planted. Weeds are controlled with an aerial application of Lasso and Sencor prior to seedling emergence. Table XI shows machinery and irrigation requirements by month.

TABLE XI

MONTHLY MACHINERY AND IRRIGATION REQUIREMENTS FOR WHEAT AND SOYBEAN DOUBLE CROP ON SANDY LOAM UNDER CIRCULAR SPRINKLER USING REDUCED TILLAGE

| Machinery Requirement | Times Over[A/] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Mar | Apr | May | Jul | Aug | Oct | Nov | Dec | Total |
| Dry Fert Spread | | | | | | 1 | | | 1 |
| Offset Disk | | | | | | 1 | | | 1 |
| Cultibedder Tiller | | | | | | 1 | | | 1 |
| Drill | | | | | | 1 | | | 1 |
| Cultibedder Plant | | | | 1 | | | | | 1 |
| ACIN IRRIG WATER | 3.0 | 3.0 | 6.0 | 7.0 | 8.0 | 3.0 | 3.0 | | 33 |

[A/]Those months not listed contain no tillage or irrigation requirements.

It is assumed that harvesting of all crops not grazed is done via custom harvesters. All reduced tillage budgets are included in Appendix A in detail which includes a monthly breakdown of the production, inputs, machinery and irrigation requirements for the eight cropping schemes.

## Prices

As noted in Chapter II the relative prices are of more concern than absolute prices for farm planning in the study. Government program target prices are used for products. This results in using relatively low prices, but the relationship between products is based on the normal relationship over a long period of time. Those crops which do not have a target price were adjusted to correspond with the target crops. This was done with a ratio multiplier developed for a similar crop over the past five year period. An example is soybeans. The 70-74 average price for grain sorghum was $3.156, while soybeans were $4.466, or 1.4 times the grain sorghum price. Applying this ratio to the target sorghum price of $2.34 gave a soybean price of $3.28 for the study.

September, 1974 input prices from the study area are assumed. The price of each input and product is listed in Table XII.

## Energy Requirements for Alternative Crops and Method of Production

Table XIII lists the quantities of inputs in their respective units of measurement for the specified crops under conventional, reduced and dryland tillage. All figures are obtained from the budgets discussed earlier and developed specifically for this study. These inputs are

TABLE XII

ASSUMED PRICES PAID AND RECEIVED IN THE MODEL FOR THE DESIGNATED STUDY AREA

| Item | Units | Price |
| --- | --- | --- |
| **Prices Received for Products** | | |
| Corn Grain | BU. | 1.38 |
| Corn Silage | TON | 5.50 |
| Wheat Grain | BU. | 2.05 |
| Grain Sorghum | CWT | 2.34 |
| Sudan Hay | TON | 22.00 |
| Soybeans | BU. | 3.28 |
| Small Grain Graze Out October to May | AUM[A/] | 10.00 |
| Small Grain Graze Out November to March | AUM | 10.00 |
| Grain Sorghum Stubble | AUM | 10.00 |
| **Prices Paid for Inputs** | | |
| Labor | HR. | 3.00 |
| Operating Interest | DOL. | .10 |
| Investment Interest | DOL. | .08 |
| Nitrogen | | |
| Anhydrous | LB. | .14 |
| Dry | LB. | .30 |
| Phosphate | LB. | .25 |
| Insecticide | AC. | 8.00 |
| Herbicides | | |
| Aatrix | LB. | 2.40 |
| Paraquat | Pt. | 4.78 |
| 2, 4-D | LB. | 8.00 |
| Lasso & Sencor | AC. | 10.00 |
| Diesel | GALS | .31 |
| Oil | QTS. | .45 |
| Natural Gas | 1000 CUFT. | .55 |
| **Plant Seed** | | |
| Corn | LB. | .52 |
| Rye | BU. | 5.00 |
| Wheat | BU. | 5.00 |
| Grain Sorghum | LB. | .27 |
| Sudan | LB. | .27 |
| Soybean | LB. | .17 |
| **Custom Combine Rate** | | |
| Corn | | |
| Cutting and Hauling | BU. | .30 |
| Sorghum | | |
| Cutting | AC. | 10.00 |
| Hauling | CWT | .10 |
| Wheat | | |
| Cutting for first 20 Bu. | AC. | 7.00 |
| Over 20 Bu. | BU. | .08 |
| Hauling | BU. | .10 |
| **Swathing**[B/] | AC. | 3.16 |
| **Baling** | Bale | .15 |
| **Hauling** | Bale | .14 |

[A/] AUM - Animal Unit Month, the feed required to feed a 1000 lb. steer for one month.

[B/] Source: Ted R. Nelson, Darrell D. Kletke, "Custom Rates for Summer and Fall Jobs," OSU Extension Facts, Number 126 (1974).

# TABLE XIII

## AVERAGE PER ACRE REQUIREMENT FOR SPECIFIED INPUTS TO PRODUCE DESIGNATED CROPS ANNUALLY FOR IRRIGATED AND DRYLAND PRODUCTION

| Production Method | INPUTS | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Nitrogen | Phosphate | Herbicide | Insecticide | Diesel | Equip. Lube | Irr. Fuel | Irr. Lube | Planting Seed 1st Crop | Planting Seed 2nd Crop | Labor D/ | Machinery |
| Conventional Tillage | LBS. | LBS. | LBS. | LBS. | GALS. | QTS. | 1000 CUFT | QTS. | LBS. | LBS. | HRS. | DOL. |
| Corn Grain | 200 | 50 | 2.0 | 1 | 9.1 | .65 | 20.325 | 2.50 | 20 | | 3.43 | 23.06 |
| Wheat | 100 | | | | 7.6 | .54 | 10.525 | 1.74 | 60 | | 2.67 | 11.64 |
| Corn Silage | 200 | 50 | 2.0 | 1 | 8.9 | .63 | 20.325 | 2.51 | 20 | | 3.40 | 23.03 |
| Sorghum Moderate Irrigation | 100 | | 1.5 | 1 | 10.2 | .72 | 6.425 | 1.06 | 7 | | 2.88 | 8.03 |
| Rye Graze Out | 80 | 40 | 0 | | 7.2 | .52 | 15.250 | 1.88 | 60 | | 2.59 | 10.90 |
| Sorghum Heavy Irrigation | 150 | | 1.5 | 1 | 12.2 | .88 | 14.625 | 1.65 | 10 | | 4.03 | 12.29 |
| Grazed Wheat | 80 | 40 | | | 7.2 | .52 | 10.525 | 1.74 | 60 | | 2.57 | 9.74 |
| Sudan Hay | 100 | | | | 5.2 | .37 | 20.325 | 2.51 | 10 | | 3.02 | 15.45 |
| Soybeans | 50 | | 1.0 | | 8.2 | .58 | 20.325 | 2.50 | 90 | | 3.13 | 22.77 |
| Reduced Tillage | | | | | | | | | | | | |
| Corn Grain | 200 | 50 | 1.5 | 1 | 9.2 | .66 | 20.325 | 2.50 | 20 | 60 | 3.58 | 22.83 |
| Silage and Rye Graze Sand | 280 | 50 | 1.5 | 1 | 5.6 | .40 | 28.125 | 3.50 | 20 | 60 | 3.16 | 24.17 |
| Wheat A/ | 100 | | 1.0 | | 5.4 | .38 | 9.950 | 1.60 | 60 | 0 | 2.24 | 8.99 |
| Wheat and Sorghum | 240 | | 1.5 | 1 | 6.0 | .43 | 16.975 | 2.80 | 60 | 7 | 3.00 | 14.62 |
| Wheat-Fallow-Sorghum HI B/ | 81 | | 1 | 1 | 2.3 | .16 | 7.167 | 1.10 | 20 | 3.3 | 1.06 | 5.29 |
| Wheat-Fallow-Sorghum MI C/ | 80 | | 1 | 1 | 2.3 | .16 | 5.067 | .84 | 20 | 2.3 | .89 | 4.37 |
| Grazed Wheat and Sudan Hay | 180 | | .50 | | 4.2 | .31 | 21.500 | 3.00 | 60 | 10 | 2.95 | 14.93 |
| Silage and Rye Graze Clay | 280 | | .25 | 1 | 7.7 | .55 | 29.125 | 3.50 | 20 | 60 | 3.96 | 44.26 |
| Wheat and Soybeans | 120 | 50 | 2.5 | | 3.6 | .26 | 28.050 | 3.50 | 60 | 90 | 2.55 | 25.79 |
| Dryland Production | | | | | | | | | | | | |
| Wheat Clay Loam | 60 | | | | 1.3 | .13 | | | 45 | | .36 | 1.04 |
| Wheat Sandy Loam | 60 | | | | 1.3 | .13 | | | 45 | | .36 | 1.04 |
| Sorghum Clay Loam | 50 | | | 1 | 5.2 | .52 | | | 4 | | 1.20 | 2.07 |
| Sorghum Sandy Loam | | | | | 5.4 | .54 | | | 4 | | 1.22 | 2.03 |
| Small Grain Graze Out Clay | 30 | 30 | | | 3.9 | .39 | | | 60 | | .88 | 1.53 |
| Small Grain Graze Out Sand | 30 | 30 | | | 3.9 | .39 | | | 60 | | .88 | 1.53 |

A/ The two year wheat rotation of conventional tillage in year one and reduced tillage in year two requires a two year planning budget. In order to compare the inputs on an annual basis an average is determined for the scheme.

B/ The Wheat-Fallow-Sorghum Heavy Irrigation scheme is a three year rotation. An average for the three year period is used.

C/ The same averaging requirement is needed for the Wheat-Fallow-Sorghum and three year rotation for a moderate irrigation scheme.

D/ Includes both Machinery and Irrigation Labor.

converted to the amount of fossil fuel energy required to produce, process and transport the input to the farm gate. The amounts of energy for each method of production (enterprise budget) are summed, providing an estimate of the total fossil fuel energy required for the outputs resulting from that method of production. The amount of machinery listed as required per acre to produce the crop, is equal to the dollars of depreciation, repairs and maintenance allocated to one acre of the enterprise.

## Conversion Factors

The common denominator used for energy calculations is the kilocalorie. Each of the inputs is converted from its common unit into its equivalent in kilocalories of energy. The input categories in Table XIV indicate conversion factors that are needed for nitrogen, phosphate, herbicides, insecticides, diesel, equipment lube, irrigation fuel (natural gas), irrigation lube, labor, machinery, and planting seed. All conversion factors except diesel, lube, natural gas, machinery and planting seed were taken from a study conducted by David Pimentel (14).

There are several ways to estimate the machinery energy which includes tractors, farm equipment and irrigation equipment. One means in which the kilocalorie energy can be estimated was presented by Pimentel in his article (14). In his presentation he estimated that roughly 420,000 kcal of machinery input were needed to produce an acre of corn. This was obtained from a study done by Berry and Fels who calculated that about 31,968,000 kilocalories of energy was necessary to construct an average automobile weighing 3,400 pounds. Pimentel assumed 244,555,000 kilocalories (an equivalent of 13 tons of machinery)

TABLE XIV

KILOCALORIES OF ENERGY PER UNIT OF INPUT AND OUTPUT

| Identification | Unit | Kilocalories of Energy[A/] |
|---|---|---|
| Nitrogen | LB. | 8,400 |
| Phosphate | LB. | 1,520 |
| Insecticide | LB. | 11,000 |
| Herbicide | LB. | 11,000 |
| Diesel | GAL. | 46,710[B/] |
| Oil | QT. | 11,678[B/] |
| Natural Gas | 1000 CUFT. | 264,600[B/] |
| Labor | HR. | 544 |
| Machinery | DOL. | 17,523 |
| Wheat Seed | LB. | 1,522 |
| Grain Sorghum Seed | LB. | 1,423 |
| Rye Seed | LB. | 1,513 |
| Soybean Seed | LB. | 1,692 |
| Sudan Seed | LB. | 1,296 |
| Corn Seed | LB. | 1,574 |
| Rye Pasture | AUM | 793,456[C/] |
| Wheat Pasture | AUM | 793,465[C/] |
| Grain Sorghum Stubble | AUM | 735,233[C/] |
| Sudan Hay | LB. | 1,049 |
| Corn Silage | LB. | 338 |

[A/]Source: David Pimentel, "Food Production and the Energy Crisis," Science, Vol. 182 (November 2, 1973) p. 445. Except those in footnote B and C.

[B/]Source: Allen J. Johnson, Fuels and Combustion Handbook, p. 365, 1st edition McGraw-Hill Book Company, New York, 1951.

[C/]The amount of energy in wheat, rye and sorghum stubble pasture assumes 645 pounds of oven dry forage (or 750 pounds with 14% moisture) is required per AUM. The 645 pounds are multiplied by 1230.1632 kilocalories per pound for wheat and rye and 1139.8968 for sorghum stubble to obtain the kilocalories of energy per AUM.

were used for the production of all machinery (tractors, trucks, miscellaneous) to farm 62 acres of corn. This machinery was assumed to function about 10 years. Repairs were assumed to be six percent of the total machinery production or about 15,000,000 kilocalories. Hence, a conservative estimate for the production and repair of farm machinery per corn acre per year was 420,000 kcal.

In this study a somewhat more concrete method for calculating machinery energy is used. This method more accurately estimates the relative machinery energy requirements for each production method considered in this study. The method used is based on the dollar value of the machinery "used up" as measured by dollars of depreciation and repairs. The coefficients to convert the dollars per acre into kilocalories per acre is based on a study prepared by W. S. Reardon (16). However, one problem is that the most recent data available to estimate the conversion factor was 1963. Therefore, the 1973 machinery costs were deflated by the index of machinery prices to 1963 terms (1). The deflated machinery values were multiplied by the kilocalories of fossil fuel energy required per dollar of machinery used. The coefficient presented by Reardon is in BTU's, but is equal to 17,523 kilocalories per dollar. This is an estimate of all direct, indirect and induced fossil fuel considered in the construction of the machinery. The direct energy is that used directly by the plant in construction of the machinery itself. The indirect energy is that used in production of the imputs purchased by the plant. Induced energy is that used by the households of the employees working in the plant. Table XIV shows the kilocalories for machinery dollar used for each cropping scheme. A comparison of Pimentel's calculated machinery energy for corn of 420,000 kilocalories per acre is similar to the estimate of machinery energy for corn in this study, 404,080 kilocalories per acre.

Estimates of kilocalories of fossil fuel energy per unit of diesel, oil and natural gas do not reflect the energy used in production, processing and transportation of these products. To correct for this omission, a ratio of direct to direct, indirect and induced energy was determined for each of the three fuels. The estimated multiplier is 1.30 for diesel and oil and 1.05 for natural gas (4). These ratios were multiplied by the kilocalories of energy in the finished product itself to obtain the total kilocalories of energy used in consuming the input.

It is assumed each hour of labor input used in production requires 544 kilocalories of fossil fuel energy for transportation and other uses. This estimate is based on the work of Pimental (14). He assumed that a farm laborer consumes 21,770 kilocalories of energy per week and works a forty hour week. This is equal to the 544 kilocalories per hour used in this study.

The kilocalories of energy in seed to be planted was obtained from the same source as the produce output kilocalorie energy, the "United States - Canadian Tables of Feed Composition" (18). Table XIV shows the kilocalories of energy per unit for each input and crop product. These values are used as the conversion factors to calculate the kilocalories of input and output energy for each method of production on a per acre basis. Table XV shows the average annual kilocalories of fossil fuel energy by input and the sum for all inputs for each of the conventional, reduced and dryland tillage methods. Table XVI shows the average annual energy produced by method in kilocalories per acre.

# TABLE XV

## AVERAGE ANNUAL ENERGY FOR INPUTS IN KILOCALORIES PER ACRE FOR DESIGNATED CROPS FOR CONVENTIONAL REDUCED AND DRYLAND TILLAGE

| Production Method | Nitrogen | Phosphate | Herbicide | Insecticide | Diesel | Equip. Lube | Irr. Fuel | Irr. Lube | Planting Seed 1st Crop | Planting Seed 2nd Crop | Labor | Machinery | Total Input |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | INPUTS | | | | | | | | | | | | |
| Conventional Tillage | KCAL | KCAL | KCAL | KCAL | KCAL | KCAL | KCAL | KCAL | KCAL | KCAL | KCAL | KCAL | KCAL |
| Corn Grain | 1,680,000 | 76,000 | 22,000 | 11,000 | 425,061 | 7,591 | 5,377,995 | 29,195 | 31,480 | 0 | 1,866 | 404,080 | 8,066,268 |
| Wheat | 840,000 | 0 | 0 | 0 | 354,996 | 6,306 | 2,784,915 | 20,320 | 91,320 | 0 | 1,452 | 202,968 | 4,302,277 |
| Corn Silage | 1,680,000 | 76,000 | 22,000 | 11,000 | 415,719 | 7,357 | 5,377,995 | 29,195 | 31,480 | 0 | 1,850 | 403,555 | 8,056,151 |
| Sorghum Moderate Irrigation | 840,000 | 0 | 16,500 | 11,000 | 467,412 | 8,408 | 1,700,055 | 12,378 | 9,961 | 0 | 1,567 | 140,710 | 3,217,021 |
| Rye Graze Out | 672,000 | 60,800 | 0 | 0 | 336,312 | 6,073 | 4,106,592 | 21,955 | 90,780 | 0 | 1,409 | 191,001 | 5,492,922 |
| Sorghum Heavy Irrigation | 1,260,000 | 0 | 16,500 | 11,000 | 569,862 | 10,277 | 3,869,775 | 19,269 | 14,320 | 0 | 2,192 | 215,358 | 5,988,733 |
| Grazed Wheat | 672,000 | 60,800 | 0 | 0 | 336,312 | 6,073 | 2,784,386 | 19,269 | 91,320 | 0 | 1,398 | 170,674 | 4,142,232 |
| Sudan Hay | 840,000 | 0 | 0 | 0 | 242,892 | 4,321 | 5,377,995 | 29,195 | 12,960 | 0 | 1,643 | 270,730 | 6,779,736 |
| Soybeans | 420,000 | 0 | 11,000 | 0 | 383,022 | 6,773 | 5,377,995 | 29,195 | 152,280 | 0 | 1,703 | 398,999 | 6,780,967 |
| Reduced Tillage | | | | | | | | | | | | | |
| Corn Grain | 1,680,000 | 76,000 | 16,500 | 11,000 | 429,732 | 7,707 | 5,377,995 | 29,195 | 31,480 | 0 | 1,948 | 400,050 | 8,061,607 |
| Silage and Rye Graze Sand | 2,352,000 | 76,000 | 16,500 | 11,000 | 261,576 | 4,671 | 7,441,875 | 40,873 | 31,480 | 90,780 | 1,719 | 423,530 | 10,670,302 |
| Wheat[A/] | 840,000 | 0 | 11,000 | 0 | 252,234 | 4,438 | 2,632,770 | 18,685 | 91,320 | 0 | 1,219 | 157,532 | 4,009,198 |
| Wheat and Sorghum | 2,016,000 | 0 | 16,500 | 11,000 | 280,260 | 5,021 | 4,491,585 | 32,698 | 91,320 | 9,961 | 1,632 | 256,186 | 7,212,163 |
| Wheat-Fallow-Sorghum HI[B/] | 680,400 | 0 | 11,000 | 11,000 | 107,433 | 1,868 | 1,896,388 | 12,846 | 30,440 | 4,696 | 577 | 92,697 | 2,849,345 |
| Wheat-Fallow-Sorghum MI[C/] | 672,000 | 0 | 11,000 | 11,000 | 107,433 | 1,868 | 1,340,728 | 9,809 | 30,440 | 3,273 | 484 | 76,576 | 2,264,611 |
| Grazed Wheat and Sudan Hay | 151,200 | 0 | 5,500 | 0 | 196,182 | 3,620 | 5,688,900 | 35,034 | 91,320 | 12,960 | 1,605 | 261,618 | 6,447,939 |
| Silage and Rye Graze Clay | 151,200 | 0 | 2,750 | 11,000 | 359,667 | 6,189 | 7,706,475 | 40,873 | 31,480 | 90,780 | 2,154 | 775,568 | 9,178,136 |
| Wheat and Soybeans | 1,008,000 | 76,000 | 27,500 | 0 | 168,156 | 3,036 | 7,422,030 | 40,873 | 91,320 | 152,280 | 1,387 | 451,918 | 9,442,500 |
| Dryland Tillage | | | | | | | | | | | | | |
| Wheat Clay Loams | 504,000 | | | | 60,723 | 1,518 | | | 68,490 | | 196 | 18,224 | 653,151 |
| Wheat Sandy Loams | 504,000 | | | | 60,723 | 1,518 | | | 68,490 | | 196 | 18,224 | 653,151 |
| Sorghum Clay Loam | 420,000 | | | 11,000 | 242,892 | 6,073 | | | 5,692 | | 653 | 36,273 | 722,583 |
| Sorghum Sandy Loam | 252,000 | | | | 252,234 | 6,306 | | | 5,692 | | 664 | 35,572 | 300,468 |
| Small Grain Graze Out Clay | 252,000 | 45,600 | | | 182,169 | 4,554 | | | 91,320 | | 479 | 26,810 | 602,992 |
| Small Grain Graze Out Land | 252,000 | 45,600 | | | 182,169 | 4,554 | | | 91,320 | | 479 | 26,810 | 602,922 |

[A/] Two Year wheat rotation of conventional tillage year one and reduced tillage year two.

[B/] Heavy Irrigation for three year rotation.

[C/] Moderate Irrigation for three year rotation.

TABLE XVI

AVERAGE ANNUAL ENERGY FOR OUTPUTS IN KILOCALORIES PER ACRE FOR DESIGNATED CROPS FOR CONVENTIONAL, REDUCED AND DRYLAND TILLAGE

| Production Method | OUTPUT | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1st Crop Yield | 2nd Crop Yield | 1st Crop Energy Yield | 2nd Crop Energy Yield | Total Crop Energy | Grazed Crop | Total Grazing & Crop Energy | Energy Efficiency B/ |
| Conventional Tillage | LBS. | LBS. | KCAL | KCAL | KCAL | KCAL | KCAL | |
| Corn Grain | 6,720 | | 10,570,280 | | 10,570,280 | | 10,570,280 | 1.3 |
| Wheat | 3,300 | | 5,022,600 | | 5,022,600 | 3,862,333 | 8,884,933 | 1.4 |
| Corn Silage | 40,000 | | 13,520,000 | | 13,520,000 | | 13,520,000 | 1.7 |
| Sorghum Moderate Irrigation | 4,200 | | 5,976,600 | | 5,976,600 | 661,500 | 6,638,100 | 2.1 |
| Rye Graze Out | | | | | | 3,705,784 | 3,705,784 | .9 |
| Sorghum Heavy Irrigation | 6,200 | | 8,822,600 | | 8,822,600 | 962,100 | 9,784,700 | 1.6 |
| Grazed Wheat | | | | | | 3,862,333 | 3,862,333 | 1.1 |
| Sudan Hay | 9,750 | | 10,277,750 | | 10,277,750 | | 10,277,750 | 1.5 |
| Soybeans | 2,700 | | 4,568,400 | | 4,568,400 | | 4,568,400 | .7 |
| Reduced Tillage | | | | | | | | |
| Corn Grain | 7,560 | | 11,899,440 | | 11,899,440 | | 11,899,440 | 1.5 |
| Silage and Rye Graze Land | 40,000 | | 13,520,000 | | 13,520,000 | 3,705,784 | 17,225,784 | 1.6 |
| Wheat | 3,300 | | 5,022,600 | | 5,022,600 | 3,862,333 | 8,884,933 | 1.5 |
| Wheat and Grain Sorghum | 3,000 | 4,800 | 4,566,000 | 6,830,400 | 11,396,400 | | 11,396,400 | 1.6 |
| Wheat-Fallow-Sorghum HI | 1,100 | 2,067 | 1,674,200 | 2,941,341 | 4,615,682 | 320,700 | 4,936,382 | 1.8 |
| Wheat-Fallow-Sorghum MI | 1,100 | 1,600 | 1,674,200 | 2,276,800 | 3,951,000 | 220,500 | 4,171,500 | 2.0 |
| Grazed Wheat and Sudan Hay A/ | 6,825 | | 7,159,425 | | 7,159,425 | 3,862,333 | 11,021,758 | 1.8 |
| Silage and Rye-Graze Clay | 40,000 | | 13,520,000 | | 13,520,000 | 3,705,784 | 17,225,784 | 1.8 |
| Wheat and Soybeans | 3,000 | 2,100 | 4,566,000 | 3,533,200 | 8,119,200 | | 8,119,200 | .9 |
| Dryland Tillage | | | | | | | | |
| Wheat Clay Loam | 990 | | 1,506,780 | | | 277,710 | 1,784,490 | 2.7 |
| Wheat Sandy Loam | 990 | | 1,506,780 | | | 277,710 | 1,784,490 | 2.7 |
| Sorghum Clay Loam | 1,100 | | 1,565,300 | | | 551,425 | 3,539,725 | 4.9 |
| Sorghum Sandy Loam | 2,100 | | 2,988,300 | | | 551,425 | 2,116,725 | 7.0 |
| Small Grain Graze Out Clay | | | | | | 1,904,294 | 1,904,294 | 3.2 |
| Small Grain Graze Out Land | | | | | | 1,904,294 | 1,904,294 | 3.2 |

A/ Assuming 65 pound bale as standard size.

B/ Energy efficiency is kilocalorie output/kilocalorie input. This measure of efficiency is probably most appropriate for ruminant animals. As similar measure for man and nonruminant animals must consider the ability of the species to assimilate the energy from the crop product.

In the case of inputs the gross energy coefficients are used since it is very difficult to determine an actual energy used coefficient. Gross energy is defined as the amount of heat, measured in calories, that is released when a substance is completely oxidized. The output is measured on the basis of digestable energy rather than gross energy. Digestable energy as a proportion of gross energy varies greatly from one crop to another. Thus output is measured in digestable energy because it is a better measure of the useable energy produced when several crops are to be compared. Therefore, digestable energy is used to determine the kilocalories of energy produced by the output (3).

A measure of energy efficiency, calculated as kilocalories of output divided by kilocalories of input, is also presented for each production method in Table XVI. It should be noted that this measure of efficiency is probably most appropriate for ruminant animals. A similar measure for man and nonruminant animals must consider the ability of the species to assimulate the energy from the crop product. Developing other measures of efficiency was considered beyond the scope of this study. In viewing the energy efficiencies a range of .7 for irrigated conventional tillage soybeans to 7.0 for dryland grain sorghum on clay loam is seen. In general it is evident that the dryland crops generate a higher energy efficiency than the irrigated crops. Furthermore, the reduced tillage cropping systems have a higher energy efficiency, than the irrigated conventional tillage systems. However, the irrigated crops in general generate a higher net return per acre.

# CHAPTER IV

# REPRESENTATIVE FARMS AND LINEAR PROGRAMMING MODEL

## Representative Farms

To define a representative farm situation, the resources available must be specified. This includes the land, water (number and size of wells), labor, capital, institutional constraints, buildings, machinery and equipment. The emphasis on energy use for irrigated production make two resources, the land and water, particularly important in this study. The representative farms defined emphasize alternative combinations of cropland and water. The cropland is specified as clay loam or sandy loam. The water characteristics of concern are the number of wells, depth of wells and gallons per minute.

Representative irrigated farms were defined for the area as part of a previous study (5). The representative farms were defined to denote the alternative land and water resource situations found in surveying farm operations in the area. Since this is the most important aspect of the resource combination for the study, the same representative farms are used here. Although it is impossible to define each farmer's situation, the situations presented encompass the major part of the farming populas.

## Characteristics of Representative Situations

The factors or characteristics used as a basis for differentiating between representative situations include three water situations on each of three sizes of irrigated crop farms.

### Water Situations

The water situation is divided into three classes based on the saturated thickness. The saturated thickness for case A is 75 feet. It is also assumed there is 75 feet of depth to water and wells yield 400 gallons per minute. Class B represents an area having 250 feet of saturated aquifer and 175 feet of depth to water with wells yeilding 750 gallons per minute. The final class, C, represents an area having 450 feet of saturated aquifer and 125 feet of depth to water yielding 1,000 gallons per minute. These three situations represent the predominate range in depth to water and feet of saturated thickness in the study area. The number of wells per farm depends on farm size and is specified later.

### Selected Sizes

The size of the three irrigated crop farms were chosen so that the implications for most actual situations could be determined from one of the examples. Generally, the representative crop farms of 640, 1,600, and 2,800 acres used are consistent with the small, medium, and large farms in the area of study. Minor differences occur for the purpose of equating representative sizes with common blocks of land in multiples of 80 or 160 acres. For the same reason, cropland acreages are slightly different. The 640-acre farm has 560 acres of cropland, the 1,600-acre operation has 1,440 cropland acres and the 2,880-acre unit has 2,680 acres of cropland. The percent of cropland in the total operation varies from 87.5 to 93 percent. The crop farm situations are referred to hereafter as I, II, and III for the respective cropland acreage of 560, 1,440 and 2,680.

The three water situations are combined with the three farm sizes to define nine representative farms. While the gallons pumped per minute is the same for farm sizes in a given water situation, the number of wells per farm varies by size of farm. The 560-acre unit has two wells for "Class A" and "B" and one well for "Class C" water. The 1,440-acre operation has three wells in the first two cases and two wells for "Class C". The final situation made up of 2,680 acres includes six wells in "Class A and B' and four wells in the "Class C" situation.

The amount of labor available by size of farm is taken from a study by Roy Hatch (6) on "Growth Potential and Survival Capability of Southern Plains Dryland Farms." The study specified the number of days and hours per day that could be devoted to the business by the owner operator. Depending on the farm size a certain amount of time was alloted for managerial work. The remaining time could then be devoted to actual farm labor. This study assumes the hours needed for managerial purposes are one-half hour per day for the 560 acre farm, one and one-half per day for the 1,440 acre farm, and two and one-half per day for the 2,680 acre farm. The remaining hours per day and month can then be used for direct farm labor purposes. One other labor restriction is the maximum number of hours that can be used in certain time periods, specifically for double cropping schemes. The critical months for each farm are June, September, and October. In each case the critical period represents the maximum time available to harvest one crop and plant the second. The hours available in a critical period was determined in the following manner: number of tractor(s) per farm times seven working days at twelve hours per day.[1] Therefore, a limit has been placed on these months which are defined as critical periods for double cropping schemes.

The final farm characteristic deals with a monthly and annual limit that was placed on the amount of water that can be pumped on each size of farm and irrigation situation based on the number of wells and GPM. Table XVII shows the three representative farm situations and the characteristics associated with each of the situations.

## Linear Programming Model Construction

The type and construction of the model developed are a vital part of this study. The validity of solutions and their potential use rely on the ability of the model to perform the desired mechanics and answer the major objectives. An optimum combination of resources and products must be obtained for specified situations through the use of the model.

The model contains three types of constraints: real, accounting, and a group specified in this study as all others. The model also includes three categories of activities: production, marketing and resource supplying. The following describes each constraint and activity category. Appendix B shows the complete LP matrix and its coefficients

[1]Seven working days as assumed over the two-week period to allow for bad weather and down time for maintenance and repairs.

# TABLE XVII

## REPRESENTATIVE FARMS, I, II AND III UNDER THREE WATER SITUATIONS ASSUMING FULL OWNERSHIP

| | | Farm Situation | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | I | | | II | | | III | | |
| ITEM | Unit | Class A Water | Class B Water | Class C Water | Class A Water | Class B Water | Class C Water | Class A Water | Class B Water | Class C Water |
| Land Specifications | | | | | | | | | | |
| Land Operated | AC | 640 | 640 | 640 | 1,600 | 1,600 | 1,600 | 2,880 | 2,880 | 2,880 |
| Cropland | AC | 560 | 560 | 560 | 1,440 | 1,440 | 1,440 | 2,680 | 2,680 | 2,680 |
| Water Specifications | | | | | | | | | | |
| Saturated Aquifer | FT[A/] | 75 | 250 | 450 | 75 | 250 | 450 | 75 | 250 | 450 |
| Depth to Water | FT | 75 | 175 | 125 | 75 | 175 | 125 | 75 | 175 | 125 |
| Number of Wells | | 2 | 2 | 1 | 3 | 3 | 2 | 6 | 6 | 4 |
| Gallons Per Minute | | 400 | 750 | 1000 | 400 | 750 | 1,000 | 400 | 750 | 1,000 |
| Monthly Labor Availability | | | | | | | | | | |
| January | HRS | 165 | 165 | 165 | 143 | 143 | 143 | 121 | 121 | 121 |
| February | HRS | 150 | 150 | 150 | 130 | 130 | 130 | 110 | 110 | 110 |
| March | HRS | 165 | 165 | 165 | 143 | 143 | 143 | 121 | 121 | 121 |
| April | HRS | 187 | 187 | 187 | 165 | 165 | 165 | 143 | 143 | 143 |
| May | HRS | 187 | 187 | 187 | 165 | 165 | 165 | 143 | 143 | 143 |
| June | HRS | 209 | 209 | 209 | 187 | 187 | 187 | 165 | 165 | 165 |
| July | HRS | 209 | 209 | 209 | 187 | 187 | 187 | 165 | 165 | 165 |
| August | HRS | 209 | 209 | 209 | 187 | 187 | 187 | 165 | 165 | 165 |
| September | HRS | 209 | 209 | 209 | 187 | 187 | 187 | 165 | 165 | 165 |
| October | HRS | 209 | 209 | 209 | 187 | 187 | 187 | 165 | 165 | 165 |
| November | HRS | 187 | 187 | 187 | 165 | 156 | 165 | 143 | 143 | 143 |
| December | HRS | 165 | 165 | 165 | 143 | 143 | 143 | 121 | 121 | 121 |
| Limited Labor Months | | | | | | | | | | |
| June 8-22 | HRS | 84 | 84 | 84 | 168 | 168 | 168 | 366 | 366 | 366 |
| October 1-15 | HRS | 84 | 84 | 84 | 168 | 168 | 168 | 366 | 366 | 366 |
| September 15-29 | HRS | 84 | 84 | 84 | 168 | 168 | 168 | 366 | 366 | 366 |
| Irrigation Availability | | | | | | | | | | |
| Per Month | ACIN | 1,066 | 2,000 | 1,333 | 1,600 | 3,000 | 2,667 | 3,200 | 6,000 | 5,333 |
| Annual | ACIN | 10,000 | 20,000 | 12,000 | 15,000 | 30,000 | 25,000 | 30,000 | 56,000 | 50,000 |

[A/] An aquifer is a water saturated geologic unit that will yield water to wells or springs at a sufficient rate so that the wells or springs can serve as a practical source of water supply. Source: Ground Water Wells, (1972) p. 21.

along with a list describing each constraint and activity used in the model.

## Objective Functions

The model includes four objective functions designated as OBJ1, OBJ2, OBJ3, and OBJ4. OBJ1 is specified as maximization of net returns. It is that amount returned to land, management, risk, and overhead. OBJ2 is the kilocalorie input requirements for the cropping alternatives. OBJ3 is the calorie output which is simply the kilocalorie energy created by each unit produced of that crop. OBJ4 is the net kilocalorie energy for the crops or simply the difference between the kilocalories of output (OBJ3) and input (OBJ2).

# Programming Constraints

## Real Constraints

The model includes four groups of real constraints. The first, land, is divided into two categories, Cropland Clay Loam and Cropland Sandy Loam. The division of soils was made because of the difference in input-output coefficients for the two groups. The clay soil is irrigated with a surface irrigation system. However, the sandy soil uses a circular sprinkler irrigation system with a somewhat more limited choice of cropping schemes.

The next group of real constraints are twelve monthly labor restrictions. The third group of real constraints, irrigation requirements by period, form a major constituent of the model. One constraint is included for each of the nine monthly periods of March through November.

The unit of measure for the constraints is the acre inch. The months deleted, January, February and December, do not require irrigation water for any of the cropping alternatives considered.

The next real constraint is the amount of capital available for use. This has been divided into two parts, operating capital and investment capital. The constraints do not limit the amount of capital that can be borrowed, but require that an interest charge of ten percent and eight percent be paid on each dollar of operating and investment capital used, respectively.

## Accounting Constraints

An accounting constraint is included for each product that can be produced with the activities considered. These constraints are used to determine the amount produced by the optimal solution for the farm situations. A constraint is included for wheat grain, grain sorghum, soybeans, small grain graze out and each of the other possible products as noted in Appendix B.

The second group of accounting constraints are input restrictions. These restrictions are used to determine the amount of the individual energy inputs required by the optimum farm organization. These are much like the capital constraints in that they are not restricted to a maximum limit. These eight items nitrogen, phosphate, insecticides, herbicides, diesel, oil, natural gas and machinery represent the major fossil fuel energy inputs used for production of the crops considered in this study.

## Other Constraints

The constraints discussed in this section are needed so that one model can be used for all representative farms and objectives of the study. The first two labeled MCT and MMT (Maximum Conventional and Minimum Tillage) are included so the solution can be restricted to include either conventional or reduced tillage methods of production.

The next two SIS (surface irrigation system) and CSIS (circular irrigation system) are used to limit the solution for any situation to the proper irrigation system. After a specified soil type is chosen, the irrigation system constraint allows for the proper system to be used in selecting the optimal plan. This avoids additional model building. Next are the LSI (limit surface irrigation) and LCSI (limit circular sprinkler irrigation) which serve as accounting constraints in determining the total acre inches of irrigation water pumped corresponding with the proper system in each optimum organization. One constraint LNGW (limit natural gas water) determines the total variable cost associated with the specified solution set and also can be used to specify natural gas if additional irrigation fuels are added to the model. Then the proper fuel specified can be made in future studies. with the one model. The next group of (FVS42-FVS104, FVC42-FCS104) constraints is used to insure that the proper variable cost of pumping is used for each farm situation. While the final set of constraints (NRC1-9, NRS1-9) insure that the corresponding fixed cost for that farm situation is used. Again these can be found in Appendix B.

## Programming Activities

### Production Activities

The model includes twenty-four crop producing activities. The activity titles indicate the crop(s) produced by each. The total includes nine conventional tillage schemes, nine reduced tillage schemes both requiring irrigation facilities, and six dryland crop activities. The production methods represented by these twenty-four activities are discussed in detail in Chapter III and are not repeated here. Examples are conventional wheat grain, conventional sudan hay, minimum wheat soybean double crop, minimum corn grain, dryland wheat and grain sorghum as discussed in detail earlier.

### Marketing or Selling Activities

Here again the name suggests the purpose of the activity. These activities enable the model to sell the crops produced. The model also includes selling activities for grazing produced since no livestock to utilize the forage are included in the analysis. The model includes selling activities for corn, corn silage, wheat, sorghum, sudan hay, and soybeans. Grazing sell activities are included for small grain graze out October through May, small grain graze out November through March and grain sorghum stubble November through January.

### Resource Supplying Activities

A resource supplying and purchasing activity is included for each of the resources that can be purchased from off the farm. A resource supply activity is included for capital, hiring labor in each of the twelve months and to purchase each of the eight inputs discussed earlier. There are two cost activities involved for each irrigation system, one activity to indicate the fixed cost and one including the variable cost of pumping the irrigation water. One pair of cost activities (fixed and variable) is included for a surface system and one for a center pivot system on each of the nine soil-water situations making eighteen pairs in total.

Right Hand Sides or Constraints Levels

The information defining representative farms in Table XVII is used in the right hand side (RHS) for representative farms. Other RHS values are selected to limit the solution to the relevant activities for the situation. The detailed matrix (constraints, activities, RHS) can be found with a complete explanation of each row and column in Appendix B.

# CHAPTER V

## RESULTS OF LINEAR PROGRAMMING MODEL

This chapter presents the linear programming analysis for each of the eighteen representative farm situations described in Chapter III. All combinations of three farm sizes, three water situations and two soil classifications make up the representative situations analyzed. Two objective functions OBJ1 (net returns) and OBJ4 (net kilocalories), were maximized in the analysis of this study. Maximization of net returns was selected because it is the customary objective used in selecting an optimum farm organization. The model was also used to solve for the organization that maximizes net kilocalories of output to determine the effect of using this measure of physical efficiency on the methods of production used, output level and net returns to fixed resources.[1]

The results are presented in three major sections. The first section describes the results for optimization of objective function one. The second section is very similar except the description is for objective function four. The third major section contrasts the organization obtained for the two objective functions.

The first two sections are subdivided based on farm size and water situations. Optimal solutions are presented for farms having clay loam

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[1]The time available for this study did not permit considering other objective functions and other price levels of fossil fuel inputs.

soils as well as sandy loam soils, under each objective function.

The final section is subdivided into two parts based on soils. The optimal solutions for the two objective functions are contrasted by farm size and water situation under each soil classification.

## Objective Function One

## 560 Cropland Acres

### Clay Loam Soils

Table XXIII shows the optimum organization for the 560 acre farm under its respective irrigation situations. The labeling used throughout the results presentation is I, II, or III describing farm size, and A, B, or C for the water situation as described in Chapter IV. These are combined and written as IA, IB, IC, etc. to refer to the farm size and water situation.

Organization IA has a pumping capacity of 800 GPM. The optimum solution includes 9.2 acres of a two-year rotation of wheat produced under conventional tillage the first year and reduced tillage the second year (RWG2RCRC). This is accompanied by 71.8 acres reduced tillage wheat-grain sorghum double crop (RWGSDC) and 294.6 acres of reduced tillage wheat-fallow-sorghum in a three-year rotation under heavy irrigation (RWFS3HI). The remaining 184.4 acres are devoted to dryland wheat (DLW).

Of the 560 acres, 375.6 are irrigated and all utilize a reduced tillage cropping scheme. The optimum plan requires 5,773 acre inches of irrigation water annually and all of the capacity for May and July. There are 577 hours of operator labor required with an additional 174

# TABLE XVIII

## 560 ACRE CLAY LOAM FARM OPTIMAL SOLUTIONS OBJECTIVE FUNCTION ONE

| Identification | Units | | 560 Acres | |
|---|---|---|---|---|
| Number of Wells | | Two | Two | One |
| Total GPM | | 800 | 1500 | 1000 |
| Solution Number: | | IA | IB | IC |
| Net Returns | DOL. | 23,785 | 30,668 | 26,689 |
| Net Kilocalories | MILLION | 1,220.45594 | 925.59538 | 1,353.33517 |
| Irrigated Crops[A/] | | | | |
| CSB | AC | -- | 112.3 | -- |
| RWG2RCRC | AC | 9.2 | 29.0 | 3.6 |
| RWGSDC | AC | 71.8 | 71.7 | 71.7 |
| RWFS3HI | AC | 294.6 | 346.8 | 405.8 |
| Dryland Crops[A/] | | | | |
| DLW | AC | 184.4 | -- | 78.7 |
| Crop Products[B/] | | | | |
| SGGONM | AUM | 170 | 143 | 165 |
| GSNJ | AUM | 135 | 159 | 186 |
| Wheat | BU | 12,543 | 11,578 | 12,521 |
| Grain Sorghum | CWT | 9,535 | 10,616 | 11,835 |
| Soybeans | BU | -- | 5,056 | -- |
| Cropping System[C/] | | | | |
| CT | AC | -- | 112.3 | -- |
| RT | AC | 375.6 | 447.7 | 481.2 |
| Total Irrigation | | | | |
| Water Used | ACIN | 5,773 | 9,433 | 7,014 |
| Labor | | | | |
| Operator Labor | HR. | 577 | 903 | 638 |
| Hired Labor | HR. | 174 | 231 | 180 |
| Annual Capital Used | | | | |
| Operating | DOL. | 9,405 | 10,801 | 10,006 |
| Investment | DOL. | 19,326 | 37,781 | 21,821 |
| Energy Inputs | | | | |
| Nitrogen | CWT | 531 | 539 | 552 |
| Phosphate | CWT | -- | -- | -- |
| Herbicide | LB. | 412 | 596 | 517 |
| Insecticide | LB. | 336 | 419 | 478 |
| Diesel | GALS. | 1,398 | 2,306 | 1,486 |
| Oil | QTS. | 645 | 1,072 | 761 |
| Natural Gas | 1000 CUFT. | 3,421.632 | 6,276.205 | 4,163.614 |
| Machinery | DOL. | 2,883 | 5,703 | 3,311 |

[A/]CSB, Conventional tillage soybeans; RWG2RCRC, Reduced tillage wheat grain two year rotation of conventional tillage year one, reduced tillage year two; RWGSDC, Reduced tillage wheat grain sorghum double crop; RWFS3HI, Reduced tillage wheat-fallow-sorghum three year rotation heavy irrigation; DLW, Dryland tillage wheat.

[B/]SGGONM, Small grain graze out November-March; GSNJ, Grain Sorghum stubble graze November-January.

[C/]For irrigated acreage only, CT refers to conventional tillage and RT means reduced tillage.

hours of labor being hired. The operation requires $9,405 of operating capital and $19,326 of investment capital for machinery and equipment for a total capital expense of $28,730.

Input requirements include 53,080 pounds of nitrogen along with 412 pounds of herbicide, 336 pounds of insecticide, 1,398 gallons of diesel, 645 quarts of oil, 3,421,632 cubic feet of natural gas for irrigation purposes and $2,883 of machinery. The dollars of machinery input equals the dollar value of depreciation and repairs, a measure of the amount of machinery "used up" in producing the crop.

The crops selected in the solution set produce 170 AUM's of small grain grazing November through March (SGGONM) and 135 AUM's of grain sorghum stubble from November to January. In addition to 12,543 bushels of wheat grain and 953,500 pounds of grain sorghum. This solution generates a net return of $23,785 and a net kilocalorie output of 1,220,445,940.

The larger amount of water available in solution IB increases total irrigated production by 184.4 acres (Table XVIII). This includes an additional 112.3 acres of conventional tillage soybeans (CSB), and 29.0 acres of a two-year rotation of wheat produced under conventional tillage the first year followed by reduced tillage the second year (RWG2RCRC) which is an increase of 19.8 acres over solution IA. This solution also includes 71.7 acres of reduced tillage wheat-grain sorghum double crop (RWGSDC), while a reduced tillage three-year rotation of wheat-fallow-sorghum with heavy irrigation (RWFS3HI) is increased by 52.2 acres to total 346.8 acres. All 560 acres of cropland are irrigated and no dryland production is included in the solution.

The solution includes 112.3 acres of irrigated conventional tillage and 477.7 acres of reduced tillage production. The amount of irrigation water applied increased by 3,660 acre inches to a total of 9,433 acre inches. The labor required also increases to 903 hours of operator labor and 231 hours of hired labor - an increase of 383 hours of labor for the total farm. The amount of capital required increases to $10,801 for operating and $37,781 for investment capital. This generates a combined total of $48,582 of capital, an increase over IA of $19,851.

The amount of inputs required also increases. Nitrogen required increases to 53,850 pounds, an increase of 770 pounds, while herbicide use increases by 184 pounds to 596 pounds. Insecticide used increases by 82 pounds to a total of 419 pounds, due to the increased acreage of grain sorghum. The diesel requirement totals 2,306 gallons or 909 gallons more while oil increases to a total of 1,072 quarts, 427 quarts more. Increasing the amount fo water pumped increases the cubic feet of natural gas needed by 2,854,576. Machinery depreciation and repairs total $5,703 or $2,820 more than solution IA.

Net returns for this solution are $30,668 or a $6,883 increase. However, the surprising result is that the net kilocalories of output decreased by 29,486,060. This decrease results from the increased use of natural gas and the relatively low net kilocalorie output of soybeans.

The third solution IC falls between the previous two discussed because the GPM available on the farm is more than farm IA but less than IB. The solution includes 3.6 acres of reduced tillage wheat grain two-year rotation of conventional tillage in year one and reduce tillage in year two (RWG2RCRC) which is 25.4 acres less than IB and 5.6 acres less than IA. As in the first two solutions, the reduced tillage wheat grain sorghum double crop is again 71.7 acres. However, the acreage of reduced tillage wheat-fallow-sorghum three-year rotation heavy irrigation (RWFS3HI) is 111.2 acres more than solution IA and 59 acres greater than IB. This solution includes 78.7 acres of dryland wheat, 105.7 less than IA.

As in solution IA all of the irrigated production uses reduced tillage methods. The irrigation water required totals 7,014 acre inches, 1,241 acre inches more than IA and 2,419 acre inches less than IB. The labor required includes 638 hours of operator labor and 180 hours of hired labor. This is 316 less total hours than IB and 67 more hours than IA. Operating capital needs are $10,006 while investment capital requirements are $21,821. This totals $31,827, $16,755 less than IB and only $3,096 more than IA.

Some input requirements are greater than the previous solutions while others are less. For example, the amount of nitrogen used totals 55,190 pounds, 1,879 pounds more than IB and 2,641 pounds more than IA. Herbicide usage totals 517 pounds, 79 pounds less than IB and 106 pounds more than IA. As in the case of nitrogen, insecticide usage is greater than either of the other two. It is 141 pounds more than IA and 59 pounds more than IB.

Both the increased nitrogen and insecticide, are due to the increase in grain sorghum acreage. Diesel use totals 1,486 gallons which is 88 gallons more than IA and 820 gallons less than IB. Also 761 quarts of oil are required. This is 115 more than IA and 312 less than IB. The cropping program requires 2,112,590 cubic feet less natural gas than IB, but 74,198 cubic feet more natural gas than IA. Machinery depreciation and repairs totaled $3,311, $428 more than IA and $2,391 less than IB.

The net returns of $26,689 also fell between IA and IB. The net kilocalories of output totals 1,353,335,170, 132,879,230 more than IA and 427,739,790 kilocalories more than IB. This occurs because the solution for IC includes no soybeans which have a low net output of kilocalories and an increase in grain sorghum acreage has a relatively high net output of kilocalories. It is evident from these three solutions that the water situations are an important factor in determining the optimum solution. Their variation is a major factor of the model outcome.

Sandy Loam Soil

Table XIX shows the results for the 560 acre farms for the sandy loam soils. As mentioned in Chapter IV, the net returns on sandy loam soil are lower because high irrigation costs are associated with the circular sprinkler systems required.

Situation IA includes 42.2 acres of reduced tillage corn grain (RCG) and 103.7 acres of reduced tillage wheat grain and soybean double crop (RWGSBDC) accompanied by 414.1 acres of dryland grain sorghum (DLGSS).

No irrigated production with conventional tillage was used, but 145.9 acres of reduced tillage was incorporated in the solution. There are 4,435 acre inches of irrigation water used, 873 hours of operator labor required and an additional 36 hours of labor are hired. Capital requirements are $8,992 of operating and $40,424 of investment capital, for a total requirement of $49,416.

The inputs are as follows: 41,590 pounds of nitrogen, 7,290 pounds

# TABLE XIX

## 560 ACRE SANDY LOAM FARM OPTIMAL SOLUTIONS OBJECTIVE FUNCTION ONE

| Identification | Units | | 560 Acres | |
|---|---|---|---|---|
| Number of Wells | | Two | Two | One |
| Total GPM | | 800 | 1500 | 1000 |
| Solution Number: | | IA | IB | IC |
| Net Returns | DOL. | 10,367 | 867 | 9,277 |
| Net Kilocalories | MILLION | 1,191.30269 | 1,328.83645 | 1,234.28077 |
| Irrigated Crops[A/] | | | | |
| RCG | AC | 42.2 | 176.9 | 84.3 |
| RWGSBDC | AC | 103.7 | 103.7 | 103.7 |
| Dryland Crops[A/] | | | | |
| DLGSS | AC | 414.1 | 279.3 | 371.9 |
| Crop Products[B/] | | | | |
| GSNJ | AUM | 310 | 209 | 278 |
| Corn | BU | 5,698 | 23,889 | 11,833 |
| Wheat | BU | 5,185 | 5,185 | 5,185 |
| Grain Sorghum | CWT | 8,696 | 5,866 | 7,812 |
| Soybeans | BU | 3,629 | 3,629 | 3,629 |
| Cropping System[C/] | | | | |
| CT | AC | -- | -- | -- |
| RT | AC | 145.9 | 280.7 | 188.0 |
| Total Irrigation | | | | |
| Water Used | ACIN | 4,435 | 7,669 | 5,445 |
| Labor | | | | |
| Operator Labor | HR. | 873 | 1,092 | 964 |
| Hired Labor | HR. | 36 | 134 | 95 |
| Annual Capital Used | | | | |
| Operating | DOL. | 8,992 | 13,441 | 10,382 |
| Investment | DOL. | 40,424 | 73,724 | 43,284 |
| Energy Inputs | | | | |
| Nitrogen | CWT | 415 | 618 | 479 |
| Phosphate | CWT | 73 | 140 | 94 |
| Herbicide | LB. | 323 | 525 | 386 |
| Insecticide | LB. | 456 | 456 | 456 |
| Diesel | GALS. | 2,914 | 3,454 | 3,083 |
| Oil | QTS. | 738 | 1,094 | 849 |
| Natural Gas | 1000 CUFT. | 3,766.786 | 6,505.493 | 4,622.608 |
| Machinery | DOL. | 4,495 | 7,293 | 5,369 |

[A/] RCG, Reduced tillage corn grain; RWGSBDC, Reduced tillage grain soybean double crop; DLGSS, Dryland tillage grain sorghum sandy soil.

[B/] GSNJ, Grain sorghum stubble November-January.

[C/] For irrigated acreage only, CT refers to conventional tillage and RT means reduced tillage.

of phosphate, 323 pounds of herbicide, 456 pounds of insecticide, 2,914 gallons of diesel, 738 quarts of oil, 3,766,746 cubic feet of natural gas and $4,495 for machinery depreciation and repairs. The operation returned $10,367 and generated a net kilocalorie output of 1,191,302,690. The high investment cost is accounted for by the high cost of the sprinkler system.

Solution IB includes an increase of 134.7 acres of reduced tillage corn grain (RCG) to total 176.9 acres while reduced tillage wheat-soybean double crop remains constant at 103.7 acres. However, the dryland grain sorghum (DLGSS) is reduced to a total of 279.3 acres.

The increase in corn grain employed an additional 134.7 acres of reduced tillage or 280.7 acres. The increased acreage also increases the total amount of irrigation water to 7,669 acre inches, 3,234 more than solution IA. Both operator and hired labor increased substantially to 1,092 and 134 respectively to total 1,226 hours, 317 more than IA. the operating capital amounts to $13,441 while investment jumped to $73,724 for a total of $87,165. This increase of $37,749 over IA is easily accounted for by the additional sprinkler system required in IB.

An increase of all inputs also is evident with nitrogen at 61,800 pounds, while phosphate increases to 14,030 pounds. Herbicides also increases to 525 pounds. The sole input that remains the same as for situation IA is 456 pounds of insecticide. Diesel also increases to 3,454 gallons, while oil increases to 1,094 quarts. Natural gas increases to 6,505,493.83 cubic feet, while machinery depreciation and repairs increases to $7,293.

The surprising result is the net return of only $867, $9,500 less than IA. However, this decrease is accounted for by the high variable and fixed cost associated with the two sprinkler systems and the increase in inputs required. The net kilocalories produced increased to 1,328,836,450.

The third solution, IC, like the IC clay loam solution falls between the previous two in most respects. The solution includes 84.3 acres of reduced tillage corn grain (RCG). Again, as in IA and IB, reduced wheat-soybean double crop (RWGSBDC) remains at 103.7 acres while dryland grain sorghum employs 371.9 acres (Table XIX).

There is a slight decrease in reduced tillage crops. Solution IB includes 280.7 acres compared to 188 for IC, while IA has 145.9 acres. The total irrigation water required is 5,445 acre inches which is 1,010 more than IA and 2,224 less than IB. The labor requirements total 1,059 hours of which 964 is operator labor and 95 is hired labor. Capital requirements dropped considerably from IB due to the need for only one sprinkler system. Total capital is $53,666 composed of $10,382 for operating and $43,284 for investment. This is $30,440 less than IB. However, it is $4,249 more than the amount required by IA.

As in the previous case inputs required lie between the two earlier discussed solutions. A required 47,910 pounds of nitrogen is needed, while phosphate required 9,400 pounds. Herbicides total 386 pounds while again 456 pounds of insecticides are used. Diesel is at 3,083 gallons along with 849 quarts of oil. The natural gas requirement is 4,622,608 cubic feet while the machinery depreciation and repairs of $5,369 is greater than the amount for IA, but less than the amount required for IB.

The net returns of $9,277 are greater than IB but less than IA. The major factor explaining this differences is the irrigation cost, since solution IC requires only one sprinkler system. The net kilocalories produced total 1,234,280,770, an amount greater than the total for IA, but less than IB.

### 1440 Cropland Acres

<u>Clay Loam Soils</u>

The solutions discussed above refer to the small farm size with each of three water situations and two soil groups. The remainder of the discussion of objective function one solutions mentions only those differences which add an interesting dimension to the study.

The order of presentation of the 1440 and 2680 acre representative farms follows that of the 560 acre solutions presented earlier. The first solution discussed is the optimal organization for situation IIA having three wells, a total of 1200 GPM and 1440 acres.

The optimal solution (Table XX) includes 29.5 acres of reduced tillage two-year wheat rotation of conventional tillage in year one and reduced tillage in year two (RWG2RCRC), 143.6 acres of reduced tillage wheat and grain sorghum double crop (RWGSDC), and 367.5 acres of reduced tillage wheat-fallow-sorghum three year rotation moderate irrigation (RWFS3HI). In addition to 899.4 acres of dryland, all of the 540.6 acres of land under irrigation is in reduced tillage. This acreage requires 9,075 acre-inches of irrigation water. Labor totals 1,480 hours of which 976 is operator and 504 is hired labor. Required operating capital is $20,911 while investment is $33,913.

Needed inputs are made up of 121,140 pounds of nitrogen, 612 pounds of herbicide, 511 pounds of insecticide, 3,035 gallons of diesel,

# TABLE XX

## 1440 ACRE CLAY LOAM FARM OPTIMAL SOLUTIONS OBJECTIVE FUNCTION ONE

| Identification | Units | | 1440 Acres | |
|---|---|---|---|---|
| Number of Wells | | Three | Three | Two |
| Total GPM | | 1200 | 2250 | 2000 |
| Solution Number: | | IIA | IIB | IIC |
| Net Returns | DOL. | 42,605 | 59,019 | 55,630 |
| Net Kilocalories | MILLION | 2,538.17725 | 3,234.92227 | 3,069.19649 |
| Irrigated Crops A/ | | | | |
| RWG2RCRC | AC | 29.5 | .3 | 7.1 |
| RWGSDC | AC | 143.6 | 143.6 | 143.6 |
| RWFS3HI | AC | 367.5 | 950.9 | 812.1 |
| Dryland Crops A/ | | | | |
| DLW | AC | 899.4 | 345.2 | 477.0 |
| Crop Products B/ | | | | |
| SGGONM | AUM | 465 | 434 | 442 |
| GSNJ | AUM | 169 | 437 | 373 |
| Wheat | BU | 30,411 | 30,295 | 30,322 |
| Grain Sorghum | CWT | 14,489 | 26,546 | 23,679 |
| Cropping System C/ | | | | |
| CT | AC | -- | -- | -- |
| RT | AC | 540.6 | 1,094.8 | 962.9 |
| Total Irrigation | | | | |
| Water Used | ACIN | 9,075 | 15,579 | 14,032 |
| Labor | | | | |
| Operator Labor | HR. | 976 | 1,186 | 1,138 |
| Hired Labor | HR. | 504 | 654 | 616 |
| Annual Capital Used | | | | |
| Operating | DOL. | 20,911 | 24,064 | 23,314 |
| Investment | DOL. | 33,913 | 57,870 | 45,942 |
| Energy Inputs | | | | |
| Nitrogen | CWT | 1,211 | 1,322 | 1,296 |
| Phosphate | CWT | -- | -- | -- |
| Herbicide | LB. | 612 | 1,167 | 1,035 |
| Insecticide | LB. | 511 | 1,094 | 956 |
| Diesel | GALS. | 3,035 | 3,499 | 3,389 |
| Oil | QTS. | 1,102 | 1,707 | 1,563 |
| Natural Gas | 1000 CUFT. | 5,364.859 | 9,255.400 | 8,330.007 |
| Machinery | DOL. | 5,244 | 7,491 | 6,957 |

A/ RWG2RCRC, Reduced tillage wheat grain two year rotation of conventional tillage year one, reduced tillage year two; RWGSDC, Reduced tillage wheat grain sorghum double crop; RWFS3HI, Reduced tillage wheat-fallow-sorghum three year rotation heavy irrigation; DLW, Dryland tillage wheat.

B/ SGGONM, Small grain graze out November-March; GSNJ, Grain sorghum stubble graze November-January.

C/ For irrigated acreage only, CT refers to conventional tillage and RT means reduced tillage.

1,102 quarts of oil, 5,364,859 cubic feet of natural gas and $5,244 of machinery depreciation and repairs. This solution generates a net return of $42,605 and a net kilocalorie energy output of 2,538,177,250.

Solution IIB has only .3 acres of reduced tillage two-year wheat rotation of conventional tillage in year one and reduced tillage in year two (RWG2RCRC), the same acreage (143.6) of reduced tillage wheat and grain sorghum double crop (RWGSDC), and a greater acreage (950.9) of reduced tillage wheat-fallow-sorghum three year rotation heavy irrigation (RWFS3HI). Dryland wheat decreased to 345.2 acres.

All irrigated production (1094.8 acres) utilizes reduced tillage methods. A total of 15,579 acre inches of irrigation water is utilized while 1,186 hours of operator labor and 654 hours of hired labor is employed. Capital requirements are $24,064 for operating capital and $57,870 needed for investment capital.

An increase occurred in the case of all inputs with nitrogen at 132,230 pounds, 1,167 pounds of herbicide, 1,094 pounds of insecticide, 3,499 gallons of diesel, 1,707 quarts of oil and a large increase of 3,890,541 cubic feet of natural gas to total 9,255,400. The final input, machinery depreciation and repairs, totaled $7,491. Net returns are $59,019 while net kilocalories of output total 3,234,922,270.

As in the small farm situations the acreage included in solution IIC falls between IIA and IIB. The organization includes 7.1 acres of reduced tillage two-year wheat rotation of conventional tillage in year one and reduced tillage in year two (RWG2RCRC), 143.6 acres of reduced tillage wheat and grain sorghum double crop (RWGSDC) and 812.1 acres of reduced tillage wheat-fallow-sorghum three year rotation heavy irrigation (RWFS3HI). Dryland wheat acreage is 477 comparing solutions IIA, IIB and IIC indicates there is less difference between solutions for IIB and IIC than between IIA and IIC.

This is accoutned for by the fact that there is less difference between the GPM available for IIB and IIC than IIA and IIC. This difference is true for all the farm sizes and soil types discussed in this chapter.

The solution for situation IIC requires 14,032 acre-inches of irrigation water, (Table XX) 1,138 hours of operator labor, and an additional 616 hours of hired labor. Operating capital totals $23,314 and investment capital totals $45,942. The inputs required include 129,590 pounds of nitrogen, 1,035 pounds of herbicide, 956 pounds of insecticide, 3,389 gallons of diesel, 1,563 quarts of oil and again a somewhat smaller amount of natural gas than solution IIB but an amount larger than solution IIA. It totals 8,330,007 cubic feet, which is only 925,393 cubic feet less than IIB and 2,965,148 more than IIA. Machinery depreciation and repair requirements are $6,957. The net returns generated are $55,630 while net kilocalories of output are 3,069,196,490.

It is obvious the larger water supplies considered on the 1440 acre farm induce a cropping scheme that produces both greater net returns and net kilocalories of output.

Sandy Loam Soils

Solution IIA for the intermediate size farm includes 200 acres of reduced tillage wheat and soybean double crop (RWGSBDC) and 1,240 acres of dryland grain sorghum (Table XXI). Total reduced tillage is 200 acres while zero acres are planted to irrigated conventional tillage methods.

TABLE XXI

1440 ACRE SANDY LOAM FARM OPTIMAL SOLUTIONS
OBJECTIVE FUNCTION ONE

| Identification | Units | | 1440 Acres | |
|---|---|---|---|---|
| Number of Wells | | Three | Three | Two |
| Total GPM | | 1200 | 2250 | 2000 |
| Solution Number: | | IIA | IIB | IIC |
| Net Returns | DOL. | 21,132 | 13,646 | 22,073 |
| Net Kilocalories | MILLION | 3,228.59608 | 3,197.92614 | 3,370.18875 |
| Irrigated Crops[A/] | | | | |
| RWGSBDC | AC | 200.0 | 207.4 | 207.4 |
| RCG | AC | -- | -- | 168.8 |
| Dryland Crops[A/] | | | | |
| DLGSS | AC | 1,240 | 1,232 | 1,063 |
| Crop Products[B/] | | | | |
| GSNJ | AUM | 930 | 924 | 797 |
| Wheat | BU | 10,000 | 10,370 | 10,370 |
| Grain Sorghum | CWT | 26,040 | 25,884 | 22,340 |
| Soybeans | BU | 7,000 | 7,259 | 7,259 |
| Corn | BU | -- | -- | 22,784 |
| Cropping System[C/] | | | | |
| CT | AC | -- | -- | -- |
| RT | AC | 200 | 207.4 | 376.2 |
| Total Irrigation | | | | |
| Water Used | ACIN | 6,600 | 6,844 | 10,894 |
| Labor | | | | |
| Operator Labor | HR. | 1,022 | 1,034 | 1,210 |
| Hired Labor | HR. | 1,138 | 1,142 | 1,365 |
| Annual Capital Used | | | | |
| Operating | DOL. | 18,837 | 18,915 | 24,488 |
| Investment | DOL. | 94,365 | 119,499 | 93,815 |
| Energy Inputs | | | | |
| Nitrogen | CWT | 860 | 865 | 1,118 |
| Phosphate | CWT | 100 | 104 | 188 |
| Herbicide | LB. | 500 | 519 | 772 |
| Insecticide | LB. | 1,240 | 1,233 | 1,233 |
| Diesel | GALS. | 7,168 | 7,156 | 7,831 |
| Oil | QTS. | 1,397 | 1,421 | 1,866 |
| Natural Gas | 1000 CUFT. | 5,610.000 | 5,817.777 | 9,248.039 |
| Machinery | DOL. | 7,725 | 7,901 | 11,404 |

[A/]RWGSBDC, Reduced tillage grain soybean double crop; DLGSS, Dryland tillage grain sorghum sandy soil, RCG, Reduced tillage corn grain.

[B/]GSNJ, Grain sorghum stubble graze November-January.

[C/]For irrigated acreage only, CT refers to conventional tillage and RT means reduced tillage.

A total of 6,600 acre inches of irrigation water are needed along with 2,160 hours of labor of which 1,022 is operator labor and 1,138 are hired labor. Capital includes $18,837 for operating, and $94,366 for investment needs.

Inputs include 86,000 pounds of nitrogen, 10,000 pounds of phosphate, 500 pounds of herbicide, 1,240 pounds of insecticide, 7,168 gallons of diesel, 1,397 quarts of oil, 5,610,000 cubic feet natural gas, and $7,724 of machinery depreciation and repairs. A total of $21,132 in net returns and 3,228,596,080 in net kilocalories of output is generated by solution IIA.

Solution IIB follows much the same pattern the solution for the 560 acre sandy loam farm. The reduction in returns to only $13,646 and to 3,197,926,140 kilocalories of net output is again accounted for by the high cost of irrigation associated with the 750 GPM wells under sprinkler irrigation. Crops include 207.4 acres of reduced tillage wheat and soybean double crop (RWGBDC) along with 1,232 acres of dryland grain sorghum.

Because of the high water pumping and distribution costs, irrigated production is only 7.4 acres greater than in solution IIA. The low net returns result from the additional $25,133 investment capital required for the additional sprinkler system, that is, three systems for IIB compared to two for IIA. Reduced tillage production totals 207.4 acres, slightly more than is included in solution IIA. The amount of inputs required by solution IIB are slightly higher in most cases than for solution IIA. However, the quantity of insecticide and diesel is slightly less for IIB than IIA because of the decrease in dryland grain sorghum.

The solution for situation IIC on sandy soil has lower variable irrigation cost than IIB, resulting in an increase in irrigated acreage. In addition to the 207.4 acres of reduced tillage two-year wheat rotation of conventional tillage in year one and reduced tillage in year two (RWG2RCRC), the solution also includes 168.8 acres of reduced tillage corn grain (RCG). The increase in irrigated crops reduces dryland grain sorghum to 1,063 acres. The amount of reduced tillage cropping system, irrigation water, operator labor, hired labor and operating capital are all greater than the corresponding amount for either solution IIB or IIA. However, the amount of investment capital is reduced to $92,815 because of the need for only two sprinkler systems rather than three.

The amount of each of the inputs increases as shown in Table XXI. Net returns are $22,073 while the net kilocalories of output are 3,370,188,750. Both of these totals are greater than the corresponding values for solutions IIA and IIB.

## 2680 Cropland Acres

### Clay Loam Soil

Solution IIIA listed in Table XXII, includes 58.9 acres of reduced tillage two-year wheat rotation of conventional tillage year one and reduced tillage year two (RWG2RCRC), 287.2 acres of reduced tillage wheat and grain sorghum double crop (RWGSDC) and 735 acres of reduced wheat-fallow-sorghum three year rotation heavy irrigation (RWFS3HI), in addition to 1,598.8 acres of dryland wheat.

Reduced tillage acreage comprises a total of 1,081.2 acres. The

TABLE XXII

2680 ACRE CLAY LOAM FARM OPTIMAL SOLUTIONS
OBJECTIVE FUNCTION ONE

| Identification | Units | | 2680 Acres | |
|---|---|---|---|---|
| Number of Wells | | Six | Six | Four |
| Total GPM | | 2400 | 4500 | 4000 |
| Solution Number | | IIIA | IIIB | IIIC |
| Net Returns | DOL. | 81,280 | 133,204 | 106,665 |
| Net Kilocalories | MILLION | 4,850.08669 | 6,243.57675 | 5,911.62751 |
| Irrigated Crops[A/] | | | | |
| RWG2RCRC | AC | 58.9 | .6 | 14.5 |
| RWGSDC | AC | 287.2 | 287.2 | 287.2 |
| RWFS3HI | AC | 735.0 | 1,901.7 | 1,623.8 |
| Dryland Crops[A/] | | | | |
| DLW | AC | 1,598.8 | 490.5 | 754.5 |
| Crop Products[B/] | | | | |
| SGGONM | AUM | 861 | 799 | 814 |
| GSNJ | AUM | 338 | 874 | 746 |
| Wheat | BU | 57,523 | 57,289 | 57,344 |
| Grain Sorghum | CWT | 28,978 | 53,093 | 47,348 |
| Cropping System[C/] | | | | |
| CT | AC | -- | -- | -- |
| RT | AC | 1,081.2 | 2,189.5 | 1,925.5 |
| Total Irrigation | | | | |
| Water Used | ACIN | 18,151 | 31,159 | 28,060 |
| Labor | | | | |
| Operator Labor | HR. | 1,254 | 1,373 | 1,362 |
| Hired Labor | HR. | 1,641 | 2,222 | 2,080 |
| Annual Capital Used | | | | |
| Operating | DOL. | 39,760 | 46,066 | 44,564 |
| Investment | DOL. | 66,387 | 114,302 | 90,446 |
| Energy Inputs | | | | |
| Nitrogen | CWT | 2,303 | 2,525 | 2,472 |
| Phosphate | CWT | -- | -- | -- |
| Herbicide | LB. | 1,224 | 2,333 | 2,069 |
| Insecticide | LB. | 1,022 | 2,189 | 1,911 |
| Diesel | GALS. | 5,810 | 6,738 | 6,517 |
| Oil | QTS. | 2,178 | 3,389 | 3,100 |
| Natural Gas | 1000 CUFT. | 10,729.717 | 18,510.801 | 16,657.236 |
| Machinery | DOL. | 10,280 | 14,774 | 13,704 |

[A/] RWG2RCRC, Reduced tillage wheat grain two year rotation of conventional tillage year one, reduced tillage year two; RWGSDC, Reduced tillage wheat grain sorghum double crop; RWFS3HI, Reduced tillage wheat-fallow-sorghum three year rotation heavy irrigation; DLW, Dryland tillage wheat.

[B/] SGGONM, Small grain graze out November-March; GSNJ, Grain sorghum stubble graze November-January.

[C/] For irrigated acreage only, CT refers to conventional tillage and RT means reduced tillage.

solution requires 18,151 acre inches of irrigation water, 1,254 hours of operator and 1641 hours of hired labor. Capital requirements are $39,760 for operating expense and $66,387 for investment.

Inputs also soar to 230,290 pounds of nitrogen, 1,224 pounds of herbicide, 1,022 pounds of insecticide along with 5,810 gallons of diesel, 2,178 quarts of oil, 10,729,717 cubic feet of gas and $10,280 of machinery depreciation and repairs. The net returns generated total $81,280 while the net kilocalories of output are estimated at 4,850,086, 690.

For farm solution IIIB which has, 4,500 GPM, the solution includes .6 acres of reduced tillage two-year wheat rotation of conventional tillage in year one and reduced tillage in year two (RWG2RCRC), 287.2 acres of reduced tillage wheat and grain sorghum double crop (RWGSDC), 1,901.7 acres of reduced tillage wheat-fallow-sorghum three-year rotation heavy irrigation and only 490.5 acres of dryland wheat. The acreage of reduced tillage production under irrigation is 2189.5 (Table XXII).

The quantity of the inputs required by solution IIIB is greater than for IIIA. The amount of irrigation water required is 31,159 acre inches. Labor requirements total 3,595 hours including 1,373 of operator labor and 2,222 hours of hired labor. Capital needs are made up of $46,066 for operating expenses and $114,302 in investment capital. The other input requirements increase as shown in Table XXII. Net returns reached a high of $133,204 while net kilocalories of output reached 6,243,576,750.

The optimal solution values for IIIC again fall between the previously discussed solutions (IIIA & IIIB). Like the past situations, the GPM for IIIC more closely approximates solution IIIB. The net returns for solution IIIC are $106,665 and the net kilocalories of output are 5,911,627,510. These values are very close to the corresponding values for the IIIB solution. The cropping scheme again consists of all reduced tillage methods of production on the irrigated acreage (1,925.5 acres), made up of 14.5 acres of reduced tillage two-year wheat rotation of conventional tillage in year one and reduced tillage in year two (RWG2RCRC), 287.2 acres of reduced tillage wheat and grain sorghum double crop (RWGSBDC), and 1,623.8 acres of reduced tillage wheat-fallow-sorghum three year rotation heavy irrigation (RWFS3HI). The remaining 754.5 acres is in dryland wheat. The irrigation water used is only 3,099 acre inches less than IIIB but is 10,455 acre inches more than IIIA. The labor and capital required (1,362 hours of operator labor, 2,080 hours of hired) $44,546 of operating capital and $90,446 of investment capital are relatively close to the corresponding quantities required by solution IIIB. The quantity of each of the remaining inputs required by solution IIIC is much greater than for IIIA, but somewhat less than IIIB (Table XXII).

Sandy Loam Soils

This is the final set of representative farm organizations to be discussed under objective function one. The results follow much the same pattern as those of the other farm sizes with sandy loam soils. The quantities for solution IIIA and IIIC are very similar in most categories. As for the other two farm sizes, water situation B has high irrigation costs associated with the additional sprinkler systems. So solution IIIA includes only 400 acres of reduced tillage wheat and soybean double crop (RSGSBDC) and 2,280 acres of dryland grain sorghum. The 400 acres of irrigated production utilize a reduced tillage method (Table XXIII). The net returns are $35,917 and the net kilocalories of output are 5,893,763,760. Table XXIII lists the items mentioned above along with the remaining solutions to be discussed.

Solution IIIB includes only an additional 14.8 acres of irrigated production (414.8 acres of reduced tillage wheat and soybean double crop) even though an additional 2100 GPM of irrigation water is available. However, water is available only at high cost. Approximately the same is used in solution IIB (13,688 acre inches) as in IIA (13,296 acre inches). The remaining 2,265.2 acres are in dryland sorghum.

While operating capital requirements increase only to $35,505, investment jumps to $235,094, an additional $50,266 because of the additional sprinkler systems.

As expected input requirements for solution IIIB are only slightly above the corresponding requirements for solution IIIA (Table XXIII). The net returns of $20,890 are $15,026 lower than for solution IIIA. However, the net kilocalories of output fall a relatively small amount. This seeming discrepancy occurs because the fixed costs associated with additional sprinkler systems greatly reduce net returns, but have relatively little effect on net kilocalories of output.

The final solution, IIIC, has somewhat higher returns than IIIA, but approximately the same net kilocalories of output (5,873,272,520). The increase in returns over IIIB results from the reduction in both variable and fixed irrigation cost as well as the addition of 40 acres of reduced tillage corn grain (RCG). This solution includes the same acreage of reduced tillage wheat and soybean double crop (RWGSBDC) as

# TABLE XXIII

## 2680 ACRE SANDY LOAM FARM OPTIMAL SOLUTIONS OBJECTIVE FUNCTION ONE

| Identification | Units | | 2680 Acres | |
|---|---|---|---|---|
| Number of Wells | | Six | Six | Four |
| Total GPM | | 2400 | 4500 | 4000 |
| Solution Number: | | IIIA | IIIB | IIIC |
| Net Returns | DOL. | 35,917 | 20,891 | 37,297 |
| Net Kilocalories | MILLION | 5,893.76376 | 5,832.42388 | 5,873.27252 |
| Irrigated Crops[A/] | | | | |
| RCG | AC | -- | -- | 40.0 |
| RWGSBDC | AC | 400.0 | 414.8 | 414.8 |
| Dryland Crops[A/] | | | | |
| DLGSS | AC | 2,280.0 | 2,265.2 | 2,225.2 |
| Crop Products[B/] | | | | |
| GSNJ | AUM | 1,710 | 1,698 | 1,668 |
| Wheat | BU | 20,000 | 20,741 | 20,741 |
| Grain Sorghum | CWT | 47,880 | 47,569 | 46,728 |
| Soybeans | BU | 14,000 | 14,519 | 14,519 |
| Corn | BU | -- | -- | -- |
| Cropping System[C/] | | | | |
| CT | AC | -- | -- | -- |
| RT | AC | 400.0 | 414.8 | 454.8 |
| Total Irrigation | | | | |
| Water Used | ACIN | 13,320 | 13,688 | 14,649 |
| Labor | | | | |
| Operator Labor | HR. | 1,112 | 1,118 | 1,148 |
| Hired Labor | HR. | 2,811 | 2,995 | 3,059 |
| Annual Capital Used | | | | |
| Operating | DOL. | 35,350 | 35,505 | 36,827 |
| Investment | DOL. | 184,827 | 235,094 | 178,932 |
| Energy Inputs | | | | |
| Nitrogen | CWT | 1,620 | 1,630 | 1,690 |
| Phosphate | CWT | 200 | 207 | 277 |
| Herbicide | LB. | 1,000 | 1,037 | 1,097 |
| Insecticide | LB. | 2,280 | 2,265 | 2,265 |
| Diesel | GALS. | 13,296 | 13,272 | 13,432 |
| Oil | QTS. | 2,689 | 2,737 | 2,843 |
| Natural Gas | 1000 CUFT. | 11,220.000 | 11,635.555 | 12,448.973 |
| Machinery | DOL. | 15,036 | 15,387 | 16,218 |

[A/] RCG, Reduced tillage corn grain; RWGSBDC, Reduced tillage grain soybean double crop; DLGSS, Dryland tillage grain sorghum sandy soil.

[B/] GSNJ, Grain sorghum stubble graze November-January.

[C/] For irrigated acreage only, CT refers to conventional tillage and RT means reduced tillage.

IIIB (414.8 acres), but somewhat less dryland grain sorghum (2,225.2). Reduced tillage acreage increases to 454.8 acres.

The solution requires 14,649 acre inches of irrigation water and 4,207 hours of labor. Operating capital increases slightly to $36,827 while investment capital fell below both IIIB and IIIA to $178,932. This is due to the reduction in both number of wells and sprinkler systems in the case of IIIB, and the number of wells in the case of IIIA.

The inputs used increase by a small amount to 169,040 pounds of nitrogen, 27,740 pounds of phosphate, 1,097 pounds of herbicide, 2,265 pounds of insecticide, 13,432 gallons of diesel, 2,843 quarts of oil, while irrigation requires 12,448,973 cubic feet of natural gas, and the solution requires $16,218 of machinery depreciation and repairs.

## Objective Function Four

Maximimizing OBJ4 maximizes net kilocalories of output for the farm. This is the difference between the calories of fossil fuel energy inputs and the digestable energy in the crop(s) harvested. Maximization of output results in farm organizations including those crops and methods of production requiring relatively little input energy per kilocalorie of output. In many cases the organizations selected using this objective function are very unprofitable. However, the changes in methods of production indicate the direction of optimum adjustments as fossil fuel energy prices increase.

## 560 Cropland Acres

Clay Loam Soil

Table XXIV presents the results for the 560 acre farm size and the three water situations. The first solution includes 88.8 acres of conventional tillage grain sorghum under moderate irrigation (CSMI) along with 133.3 acres of reduced tillage silage and rye grazing double crop (RSRSCL). The remaining 337.9 acres of cropland is planted in dryland grain sorghum. The production of irrigated crops involves 88.8 acres of conventional tillage and 133.3 acres of reduced tillage methods.

A total of 6,307 acre inches of irrigation water and 1,192 hours of labor is utilized. Capital requirements are $6,778 for operating expenses and $26,882 for investment.

The inputs required include 46,190 pounds of nitrogen, 166 pounds of herbicide, 222 pounds of insecticide, 3,756 gallons of diesel and 880 quarts of oil. Natural gas required for irrigation is 4,451,660 cubic feet while $7,297 of machinery depreciation and repairs is needed. Net kilocalories of output total 1,930,907,590, while net returns are a minus $27,030.

As expected solution IIA includes an increased irrigated acreage (166.7 acres) of conventional tillage sorghum under moderate irrigation (CSMI) plus 250 acres of reduced tillage silage and rye grazing double crop (RSRSCL), resulting in a smaller acreage of dryland sorghum (143.3 acres). The larger irrigated acreage requires more irrigation water (11,833 acre inches) and more labor (1,206 hours of operator labor and 492 hours of hired labor). Operating capital increases to $8,615 and investment capital increases to $44,689. The quantities of

# TABLE XXIV

## 560 ACRE CLAY LOAM FARM OPTIMAL SOLUTIONS OBJECTIVE FUNCTION FOUR

| Identification | Units | | 560 Acres | |
|---|---|---|---|---|
| Number of Wells | | Two | Two | One |
| Total GPM | | 800 | 1500 | 1000 |
| Solution Number: | | IA | IB | IC |
| Net Returns | DOL. | -27,030 | -43,209 | -31,977 |
| Net Kilocalories | MILLION | 1,930.90759 | 2,731.55734 | 2,159.78712 |
| Irrigated Crops[A/] | | | | |
| CSMI | AC | 88.8 | 166.7 | 111.1 |
| RSRSCL | AC | 133.3 | 250.0 | 166.6 |
| Dryland Crops[A/] | | | | |
| DLGSC | AC | 337.9 | 143.3 | 282.3 |
| Crop Products[B/] | | | | |
| SGGOOM | AUM | 546 | 1,025 | 683 |
| GSNJ | AUM | 342 | 274 | 323 |
| Corn Silage | TON | 2,665 | 5,000 | 3,333 |
| Grain Sorghum | CWT | 7,448 | 8,577 | 7,771 |
| Cropping System[C/] | | | | |
| CT | AC | 88.3 | 166.7 | 111.1 |
| RT | AC | 133.3 | 250.0 | 166.6 |
| Total Irrigation | | | | |
| Water Used | ACIN | 6,307 | 11,833 | 7,886 |
| Labor | | | | |
| Operator Labor | HR. | 1,003 | 1,206 | 1,084 |
| Hired Labor | HR. | 189 | 492 | 238 |
| Annual Capital Used | | | | |
| Operating | DOL. | 6,778 | 8,615 | 7,303 |
| Investment | DOL. | 26,883 | 44,689 | 29,904 |
| Energy Inputs | | | | |
| Nitrogen | CWT | 462 | 866 | 578 |
| Phosphate | CWT | -- | -- | -- |
| Herbicide | LB. | 166 | 313 | 208 |
| Insecticide | LB. | 222 | 417 | 278 |
| Diesel | GALS. | 3,756 | 4,399 | 3,940 |
| Oil | QTS. | 880 | 1,387 | 1,025 |
| Natural Gas | 1000 CUFT. | 4,451.660 | 8,352.083 | 5,566.663 |
| Machinery | DOL. | 7,297 | 12,694 | 8,840 |

[A/] CSMI, Conventional tillage sorghum moderate irrigation; RSRSCL, Reduced tillage silage and rye surface irrigation, DLGSC, Dryland tillage grain sorghum clay soil.

[B/] SGGOOM, Small grain graze out October-May; GSNJ, Grain sorghum graze November-January.

[C/] For irrigated acreage only, CT refers to conventional tillage and RT means reduced tillage.

fertilizer, pesticides, petroleum products and machinery depreciation and repairs are greater for solution IB than IA (Table XXIV). Again, net returns are negative (-$43,209), while net kilocalories of output increase to 2,731,557,340.

As in previously discussed solutions, the levels of crop production inputs and value of the objective function for IC falls between IA and IB. The solution for IC includes 166.6 acres of reduced tillage silage and rye grazing double crop (RSRSCL), 111.1 acres of conventional tillage sorghum under moderate irrigation (CSMI) and 282.3 acres of dryland grain sorghum. The input requirements are presented in Table XXIV. This organization generates 2,159,787,120 kilocalories of output and a minus $31,977 in net returns.

Sandy Loam Soil

Solution IA has only one irrigated crop, 148.1 acres of reduced tillage silage and rye grazing double crop which requires a total of 5,033 acre inches of irrigated water (Table XXV). The remaining 411.9 acres are planted in dryland sorghum.

The organization entails 921 hours of operator labor and 38 hours of hired labor. There are $9,279 of operating capital along with $40,627 of investment capital required.

Input requirements are 62,050 pounds of nitrogen, 7,400 pounds of phosphate, 222 pounds of herbicide 560 pounds of insecticide, 2,971 gallons of diesel in addition to 791 quarts of oil. There are 4,164,062 cubic feet of gas required for irrigation along with $4,431 in machinery depreciation and repairs. Net returns equal a minus $39,078 while net kilocalories of output are 2,064,069,510 for solution IA.

# TABLE XXV

## 560 ACRE SANDY LOAM FARM OPTIMAL SOLUTIONS OBJECTIVE FUNCTION FOUR

| Identification | Units | | 560 Acres | |
|---|---|---|---|---|
| Number of Wells | | Two | Two | One |
| Total GPM | | 800 | 1500 | 1000 |
| Solution Number: | | IA | IB | IC |
| Net Returns | DOL. | -39,079 | -62,136 | -44,111 |
| Net Kilocalories | MILLION | 2,064.06951 | 2,490.30119 | 2,185.91518 |
| Irrigated Crops[A/] | | | | |
| RSRCSL | AC | 148.1 | 277.8 | 185.1 |
| Dryland Crops[A/] | | | | |
| DLGSS | ACC | 411.9 | 282.2 | 375.9 |
| Crop Products[B/] | | | | |
| SGGOOM | AUM | 607 | 1,139 | 759 |
| GSNJ | AUM | 309 | 212 | 281 |
| Corn Silage | TON | 2,961 | 5,556 | 3,703 |
| Grain Sorghum | CWT | 8,651 | 5,927 | 7,872 |
| Cropping System[C/] | | | | |
| CT | AC | -- | -- | -- |
| RT | AC | 148.1 | 277.8 | 185.1 |
| Total Irrigation | | | | |
| Water Used | ACIN | 5,033 | 9,444 | 6,294 |
| Labor | | | | |
| Operator Labor | HR. | 921 | 1,111 | 987 |
| Hired Labor | HR. | 38 | 101 | 43 |
| Annual Capital Used | | | | |
| Operating | DOL. | 9,279 | 11,707 | 9,973 |
| Investment | DOL. | 40,627 | 72,647 | 43,086 |
| Energy Inputs | | | | |
| Nitrogen | CWT | 621 | 919 | 706 |
| Phosphate | CWT | 74 | 139 | 93 |
| Herbicide | LB. | 222 | 416 | 278 |
| Insecticide | LB. | 560 | 560 | 560 |
| Diesel | GALS. | 2,971 | 3,023 | 2,986 |
| Oil | QTS. | 791 | 1,230 | 917 |
| Natural Gas | 1000 CUFT. | 4,164.062 | 7,812.500 | 5,207.031 |
| Machinery | DOL. | 4,431 | 7,298 | 5,251 |

[A/]RSRCSL, Reduced tillage silage and rye circular sprinkler irrigation; DLGSS, Dryland tillage grain sorghum sandy soil.

[B/]SGGOOM, Small grain graze out October-May; GSNJ, Grain sorghum stubble graze November-January.

[C/]For irrigated acreage only, CT refers to conventional tillage and RT means reduced tillage.

Solution IB includes more irrigated but less dryland production. Reduced tillage silage and rye graze double crop increases to 277.8 acres which requires 9,444 acre inches of irrigation water. The remaining 282.2 acres are in dryland grain sorghum. The requirement for all inputs except insecticide are greater than for IA. The net returns are a minus $62,136, while the net kilocalories of output are 2,490,301,190.

The pattern that is seen in the objective function four organizations follows that of the clay loam results with the results for water situation C between A and B. The reason for the change in pattern set in sandy loam objective function one is that the fixed and variable cost of irrigation is not a limiting factor here. Net returns are a negative $44,110 while net kilocalories of output total 2,185,915,181. These objective function values are generated by 185.1 acres of reduced tillage silage and rye grazing double crop (RSRCSL), and 375.9 acres of dryland sorghum. A required 6,294 acre inches of water are needed for the 185.1 acres of irrigated reduced tilled production. The solution entails 987 hours of operator labor and 43 hours of hired labor. A total of $53,059 of capital is needed of which $9,973 is operating and $43,086 is investment. The quantities of fertilizer, pesticides, petroleum products and machinery depreciation are shown in Table XXV.

## 1440 Cropland Acres

### Clay Loam Soil

The same combination of crops is included in the 1440 acre farm solution set for IIA. It includes 133.3 acres of conventional sorghum moderate irrigation and 200 acres of reduced tillage silage and rye grazing double crop (Table XXVI). A total of 9,466 acre inches of irrigation water are utilized on the 333.3 acres of irrigated land. The remaining 1,106.7 acres are planted in dryland grain sorghum. The net returns decrease to a minus $56,109 while net kilocalories of output are 3,986,972,810.

Solution IIB requires a considerable increase in irrigated acreage (625 acres) which produces conventional tillage grain sorghum moderately irrigated (250 acres) and 375 acres of reduced tillage silage and rye grazing double crops.

The three crops use 17,750 acre inches of irrigation water requiring 12,528,125 cubic feet of natural gas. The remaining 815 acres of cropland is planted in dryland grain sorghum.

All remaining categories (labor, capital and fossil fuel inputs) increase in solution IIB (Table XXVI). The net returns are a minus $80,742 while net kilocalories of output are 5,187,090,200.

Again, solution IIC falls between IIA and IIB with a minus $73,390 in net returns and 4,901,633,710 kilocalories of output. The solution includes conventional tillage sorghum moderate irrigation (222.2 acres) and reduced tillage silage and rye grazing double crop (333.4 acres). The total irrigated acres (555.6 acres) require 15,779 acre inches of irrigation water which uses 11,137,503 cubic feet of natural gas. The remaining items (labor, capital, and fossil fuel inputs) fall between IIA and IIB (Table XXVI).

## Sandy Loam Soil

Solution IIA incorporates a small percentage of irrigated land,

# TABLE XXVI

## 1440 ACRE CLAY LOAM FARM OPTIMAL SOLUTIONS OBJECTIVE FUNCTION FOUR

| Identification | Units | | 1440 Acres | |
|---|---|---|---|---|
| Number of Wells | | Three | Three | Two |
| Total GPM | | 1200 | 2250 | 2000 |
| Solution: | | IIA | IIB | IIC |
| Net Returns | DOL. | -56,109 | -80,742 | -73,390 |
| Net Kilocalories | MILLION | 3,986.97281 | 5,187.09020 | 4,901.63371 |
| Irrigated Crops[A/] | | | | |
| CSMI | AC | 133.3 | 250.0 | 222.2 |
| RSRSCL | AC | 200.0 | 375.0 | 333.4 |
| Dryland Crops[A/] | | | | |
| DSGSC | AC | 1,106.7 | 815.0 | 884.4 |
| Crop Products[B/] | | | | |
| SGGOOM | AUM | 820 | 1,538 | 1,367 |
| GSNJ | AUM | 963 | 861 | 886 |
| Corn Silage | TON | 4,000 | 7,500 | 6,668 |
| Grain Sorghum | CWT | 17,773 | 19,465 | 19,063 |
| Cropping System[C/] | | | | |
| CT | AC | 133.3 | 250.0 | 222.3 |
| RT | AC | 200.0 | 375.0 | 333.4 |
| Total Irrigation | | | | |
| Water Used | ACIN | 9,466 | 17,750 | 15,779 |
| Labor | | | | |
| Operator Labor | HR. | 1,097 | 1,269 | 1,244 |
| Hired Labor | HR. | 1,430 | 1,932 | 1,798 |
| Annual Capital Used | | | | |
| Operating | DOL. | 15,185 | 17,938 | 17,284 |
| Investment | DOL. | 51,810 | 78,518 | 65,936 |
| Energy Inputs | | | | |
| Nitrogen | CWT | 693 | 1,300 | 1,156 |
| Phosphate | CWT | -- | -- | -- |
| Herbicide | LB. | 250 | 469 | 417 |
| Insecticide | LB. | 333 | 625 | 556 |
| Diesel | GALS. | 8,876 | 9,839 | 9,610 |
| Oil | QTS. | 1,645 | 2,404 | 2,223 |
| Natural Gas | 1000 CUFT. | 6,681.666 | 12,528.125 | 11,137.503 |
| Machinery | DOL. | 12,169 | 20,259 | 18,335 |

[A/] CSMI, Conventional tillage sorghum moderate irrigation; RSRSCL, Reduced tillage silage and rye surface irrigation, DLGSC, Dryland tillage grain sorghum clay soil.

[B/] SGGOOM, Small grain graze out October-May; GSNJ, Grain sorghum stubble graze November-January.

[C/] For irrigated acreage only, CT refers to conventional tillage and RT means reduced tillage.

222.2 acres of reduced tillage silage and rye grazing double crop with a large amount of dryland grain sorghum, 1,217.8 acres (Table XXVII).

The reduced tillage scheme requires 7,555 acre inches of irrigation water which requires 6,250,000 cubic feet of natural gas. Labor totals 2,160 hours (1,101 to operator and 1,059 to hired labor) while capital requires $20,893 for operating and $95,527 for investment.

Input requirements include 123,110 pounds of nitrogen, 11,110 pounds of phosphate 333 pounds of herbicide, 1,440 acres of insecticide, 7,577 gallons of diesel, 1,499 quarts of oil and $7,892 for machinery depreciation and repairs. The net returns are a minus $86,696 while the net kilocalories of output are estimated at 4,786,845.810.

Solution set IIB increases irrigated acreage to 416.7 acres which is reduced tillage silage and rye graze double crop (RSRCSL) but decreases dryland grain sorghum (1023.3 acres). A large increase in acre inches of irrigation water is indicated (14,166 acre inches) along with an increase in all other categories (labor, capital and fossil fuel inputs). The net returns are a minus $115,019 while the net kilocalories of output are 5,425,736,980.

The same irrigated crops and other categories are used as in IIA and IIB (Table XXXVII). The net kilocalories of output generated are 5,273,772,150 while net returns are a minus $101,437.

## 2680 Cropland Acres

### Clay Loam Soil

These results show a large increase in irrigated acreage which is expected with the additional irrigation water available. Solution IIA

TABLE XXVII

1440 ACRE SANDY LOAM FARM OPTIMAL SOLUTIONS
OBJECTIVE FUNCTION FOUR

| Identification | Units | | 1440 Acres | |
|---|---|---|---|---|
| Number of Wells | | Three | Three | Two |
| Total GPM | | 1200 | 2250 | 2000 |
| Solution Number | | IIA | IIB | IIC |
| Net Returns | DOL. | -86,696 | -115,019 | -101,437 |
| Net Kilocalories | MILLION | 4,786.84581 | 5,425.73698 | 5,273.77215 |
| Irrigated Crops[A/] | | | | |
| RSRCSL | AC | 222.2 | 416.7 | 370.4 |
| Dryland Crops[A/] | | | | |
| DLGSS | AC | 1,217.8 | 1,023.3 | 1,069.6 |
| Crop Products[B/] | | | | |
| SGGOOM | AUM | 911 | 1,708 | 1,519 |
| GSNJ | AUM | 913 | 768 | 802 |
| Corn Silage | TON | 4,444 | 8,333 | 7,408 |
| Grain Sorghum | CWT | 25,573 | 21,490 | 22,461 |
| Cropping System[C/] | | | | |
| CT | AC | -- | -- | -- |
| RT | AC | 222.2 | 416.7 | 370.4 |
| Total Irrigation | | | | |
| Water Used | ACIN | 7,555 | 14,166 | 12,594 |
| Labor | | | | |
| Operator Labor | HR. | 1,101 | 1,275 | 1,248 |
| Hired Labor | HR. | 1,059 | 1,267 | 1,203 |
| Annual Capital Used | | | | |
| Operating | DOL. | 20,893 | 24,533 | 23,667 |
| Investment | DOL. | 95,527 | 120,683 | 92,419 |
| Energy Inputs | | | | |
| Nitrogen | CWT | 1,231 | 1,678 | 1,572 |
| Phosphate | CWT | 111 | 208 | 185 |
| Herbicide | LB. | 333 | 625 | 556 |
| Insecticide | LB. | 1,440 | 1,440 | 1,440 |
| Diesel | GALS. | 7,577 | 7,655 | 7,636 |
| Oil | QTS. | 1,499 | 2,157 | 2,001 |
| Natural Gas | 1000 CUFT. | 6,250.000 | 11,718.750 | 10,417.968 |
| Machinery | DOL. | 7,892 | 12,189 | 11,167 |

[A/]RSRCSL, Reduced tillage silage and rye circular sprinkler irrigation; DLGSS, Dryland tillage grain sorghum sandy soil.

[B/]SGGOOM, Small grain graze out October-May; GSNJ, Grain sorghum stubble graze November- January.

[C/]For irrigated acreage only, CT refers to conventional tillage and RT means reduced tillage.

has a net return of a minus $110,578 while the kilocalories of output are 7,610,694,203 (Table XXVIII).

The crops include larger acreages of the same schemes included in previously discussed solutions. The organization includes 266.7 acres of conventional sorghum moderate irrigation and 400 acres reduced tillage silage and rye grazing double crop while the remaining acreage is in dryland grain sorghum (2,013.3 acres). A total of 13,363,333 cubic feet of natural gas is used to pump 18,933 acre inches of irrigation water.

Labor requirements specify 1,151 hours of operator labor and 3,661 hours of hired labor, operating capital requires $28,698 while investment capital requires $99,793. Input requirements are nitrogen 138,670 pounds, herbicides 500 pounds, insecticides 667 pounds, diesel 16,672 gallons, oil 3,182 quarts and $23,932 for machinery depreciation and repairs.

Solution IIIB also shows a large increase in all categories such as conventional tillage sorghum moderate irrigation (500 acres) and reduced tillage silage and rye graze double crop (750 acres). The only crop with a smaller acreage than the solution for IIA is dryland grain sorghum (1,430 acres), because of the increase in the two irrigated crops.

As expected input requirements (fossil fuel products) along with labor and capital for solution IIIB are larger than the corresponding amounts for IIIA (Table XXVIII). The net returns are a minus $160,708 while the net kilocalories of output are 10,010,929,010.

The IIIC solution again falls between IIIA and IIIB with 1,111 acres of the same irrigated crops as IIIA and IIIB. Solution IIIC used

# TABLE XXVIII

## 2680 ACRE CLAY LOAM FARM OPTIMAL SOLUTIONS OBJECTIVE FUNCTION FOUR

| Identification | Units | | 2680 Acres | |
|---|---|---|---|---|
| Number of Wells | | Six | Six | Four |
| Total GPM | | 2400 | 4500 | 4000 |
| Solution Number | | IIIA | IIIB | IIIC |
| Net Returns | DOL. | -110,578 | -160,708 | -147,841 |
| Net Kilocalories | MILLION | 7,610.69423 | 10,010.92901 | 9,439.15880 |
| Irrigated Crops[A/] | | | | |
| CSMI | AC | 266.7 | 500.0 | 444.4 |
| RSRSCL | AC | 400.0 | 750.0 | 666.6 |
| Dryland Crops[A/] | | | | |
| DLGSC | AC | 2,013.3 | 1,430.0 | 1,568.9 |
| Crop Products[B/] | | | | |
| SGOOM | AUM | 1,640 | 3,075 | 2,733 |
| GSNJ | AUM | 1,777 | 1,572 | 1,621 |
| Corn Silage | TON | 8,000 | 15,000 | 13,333 |
| Grain Sorghum | CWT | 33,347 | 36,730 | 35,924 |
| Cropping System[C/] | | | | |
| CT | AC | 266.7 | 500.0 | 444.4 |
| RT | AC | 400.0 | 750.0 | 666.6 |
| Total Irrigation | | | | |
| Water Used | ACIN | 18,933 | 35,500 | 31,553 |
| Labor | | | | |
| Operator Labor | HR. | 1,151 | 1,210 | 1,206 |
| Hired Labor | HR. | 3,661 | 4,953 | 4,634 |
| Annual Capital Used | | | | |
| Operating | DOL. | 28,698 | 34,205 | 32,893 |
| Investment | DOL. | 99,793 | 153,307 | 128,042 |
| Energy Inputs | | | | |
| Nitrogen | CWT | 1,387 | 2,600 | 2,311 |
| Phosphate | CWT | -- | -- | -- |
| Herbicide | LB. | 500 | 938 | 884 |
| Insecticide | LB. | 667 | 1,250 | 1,111 |
| Diesel | GALS | 16,672 | 18,597 | 18,138 |
| Oil | QTS. | 3,182 | 4,700 | 4,338 |
| Natural Gas | 1000 CUFT. | 13,363.333 | 25,056.250 | 22,270.830 |
| Machinery | DOL. | 23,932 | 40,113 | 36,258 |

[A/] CSMI, Conventional tillage sorghum moderate irrigation; RSRSCL, Reduced tillage silage and rye surface irrigation; DLGSC, Dryland tillage grain sorghum clay soil.

[B/] SGGOOM, Small grain graze out October-May; GSNJ, Grain sorghum stubble graze November-January.

[C/] For irrigated acreage only, CT refers to conventional tillage and RT means reduced tillage.

31,553 acre inches of irrigation water which requires 22,270,830 cubic feet of natural gas. All other categories fall between IIIA and IIIB as do the above for solution IIIC. Net returns are a minus $147,841 while net kilocalories of output are 9,439,158,800.

Sandy Loam Soil

The three solutions (IIIA, IIIB, IIIC, Table XXIX) for the 2,680 acre farm all use the same irrigated and dryland crops, reduced tillage silage and rye grazing double crop (RSRCSL) and dryland grain sorghum. As in most cases discussed in this chapter, the solution for resource situation IIIC falls between IIIA and IIIB in all categories. The net returns for IIIA are a minus $169,651, while IIIB is a minus $227,186 and IIIC is a minus $199,847. Net kilocalories of output are 9,010,263,230 for IIIA, 10,288,045,560 for IIIB and 9,983,659,550 for IIIC. All numerical results for the three solutions are presented in Table XXIX.

## Comparison of Solutions for Objective Functions One and Four Clay Loam Soils

560 Cropland Acres

The numerals and letters used to refer to the representative farm organizations are supplemented with the superscripts 1 and 4 in this section to refer to the results for OBJ1 and OBJ4, respectively. For instance, solution $IA^1$ refers to the solution for the 560 acre farm with water situation A when net returns are maximized (OBJ1), while $IA^4$

# TABLE XXIX

## 2680 ACRE SANDY LOAM FARM OPTIMAL SOLUTIONS OBJECTIVE FUNCTION FOUR

| Identification | Units | | 2680 Acres | |
|---|---|---|---|---|
| Number of Wells | | Six | Six | Four |
| Total GPM | | 2400 | 4500 | 4000 |
| Solution Number: | | IIIA | IIIB | IIIC |
| Net Returns | DOL. | -169,651 | -227,186 | -199,847 |
| Net Kilocalories | MILLION | 9,010.26323 | 10,288.04556 | 9,983.65955 |
| Irrigated Crops[A/] | | | | |
| RSRCSL | AC | 444.4 | 833.3 | 740.7 |
| Dryland Crops[A/] | | | | |
| DLGSS | AC | 2,235.6 | 1,846.7 | 1,939.3 |
| Crop Products[B/] | | | | |
| SGOOM | AUM | 1,822 | 3,417 | 3,037 |
| GSNJ | AUM | 1,676 | 1,385 | 1,454 |
| Corn Silage | TON | 8,889 | 16,667 | 14,813 |
| Grain Sorghum | CWT | 46,947 | 38,780 | 40,725 |
| Cropping System[C/] | | | | |
| CT | AC | -- | -- | -- |
| RT | AC | 444.4 | 833.3 | 740.7 |
| Total Irrigation Water Used | ACIN | 15,111 | 28,333 | 25,183 |
| Labor | | | | |
| Operator Labor | HR. | 1,159 | 1,210 | 1,210 |
| Hired Labor | HR. | 2,924 | 3,637 | 3,455 |
| Annual Capital Used | | | | |
| Operating | DOL. | 39,462 | 46,742 | 45,007 |
| Investment | DOL. | 187,150 | 237,462 | 180,934 |
| Energy Inputs | | | | |
| Nitrogen | CWT | 2,362 | 3,257 | 3,044 |
| Phosphate | CWT | 222 | 417 | 370 |
| Herbicide | LB. | 667 | 1,250 | 1,111 |
| Insecticide | LB. | 2,680 | 2,680 | 2,680 |
| Diesel | GALS. | 14,114 | 14,269 | 14,232 |
| Oil | QTS. | 2,896 | 4,210 | 3,897 |
| Natural Gas | 1000 CUFT. | 12,500.000 | 23,437.500 | 20,832.031 |
| Machinery | DOL. | 15,370 | 23,964 | 21,917 |

A/ RSRCSL, Reduced tillage silage and rye circular sprinkler irrigation; DLGSS, Dryland tillage grain sorghum sandy soil.

B/ SGGOOM, Small grain graze out October-May; GSNJ, Grain sorghum stubble graze November-January.

C/ For irrigated acreage only, CT refers to conventional tillage and RT means reduced tillage.

denotes the organization for the same land and water situation when net kilocalories of output are maximized (OBJ4). The information discussed in this section is presented in detail in Table XXX.

Solution $IA^1$ produces a $23,785 net return with an energy output of 1,200,455,940 net kilocalories as compared to a minus $27,030 in returns for $IA^4$ and 1,930,907,590. Thus shifting from $IA^1$ to $IA^4$ reduces net returns $50,814 and increases net kilocalories of output 710,451,650. The cropping schemes are quite different with $IA^1$ using entirely reduced tillage methods and $IA^4$ using a combination of reduced and conventional tillage.

A comparison of the crop products in Table XXX indicates a combination of 12,543 bushels of wheat, 9,535 hundred weights of sorghum, 170 AUM's of small grain graze-out November-March and 135 AUM's of sorghum stubble are produced in $IA^1$. $IA^4$ produces 2,665 tons of corn silage, 7,448 hundred weights of sorghum, 546 AUM's of small grain graze-out October-May and 342 AUM's of sorghum stubble. The crops produced in $IA^1$ and all the objective function one solutions produce grain type crops, while the crops produced in $IA^4$ and all the objective four solutions produce forage type crops. This shift demonstrates the difference in the kilocalories of energy produced by grain and forage crops. This point is also demonstrated by the efficiencies shown in Chapter III (Table XVI).

Labor requirements differ greatly with $IA^1$ using a total of 751 hours and $IA^4$ using 1,192 hours. This occurs because less reduced tillage is used by the $IA^4$ solution. Also a total of 6,307 acre inches of irrigation water is applied on $IA^4$ as compared to 5,773 acre inches in $IA^1$, indicating that the irrigated crops require more water even though

# TABLE XXX

## COMPARISON OF OPTIMAL SOLUTIONS FOR OBJECTIVE FUNCTIONS ONE AND FOUR FOR THE 560 ACRE CLAY LOAM FARMS

| Farm Size | | 560 Acres | | | | | |
|---|---|---|---|---|---|---|---|
| Solution Number | | IA1 | IB1 | IC1 | IA4 | IB4 | IC4 |
| Number of Wells | | Two | Two | One | Two | Two | One |
| Total GPM | | 800 | 1500 | 1000 | 800 | 1500 | 1000 |
| Identification | Units | | | | | | |
| Net Returns | DOL | 23,785 | 30,688 | 26,689 | -27,030 | -43,209 | -31,977 |
| Net Kilocalories | MILLION | 1,220.45594 | 925.59538 | 1,353.33517 | 1,930.90759 | 2,731.55734 | 2,159.78712 |
| Irrigated Crops A/ | | | | | | | |
| CSB | AC | -- | 112.3 | -- | -- | -- | -- |
| RWG2RCRC | AC | 9.2 | 29.0 | 3.6 | -- | -- | -- |
| RWGSDC | AC | 71.8 | 71.7 | 71.7 | -- | -- | -- |
| RWFS3HI | AC | 294.6 | 346.8 | 405.8 | -- | -- | -- |
| CSMI | AC | -- | -- | -- | 88.8 | 166.7 | 111.1 |
| RSRSCL | AC | -- | -- | -- | 133.3 | 250.0 | 166.6 |
| Dryland Crops A/ | | | | | | | |
| DLW | AC | 184.4 | -- | 78.7 | -- | -- | -- |
| DLGSC | AC | -- | -- | -- | 337.9 | 143.3 | 282.3 |
| Crop Products B/ | | | | | | | |
| Wheat | BU | 12,543 | 11,578 | 12,521 | -- | -- | -- |
| Soybeans | BU | -- | 5,056 | -- | -- | -- | -- |
| Grain Sorghum | CWT | 9,535 | 10,616 | 11,835 | 7,448 | 8,577 | 7,771 |
| Corn Silage | TON | -- | -- | -- | 2,665 | 5,000 | 3,333 |
| SGGONM | AUM | 170 | 143 | 165 | -- | -- | -- |
| SGGOOM | AUM | -- | -- | -- | 546 | 1,025 | 683 |
| GSNJ | AUM | 135 | 159 | 186 | 342 | 274 | 323 |
| Cropping System C/ | | | | | | | |
| Con Tillage | AC | -- | 112.3 | -- | 88.8 | 166.7 | 111.1 |
| Red Tillage | AC | 375.6 | 447.7 | 481.2 | 133.3 | 250.0 | 166.6 |
| Labor | | | | | | | |
| Operator Labor | HR | 577 | 903 | 638 | 1,003 | 1,206 | 1,084 |
| Hired Labor | HR | 174 | 231 | 180 | 189 | 492 | 238 |
| Irrigation | | | | | | | |
| Total Water Used | ACIN | 5,773 | 9,433 | 7,014 | 6,307 | 11,833 | 7,886 |
| Inputs | | | | | | | |
| Nitrogen | CWT | 531 | 539 | 552 | 462 | 866 | 578 |
| Phosphate | CWT | -- | -- | -- | -- | -- | -- |
| Herbicide | LB | 412 | 596 | 517 | 166 | 313 | 208 |
| Insecticide | LB | 336 | 419 | 478 | 222 | 417 | 278 |
| Diesel | GALS | 1,398 | 2,306 | 1,486 | 3,756 | 4,399 | 3,940 |
| Oil | QTS | 645 | 1,072 | 761 | 880 | 1,387 | 1,025 |
| Natural Gas | 1000 CUFT | 3,421.632 | 6,276.205 | 4,163.614 | 4,451.660 | 8,352.083 | 5,566.663 |
| Machinery | DOL | 2,883 | 5,703 | 3,311 | 7,297 | 12,694 | 8,840 |

A/ CSB, Conventional tillage soybeans; RWG2RCRC, Reduced tillage wheat grain two year rotation of conventional tillage year one and reduced tillage year two; RWGSDC, Reduced wheat grain sorghum double crop; RWFS3HI, Reduced tillage wheat-fallow-sorghum three year rotation heavy irrigation; CSMI, Conventional tillage grain sorghum moderate irrigation; RSRSCL, Reduced tillage silage-rye double crop; DLW, Dryland tillage wheat; DLGSC, Dryland tillage grain sorghum clay soil.

B/ SGGONM, Small grain graze out November-March; SGGOOM, Small grain graze out October-May; GSNJ, Grain sorghum stubble graze November-January.

C/ For irrigated acreage only, Con refers to conventional and Red means reduced tillage.

less land is irrigated.

Solution $IA^1$ requires more units of each input except diesel, oil, machinery and natural gas. This is understandable since more conventional and dryland acreage is planted in $IA^4$ and more inches of irrigation water are pumped.

The comparison for solution IB is quite different. The net returns react in much the fashion expected in that $IB^1$ increases to $30,668 and $IB^4$ decreases to a minus $43,209. The interesting result is in the kilocalories category with $IB^1$ falling to 925,595,380 while its comparison increases to 2,731,557,340 kilocalories.

As expected, all irrigated crops increase in acreage slightly while dryland crops decreased in both solutions. However, organization set $IB^1$ includes no dryland crops while $IB^4$ includes 143.3 acres of dryland sorghum. The large difference is net kilocalories of output is due to the relative net energy output of the soybeans included in $IB^1$ but excluded from $IB^4$.

The crop products for $IB^1$ are 11,578 bushels of wheat 10,616 hundred weights of sorghum 5,056 bushels of soybeans, 143 AUM's of graze-out November-March and 159 AUM's of sorghum stubble. Compared to $IB^4$ which produces 5,000 tons of corn silage, 8,577 hundred weights of sorghum 1,025 AUM's of graze-out October-May and 274 AUM's of sorghum stubble.

Solution $IB^4$ requires 564 hours more labor. Of particular interest is that $IB^4$ requires an additional 2,400 acre inches of irrigation water, in spite of the 143.3 acres of dryland production.

The large quantity of additional nitrogen (32,750 pounds) required by $IB^4$ is due to the reduction in soybean acreage. The fossil fuel inputs of diesel, oil, machinery and natural gas are required in larger amounts by $IB^4$ for the additional acreage of conventional tillage and the additional irrigation requirements.

The final comparison in the 560 acre clay loam soils again falls between the previous two. In this comparison it is found that $IC^1$ returns $26,689 while $IC^4$ returns fall to a minus $31,977. The net kilocalories are 1,353,335,170 for $IC^1$ and 2,159,787,120 kilocalories for $IC^4$ (Table XXX). The combination of crops produced is similar to the IA solutions for the same objective function except that more acreage is irrigated because more water is available.

The crop products for $IC^1$ are 12,521 bushels of wheat, 11,835 hundred weights of sorghum, 165 AUM's of graze-out November-March and 186 AUM's of sorghum stubble. Solution $IC^4$ produces 3,333 tons of corn silage, 7,771 hundred weights of sorghum, 683 AUM's of graze-out and 323 AUM's of sorghum stubble.

## 1440 Cropland Acres

The same cropping schemes are used in the 1440 acre farms as were used in the 560 acre farms (Table XXXI). Solution $IIA^1$ produces 30,411 bushels, 14,489 hundred weights of sorghum, 465 AUM's of graze-out November-March and 169 AUM's of sorghum stubble. This compares to 17,773 hundred weights of sorghum, 820 AUM's of graze-out October-May and 963 AUM's of sorghum stubble for solution $IIA^4$.

The proportion of dryland to irrigated land finds $IIA^4$ with a higher percentage of dryland than $IIA^1$ but again $IIA^4$ uses 9,466 acre inches compared to 9,075 acre inches of irrigation water for $IIA^1$. Labor is also used more extensively by $IIA^4$ in addition to diesel, oil,

# TABLE XXXI

## COMPARISON OF OPTIMAL SOLUTIONS FOR OBJECTIVE FUNCTIONS ONE AND FOUR FOR THE 1440 ACRE CLAY LOAM FARMS

| Farm Size | | 1440 Acres | | | | | |
|---|---|---|---|---|---|---|---|
| Solution Number | | IIA1 | IIB1 | IIC1 | IIA4 | IIB4 | IIC4 |
| Number of Wells | | Three | Three | Two | Three | Three | Two |
| Total GPM | | 1200 | 2250 | 2000 | 1200 | 2250 | 2000 |
| Identification | Units | | | | | | |
| Net Returns | DOL | 42,605 | 59,019 | 55,630 | -56,109 | -80,742 | -73,390 |
| Net Kilocalories | MILLION | 2,538.17725 | 3,234.92227 | 3,069.19649 | 3,986.97281 | 5,187.09020 | 4,901.63371 |
| Irrigated Crops A/ | | | | | | | |
| RWG2RCRC | AC | 29.5 | .3 | 7.1 | -- | -- | -- |
| RWGSDC | AC | 143.6 | 143.6 | 143.6 | -- | -- | -- |
| RWFS3HI | AC | 376.5 | 950.9 | 812.1 | -- | -- | -- |
| CSMI | AC | -- | -- | -- | 133.3 | 250.0 | 222.3 |
| RSRCSL | AC | -- | -- | -- | 200.0 | 375.0 | 333.4 |
| Dryland Crops A/ | | | | | | | |
| DLW | AC | 899.4 | 345.2 | 477.0 | -- | -- | -- |
| DLGSC | AC | -- | -- | -- | 1,106.7 | 815.0 | 884.4 |
| Crop Products B/ | | | | | | | |
| Wheat | BU | 30,411 | 30,295 | 30,322 | -- | -- | -- |
| Grain Sorghum | CWT | 14,489 | 26,546 | 23,679 | 17,773 | 19,465 | 19,063 |
| Corn Silage | TON | 4,000 | 7,500 | 6,668 | -- | -- | -- |
| SGGONM | AUM | 465 | 434 | 442 | -- | -- | -- |
| SGGOOM | AUM | -- | -- | -- | 820 | 1,538 | 1,367 |
| GSNJ | AUM | 169 | 437 | 373 | 963 | 861 | 886 |
| Cropping System C/ | | | | | | | |
| Con Tillage | AC | -- | -- | -- | 133.3 | 250.0 | 222.3 |
| Red Tillage | AC | 540.6 | 1,094.8 | 962.9 | 200.0 | 375.0 | 333.4 |
| Labor | | | | | | | |
| Operator Labor | HR | 976 | 1,186 | 1,138 | 1,097 | 1,269 | 1,244 |
| Hired Labor | HR | 504 | 654 | 616 | 1,430 | 1,932 | 1,798 |
| Irrigation | | | | | | | |
| Total Water Used | ACIN | 9,075 | 15,579 | 14,032 | 9,466 | 17,750 | 15,779 |
| Inputs | | | | | | | |
| Nitrogen | CWT | 1,211 | 1,322 | 1,296 | 693 | 1,300 | 1,156 |
| Phosphate | CWT | -- | -- | -- | -- | -- | -- |
| Herbicide | LB | 612 | 1,167 | 1,035 | 250 | 469 | 417 |
| Insecticide | LB | 511 | 1,094 | 956 | .333 | 625 | 556 |
| Diesel | GALS | 3,035 | 3,499 | 3,389 | 8,876 | 9,839 | 9,610 |
| Oil | QTS | 1,102 | 1,707 | 1,563 | 1,645 | 2,404 | 2,223 |
| Natural Gas | 1000 CUFT | 5,364.858 | 9,255.400 | 8,330.007 | 6,681.666 | 12,528.125 | 11,137.503 |
| Machinery | DOL | 5,244 | 7,491 | 6,957 | 12,169 | 20,259 | 18,335 |

A/ RWG2RCRC, Reduced tillage wheat grain two year rotation of conventional tillage year one and reduced tillage year two; RWGSDC, Reduced wheat grain sorghum double crop; RWFS3HI, Reduced tillage wheat-fallow-sorghum three year rotation heavy irrigation; CSMI, Conventional tillage grain sorghum moderate irrigation; RSRSCL, Reduced tillage silage-rye surface irrigation; DLW, Dryland tillage wheat; DLGSC, Dryland tillage grain sorghum clay soil.

B/ SGGONM, Small grain graze out November-March; SGGOOM, Small grain graze out October-May, GSNJ, grain sorghum stubble graze November-January.

C/ For irrigated acreage only, Con refers to conventional and Red means reduced tillage.

natural gas, and machinery.

The net returns for IIA$^{1}$ are \$42,605 and a minus \$56,109 for IIA$^{4}$. Net kilocalories of output are 2,538,177,250 for IIA$^{1}$ and 3,986,972,810 for IIA$^{4}$.

In comparing solution IIB$^{1}$ and IIB$^{4}$ (Table XXXI) the net returns for IIB$^{1}$ are \$59,019 while IIB$^{4}$ net returns are a minus \$80,742. Net kilocalories of output are 3,234,922,270 for IIB$^{1}$ and 5,187,090,202 for IIB$^{4}$. The products to generate these returns are 30,295 bushels of wheat, 26,546 hundred weights of sorghum 434 AUM's of graze-out November-March and 437 AUM's of sorghum stubble for IIB$^{1}$. Solution IIB$^{4}$ produces 7,500 tons of corn silage, 19,465 hundred weights of sorghum, 1,538 AUM's of graze-out November-March, and 861 AUM's of sorghum stubble.

The categories of dryland acreage, labor and acre inches of irrigation water are used in larger amounts by IIB$^{4}$. In addition to these categories IIB$^{4}$ uses more diesel, oil, natural gas and machinery.

In comparing IIC$^{1}$ and IIC$^{4}$ it is evident from Table XXXI that the same pattern exists here as in the IIA and IIB cases. Solution IIC$^{4}$ uses more labor, irrigation, and dryland acreage, which in turn requires more diesel, oil, natural gas and machinery.

It is of particular interest that in all the comparisons made in the 1440 acre farm solution IIA$^{1}$, IIB$^{1}$ and IIC$^{1}$ use all reduced tillage cropping methods on irrigated land, while their comparisons use a combination of reduced and conventional tillage.

Solution IIC$^{1}$ produces 30,322 bushels of wheat 23,679 hundred weights of sorghum, 442 AUM's of graze-out for November-March and 373 AUM's sorghum stubble. In comparison IIC$^{4}$ produces 6,668 tons of silage, 19,063 hundred weights of sorghum, 1,367 AUM's of graze-out for October-

May and 886 AUM's of sorghum stubble.

The net returns for IIC$^1$ are $55,630 compared to a minus $73,390 for solution IIC$^4$. Net kilocalories of output for solution IIC$^1$ are 3,069,196,490 and are 4,901,633,710 for solution IIC$^4$.

## 2680 Cropland Acres

The objective one solution for this size farm also uses the reduced tillage two-year wheat rotation, reduced tillage wheat and sorghum double crop, and reduced tillage wheat-fallow-sorghum three-year rotation heavy irrigation. The objective four solutions again use a combination for the irrigated land of conventional tillage grain sorghum production and reduced tillage silage and rye grazing double crop.

Production of these crops for solution IIIA$^1$ is 57,523 bushels of wheat, 28,978 hundred weights of sorghum 861 AUM's of graze-out November-March and 338 AUM's of sorghum stubble November-January. Solution IIIA$^4$ produces 8,000 tons of silage, 33,347 hundred weights of sorghum 1,640 AUM's of graze-out October-May and 1,777 AUM's of sorghum stubble (Table XXXII).

As has been the pattern in the other solutions, IIIA$^4$ requires more dryland acreage, labor, and irrigation water, while IIIA$^1$ requires more nitrogen, herbicides, and insecticides. An interesting point here is that in solution IIIA$^4$ the amount of diesel required (16,672 gallons) is more than twice that of IIIA$^1$ (5,810 gallons). This is accounted for by the large amount of dryland acreage included in solution IIIA$^4$. The remaining fossil fuel inputs (oil, natural gas and machinery) are also required in greater amounts by solution IIIA$^4$.

The net returns for IIIA$^1$ are $81,280 while solution IIIA$^4$ returns

## TABLE XXXII

## COMPARISON OF OPTIMAL SOLUTIONS FOR OBJECTIVE FUNCTIONS ONE AND FOUR FOR THE 2680 ACRE CLAY LOAM FARMS

| Farm Size | | 2680 Acres | | | | | |
|---|---|---|---|---|---|---|---|
| Solution Number | | IIIA[1] | IIIB[1] | IIIC[1] | IIIA[4] | IIIB[4] | IIIC[4] |
| Number of Wells | | Six | Six | Four | Six | Six | Four |
| Total GPM | | 2400 | 4500 | 4000 | 2400 | 4500 | 4000 |
| Identification | Units | | | | | | |
| Net Returns | DOL | 81,280 | 133,204 | 106,665 | -110,578 | -160,708 | -147,841 |
| Net Kilocalories | MILLION | 4,850.08669 | 6,243.57675 | 5,911.62751 | 7,610.69423 | 10,010.92901 | 9,439.15880 |
| Irrigated Crops[A/] | | | | | | | |
| RWG2RCRC | AC | 58.9 | .6 | 14.5 | -- | -- | -- |
| RWGSDC | AC | 287.2 | 287.2 | 287.2 | -- | -- | -- |
| RWFS3HI | AC | 735.0 | 1,901.7 | 1,623.8 | -- | -- | -- |
| CSMI | AC | -- | -- | -- | 266.7 | 500.0 | 444.4 |
| RSRSCL | AC | -- | -- | -- | 400.0 | 750.0 | 666.6 |
| Dryland Crops[A/] | | | | | | | |
| DLW | AC | 1,598.8 | 490.5 | 754.5 | -- | -- | -- |
| DLGSC | AC | -- | -- | -- | 2,013.3 | 1,430.0 | 1,568.9 |
| Crop Products[B/] | | | | | | | |
| Wheat | BU | 57,523 | 57,289 | 57,344 | -- | -- | -- |
| Grain Sorghum | CWT | 28,978 | 53,093 | 47,348 | 33,347 | 36,730 | 35,924 |
| Corn Silage | TON | -- | -- | -- | 8,000 | 15,000 | 13,333 |
| SGGONM | AUM | 861 | 799 | 814 | -- | -- | -- |
| SGGOOM | AUM | -- | -- | -- | 1,640 | 3,075 | 2,733 |
| GSNJ | AUM | 338 | 874 | 746 | 1,777 | 1,572 | 1,621 |
| Cropping System[C/] | | | | | | | |
| Con Tillage | AC | -- | -- | -- | 266.7 | 500.0 | 444.4 |
| Red Tillage | AC | 1,081.2 | 2,189.5 | 2,471.7 | 400.0 | 750.0 | 666.6 |
| Labor | | | | | | | |
| Operator Labor | HR | 1,254 | 1,373 | 1,362 | 1,151 | 1,210 | 1,206 |
| Hired Labor | HR | 1,641 | 2,222 | 2,080 | 3,661 | 4,953 | 4,634 |
| Irrigation | | | | | | | |
| Total Water Used | ACIN | 18,151 | 31,159 | 28,060 | 18,933 | 35,500 | 31,553 |
| Inputs | | | | | | | |
| Nitrogen | CWT | 2,303 | 2,525 | 2,472 | 1,387 | 2,600 | 2,311 |
| Phosphate | CWT | -- | -- | -- | -- | -- | -- |
| Herbicide | LB | 1,224 | 2,333 | 2,069 | 500 | 938 | 884 |
| Insecticide | LB | 1,022 | 2,189 | 1,911 | 667 | 1,250 | 1,111 |
| Diesel | GALS | 5,810 | 6,738 | 6,517 | 16,672 | 18,597 | 18,138 |
| Oil | QTS | 2,178 | 3,389 | 3,100 | 3,182 | 4,700 | 4,338 |
| Natural Gas | 1000 CUFT | 10,729.717 | 18,510.801 | 16,657.236 | 13,363.333 | 25,056.250 | 22,270.830 |
| Machinery | DOL | 10,280 | 14,774 | 13,704 | 23,932 | 40,113 | 36,258 |

A/ RWG2RCRC, Reduced tillage wheat grain two year rotation of conventional tillage year one and reduced tillage year two; RWGSDC, Reduced wheat grain sorghum double crop; RWFS3HI, Reduced tillage wheat-fallow-sorghum three year rotation heavy irrigation; CSMI, Conventional tillage grain sorghum moderate irrigation; RSRSCL, Reduced tillage silage-rye surface irrigation; DLW, Dryland tillage wheat; DLGSC, Dryland tillage grain sorghum clay soil.

B/ SGGONM, Small grain graze out November-March; SGGOOM, Small grain graze out October-May; GSNJ, grain sorghum stubble graze November-January.

C/ For irrigated acreage only, Con refers to conventional and Red means reduced tillage.

a minus $110,578. Net kilocalories of output are 4,850,086,690 for IIIA$^{1}$ and 7,610,694,230 for solution IIIA$^{4}$.

In comparing the solutions for the two objective functions for resource situation IIIB, the solution for IIIB$^{4}$ requires more fossil fuel inputs along with labor, dryland acreage and irrigation, while solution IIIB$^{1}$ includes more irrigated land and reduced tillage techniques.

Production by IIIB$^{1}$ includes 57,289 bushels of wheat, 53,093 hundred weights of sorghum, 799 AUM's of graze-out November-March and 874 AUM's of sorghum stubble. Its comparison, IIIB$^{4}$, produces 15,000 tons of silage, 36,730 hundred weights of sorghum 3,075 AUM's of graze-out October-May, and 1,572 AUM's of sorghum stubble.

The net returns are $133,204 for IIIB$^{1}$ and a minus $160,708 for solution IIIB$^{4}$. Solution IIIB$^{1}$ returns 6,243,576,750 net kilocalories of output, while solution IIIB$^{4}$ returns 10,010,929,010 net kilocalories of output.

The final comparison for the clay loam soils is the solutions for IIIC$^{1}$ and IIIC$^{4}$. It follows the same pattern as do the other two comparisons for the 2680 acre clay loam farm (Table XXXII).

Solution IIIC$^{1}$ produces 57,344 bushels of wheat, 47,348 hundred weights of sorghum, 814 AUM's of graze-out for November-March and 746 AUM's of sorghum stubble. Solution IIIC$^{4}$ produces 13,333 tons of silage, 35,924 hundred weights of sorghum, 2,733 AUM's of graze-out October-May and 1,621 AUM's of sorghum stubble. The net returns for IIIC$^{1}$ are $106,665, while solution IIIC$^{4}$ returns a minus $147,846. The net kilocalories of output for IIIC$^{1}$ are 5,911,627,510, while 9,439,158,800 kilocalories of output are returned by solution IIIC$^{4}$.

## Sandy Loam Soils

560 Cropland Acres

The solutions for $IA^1$ and $IA^4$ are similar with the exception of net returns and net kilocalories. Net returns are $10,367 for solution $IA^1$ and a minus $39,079 for $IA^4$. Net energy totals 1,191,302,690 kilocalories of output for $IA^1$ and 2,064,069,510 kilocalories of output for $IA^4$ (Table XXXIII).

The cropping programs are also similar. Land irrigated totals 145.9 acres and 148.1 acres for $IA^1$ and $IA^4$, respectively. However, the crops do differ with solution $IA^1$ planting reduced tillage corn grain (42.2 acres) and reduced tillage wheat and soybean double crop (103.7 acres) while solution $IA^4$ includes only one irrigated crop, reduced tillage silage and rye grazing double crop (148.1 acres). The acreage of dryland grain sorghum, the only dryland crop included, is approximately the same in the two solutions.

The products produced by solution $IA^1$ are 5,698 bushels of corn, 5,185 bushels of wheat, 3,629 bushels of soybeans, 8,696 hundred weights of sorghum and 310 AUM's of sorghum stubble. The products produced by solution $IA^4$ are 2,961 tons of silage 8,651 hundred weight of sorghum, 607 AUM's of graze-out October-May and 309 AUM's of sorghum stubble (Table XXXIII).

Solutions $IB^1$ and $IB^4$ are also similar in some respects. However, net returns for $IB^1$ are $867 while solution $IB^4$ returns a minus $39,071. Net kilocalories of output for solution $IB^1$ are 1,191,302,690 compared to 2,490,301,190 for solution $IB^4$.

The crops for $IB^1$ produced 23,889 bushels of corn, 5,185 bushels

# TABLE XXXIII

## COMPARISON OF OPTIMAL SOLUTIONS FOR OBJECTIVE FUNCTIONS ONE AND FOUR FOR THE 560 ACRE SANDY LOAM FARMS

| Farm Size | | 560 Acres | | | | | |
|---|---|---|---|---|---|---|---|
| Solution Number | | IA1 | IB1 | IC1 | IA4 | IB4 | IC4 |
| Number of Wells | | One | Two | One | Two | Two | One |
| Total GPM | | 800 | 1500 | 1000 | 800 | 1500 | 1000 |
| Identification | Units | | | | | | |
| Net Returns | DOL | 10,367 | 867 | 9,277 | -39,079 | -62,136 | -44,111 |
| Net Kilocalories | MILLION | 1,191.30269 | 1,328.83645 | 1,234.28077 | 2,064.06951 | 2,490.30119 | 2,185.91518 |
| Irrigated Crops A/ | | | | | | | |
| RCG | AC | 42.4 | 176.9 | 84.3 | -- | -- | -- |
| RWGSBDC | AC | 103.7 | 103.7 | 130.7 | -- | -- | -- |
| RSRCSL | AC | -- | -- | -- | 148.1 | 277.8 | 185.1 |
| Dryland Crops A/ | | | | | | | |
| DLGSS | AC | 414.1 | 279.3 | 371.9 | 411.9 | 282.2 | 375.9 |
| Crop Products B/ | | | | | | | |
| Corn | BU | 5,698 | 23,889 | 11,833 | -- | -- | -- |
| Wheat | BU | 5,185 | 5,185 | 5,185 | -- | -- | -- |
| Soybeans | BU | 3,629 | 3,629 | 3,629 | -- | -- | -- |
| Grain Sorghum | CWT | 8,696 | 5,866 | 7,812 | 8,651 | 5,927 | 7,872 |
| Corn Silage | TON | -- | -- | -- | 2,961 | 5,556 | 3,703 |
| SGGOOM | AUM | -- | -- | -- | 607 | 1,139 | 759 |
| GSNJ | AUM | 310 | 209 | 278 | 309 | 212 | 281 |
| Cropping System C/ | | | | | | | |
| Con Tillage | AC | -- | -- | -- | -- | -- | -- |
| Red Tillage | AC | 145.9 | 208.7 | 188.0 | 148.1 | 277.8 | 185.1 |
| Labor | | | | | | | |
| Operator Labor | HR | 873 | 1,092 | 964 | 921 | 1,111 | 987 |
| Hired Labor | HR | 36 | 134 | 95 | 38 | 101 | 43 |
| Irrigation | | | | | | | |
| Total Water Used | ACIN | 4,435 | 7,669 | 5,445 | 5,033 | 9,444 | 6,294 |
| Inputs | | | | | | | |
| Nitrogen | CWT | 416 | 618 | 479 | 621 | 919 | 706 |
| Phosphate | CWT | 73 | 140 | 94 | 74 | 139 | 93 |
| Herbicide | LB | 323 | 525 | 386 | 222 | 416 | 278 |
| Insecticide | LB | 456 | 456 | 456 | 560 | 560 | 560 |
| Diesel | GALS | 2,915 | 3,454 | 3,083 | 2,971 | 3,023 | 2,986 |
| Oil | QTS | 739 | 1,094 | 849 | 791 | 1,230 | 917 |
| Natural Gas | 1000 CUFT | 3,766.786 | 6,505.493 | 4,622.608 | 4,164.062 | 7,812.500 | 5,207.031 |
| Machinery | DOL | 4,495 | 7,293 | 5,369 | 4,431 | 7,298 | 5,251 |

A/ RCG; Reduced tillage corn grain; RWGSBDC, Reduced wheat grain soybean double crop; RSRCSL, Reduced silage and rye circular sprinkler irrigation; DLGSS, Dryland tillage grain sorghum sandy loam.

B/ SGGOOM, Small grain graze out October-May; GSNJ, Grain sorghum stubble graze November-January.

C/ For irrigated acreage only, Con refers to conventional and Red means reduced tillage.

of wheat, 3,629 bushels of soybeans, 5,866 hundred weights of sorghum and 209 AUM's of sorghum stubble. Solution IB$^{4}$ produces 5,556 tons of silage, 5,927 hundred weights of sorghum, 1,139 AUM's of graze-out October-May and 212 AUM's of sorghum stubble.

Solution IC$^{1}$ produces 11,833 bushels of corn, 5,185 bushels of wheat, 3,629 bushels of soybeans, 7,812 hundred weights of sorghum and 278 AUM's of sorghum stubble. Solution IC$^{4}$ produces 3,703 tons of silage, 7,872 hundred weights of sorghum, 759 AUM's of graze-out October-May and 281 AUM's of sorghum stubble.

The fossil fuel inputs of nitrogen, insecticides, oil, and natural gas are greater for solution IC$^{4}$. Net returns for IC$^{1}$ are \$9,277 but they are a minus \$4,111 for solution IC$^{4}$. The net kilocalories of output are 1,234,280,770 for IC$^{1}$ and 2,185,915,180 for solution IC$^{4}$.

<u>1440 Cropland Acres</u>

Solution IIA$^{1}$ plants 200 irrigated acres in reduced tillage wheat-soybean double crop and the remaining acres (1240) in dryland sorghum. These crops produce 10,000 bushels of wheat, 7,000 bushels of soybeans, 26,040 hundred weights of sorghum and 930 AUM's of sorghum stubble. Solution IIA$^{4}$ crops consist of 222.2 acres of reduced tillage silage and rye grazing double crop and 1217.8 acres of dryland wheat. This produces 4,444 tons of silage, 25,573 hundred weights of sorghum, 911 AUM's of graze-out and 913 AUM's of sorghum stubble (Table XXXIV).

Other categories that are used in larger amounts by IIA$^{4}$ are irrigation water and fossil fuel inputs of nitrogen, phosphate, insecticides, diesel, oil, natural gas and machinery. However, solution IIA$^{1}$ uses more herbicide than IIB$^{4}$.

# TABLE XXXIV

## COMPARISON OF OPTIMAL SOLUTIONS FOR OBJECTIVE FUNCTION ONE AND FOUR FOR THE 1440 ACRE SANDY LOAM FARMS

| Farm Size | | 1440 Acres | | | | | |
|---|---|---|---|---|---|---|---|
| Solution Number | | IIA1 | IIB1 | IIC1 | IIA4 | IIB4 | IIC4 |
| Number of Wells | | Three | Three | Two | Three | Three | Two |
| Total GPM | | 1200 | 2250 | 2000 | 1200 | 2250 | 2000 |
| Identification | Units | | | | | | |
| Net Returns | DOL | 21,132 | 13,646 | 22,074 | -86,696 | -115,019 | -101,437 |
| Net Kilocalories | MILLION | 3,228.59608 | 3,197.92614 | 3,370.18875 | 4,786.84581 | 5,425.73698 | 5,273.77215 |
| Irrigated Crops A/ | | | | | | | |
| RCG | AC | 200.0 | 207.4 | 207.4 | -- | -- | -- |
| RWGSBDC | AC | -- | -- | 168.8 | -- | -- | -- |
| RSRCSL | AC | -- | -- | -- | 222.2 | 416.7 | 370.4 |
| Dryland Crops A/ | | | | | | | |
| DLGSS | AC | 1,240 | 1,232 | 1,063 | 1,217.8 | 1,023.3 | 1,069.6 |
| Crop Products B/ | | | | | | | |
| Corn | BU | -- | -- | 22,784 | -- | -- | -- |
| Wheat | BU | 10,000 | 10,370 | 10,370 | -- | -- | -- |
| Soybeans | BU | 7,000 | 7,259 | 7,259 | -- | -- | -- |
| Grain Sorghum | CWT | 26,040 | 25,884 | 22,340 | 25,573 | 21,490 | 22,461 |
| Corn Silage | TON | -- | -- | -- | 4,444 | 8,333 | 7,408 |
| SGGOOM | AUM | -- | -- | -- | 911 | 1,708 | 1,519 |
| GSNJ | AUM | 930 | 924 | 797 | 913 | 768 | 802 |
| Cropping System C/ | | | | | | | |
| Con Tillage | AC | -- | -- | -- | -- | -- | -- |
| Red Tillage | AC | 200.0 | 207.4 | 376.2 | 222.2 | 416.7 | 370.4 |
| Labor | | | | | | | |
| Operator Labor | HR | 1,022 | 1,034 | 1,210 | 1,101 | 1,275 | 1,248 |
| Hired Labor | HR | 1,138 | 1,142 | 1,365 | 1,059 | 1,267 | 1,203 |
| Irrigation | | | | | | | |
| Total Water Used | ACIN | 6,600 | 6,844 | 10,894 | 7,555 | 14,166 | 12,594 |
| Inputs | | | | | | | |
| Nitrogen | CWT | 860 | 865 | 1,118 | 1,231 | 1,678 | 1,572 |
| Phosphate | CWT | 100 | 104 | 188 | 111 | 208 | 185 |
| Herbicide | LB | 500 | 519 | 772 | 333 | 625 | 556 |
| Insecticide | LB | 1,240 | 1,233 | 1,233 | 1,440 | 1,440 | 1,440 |
| Diesel | GALS | 7,168 | 7,156 | 7,831 | 7,577 | 7,655 | 7,636 |
| Oil | QTS | 1,397 | 1,421 | 1,866 | 1,500 | 2,157 | 2,001 |
| Natural Gas | 1000 CUFT | 5,610.000 | 5,817.777 | 9,248.039 | 6,250.000 | 11,718.750 | 10,417.968 |
| Machinery | DOL | 7,725 | 7,901 | 11,404 | 7,892 | 12,189 | 11,167 |

A/ RCG; Reduced tillage corn grain; RWGSBDC, Reduced wheat grain soybean double crop; RSRCSL, Reduced silage and rye circular sprinkler irrigation; DLGSS, Dryland tillage grain sorghum sandy loam.

B/ SGGOOM, Small grain graze out October-May; GSNJ, Grain sorghum stubble graze November-January.

C/ For irrigated acreage only, Con refers to conventional and Red means reduced tillage.

Net returns for solution IIA$^1$ are $21,132 while solution IIA$^4$ returns a minus $86,696. The net kilocalories of output for IIA$^1$ are 3,228,596,080, while they are 4,786,845,810 for solution IIA$^4$.

Shifting to the "B" water situation increased irrigated acreage (for IIB$^1$) only 7.4 acres (207.4) while solution IIB$^4$ has 194.5 additional acres (416.7) of irrigated production. This difference is associated with the irrigation cost for the solutions along with the difference in the objective functions used. This shift also increased the amount of inputs required by the IIB$^4$ solution.

The products for IIB$^1$ are 10,370 bushels of wheat, 25,884 hundred weights of sorghum, 7,259 bushels of soybeans and 924 AUM's of sorghum stubble. Solution IIB$^4$ produces 8,333 tons of silage, 21,490 hundred weights of sorghum, 1,708 AUM's of graze-out October-May and 768 AUM's of sorghum stubble. The net returns are $13,646 for solution IIB$^1$ and a minus $115,019 for solution IIB$^4$. The net kilocalories of output for IIB$^1$ are 3,197,926,140 and 5,425,736,980 for IIB$^4$.

The divergence between objective function one and four solutions for resource solution IIC is almost as pronounced as for IIB. The returns, production levels and inputs used are presented in Table XXXIV.

## 2680 Cropland Acres

Viewing the overall results of the 2680 acre sandy loam farms in Table XXXV, it is evident that the relatively high irrigation costs have a pronounced effect on the organization selected. The pattern is much like that of the 1440 acre farms.

Solutions IIIA$^1$ and IIIA$^4$ are similar in many respects. The same irrigated crops, reduced tillage wheat and soybean double crop in

# TABLE XXXV

## COMPARISON OF OPTIMAL SOLUTIONS FOR OBJECTIVE FUNCTIONS ONE AND FOUR FOR THE 2680 ACRE SANDY LOAM FARMS

| Farm Size | | 2680 Acres | | | | | |
|---|---|---|---|---|---|---|---|
| Solution Number | | IIIA[1] | IIIB[1] | IIIC[1] | IIIA[4] | IIIB[4] | IIIC[4] |
| Number of Wells | | Six | Six | Four | Six | Six | Four |
| Total GPM | | 2400 | 4500 | 4000 | 2400 | 4500 | 1000 |
| Identification | Units | | | | | | |
| Net Returns | DOL | 35,917 | 20,891 | 37,297 | -169,651 | -227,186 | -199,847 |
| Net Kilocalories | MILLION | 5,893.76376 | 5,832.42388 | 5,873.27252 | 9,010.26323 | 10,288.04556 | 9,983.65055 |
| Irrigated Crops[A/] | | | | | | | |
| RCG | AC | -- | -- | 40.0 | -- | -- | -- |
| RWGSBDC | AC | 400 | 414.8 | 414.8 | -- | -- | -- |
| RSRCSL | AC | -- | -- | -- | 444.4 | 833.3 | 740.7 |
| Dryland Crops[A/] | | | | | | | |
| DLGSS | AC | 2,280 | 2,265.2 | 2,225.2 | 2,235.6 | 1,846.7 | 1,939.3 |
| Crop Products[B/] | | | | | | | |
| Corn | BU | -- | -- | 5,403 | -- | -- | -- |
| Wheat | BU | 20,000 | 20,741 | 20,741 | -- | -- | -- |
| Soybeans | BU | 14,000 | 14,519 | 14,519 | -- | -- | -- |
| Grain Sorghum | CWT | 47,880 | 47,569 | 46,728 | 46,947 | 38,780 | 40,725 |
| Corn Silage | TON | -- | -- | -- | 8,889 | 16,667 | 14,813 |
| SGGOOM | AUM | -- | -- | -- | 1,822 | 3,417 | 3,037 |
| GSNJ | AUM | 1,710 | 1,698 | 1,668 | 1,676 | 1,385 | 1,454 |
| Cropping System[C/] | | | | | | | |
| Con Tillage | AC | -- | -- | -- | -- | -- | -- |
| Red Tillage | AC | 400.0 | 414.8 | 454.8 | 444.4 | 833.3 | 740.7 |
| Labor | | | | | | | |
| Operator Labor | HR | 1,112 | 1,118 | 1,148 | 1,159 | 1,210 | 1,210 |
| Hired Labor | HR | 2,811 | 2,995 | 3,059 | 2,924 | 3,637 | 3,455 |
| Irrigation | | | | | | | |
| Total Water Used | ACIN | 13,320 | 13,688 | 14,649 | 15,111 | 28,333 | 25,183 |
| Inputs | | | | | | | |
| Nitrogen | CWT | 1,620 | 1,630 | 1,690 | 2,362 | 3,257 | 3,044 |
| Phosphate | CWT | 200 | 207 | 277 | 222 | 417 | 370 |
| Herbicide | LB | 1,000 | 1,037 | 1,097 | 667 | 1,250 | 1,111 |
| Insecticide | LB | 2,280 | 2,265 | 2,265 | 2,680 | 2,680 | 2,680 |
| Diesel | GALS | 13,296 | 13,272 | 13,432 | 14,114 | 14,269 | 14,232 |
| Oil | QTS | 2,689 | 2,738 | 2,843 | 2,896 | 4,210 | 3,897 |
| Natural Gas | 1000 CUFT | 11,220.000 | 11,635.555 | 12,448.973 | 12,500.000 | 23,437.500 | 20,832.031 |
| Machinery | DOL | 15,036 | 15,387 | 16,218 | 15,370 | 23,964 | 21,917 |

A/ RCG; Reduced tillage corn grain; RWGSBDC, Reduced wheat grain soybean double crop; RSRCSL, Reduced silage and rye circular sprinkler irrigation; DLGSS, Dryland tillage grain sorghum sandy loam.

B/ SGGOOM, Small grain graze out October-May; GSNJ, Grain sorghum stubble graze November- January.

C/ For irrigated acreage only, Con refers to conventional and Red means reduced tillage.

solution IIIA$^{1}$ and reduced tillage silage and rye grazing double crop in IIIA$^{4}$, are listed.

Solution IIIA$^{1}$ produces 20,000 bushels of wheat, 47,880 hundred weights of grain sorghum, 14,000 bushels of soybeans and 1,710 AUM's of sorghum stubble. Solution IIIA$^{4}$ produces 8,889 tons of silage, 46,947 hundred weights of sorghum along with 1,676 AUM's of sorghum stubble from dryland sorghum, plus 1,822 AUM's of small grain graze-out October-May.

All other categories except herbicides are used in larger amounts by solution IIIA$^{4}$. The net returns are $35,917 for solution IIIA$^{1}$ and a minus $169,651 for solution IIIA$^{4}$. Net kilocalories of output for solution IIIA$^{1}$ are 5,893,763,760. They total 9,010,263,230 kilocalories of output for IIIA$^{4}$.

Solutions IIIB$^{1}$ and IIIB$^{4}$ (Table XXXV) show the same pattern of results as did the IIB comparisons except in larger amounts. All categories of irrigated land, labor, irrigation water and all eight fossil fuel inputs are used in larger amounts by IIIB$^{4}$.

The products from the crops for solution IIIB$^{1}$ are 20,741 bushels of wheat, 47,569 hundred weights of sorghum, 14,519 bushels of soybeans and 1,698 AUM's of sorghum stubble. Solution IIIB$^{4}$ produces 16,667 tons of silage 38,780 hundred weights of sorghum, 3,417 AUM's of graze-out October-May and 1,385 AUM's of sorghum stubble.

The net returns for solution IIIB$^{1}$ are $20,891 and a minus $227,186 for solution IIB$^{4}$. The net kilocalories of output for IIIB$^{1}$ are 5,832,423,880, approximately one-half the output for solution IIIB$^{4}$ (10,288,045,560).

The solution comparison for IIIC$^{1}$ and IIIC$^{4}$ shows the addition of irrigated reduced tillage corn grain to solution IIIC$^{1}$. However, an even larger irrigated acreage is added to solution IIIC$^{4}$ (454.8 acres compared to 740.7 acres).

Again all categories except dryland acreage are included in larger amounts in solution IIIC$^{4}$. The net returns for IIIC$^{1}$ are $37,297, while solution IIIC$^{4}$ net returns are a minus $199,847. Solution IIIC$^{1}$ generates 5,873,272,520 kilocalories of output compared to 9,983,659,550 for solution IIIC$^{4}$ (Table XXXV).

On the production side solution IIIC$^{1}$ produces 20,741 bushels of wheat, 46,728 hundred weights of sorghum, 14,519 bushels of soybeans, 5,403 bushels of corn and 1,668 AUM's of sorghum stubble. Solution IIIC$^{4}$ produces 14,813 tons of silage, 40,725 hundred weights of sorghum, 3,037 AUM's graze-out October-May and 1,454 AUM's of sorghum stubble. Detailed organizations for each farm solution can be found in Appendix C.

## Shadow Prices

Clay Loam Soils. The irrigated conventional tillage methods have shadow prices ranging from $1.04 per acre for wheat grain to $116.34 per acre for sudan hay (Table LXXIV, Appendix D). The values, associated with objective function one, indicate the reduction in net returns that would occur if one acre of the crop was forced into the solution. In objective function four the range varies from a low of 152,930 kilocalories of energy for sudan hay to a high of 9,865,150 kilocalories of energy for soybeans. These are the kilocalories that would be lost if an acre of either one of these crops were produced.

Considering reduced tillage methods the low shadow price with objective function one is $.29 for the three-year rotation of wheat-fallow-sorghum moderate irrigation. The highest shadow price is $118.00 for grazed wheat and sudan hay double crop. The shadow prices for reduced tillage methods with objective function four tend to be less than those computed for irrigated conventional tillage methods of production. The range varies from a low of 36,090 kilocalories of energy for sorghum and soybean double crop to a high of 3,180,080 kilocalories of energy for the two-year wheat rotation. Of particular interest is the three-year rotation of wheat-fallow-sorghum heavy irrigation which is in the solution for each farm in OBJ1, but generates a small shadow price in kilocalories of energy for objective four solutions. In contrast silage and rye graze double crop found in solution for all farms in OBJ4 is in solution at a zero level in OBJ1.

The dryland crop having the highest shadow price for OBJ1 is small grain graze-out ($38.28) while grain sorghum generates the lowest of $1.58. The dryland crops have relatively low shadow prices in kilocalories per acre. The values for dryland wheat range from 142,080 for solution IB to 684,920 kilocalories of energy for all the "C" water situations. Small grain graze-out has a shadow price of 514,960 for all situations.

Sandy Loam Soils. No irrigated conventional tillage methods are included in the solution for either objective function. All three methods of production generate high shadow prices both in returns and kilocalories.

Considering the reduced tillage methods the most interesting result concerns the wheat and soybean double cropping technique.

Objective function one solutions include this scheme in all cases, but it has the highest shadow prices in kilocalories (7,791,250) for objective function four.

Dryland grain sorghum is found in the solution for both objective functions. This demonstrates the efficiency of this crop harvested for grain and then utilized for grazing. All shadow prices are given in Appendix D.

## CHAPTER VI

## SUMMARY

The central bojective of this study is to determine if adoption of reduced tillage cropping techniques can reduce the amount of fossil fuel energy required in producing crops while not hampering the net returns to the farm. A second purpose is to identify shifts in crops and cropping techniques that will increase efficiency of fossil fuel energy use on representative farms in the Oklahoma Panhandle. These two issues are accomplished through four objectives: (1) Development of enterprise budgets for reduced tillage methods on irrigated land, (2) Estimate the quantities of fissil fuel energy required by the conventional, reduced, and dryland tillage methods, (3) Determine the profit maximizing organization for representative farms, and (4) Maximize net energy output for representative farms.

The representative farms chosen for the Oklahoma Panhandle consist of three cropland sizes (560, 1440 and 2680 acres) which represent the small, medium, and large farms for the study area. Each farm size is characterized by two soil types (clay loam with surface irrigation and sandy loam with circular sprinkler irrigation) and three water situations (400, 750, and 1000 GPM) with a specified number of wells for each situation.

The analytical procedure chosen was to construct a linear programming model and use it to determine the optimum organization for each farm situation. The model is designed so it can be used to satisfy a number of objective functions. Two functions are maximized for each farm situation in this study, net returns and net kilocalories of output.

Each solution can choose from seven irrigated crops (corn, wheat, silage, sorghum, small grain graze-out, sudan and soybeans) produced as single crops under conventional tillage techniques and as single, rotation and double cropping schemes under irrigation. The dryland production alternatives consist of three crops (wheat, sorghum, small grain graze-out) that can be produced on either of the two soil types.

## Results

The solutions are specific to their objective function, soil, and water situation. Twelve solutions are discussed in Chapter V for each farm size. This section summarizes these results by farm size.

### 560-Cropland Acre Solutions

Objective Function One. The maximization of net returns is the objective. The three situations for the 560 acres farm have two wells pumping 800 GPM and 1500 GPM, and one well pumping 1000 GPM, respectively. The net returns for the clay loam soil solutions vary from a low of $23,785 (800 GPM) to a high of $30,688 (1500 GPM). The variation in net returns is affected by the irrigation water availability since the farm size and other inputs remain constant. The net returns on the sandy loam soils do not follow the same pattern. In fact, the high and low range are the opposite in the case of this soil. The low net return is $867 (1500 GPM), while the high net return is $10,367 (800 GPM).

This range and shift in net returns is once again associated with the availability of irrigation water. The sandy loam soils irrigated with circular sprinkler systems, thereby incurring a higher variable irrigation cost. Thus the higher variable irrigation cost in the 1500 GPM farm is reflected by the low net return. The corresponding net kilocalories of energy for the clay laom soils are 1,220,455,940 for the 800 GPM farm and 925,595,380 for the 1500 GPM farm. The corresponding kilocalories of energy for the clay loam soils are 1,220,455,940 for the 800 GPM farm and 925,595,380 for the 1500 GPM farm. The corresponding kilocalories of energy for the sandy loam soils are 1,328,836,450 for the 1500 GPM farm and 1,191,302,690 kilocalories for the 800 GPM farm.

Objective Function Four. Maximizing net kilocalories of energy is the objective. The same irrigation characteristics are used for this objective function as discussed for the previous function. The value of the objective for clay loam soils ranges from a low of 1,930,907,590 kilocalories of energy for the 800 GPM farm to a high of 2,731,557,340 for the 1500 GPM farm. This variation can once again be accounted for by the increased water availability on the 1500 GPM farm. The sandy loam farms follow the same pattern with the 1500 GPM farm generating the highest kilocalories of energy return at 2,490,301,190 and the lowest return from the 800 GPM solution at 2,064,069,510 kilocalories of energy. Here the variable irrigation cost does not affect the optimization of objective function four. Thus the irrigation water availability in the 1500 GPM farm is beneficial. The net returns that correspond with these results for the clay loam soils are a minus $27,030 for the

800 GPM farm which is the lowest and a minus $43,209 for the 1500 GPM farm which is the highest. The corresponding net returns for the sandy loam soils range from a minus $62,136 for the 1500 GPM farm to a minus $39,079 for the 800 GPM farm.

Clay Loam Crops. The irrigated crops produced by objective function one are reduced tillage wheat two-year rotation, reduced tillage wheat and sorghum double crop, reduced tillage wheat-fallow-sorghum three-year rotation heavy irrigation. Conventional tillage soybeans is the sole conventional method used and it is included only on the 1500 GPM farm. Dryland wheat is the only crop produced under dryland methods and it is not included in the 1500 GPM farm because all acreage was irrigated. In each case the majority of the cropland is planted in irrigated crops. The irrigated crops produced in objective function four solutions are conventional tillage sorghum moderate irrigation and reduced tillage silage and rye grazing. Dryland grain sorghum is planted in all three situations. In contrast to objective function one, a complete shift in crops is made to those producing more net kilocalories of output per acre. In each case objective function four solutions utilize more dryland acreage.

Sandy Loam Crops. The irrigated crops produced in objective function one are reduced tillage wheat and soybeans double crop and reduced tillage corn for grain. The dryland crop is grain sorghum which is also included in objective function four solutions. The sole irrigated crop for objective function four solutions is reduced tillage silage and rye grazing double crop. Again the shift in irrigated crops is seen but in the dryland crop sorghum is planted in both objective functions.

This demonstrates the efficiency of the dryland sorghum as a cash crop and as a high energy efficiency crop, which is utilized as a grain and a forage. In both functions more dryland than irrigated acreage is used. This is due to the high variable irrigation cost in objective function one and the nature of objective function four, since the dryland crops are a more efficient producer of net kilocalories of energy.

Input Use. In both objective functions and all farm situations it is evident that the increase in irrigation water is beneficial, with the exception of sandy loam soils in objective function one due to the high variable irrigation cost. Of particular interest is the amount of irrigation water used. Objective function four solutions for both soils exceed the amount used by any of the objective function one solutions. This is surprising since less irrigated land is included in the objective function four solutions. This means that a higher concentration of irrigation water per acre is needed by the crops in the objective function four solutions.

Generally a higher amount of fossil fuel inputs are used by objective function four solutions than by objective function one solutions. This indicates that with the proper crops an increase rather than a decrease in fossil fuel inputs is incurred to increase the net kilocalories of output for the farm.

### 1440-Cropland Acre Solutions

Objective Function One. The three situations for the 1440 acre farm have three wells pumping 1200 GPM and 2250 GPM, and two wells pumping 2000 GPM, respectively. The net returns for the clay loam soil solutions vary from a low of $42,605 (1200 GPM) to a high of $59,019 (2250 GPM). Again as was the case in the 560 acre farm the increase in water availability affects the net returns. The returns on the sandy loam soils do not follow the same pattern. This change in the pattern is associated with the higher variable irrigation cost found in each of the "class B" water situations. The net returns vary from a low of $13,646 (2250 GPM) to a high of $22,074 (2000 GPM). Once again the high variable irrigation cost of the 2250 GPM is reflected by the low net return. The corresponding net kilocalories of energy for the clay loam soils are 2,538,177,250 for the 1200 GPM farm and 3,234,922,270 for the 2250 GPM farm. The corresponding kilocalories of energy for the sandy loam soils are 3,197,926,140 for the 2250 GPM and 3,370,188, 750 kilocalories of energy for the 2000 GPM farm.

Objective Function Four. The same irrigation characteristics hold true for this objective function as discussed for the previous function. The clay loam soils range from a low of 3,986,972,810 (1200 GPM) kilocalories of energy to a high of 5,187,090,200 (2250 GPM). In moving to the 1440 acre farm once again the increase in irrigation water is evidently beneficial. The sandy loam farms follow the same pattern with the 1200 GPM farm generating the lowest return in kilocalories of energy at 4,786,845,810 and the 2250 GPM farm generating the highest at 5,425,736,980 kilocalories of energy which are again not affected by the high variable irrigation cost. The net returns that correspond with these results for the clay loam soils are a minus $80,742 from the 2250 GPM farm and a minus $56,109 from the 1200 GPM farm. The corresponding net returns for the sandy loam soils are a minus $86,696 for the 1200 GPM farm and a minus $115,019 for the 2250 GPM farm.

Clay Loam Crops. The irrigated crops produced by objective function one are reduced tillage wheat two-year rotation, reduced tillage wheat and sorghum double crop and reduced tillage wheat-fallow-sorghum three-year rotation heavy irrigation. Dryland wheat is again the only crop produced under dryland methods. The major portion of the cropland (2250 GPM and 2000 GPM) is planted in irrigated crops while more than half of the 1200 GPM farm plants dryland wheat. The irrigated crops produced in objective function four are again conventional tillage sorghum moderate irrigation and reduced tillage silage and rye grazing. Dryland sorghum is planted in all three situations. As in the 560 acre farm a complete shift in crops is made in objective function four to those producing more net kilocalories of output per acre. The large portion of land is planted again in dryland acreage.

Sandy Loam Crops. The irrigated crops produced in objective function one are the same as those produced in the 560 acre farms, reduced tillage wheat and soybean double crop and reduced tillage corn for grain. However, with the increase in variable irrigation cost the corn for grain is produced only in the 2000 GPM farm. The dryland crop is grain sorghum which is also raised in objective function four. Again the sole irrigated crop for objective function four is reduced tillage silage and rye grazing double crop. Throughout all the sandy loam results more dryland acreage is utilized because of the high variable irrigation cost of objective function one and the nature of objective function four.

Input Use. The increase in irrigation water is again beneficial throughout both objective functions, except for the sandy loam soils in objective function one. The point noted in the 560 acre farm of more irrigation water being utilized on less total irrigated land in objective function four also holds true for the 1440 acre farm. This again demonstrates the concentration of the irrigation application per acre required by the objective function four crops.

## 2680-Cropland Acre Solutions

Objective Function One. The three situations for the 2680 acre farm have six wells pumping 2400 GPM and 4500 GPM, and four wells pumping 4000 GPM, respectively. The net returns for the clay loam soil solutions vary from a low of $81,280 (2400 GPM) to a high of $133,204 (4500 GPM). The net returns for the sandy loam soil solutions vary from a low of $20,891 (4500 GPM) to a high of $37,297 on the 4000 GPM farm. The lower returns on sandy loam soils reflect the variable irrigation cost on the sandy loam soils.

The corresponding net kilocalories of energy for the clay loam soils are 4,850,086,690 for the 2400 GPM farm and 6,243,576,750 kilocalories of energy for the 4500 GPM farm. While the corresponding net kilocalories of energy for the sandy loam soils are 5,832,423,880 kilocalories of energy for the 4500 GPM farm and 5,873,272,520 for the 4000 GPM farm.

Objective Function Four. The clay loam soils range from a low of 7,610,694,230 kilocalories of energy (2400 GPM) to a high of 10,010,929,010 (4500 GPM). The sandy loam soil farms vary from a low of

9,010,263,230 kilocalories of energy for the 2400 GPM farm to a high of 10,288,045,560 for the 4500 GPM farm. The net return generated by the clay loam soil solutions are a minus $110,578 for the 2400 GPM farm and a minus $160,708 for the 4500 GPM farm. The sandy loam soils generate a net return of a minus $169,651 for the 2400 GPM farm and a minus $227,186 for the 4500 GPM farm.

<u>Clay Loam Crops</u>. The irrigated crops included in objective function one solutions are the same as those produced on the 1440 acre farm. These are reduced tillage wheat two-year rotation, reduced tillage wheat and sorghum double crop and reduced tillage wheat-fallow-sorghum three-year rotation. While once again dryland wheat is the only dryland crop produced. Again most of the land on the 4500 and 4000 GPM farms is planted in irrigated crops, while the 2400 GPM farm utilizes more dryland acreage because less irrigation water is available. The irrigated and dryland crops included in objective function four solutions are the same as for the 1440 acre solutions, conventional tillage sorghum moderate irrigation, reduced tillage silage and rye grazing double crop and dryland grain sorghum with the dryland sorghum requiring more acreage.

<u>Sandy Loam Crops</u>. The irrigated crops included in objective function one solutions are reduced tillage wheat and soybean double crop and reduced tillage corn for grain. However, again corn for grain is produced only by the 4000 GPM farm. For the third time dryland grain sorghum is planted in all six farm solutions, while reduced tillage silage and rye grazing double crop is the sole irrigated crop in the objective function four solutions. With the high variable irrigation

cost associated with the objective one sandy loam farms and the nature of objective function four dryland grain sorghum again requires more acreage.

Input Use. Like the small and medium size farms, irrigation water is beneficial for both objective functions, except for the usual sandy loam function one results. The irrigation water and fossil fuel inputs are again used in a higher amount by objective function four solutions. As pointed out earlier in the chapter, this demonstrates that the proper crops are the major factor which increase net kilocalories of energy rather than a reduction in fossil fuel inputs.

## Conclusions

The amount of irrigated acreage is proportional to the water availability of each farm and irrigation situation. The only exception is for objective function one sandy loam soils. This is due to the high irrigation cost associated with objective function one sandy loam soils. Of course, net returns for the solutions are reflected in the cost of pumping irrigation water.

Reduced tillage methods are used more than conventional tillage methods in both objective functions and farm situations. This indicates the increased efficiency of the reduced tillage methods compared to the conventional tillage methods. It is also evident that the dryland crops generate a relatively high output of net kilocalories of energy. This is demonstrated by the objective function four solutions, where each solution includes more acreage of dryland than irrigated crops.

In comparing objective function one (maximizing net returns) and objective function four (maximizing net kelocalories of energy) three specific points are noted. First, the objective function four solutions require more fossil fuel inputs per farm. The second point is the increase in fossil fuel inputs is accounted for by the shift to crops that utilize the forage as well as the grain produced. The third point is that when maximizing the net kilocalories of energy a large negative net return is associated with the results.

This suggests that additional research is needed to maximize another measure of physical output. Perhaps an additional measure of interest is the amount of energy produced from the crop product that can be assimilated by man and nonruminant animals. Without this additional measurement a conclusion cannot be reached at this point.

## Need for Further Study

This study suggests many additional areas needing further attention. The linear programming model is used in this study to maximize net returns (with current energy prices) and to maximize net kilocalories of output. It would be of use to expand the analysis by determining the effect of increasing energy prices on the profit maximizing solution. This analysis, completed using variable price programming, could trace the relationship between the price of fossil fuel energy, the amount of energy used and the crops produced.

The analysis was completed assuming natural gas is available to pump irrigation water. However, the natural gas available to agriculture may be reduced. Thus another extension of the analysis should consider the effect of using alternative irrigation fuels (electricity or diesel) on net returns and fossil fuel energy used. Furthermore, the effect of using alternative sprinkler irrigation systems (side move, side move tow) on net returns and net kilocalories of output should also be determined.

The solution developed indicates soybeans are relatively inefficient in producing net kilocalories of output. However, soybeans are normally considered a protein producing crop. Another objective function could be used to trace the relationship between net returns, net kilocalories of output and protein produced for the representative farms.

With these extensions the analysis will provide even more information concerning the proper use of fossil fuels and fossil fuel products in increasing agricultural production in the study area over the long run. These results should be useful to economists, policy-makers and farm managers to better understand the energy situation and its implications for agricultural production.

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# APPENDIX A

## ENTERPRISE BUDGETS FOR SPECIFIED CROPS UNDER DRYLAND IRRIGATED CONVENTIONAL AND IRRIGATED REDUCED TILLAGE METHODS

# TABLE XXXVI

## DRYLAND WHEAT, CLAY LOAM SOIL

| CATEGORY | UNITS | PRICE | QUANTITY | VALUE |
|---|---|---|---|---|
| PRODUCTION: | | | | |
| WHEAT | BU. | 2.050 | 16.500 | 33.82 |
| GRAZING | AUMS | 10.000 | 0.350 | 3.50 |
| TOTAL RECEIPTS | | | | 37.32 |
| OPERATING INPUTS: | | | | |
| WHEAT SEED | BU. | 5.000 | 0.750 | 3.75 |
| NITROGEN | LBS. | 0.140 | 60.000 | 8.40 |
| CUSTOM COMBINE | ACRE | 9.800 | 1.000 | 9.80 |
| CUSTOM HAULING | BU. | 0.100 | 16.500 | 1.65 |
| TRACTOR FUEL COST | ACRE | | | 0.78 |
| TRACT REPAIR COST | ACRE | | | 0.38 |
| TRACTOR LUBE COST | ACRE | | | 0.12 |
| EQUIP REPAIR COST | ACRE | | | 0.27 |
| TOTAL OPERATING COST | | | | 25.14 |
| RETURNS TO LAND,LABOR,CAPITAL,MACHINERY, OVERHEAD,RISK,AND MANAGEMENT | | | | 12.18 |
| CAPITAL COST: | | | | |
| ANNUAL OPERATING CAPITAL | | 0.100 | 10.732 | 1.07 |
| TRACTOR INVESTMENT | | 0.100 | 5.550 | 0.56 |
| EQUIPMENT INVESTMENT | | 0.100 | 5.954 | 0.60 |
| TOTAL INTEREST CHARGE | | | | 2.22 |
| RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT | | | | 9.96 |
| OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE) | | | | |
| TRACTOR | DOL. | | | 0.66 |
| EQUIPMENT | DOL. | | | 0.93 |
| TOTAL OWNERSHIP COST | | | | 1.59 |
| RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT | | | | 8.37 |
| LABOR COST: | | | | |
| MACHINERY LABOR | HR. | 3.000 | 0.574 | 1.72 |
| TOTAL LABOR COST | | | | 1.72 |
| RETURNS TO LAND, OVERHEAD, RISK AND MANAGEMENT | | | | 6.65 |

PANHANDLE ENERGY BUDGETS

ENTERPRISE 16 AREA AND COUNTY 12 DETAIL 00 IRIG. LEVEL 0 LAND CLASS 1
GRAZING 3 MACH. COMP. _1 IRIG. SYSTEM 0 PRICE VECT 1 INDIV. NUMBER _0
ANNUAL CAPITAL MONTH: 6
DATE PRINTED: 03/05/75

# TABLE XXXVI (Continued)

| LINE | 1 JAN | 2 FEB | 3 MAR | 4 APR | 5 MAY | 6 JUN | 7 JUL | 8 AUG | 9 SEP | 10 OCT | 11 NOV | 12 DEC | 13 PRICE | 14 WEIGHT | 15 UNIT CODE | 16 ITEM CODE | 17 TYPE | 18 CONT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PRODUCTION | | | | | NUMBER OF UNITS | | | | | | | | | | | | | |
| 1 WHEAT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 16.50 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.050 | 0.0 | 2. | 76. | 2. | 0. |
| 2 GRAZING | 0.05 | 0.05 | 0.05 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.10 | 0.10 | 10.000 | 0.0 | 10. | 89. | 2. | 0. |
| OPERATING INPUTS | | | | | | RATE/UNIT | | | | | | | PRICE | NUMBER UNITS | UNIT CODE | ITEM CODE | TYPE | CONT |
| 11 WHEAT SEED | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.75 | 0.0 | 0.0 | 0.0 | 5.000 | 0.0 | 2. | 176. | 3. | 0. |
| 12 NITROGEN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 60.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.140 | 0.0 | 12. | 211. | 3. | 0. |
| 13 CUSTOM COMBINE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 9.800 | 0.0 | 7. | 305. | 3. | 0. |
| 14 CUSTOM HAULING | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 16.50 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.100 | 0.0 | 2. | 306. | 3. | 0. |
| MACHINERY REQUIREMENTS | | | | | | TIMES OVER | | | | | | | XXXXX | XXXXX | POWER UNIT | MACH CODE | TYPE | CONT |
| 38 SWEEP | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 41. | 4. | 0. |
| 39 ROD WEEDER | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 59. | 4. | 0. |
| 40 DRILL WO/FERT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 61. | 4. | 0. |
| 41 ANHYDROUS APPLIC | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 73. | 4. | 0. |

PANHANDLE ENERGY BUDGETS

MACHINERY COMPLEMENT 1
EQUIPMENT COMPLEMENT 1

***NO NAME CHANGES HAVE BEEN STORED WITH THIS BUDGET***

***NO COMPLEMENT CHANGES HAVE BEEN STORED WITH THIS BUDGET***

MONTHLY SUMMARY OF RECEIPTS AND EXPENSES

| CATEGORY | UNIT | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TOTAL RECEIPTS | ACRE | 0.50 | 0.50 | 0.50 | 0.0 | 0.0 | 33.82 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 1.00 | 37.32 |
| TOTAL EXPENSES | ACRE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 11.80 | 0.0 | 8.75 | 4.58 | 0.0 | 0.0 | 0.0 | 25.14 |
| RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT | | | | | | | | | | | | | | 12.18 |
| ANNUAL CAPITAL | DOL. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 7.29 | 3.44 | 0.0 | 0.0 | 0.0 | 10.73 |
| LABOR REQUIREMENTS BY MONTH | | | | | | | | | | | | | | |
| MACHINERY LABOR | HR. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.12 | 0.0 | 0.12 | 0.33 | 0.0 | 0.0 | 0.0 | 0.57 |

MACHINERY FIXED AND VARIABLE COSTS PER HOUR

| MACHINE | CODE | DEPR | INSUR. | TAX | TOTAL FIXED | REPAIR | FUEL | LUB. | TOTAL VARIABLE | INT. | HR/TIME |
|---|---|---|---|---|---|---|---|---|---|---|---|
| TRACTOR(4) | 4 | 1.05 | 0.06 | 0.16 | 1.27 | 0.72 | 1.49 | 0.22 | 2.44 | 1.06 | 1.00 |
| SWEEP | 41 | 2.12 | 0.09 | 0.26 | 2.48 | 0.83 | 0.0 | 0.0 | 0.83 | 1.57 | 0.10 |
| ROD WEEDER | 59 | 0.80 | 0.04 | 0.10 | 0.93 | 0.21 | 0.0 | 0.0 | 0.21 | 0.60 | 0.09 |
| DRILL WO/FERT | 61 | 1.65 | 0.07 | 0.21 | 1.93 | 0.44 | 0.0 | 0.0 | 0.44 | 1.24 | 0.18 |
| ANHYDROUS APPLIC | 73 | 0.56 | 0.03 | 0.07 | 0.66 | 0.37 | 0.0 | 0.0 | 0.37 | 0.43 | 0.26 |

| OPERATION | ITEM NO. | DATE | TIMES OVER | LABOR HOURS | MACHINE HOURS | FUEL,OIL,LUB., REPAIR PER ACRE | FIXED COSTS PER ACRE |
|---|---|---|---|---|---|---|---|
| SWEEP | 4,41 | AUG | 1.00 | 0.122 | 0.101 | 0.35 | 0.67 |
| ROD WEEDER | 4,59 | SEP | 1.00 | 0.114 | 0.094 | 0.27 | 0.39 |
| DRILL WO/FERT | 4,61 | SEP | 1.00 | 0.217 | 0.179 | 0.56 | 1.03 |
| SWEEP | 4,41 | JUN | 1.00 | 0.122 | 0.101 | 0.35 | 0.67 |
| TOTAL | | | | 0.574 | 0.474 | 1.54 | 2.74 |

TABLE XXXVII

DRYLAND WHEAT, SANDY LOAM SOIL

| CATEGORY | UNITS | PRICE | QUANTITY | VALUE |
|---|---|---|---|---|
| PRODUCTION: | | | | |
| WHEAT | BU. | 2.050 | 16.500 | 33.82 |
| GRAZING | AUMS | 10.000 | 0.350 | 3.50 |
| TOTAL RECEIPTS | | | | 37.32 |
| OPERATING INPUTS: | | | | |
| WHEAT SEED | BU. | 5.000 | 0.750 | 3.75 |
| NITROGEN | LBS. | 0.140 | 60.000 | 8.40 |
| CUSTOM COMBINE | ACRE | 9.800 | 1.000 | 9.80 |
| CUSTOM HAULING | BU. | 0.100 | 16.500 | 1.65 |
| TRACTOR FUEL COST | ACRE | | | 0.78 |
| TRACT REPAIR COST | ACRE | | | 0.38 |
| TRACTOR LUBE COST | ACRE | | | 0.12 |
| EQUIP REPAIR COST | ACRE | | | 0.27 |
| TOTAL OPERATING COST | | | | 25.14 |
| RETURNS TO LAND,LABOR,CAPITAL,MACHINERY, OVERHEAD,RISK,AND MANAGEMENT | | | | 12.18 |
| CAPITAL COST: | | | | |
| ANNUAL OPERATING CAPITAL | | 0.100 | 10.732 | 1.07 |
| TRACTOR INVESTMENT | | 0.100 | 5.550 | 0.56 |
| EQUIPMENT INVESTMENT | | 0.100 | 5.954 | 0.60 |
| TOTAL INTEREST CHARGE | | | | 2.22 |
| RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT | | | | 9.96 |
| OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE) | | | | |
| TRACTOR | DOL. | | | 0.66 |
| EQUIPMENT | DOL. | | | 0.93 |
| TOTAL OWNERSHIP COST | | | | 1.59 |
| RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT | | | | 8.37 |
| LABOR COST: | | | | |
| MACHINERY LABOR | HR. | 3.000 | 0.574 | 1.72 |
| TOTAL LABOR COST | | | | 1.72 |
| RETURNS TO LAND, OVERHEAD, RISK AND MANAGEMENT | | | | 6.65 |

PANHANDLE ENERGY BUDGETS

ENTERPRISE 76 AREA AND COUNTY 12 DETAIL 00 IRIG. LEVEL 0 LAND CLASS 8
GRAZING 3 MACH. COMP. _1 IRIG. SYSTEM 0 PRICE VECT 1 INDIV. NUMBER _0
ANNUAL CAPITAL MONTH: 6
DATE PRINTED: 03/05/75

# TABLE XXXVII (Continued)

| LINE | 1 JAN | 2 FEB | 3 MAR | 4 APR | 5 MAY | 6 JUN | 7 JUL | 8 AUG | 9 SEP | 10 OCT | 11 NOV | 12 DEC | 13 PRICE | 14 WEIGHT | 15 UNIT CODE | 16 ITEM CODE | 17 TYPE | 18 CONT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PRODUCTION | | | | | NUMBER OF UNITS | | | | | | | | | | | | | |
| 1 WHEAT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 16.50 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.050 | 0.0 | 2. | 76. | 2. | 0. |
| 2 GRAZING | 0.05 | 0.05 | 0.05 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.10 | 0.10 | 10.000 | 0.0 | 10. | 89. | 2. | 0. |
| OPERATING INPUTS | | | | | | RATE/UNIT | | | | | | | PRICE | NUMBER UNITS | UNIT CODE | ITEM CODE | TYPE | CONT |
| 11 WHEAT SEED | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.75 | 0.0 | 0.0 | 0.0 | 5.000 | 0.0 | 2. | 176. | 3. | 0. |
| 12 NITROGEN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 60.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.140 | 0.0 | 12. | 211. | 3. | 0. |
| 13 CUSTOM COMBINE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 9.800 | 0.0 | 7. | 305. | 3. | 0. |
| 14 CUSTOM HAULING | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 16.50 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.100 | 0.0 | 2. | 306. | 3. | 0. |
| MACHINERY REQUIREMENTS | | | | | | TIMES OVER | | | | | | | XXXXX | XXXXX | POWER UNIT | MACH CODE | TYPE | CONT |
| 38 SWEEP | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 41. | 4. | 0. |
| 39 ROD WEEDER | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 59. | 4. | 0. |
| 40 DRILL WO/FERT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 61. | 4. | 0. |
| 41 ANHYDROUS APPLIC | 0.03 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 73. | 4. | 0. |

PANHANDLE ENERGY BUDGETS

MACHINERY COMPLEMENT 1
EQUIPMENT COMPLEMENT 1

***NO NAME CHANGES HAVE BEEN STORED WITH THIS BUDGET***

***NO COMPLEMENT CHANGES HAVE BEEN STORED WITH THIS BUDGET***

MONTHLY SUMMARY OF RECEIPTS AND EXPENSES

| CATEGORY | UNIT | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TOTAL RECEIPTS | ACRE | 0.50 | 0.50 | 0.50 | 0.0 | 0.0 | 33.82 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 1.00 | 37.32 |
| TOTAL EXPENSES | ACRE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 11.80 | 0.0 | 8.75 | 4.58 | 0.0 | 0.0 | 0.0 | 25.14 |
| RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT | | | | | | | | | | | | | | 12.18 |
| ANNUAL CAPITAL | DOL. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.01 | 7.29 | 3.44 | 0.0 | 0.0 | 0.0 | 10.73 |
| LABOR REQUIREMENTS BY MONTH | | | | | | | | | | | | | | |
| MACHINERY LABOR | HR. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.12 | 0.01 | 0.12 | 0.33 | 0.0 | 0.0 | 0.0 | 0.57 |

MACHINERY FIXED AND VARIABLE COSTS PER HOUR

| MACHINE | CODE | DEPR | INSUR. | TAX | TOTAL FIXED | REPAIR | FUEL | LUB. | TOTAL VARIABLE | INT. | HR/TIME |
|---|---|---|---|---|---|---|---|---|---|---|---|
| TRACTOR(4) | 4 | 1.05 | 0.06 | 0.16 | 1.27 | 0.72 | 1.49 | 0.22 | 2.44 | 1.06 | 1.00 |
| SWEEP | 41 | 2.12 | 0.09 | 0.26 | 2.48 | 0.83 | 0.0 | 0.0 | 0.83 | 1.57 | 0.10 |
| ROD WEEDER | 59 | 0.80 | 0.04 | 0.10 | 0.93 | 0.21 | 0.0 | 0.0 | 0.21 | 0.60 | 0.09 |
| DRILL WO/FERT | 61 | 1.65 | 0.07 | 0.21 | 1.93 | 0.44 | 0.0 | 0.0 | 0.44 | 1.24 | 0.18 |
| ANHYDROUS APPLIC | 73 | 0.56 | 0.03 | 0.07 | 0.66 | 0.37 | 0.0 | 0.0 | 0.37 | 0.43 | 0.26 |

| OPERATION | ITEM NO. | DATE | TIMES OVER | LABOR HOURS | MACHINE HOURS | FUEL,OIL,LUB., REPAIR PER ACRE | FIXED COSTS PER ACRE |
|---|---|---|---|---|---|---|---|
| SWEEP | 4,41 | AUG | 1.00 | 0.122 | 0.101 | 0.35 | 0.67 |
| ROD WEEDER | 4,59 | SEP | 1.00 | 0.114 | 0.094 | 0.27 | 0.39 |
| DRILL WO/FERT | 4,61 | SEP | 1.00 | 0.217 | 0.179 | 0.56 | 1.03 |
| SWEEP | 4,41 | JUN | 1.00 | 0.122 | 0.101 | 0.35 | 0.67 |
| TOTAL | | | | 0.574 | 0.474 | 1.54 | 2.74 |

## TABLE XXXVIII

## DRYLAND GRAIN SORGHUM, CLAY LOAM SOIL

| CATEGORY | UNITS | PRICE | QUANTITY | VALUE |
|---|---|---|---|---|
| PRODUCTION: | | | | |
| MILO | CWT. | 2.340 | 11.000 | 25.74 |
| MILO STUBBLE | AUMS | 6.000 | 0.750 | 4.50 |
| TOTAL RECEIPTS | | | | 30.24 |
| OPERATING INPUTS: | | | | |
| MILO SEED | LBS. | 0.270 | 4.000 | 1.08 |
| CUSTOM COMBINE | ACRE | 10.000 | 1.000 | 10.00 |
| CUSTOM HAULING | CWT. | 0.100 | 11.000 | 1.10 |
| TRACTOR FUEL COST | ACRE | | | 1.62 |
| TRACT REPAIR COST | ACRE | | | 0.79 |
| TRACTOR LUBE COST | ACRE | | | 0.24 |
| EQUIP REPAIR COST | ACRE | | | 0.37 |
| TOTAL OPERATING COST | | | | 15.21 |
| RETURNS TO LAND,LABOR,CAPITAL,MACHINERY, OVERHEAD,RISK,AND MANAGEMENT | | | | 15.03 |
| CAPITAL COST: | | | | |
| ANNUAL OPERATING CAPITAL | | 0.100 | 1.626 | 0.16 |
| TRACTOR INVESTMENT | | 0.100 | 11.563 | 1.16 |
| EQUIPMENT INVESTMENT | | 0.100 | 7.957 | 0.80 |
| TOTAL INTEREST CHARGE | | | | 2.11 |
| RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT | | | | 12.92 |
| OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE) | | | | |
| TRACTOR | DOL. | | | 1.38 |
| EQUIPMENT | DOL. | | | 1.26 |
| TOTAL OWNERSHIP COST | | | | 2.65 |
| RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT | | | | 10.27 |
| LABOR COST: | | | | |
| MACHINERY LABOR | HR. | 3.000 | 1.195 | 3.59 |
| TOTAL LABOR COST | | | | 3.59 |
| RETURNS TO LAND, OVERHEAD, RISK AND MANAGEMENT | | | | 6.69 |

PANHANDLE ENERGY BUDGETS

ENTERPRISE 73 AREA AND COUNTY 10 DETAIL 00 IRIG. LEVEL 0 LAND CLASS 5
GRAZING 0 MACH. COMP. 1 IRIG. SYSTEM 0 PRICE VECT 1 INDIV. NUMBER 1
ANNUAL CAPITAL MONTH:10
DATE PRINTED: 03/05/75

# TABLE XXXVIII (Continued)

| LINE | 1 JAN | 2 FEB | 3 MAR | 4 APR | 5 MAY | 6 JUN | 7 JUL | 8 AUG | 9 SEP | 10 OCT | 11 NOV | 12 DEC | 13 PRICE | 14 WEIGHT | 15 UNIT CODE | 16 ITEM CODE | 17 TYPE | 18 CONT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PRODUCTION | | | | | NUMBER OF UNITS | | | | | | | | | | | | | |
| 1 MILO | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 11.00 | 0.0 | 0.0 | 2.340 | 0.0 | 16. | 73. | 2. | 0. |
| 2 MILO STUBBLE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 0.0 | 6.000 | 0.0 | 10. | 157. | 2. | 0. |
| OPERATING INPUTS | | | | | | RATE/UNIT | | | | | | | PRICE | NUMBER UNITS | UNIT CODE | ITEM CODE | TYPE | CONT |
| 11 MILO SEED | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.270 | 0.0 | 12. | 173. | 3. | 0. |
| 12 CUSTOM COMBINE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 10.000 | 0.0 | 7. | 305. | 3. | 0. |
| 13 CUSTOM HAULING | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 11.00 | 0.0 | 0.0 | 0.100 | 0.0 | 16. | 306. | 3. | 0. |
| MACHINERY REQUIREMENTS | | | | | | TIMES OVER | | | | | | | XXXXX | XXXXX | POWER UNIT | MACH CODE | TYPE | CONT |
| 38 OFFSET DISK | 0.0 | 0.0 | 1.00 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 37. | 4. | 0. |
| 39 CHISEL | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 42. | 4. | 0. |
| 40 OFFSET DISK | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 37. | 4. | 0. |
| 41 CULTIBEDDER PLNT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 67. | 4. | 0. |
| 42 ROW CULTIVATOR | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 45. | 4. | 0. |

PANHANDLE ENERGY BUDGETS

MACHINERY COMPLEMENT 1
EQUIPMENT COMPLEMENT 1

***NO NAME CHANGES HAVE BEEN STORED WITH THIS BUDGET***

***NO COMPLEMENT CHANGES HAVE BEEN STORED WITH THIS BUDGET***

MONTHLY SUMMARY OF RECEIPTS AND EXPENSES

| CATEGORY | UNIT | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TOTAL RECEIPTS | ACRE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 27.24 | 3.00 | 0.0 | 30.24 |
| TOTAL EXPENSES | ACRE | 0.0 | 0.0 | 1.00 | 0.40 | 0.0 | 2.01 | 0.70 | 0.0 | 0.0 | 11.10 | 0.0 | 0.0 | 15.21 |
| RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT | | | | | | | | | | | | | | 15.03 |
| ANNUAL CAPITAL | DOL. | 0.0 | 0.0 | 0.58 | 0.20 | 0.0 | 0.67 | 0.17 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.63 |
| LABOR REQUIREMENTS BY MONTH | | | | | | | | | | | | | | |
| MACHINERY LABOR | HR. | 0.0 | 0.0 | 0.41 | 0.16 | 0.0 | 0.34 | 0.29 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.20 |

MACHINERY FIXED AND VARIABLE COSTS PER HOUR

| MACHINE | CODE | DEPR | INSUR. | TAX | TOTAL FIXED | REPAIR | FUEL | LUB. | TOTAL VARIABLE | INT. | HR/TIME |
|---|---|---|---|---|---|---|---|---|---|---|---|
| TRACTOR(4) | 4 | 1.05 | 0.06 | 0.16 | 1.27 | 0.72 | 1.49 | 0.22 | 2.44 | 1.06 | 1.00 |
| OFFSET DISK | 37 | 1.66 | 0.07 | 0.21 | 1.94 | 0.43 | 0.0 | 0.0 | 0.43 | 1.24 | 0.13 |
| CHISEL | 42 | 0.52 | 0.02 | 0.06 | 0.61 | 0.14 | 0.0 | 0.0 | 0.14 | 0.39 | 0.21 |
| OFFSET DISK | 37 | 1.66 | 0.07 | 0.21 | 1.94 | 0.43 | 0.0 | 0.0 | 0.43 | 1.24 | 0.13 |
| CULTIBEDDER PLNT | 67 | 1.24 | 0.05 | 0.13 | 1.42 | 0.77 | 0.0 | 0.0 | 0.77 | 0.82 | 0.15 |
| ROW CULTIVATOR | 45 | 0.60 | 0.03 | 0.07 | 0.70 | 0.25 | 0.0 | 0.0 | 0.25 | 0.45 | 0.24 |

| OPERATION | ITEM NO. | DATE | TIMES OVER | LABOR HOURS | MACHINE HOURS | FUEL,OIL,LUB., REPAIR PER ACRE | FIXED COSTS PER ACRE |
|---|---|---|---|---|---|---|---|
| OFFSET DISK | 4,37 | MAR | 1.00 | 0.157 | 0.129 | 0.40 | 0.74 |
| CHISEL | 4,42 | MAR | 1.00 | 0.254 | 0.210 | 0.59 | 0.75 |
| OFFSET DISK | 4,37 | APR | 1.00 | 0.157 | 0.129 | 0.40 | 0.74 |
| OFFSET DISK | 4,37 | JUN | 1.00 | 0.157 | 0.129 | 0.40 | 0.74 |
| CULTIBEDDER PLNT | 4,67 | JUN | 1.00 | 0.184 | 0.152 | 0.52 | 0.73 |
| ROW CULTIVATOR | 4,45 | JUL | 1.00 | 0.288 | 0.238 | 0.70 | 0.89 |
| TOTAL | | | | 1.195 | 0.988 | 3.03 | 4.60 |

TABLE XXXIX

DRYLAND GRAIN SORGHUM, SANDY LOAM SOIL

| CATEGORY | UNITS | PRICE | QUANTITY | VALUE |
|---|---|---|---|---|
| PRODUCTION: | | | | |
| MILO | CWT. | 2.340 | 21.000 | 49.14 |
| MILO STUBBLE | AUMS | 6.000 | 0.750 | 4.50 |
| TOTAL RECEIPTS | | | | 53.64 |
| OPERATING INPUTS: | | | | |
| MILO SEED | LBS. | 0.270 | 4.000 | 1.08 |
| NITROGEN | LBS. | 0.140 | 50.000 | 7.00 |
| INSECTICIDE | ACRE | 2.200 | 1.000 | 2.20 |
| CUSTOM COMBINE | ACRE | 10.000 | 1.000 | 10.00 |
| CUSTOM HAULING | CWT. | 0.100 | 21.000 | 2.10 |
| TRACTOR FUEL COST | ACRE | | | 1.62 |
| TRACT REPAIR COST | ACRE | | | 0.79 |
| TRACTOR LUBE COST | ACRE | | | 0.24 |
| EQUIP REPAIR COST | ACRE | | | 0.37 |
| TOTAL OPERATING COST | | | | 25.41 |
| RETURNS TO LAND,LABOR,CAPITAL,MACHINERY, OVERHEAD,RISK,AND MANAGEMENT | | | | 28.23 |
| CAPITAL COST: | | | | |
| ANNUAL OPERATING CAPITAL | | 0.100 | 5.093 | 0.51 |
| TRACTOR INVESTMENT | | 0.100 | 11.563 | 1.16 |
| EQUIPMENT INVESTMENT | | 0.100 | 7.957 | 0.80 |
| TOTAL INTEREST CHARGE | | | | 2.46 |
| RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT | | | | 25.77 |
| OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE) | | | | |
| TRACTOR | DOL. | | | 1.38 |
| EQUIPMENT | DOL. | | | 1.26 |
| TOTAL OWNERSHIP COST | | | | 2.65 |
| RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT | | | | 23.13 |
| LABOR COST: | | | | |
| MACHINERY LABOR | HR. | 3.000 | 1.195 | 3.59 |
| TOTAL LABOR COST | | | | 3.59 |
| RETURNS TO LAND, OVERHEAD, RISK AND MANAGEMENT | | | | 19.54 |

PANHANDLE ENERGY BUDGETS

ENTERPRISE 73 AREA AND COUNTY 10 DETAIL 00 IRIG. LEVEL 0 LAND CLASS 8
GRAZING 0 MACH. COMP. _1 IRIG. SYSTEM 0 PRICE VECT 1 INDIV. NUMBER _0
ANNUAL CAPITAL MONTH=10
DATE PRINTED: 03/05/75

# TABLE XXXIX (Continued)

| LINE | 1 JAN | 2 FEB | 3 MAR | 4 APR | 5 MAY | 6 JUN | 7 JUL | 8 AUG | 9 SEP | 10 OCT | 11 NOV | 12 DEC | 13 PRICE | 14 WEIGHT | 15 UNIT CODE | 16 ITEM CODE | 17 TYPE | 18 CONT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PRODUCTION | | | | | NUMBER OF UNITS | | | | | | | | | | | | | |
| 1 MILO | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 21.00 | 0.0 | 0.0 | 2.340 | 0.0 | 16. | 73. | 2. | 0. |
| 2 MILO STUBBLE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.50 | 0.0 | 6.000 | 0.0 | 10. | 157. | 2. | 0. |
| OPERATING INPUTS | | | | | RATE/UNIT | | | | | | | | PRICE | NUMBER UNITS | UNIT CODE | ITEM CODE | TYPE | CONT |
| 11 MILO SEED | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.270 | 0.0 | 12. | 173. | 3. | 0. |
| 12 NITROGEN | 0.0 | 0.0 | 0.0 | 0.0 | 50.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.140 | 0.0 | 12. | 211. | 3. | 0. |
| 13 INSECTICIDE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.200 | 0.0 | 7. | 240. | 3. | 0. |
| 14 CUSTOM COMBINE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 10.000 | 0.0 | 7. | 305. | 3. | 0. |
| 15 CUSTOM HAULING | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 21.00 | 0.0 | 0.0 | 0.100 | 0.0 | 16. | 306. | 3. | 0. |
| MACHINERY REQUIREMENTS | | | | | | TIMES OVER | | | | | | | XXXXX | XXXXX | POWER UNIT | MACH CODE | TYPE | CONT |
| 38 OFFSET DISK | 0.0 | 0.0 | 1.00 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 37. | 4. | 0. |
| 39 CHISEL | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 42. | 4. | 0. |
| 40 OFFSET DISK | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 37. | 4. | 0. |
| 41 CULTIBEDDER PLNT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 67. | 4. | 0. |
| 42 ROW CULTIVATOR | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 45. | 4. | 0. |

PANHANDLE ENERGY BUDGETS

MACHINERY COMPLEMENT 1
EQUIPMENT COMPLEMENT 1

***NO NAME CHANGES HAVE BEEN STORED WITH THIS BUDGET***

***NO COMPLEMENT CHANGES HAVE BEEN STORED WITH THIS BUDGET***

MONTHLY SUMMARY OF RECEIPTS AND EXPENSES

| CATEGORY | UNIT | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TOTAL RECEIPTS | ACRE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 50.64 | 3.00 | 0.0 | 53.64 |
| TOTAL EXPENSES | ACRE | 0.0 | 0.0 | 1.00 | 0.40 | 7.00 | 2.01 | 2.90 | 0.0 | 0.0 | 12.10 | 0.0 | 0.0 | 25.41 |
| RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT | | | | | | | | | | | | | | 28.23 |
| ANNUAL CAPITAL | DOL. | 0.0 | 0.0 | 0.58 | 0.20 | 2.92 | 0.67 | 0.72 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 5.09 |
| LABOR REQUIREMENTS BY MONTH | | | | | | | | | | | | | | |
| MACHINERY LABOR | HR. | 0.0 | 0.0 | 0.41 | 0.16 | 0.0 | 0.34 | 0.29 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.20 |

MACHINERY FIXED AND VARIABLE COSTS PER HOUR

| MACHINE | CODE | DEPR | INSUR. | TAX | TOTAL FIXED | REPAIR | FUEL | LUB. | TOTAL VARIABLE | INT. | HP/TIME |
|---|---|---|---|---|---|---|---|---|---|---|---|
| TRACTOR(4) | 4 | 1.05 | 0.06 | 0.16 | 1.27 | 0.72 | 1.49 | 0.22 | 2.44 | 1.06 | 1.00 |
| OFFSET DISK | 37 | 1.66 | 0.07 | 0.21 | 1.94 | 0.43 | 0.0 | 0.0 | 0.43 | 1.24 | 0.13 |
| CHISEL | 42 | 0.52 | 0.02 | 0.06 | 0.61 | 0.14 | 0.0 | 0.0 | 0.14 | 0.39 | 0.21 |
| OFFSET DISK | 37 | 1.66 | 0.07 | 0.21 | 1.94 | 0.43 | 0.0 | 0.0 | 0.43 | 1.24 | 0.13 |
| CULTIBEDDER PLNT | 67 | 1.24 | 0.05 | 0.13 | 1.42 | 0.77 | 0.0 | 0.0 | 0.77 | 0.82 | 0.15 |
| ROW CULTIVATOR | 45 | 0.60 | 0.03 | 0.07 | 0.70 | 0.25 | 0.0 | 0.0 | 0.25 | 0.45 | 0.24 |

| OPERATION | ITEM NO. | DATE | TIMES OVER | LABOR HOURS | MACHINE HOURS | FUEL,OIL,LUB., REPAIR PER ACRE | FIXED COSTS PER ACRE |
|---|---|---|---|---|---|---|---|
| OFFSET DISK | 4,37 | MAR | 1.00 | 0.157 | 0.129 | 0.40 | 0.74 |
| CHISEL | 4,42 | MAR | 1.00 | 0.254 | 0.210 | 0.59 | 0.75 |
| OFFSET DISK | 4,37 | APR | 1.00 | 0.157 | 0.129 | 0.40 | 0.74 |
| OFFSET DISK | 4,37 | JUN | 1.00 | 0.157 | 0.129 | 0.40 | 0.74 |
| CULTIBEDDER PLNT | 4,67 | JUN | 1.00 | 0.184 | 0.152 | 0.52 | 0.73 |
| ROW CULTIVATOR | 4,45 | JUL | 1.00 | 0.288 | 0.238 | 0.70 | 0.89 |
| TOTAL | | | | 1.195 | 0.988 | 3.03 | 4.60 |

# TABLE XL

## DRYLAND SMALL GRAIN GRAZE-OUT, CLAY LOAM SOIL

| CATEGORY | UNITS | PRICE | QUANTITY | VALUE |
|---|---|---|---|---|
| PRODUCTION: | | | | |
| GRAZED WHEAT | AUMS | 10.000 | 2.400 | 24.00 |
| TOTAL RECEIPTS | | . | | 24.00 |
| OPERATING INPUTS: | | | | |
| WHEAT SEED | BU. | 5.000 | 1.000 | 5.00 |
| NITROGEN | LBS. | 0.140 | 30.000 | 4.20 |
| PHOSPHATE | LBS. | 0.250 | 30.000 | 7.50 |
| TRACTOR FUEL COST | ACRE | | | 1.20 |
| TRACT REPAIR COST | ACRE | | | 0.58 |
| TRACTOR LUBE COST | ACRE | | | 0.18 |
| EQUIP REPAIR COST | ACRE | | | 0.25 |
| TOTAL OPERATING COST | | | | 18.91 |
| RETURNS TO LAND,LABOR,CAPITAL,MACHINERY, OVERHEAD,RISK,AND MANAGEMENT | | | | 5.09 |
| CAPITAL COST: | | | | |
| ANNUAL OPERATING CAPITAL | | 0.100 | 14.817 | 1.48 |
| TRACTOR INVESTMENT | | 0.100 | 8.558 | 0.86 |
| EQUIPMENT INVESTMENT | | 0.100 | 6.203 | 0.62 |
| TOTAL INTEREST CHARGE | | | | 2.96 |
| RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT | | | | 2.13 |
| OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE) | | | | |
| TRACTOR | DOL. | | | 1.02 |
| EQUIPMENT | DOL. | | | 0.97 |
| TOTAL OWNERSHIP COST | | | | 1.99 |
| RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT | | | | 0.14 |
| LABOR COST: | | | | |
| MACHINERY LABOR | HR. | 3.000 | 0.885 | 2.65 |
| TOTAL LABOR COST | | | | 2.65 |
| RETURNS TO LAND, OVERHEAD, RISK AND MANAGEMENT | | | | -2.51 |

PANHANDLE ENERGY BUDGETS

ENTERPRISE 89 AREA AND COUNTY 10 DETAIL 00 IRIG. LEVEL 0 LAND CLASS 1
GRAZING 6 MACH. COMP. 1 IRIG. SYSTEM 0 PRICE VECT 1 INDIV. NUMBER 1
ANNUAL CAPITAL MONTH: 6
DATE PRINTED: 03/05/75

# TABLE XL (Continued)

| LINE | 1 JAN | 2 FEB | 3 MAR | 4 APR | 5 MAY | 6 JUN | 7 JUL | 8 AUG | 9 SEP | 10 OCT | 11 NOV | 12 DEC | 13 PRICE | 14 WEIGHT | 15 UNIT CODE | 16 ITEM CODE | 17 TYPE | 18 CONT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PRODUCTION | | | | | NUMBER OF UNITS | | | | | | | | | | | | | |
| 1 GRAZED WHEAT | 0.06 | 0.06 | 0.32 | 0.82 | 0.50 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.32 | 0.32 | 10.000 | 0.0 | 10. | 76. | 2. | 0. |
| OPERATING INPUTS | | | | | RATE/UNIT | | | | | | | | PRICE | NUMBER UNITS | UNIT CODE | ITEM CODE | TYPE | CONT |
| 11 WHEAT SEED | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 5.000 | 0.0 | 2. | 176. | 3. | 0. |
| 12 NITROGEN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 30.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.140 | 0.0 | 12. | 211. | 3. | 0. |
| 13 PHOSPHATE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 30.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.250 | 0.0 | 12. | 214. | 3. | 0. |
| MACHINERY REQUIREMENTS | | | | | | TIMES OVER | | | | | | | XXXXX | XXXXX | POWER UNIT | MACH CODE | TYPE | CONT |
| 38 CHISEL | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 42. | 4. | 0. |
| 39 TANDEM DISK | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 35. | 4. | 0. |
| 40 SWEEP | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 41. | 4. | 0. |
| 41 ROD WEEDER | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 59. | 4. | 0. |
| 42 DRILL WO/FERT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 61. | 4. | 0. |

PANHANDLE ENERGY BUDGETS

MACHINERY COMPLEMENT 1
EQUIPMENT COMPLEMENT 1

***NO NAME CHANGES HAVE BEEN STORED WITH THIS BUDGET***

***NO COMPLEMENT CHANGES HAVE BEEN STORED WITH THIS BUDGET***

MONTHLY SUMMARY OF RECEIPTS AND EXPENSES

| CATEGORY | UNIT | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TOTAL RECEIPTS | ACRE | 0.60 | 0.60 | 3.20 | 8.20 | 5.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.20 | 3.20 | 24.00 |
| TOTAL EXPENSES | ACRE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.59 | 0.43 | 12.05 | 5.83 | 0.0 | 0.0 | 0.0 | 18.91 |
| RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT | | | | | | | | | | | | | | 5.09 |
| ANNUAL CAPITAL | DOL. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.40 | 10.04 | 4.38 | 0.0 | 0.0 | 0.0 | 14.82 |
| LABOR REQUIREMENTS BY MONTH | | | | | | | | | | | | | | |
| MACHINERY LABOR | HR. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.18 | 0.12 | 0.33 | 0.0 | 0.0 | 0.0 | 0.88 |

MACHINERY FIXED AND VARIABLE COSTS PER HOUR

| MACHINE | CODE | DEPR | INSUR. | TAX | TOTAL FIXED | REPAIR | FUEL | LUB. | TOTAL VARIABLE | INT. | HR/TIME |
|---|---|---|---|---|---|---|---|---|---|---|---|
| TRACTOR(4) | 4 | 1.05 | 0.06 | 0.16 | 1.27 | 0.72 | 1.49 | 0.22 | 2.44 | 1.06 | 1.00 |
| CHISEL | 42 | 0.52 | 0.02 | 0.06 | 0.61 | 0.14 | 0.0 | 0.0 | 0.14 | 0.39 | 0.21 |
| TANDEM DISK | 35 | 0.91 | 0.04 | 0.11 | 1.06 | 0.24 | 0.0 | 0.0 | 0.24 | 0.68 | 0.15 |
| SWEEP | 41 | 2.12 | 0.09 | 0.26 | 2.48 | 0.83 | 0.0 | 0.0 | 0.83 | 1.57 | 0.10 |
| ROD WEEDER | 59 | 0.80 | 0.04 | 0.10 | 0.93 | 0.21 | 0.0 | 0.0 | 0.21 | 0.60 | 0.09 |
| DRILL WO/FERT | 61 | 1.65 | 0.07 | 0.21 | 1.93 | 0.44 | 0.0 | 0.0 | 0.44 | 1.24 | 0.18 |

| OPERATION | ITEM NO. | DATE | TIMES OVER | LABOR HOURS | MACHINE HOURS | FUEL,OIL,LUB., REPAIR PER ACRE | FIXED COSTS PER ACRE |
|---|---|---|---|---|---|---|---|
| TANDEM DISK | 4,35 | JUL | 1.00 | 0.179 | 0.148 | 0.43 | 0.64 |
| SWEEP | 4,41 | AUG | 1.00 | 0.122 | 0.101 | 0.35 | 0.67 |
| ROD WEEDER | 4,59 | SEP | 1.00 | 0.114 | 0.094 | 0.27 | 0.39 |
| DRILL WO/FERT | 4,61 | SEP | 1.00 | 0.217 | 0.179 | 0.56 | 1.03 |
| CHISEL | 4,42 | JUN | 1.00 | 0.254 | 0.210 | 0.59 | 0.75 |
| TOTAL | | | | 0.885 | 0.731 | 2.21 | 3.46 |

# TABLE XLI

## DRYLAND SMALL GRAIN GRAZE-OUT, SANDY LOAM SOIL

| CATEGORY | UNITS | PRICE | QUANTITY | VALUE |
|---|---|---|---|---|
| PRODUCTION: | | | | |
| GRAZED WHEAT | AUMS | 10.000 | 2.400 | 24.00 |
| TOTAL RECEIPTS | | | | 24.00 |
| OPERATING INPUTS: | | | | |
| WHEAT SEED | BU. | 5.000 | 1.000 | 5.00 |
| NITROGEN | LBS. | 0.140 | 30.000 | 4.20 |
| PHOSPHATE | LBS. | 0.250 | 30.000 | 7.50 |
| TRACTOR FUEL COST | ACRE | | | 1.20 |
| TRACT REPAIR COST | ACRE | | | 0.58 |
| TRACTOR LUBE COST | ACRE | | | 0.18 |
| EQUIP REPAIR COST | ACRE | | | 0.25 |
| TOTAL OPERATING COST | | | | 18.91 |
| RETURNS TO LAND,LABOR,CAPITAL,MACHINERY, OVERHEAD,RISK,AND MANAGEMENT | | | | 5.09 |
| CAPITAL COST: | | | | |
| ANNUAL OPERATING CAPITAL | | 0.100 | 14.817 | 1.48 |
| TRACTOR INVESTMENT | | 0.100 | 8.558 | 0.86 |
| EQUIPMENT INVESTMENT | | 0.100 | 6.203 | 0.62 |
| TOTAL INTEREST CHARGE | | | | 2.96 |
| RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT | | | | 2.13 |
| OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE) | | | | |
| TRACTOR | DOL. | | | 1.02 |
| EQUIPMENT | DOL. | | | 0.97 |
| TOTAL OWNERSHIP COST | | | | 1.99 |
| RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT | | | | 0.14 |
| LABOR COST: | | | | |
| MACHINERY LABOR | HR. | 3.000 | 0.885 | 2.65 |
| TOTAL LABOR COST | | | | 2.65 |
| RETURNS TO LAND, OVERHEAD, RISK AND MANAGEMENT | | | | -2.51 |

PANHANDLE ENERGY BUDGETS

ENTERPRISE 89 AREA AND COUNTY 10 DETAIL 00 IRIG. LEVEL 0 LAND CLASS 8
GRAZING 6 MACH. COMP. 1 IRIG. SYSTEM 0 PRICE VECT 1 INDIV. NUMBER 1
ANNUAL CAPITAL MONTH: 6
DATE PRINTED: 03/05/75

# TABLE XLI (Continued)

| LINE | 1 JAN | 2 FEB | 3 MAR | 4 APR | 5 MAY | 6 JUN | 7 JUL | 8 AUG | 9 SEP | 10 OCT | 11 NOV | 12 DEC | 13 PRICE | 14 WEIGHT | 15 UNIT CODE | 16 ITEM CODE | 17 TYPE | 18 CONT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PRODUCTION | | | | | NUMBER OF UNITS | | | | | | | | | | | | | |
| 1 GRAZED WHEAT | 0.06 | 0.06 | 0.32 | 0.82 | 0.50 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.32 | 0.32 | 10.000 | 0.0 | 10. | 76. | 2. | 0. |
| OPERATING INPUTS | | | | | RATE/UNIT | | | | | | | | PRICE | NUMBER UNITS | UNIT CODE | ITEM CODE | TYPE | CONT |
| 11 WHEAT SEED | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 5.000 | 0.0 | 2. | 176. | 3. | 0. |
| 12 NITROGEN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 30.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.140 | 0.0 | 12. | 211. | 3. | 0. |
| 13 PHOSPHATE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 30.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.250 | 0.0 | 12. | 214. | 3. | 0. |
| MACHINERY REQUIREMENTS | | | | | | TIMES OVER | | | | | | | XXXXX | XXXXX | POWER UNIT | MACH CODE | TYPE | CONT |
| 38 CHISEL | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 42. | 4. | 0. |
| 39 TANDEM DISK | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 35. | 4. | 0. |
| 40 SWEEP | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 41. | 4. | 0. |
| 41 ROD WEEDER | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 59. | 4. | 0. |
| 42 DRILL WO/FERT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 61. | 4. | 0. |

PANHANDLE ENERGY BUDGETS

MACHINERY COMPLEMENT 1
EQUIPMENT COMPLEMENT 1

***NO NAME CHANGES HAVE BEEN STORED WITH THIS BUDGET***

***NO COMPLEMENT CHANGES HAVE BEEN STORED WITH THIS BUDGET***

MONTHLY SUMMARY OF RECEIPTS AND EXPENSES

| CATEGORY | UNIT | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TOTAL RECEIPTS | ACRE | 0.60 | 0.60 | 3.20 | 8.20 | 5.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.20 | 3.20 | 24.00 |
| TOTAL EXPENSES | ACRE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.59 | 0.43 | 12.05 | 5.83 | 0.0 | 0.0 | 0.0 | 18.91 |
| RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT | | | | | | | | | | | | | | 5.09 |
| ANNUAL CAPITAL | DOL. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.40 | 10.04 | 4.38 | 0.0 | 0.0 | 0.0 | 14.82 |
| LABOR REQUIREMENTS BY MONTH | | | | | | | | | | | | | | |
| MACHINERY LABOR | HR. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.18 | 0.12 | 0.33 | 0.0 | 0.0 | 0.0 | 0.88 |

MACHINERY FIXED AND VARIABLE COSTS PER HOUR

| MACHINE | CODE | DEPR | INSUR. | TAX | TOTAL FIXED | REPAIR | FUEL | LUB. | TOTAL VARIABLE | INT. | HR/TIME |
|---|---|---|---|---|---|---|---|---|---|---|---|
| TRACTOR(4) | 4 | 1.05 | 0.06 | 0.16 | 1.27 | 0.72 | 1.49 | 0.22 | 2.44 | 1.06 | 1.00 |
| CHISEL | 42 | 0.52 | 0.02 | 0.06 | 0.61 | 0.14 | 0.0 | 0.0 | 0.14 | 0.39 | 0.21 |
| TANDEM DISK | 35 | 0.91 | 0.04 | 0.11 | 1.06 | 0.24 | 0.0 | 0.0 | 0.24 | 0.68 | 0.15 |
| SWEEP | 41 | 2.12 | 0.09 | 0.26 | 2.48 | 0.83 | 0.0 | 0.0 | 0.83 | 1.57 | 0.10 |
| ROD WEEDER | 59 | 0.80 | 0.04 | 0.10 | 0.93 | 0.21 | 0.0 | 0.0 | 0.21 | 0.60 | 0.09 |
| DRILL WO/FERT | 61 | 1.65 | 0.07 | 0.21 | 1.93 | 0.44 | 0.0 | 0.0 | 0.44 | 1.24 | 0.18 |

| OPERATION | ITEM NO. | DATE | TIMES OVER | LABOR HOURS | MACHINE HOURS | FUEL,OIL,LUB., REPAIR PER ACRE | FIXED COSTS PER ACRE |
|---|---|---|---|---|---|---|---|
| TANDEM DISK | 4,35 | JUL | 1.00 | 0.179 | 0.148 | 0.43 | 0.64 |
| SWEEP | 4,41 | AUG | 1.00 | 0.122 | 0.101 | 0.35 | 0.67 |
| ROD WEEDER | 4,59 | SEP | 1.00 | 0.114 | 0.094 | 0.27 | 0.39 |
| DRILL WO/FERT | 4,61 | SEP | 1.00 | 0.217 | 0.179 | 0.56 | 1.03 |
| CHISEL | 4,42 | JUN | 1.00 | 0.254 | 0.210 | 0.59 | 0.75 |
| TOTAL | | | | 0.885 | 0.731 | 2.21 | 3.46 |

# TABLE XLII

## CONVENTIONAL TILLAGE CORN GRAIN ON SANDY LOAM SOIL UNDER CIRCULAR SPRINKLER IRRIGATION

| CATEGORY | UNITS | PRICE | QUANTITY | VALUE |
|---|---|---|---|---|
| PRODUCTION: | | | | |
| CORN | BU. | 1.380 | 120.000 | 165.60 |
| TOTAL RECEIPTS | | | | 165.60 |
| OPERATING INPUTS: | | | | |
| CORN SEED | LBS. | 0.520 | 20.000 | 10.40 |
| NITROGEN | LBS. | 0.300 | 100.000 | 30.00 |
| NITROGEN | LBS. | 0.140 | 100.000 | 14.00 |
| PHOSPHATE | LBS. | 0.250 | 50.000 | 12.50 |
| PRE-MERGE HERB | LBS. | 2.820 | 2.000 | 5.64 |
| INSECTICIDE | ACRE | 8.000 | 1.000 | 8.00 |
| CUSTOM COMBINE | BU. | 0.200 | 120.000 | 24.00 |
| CUSTOM HAULING | BU. | 0.100 | 120.000 | 12.00 |
| TRACTOR FUEL COST | ACRE | | | 2.69 |
| TRACT REPAIR COST | ACRE | | | 1.30 |
| TRACTOR LUBE COST | ACRE | | | 0.40 |
| EQUIP REPAIR COST | ACRE | | | 0.82 |
| IRRIG FUEL COST | ACRE | | | 8.13 |
| IRRIG LUBE COST | ACRE | | | 1.63 |
| IRRIG REPAIR COST | ACRE | | | 10.25 |
| TOTAL OPERATING COST | | | | 141.76 |
| RETURNS TO LAND,LABOR,CAPITAL,MACHINERY, OVERHEAD,RISK,AND MANAGEMENT | | | | 23.84 |
| CAPITAL COST: | | | | |
| ANNUAL OPERATING CAPITAL | | 0.100 | 42.633 | 4.26 |
| TRACTOR INVESTMENT | | 0.100 | 19.173 | 1.92 |
| EQUIPMENT INVESTMENT | | 0.100 | 8.519 | 0.85 |
| IRRIGATION SYSTEM INVESTMENT | | 0.100 | 96.024 | 9.60 |
| TOTAL INTEREST CHARGE | | | | 16.63 |
| RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT | | | | 7.20 |
| OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE) | | | | |
| TRACTOR | DOL. | | | 2.29 |
| EQUIPMENT | DOL. | | | 1.36 |
| IRRIGATION SYSTEM | DOL. | | | 25.05 |
| TOTAL OWNERSHIP COST | | | | 28.70 |
| RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT | | | | -21.50 |
| LABOR COST: | | | | |
| MACHINERY LABOR | HR. | 3.000 | 2.094 | 6.28 |
| IRRIGATION LABOR | HR. | 3.000 | 1.248 | 3.74 |
| TOTAL LABOR COST | | | | 10.03 |
| RETURNS TO LAND, OVERHEAD, RISK AND MANAGEMENT | | | | -31.52 |

PANHANDLE ENERGY BUDGETS

ENTERPRISE 72 AREA AND COUNTY 12 DETAIL 00 IRIG. LEVEL 6 LAND CLASS 8
GRAZING 2 MACH. COMP. 1 IRIG. SYSTEM 4 PRICE VECT 1 INDIV. NUMBER 0
ANNUAL CAPITAL MONTH:10
DATE PRINTED: 03/05/75

# TABLE XLII (Continued)

| LINE | 1 JAN | 2 FEB | 3 MAR | 4 APR | 5 MAY | 6 JUN | 7 JUL | 8 AUG | 9 SEP | 10 OCT | 11 NOV | 12 DEC | 13 PRICE | 14 WEIGHT | 15 UNIT CODE | 16 ITEM CODE | 17 TYPE | 18 CONT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PRODUCTION | | | | | NUMBER OF UNITS | | | | | | | | | | | | | |
| 1 CORN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 120.00 | 0.0 | 0.0 | 1.380 | 0.0 | 2. | 72. | 2. | 0. |
| OPERATING INPUTS | | | | | RATE/UNIT | | | | | | | | PRICE | NUMBER UNITS | UNIT CODE | ITEM CODE | TYPE | CONT |
| 11 CORN SEED | 0.0 | 0.0 | 0.0 | 0.0 | 20.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.520 | 0.0 | 12. | 172. | 3. | 0. |
| 12 NITROGEN | 0.0 | 0.0 | 0.0 | 100.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.300 | 0.0 | 12. | 211. | 3. | 0. |
| 13 NITROGEN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 50.00 | 50.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.140 | 0.0 | 12. | 211. | 3. | 0. |
| 14 PHOSPHATE | 0.0 | 0.0 | 0.0 | 50.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.250 | 0.0 | 12. | 214. | 3. | 0. |
| 15 PRE-MERGE HERB | 0.0 | 0.0 | 0.0 | 2.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.820 | 0.0 | 12. | 254. | 3. | 0. |
| 16 INSECTICIDE | 0.0 | 0.0 | 0.0 | 0.0 | 0.50 | 0.0 | 0.50 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 8.000 | 0.0 | 7. | 240. | 3. | 0. |
| 17 CUSTOM COMBINE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 120.00 | 0.0 | 0.0 | 0.200 | 0.0 | 2. | 305. | 3. | 0. |
| 18 CUSTOM HAULING | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 120.00 | 0.0 | 0.0 | 0.100 | 0.0 | 2. | 306. | 3. | 0. |
| MACHINERY REQUIREMENTS | | | | | | TIMES OVER | | | | | | | XXXXX | XXXXX | POWER UNIT | MACH CODE | TYPE | CONT |
| 38 STALK SHREDDER | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 4. | 81. | 4. | 0. |
| 39 OFFSET DISK | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 37. | 4. | 0. |
| 40 CHISEL | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 42. | 4. | 0. |
| 41 DRY FERT SPREAD | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 71. | 4. | 0. |
| 42 ANHYDROUS APPLIC | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 73. | 4. | 0. |
| 43 SPRAYER | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2. | 74. | 4. | 0. |
| 44 CULTIBEDDER PLNT | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 67. | 4. | 0. |
| 45 ROTARY HOE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 57. | 4. | 0. |
| 49 ACIN IRRIG WATER | 0.0 | 0.0 | 0.0 | 6.00 | 0.0 | 7.20 | 7.20 | 3.60 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | | |

PANHANDLE ENERGY BUDGETS

MACHINERY COMPLEMENT 1
EQUIPMENT COMPLEMENT 1

***NO NAME CHANGES HAVE BEEN STORED WITH THIS BUDGET***

***NO COMPLEMENT CHANGES HAVE BEEN STORED WITH THIS BUDGET***

MONTHLY SUMMARY OF RECEIPTS AND EXPENSES

| CATEGORY | UNIT | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TOTAL RECEIPTS | ACRE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 165.60 | 0.0 | 0.0 | 165.60 |
| TOTAL EXPENSES | ACRE | 0.0 | 0.0 | 0.40 | 53.42 | 16.11 | 6.73 | 17.79 | 10.78 | 0.0 | 36.00 | 0.53 | 0.0 | 141.76 |
| RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT | | | | | | | | | | | | | | 23.84 |
| ANNUAL CAPITAL | DOL. | 0.0 | 0.0 | 0.24 | 26.71 | 6.71 | 2.24 | 4.45 | 1.80 | 0.0 | 0.0 | 0.49 | 0.0 | 42.63 |
| LABOR REQUIREMENTS BY MONTH | | | | | | | | | | | | | | |
| MACHINERY LABOR | HR. | 0.0 | 0.0 | 0.16 | 0.11 | 0.80 | 0.19 | 0.31 | 0.31 | 0.0 | 0.0 | 0.21 | 0.0 | 2.09 |
| IRRIGATION LABOR | HR. | 0.0 | 0.0 | 0.0 | 0.31 | 0.0 | 0.37 | 0.37 | 0.19 | 0.0 | 0.0 | 0.0 | 0.0 | 1.25 |
| TOTAL LABOR | HR. | 0.0 | 0.0 | 0.16 | 0.42 | 0.80 | 0.56 | 0.68 | 0.50 | 0.0 | 0.0 | 0.21 | 0.0 | 3.34 |
| IRRIGATION WATER | INCH | 0.0 | 0.0 | 0.0 | 6.00 | 0.0 | 7.20 | 7.20 | 3.60 | 0.0 | 0.0 | 0.0 | 0.0 | 24.00 |

MACHINERY FIXED AND VARIABLE COSTS PER HOUR

| MACHINE | CODE | DEPR | INSUR. | TAX | TOTAL FIXED | REPAIR | FUEL | LUB. | TOTAL VARIABLE | INT. | HF/TIME |
|---|---|---|---|---|---|---|---|---|---|---|---|
| TRACTOR(2) | 2 | 0.73 | 0.04 | 0.11 | 0.88 | 0.50 | 1.04 | 0.16 | 1.69 | 0.74 | 1.00 |
| TRACTOR(4) | 4 | 1.05 | 0.06 | 0.16 | 1.27 | 0.72 | 1.49 | 0.22 | 2.44 | 1.06 | 1.00 |
| STALK SHREDDER | 81 | 0.59 | 0.02 | 0.06 | 0.68 | 0.33 | 0.0 | 0.0 | 0.33 | 0.39 | 0.18 |
| OFFSET DISK | 37 | 1.66 | 0.07 | 0.21 | 1.94 | 0.43 | 0.0 | 0.0 | 0.43 | 1.24 | 0.13 |
| CHISEL | 42 | 0.52 | 0.02 | 0.06 | 0.61 | 0.14 | 0.0 | 0.0 | 0.14 | 0.39 | 0.21 |
| DRY FERT SPREAD | 71 | 0.68 | 0.03 | 0.08 | 0.80 | 0.29 | 0.0 | 0.0 | 0.29 | 0.51 | 0.09 |
| ANHYDROUS APPLIC | 73 | 0.56 | 0.03 | 0.07 | 0.66 | 0.37 | 0.0 | 0.0 | 0.37 | 0.43 | 0.26 |
| SPRAYER | 74 | 0.40 | 0.02 | 0.05 | 0.47 | 0.11 | 0.0 | 0.0 | 0.11 | 0.31 | 0.30 |
| CULTIBEDDER PLNT | 67 | 1.24 | 0.05 | 0.13 | 1.42 | 0.77 | 0.0 | 0.0 | 0.77 | 0.82 | 0.15 |
| ROTARY HOE | 57 | 0.48 | 0.02 | 0.06 | 0.56 | 1.98 | 0.0 | 0.0 | 1.98 | 0.36 | 0.16 |

| OPERATION | ITEM NO. | DATE | TIMES OVER | LABOR HOURS | MACHINE HOURS | FUEL,OIL,LUB., REPAIR PER ACRE | FIXED COSTS PER ACRE |
|---|---|---|---|---|---|---|---|
| STALK SHREDDER | 4,81 | NOV | 1.00 | 0.214 | 0.177 | 0.53 | 0.64 |
| OFFSET DISK | 4,37 | MAR | 1.00 | 0.157 | 0.129 | 0.40 | 0.74 |
| DRY FERT SPREAD | 4,71 | APR | 1.00 | 0.112 | 0.093 | 0.28 | 0.36 |
| CHISEL | 4,42 | MAY | 1.00 | 0.254 | 0.210 | 0.59 | 0.75 |
| SPRAYER | 2,74 | MAY | 1.00 | 0.365 | 0.302 | 0.60 | 0.77 |
| CULTIBEDDER PLNT | 4,67 | MAY | 1.00 | 0.184 | 0.152 | 0.52 | 0.73 |
| ROTARY HOE | 4,57 | JUN | 1.00 | 0.188 | 0.155 | 0.72 | 0.54 |
| ANHYDROUS APPLIC | 4,73 | JUL | 1.00 | 0.310 | 0.257 | 0.78 | 0.94 |
| ANHYDROUS APPLIC | 4,73 | AUG | 1.00 | 0.310 | 0.257 | 0.78 | 0.94 |
| TOTAL | | | | 2.094 | 1.730 | 5.22 | 6.42 |

# TABLE XLIII

## CONVENTIONAL TILLAGE WHEAT ON CLAY LOAM SOIL WITH SURFACE IRRIGATION

| CATEGORY | UNITS | PRICE | QUANTITY | VALUE |
|---|---|---|---|---|
| PRODUCTION: | | | | |
| WHEAT | BU. | 2.050 | 55.000 | 112.75 |
| GRAZING | AUMS | 10.000 | 1.000 | 10.00 |
| TOTAL RECEIPTS | | | | 122.75 |
| OPERATING INPUTS: | | | | |
| WHEAT SEED | BU. | 5.000 | 1.000 | 5.00 |
| NITROGEN | LBS. | 0.140 | 100.000 | 14.00 |
| CUSTOM COMBINE | ACRE | 9.800 | 1.000 | 9.80 |
| CUSTOM HAULING | BU. | 0.100 | 55.000 | 5.50 |
| TRACTOR FUEL COST | ACRE | | | 1.90 |
| TRACT REPAIR COST | ACRE | | | 0.92 |
| TRACTOR LUBE COST | ACRE | | | 0.29 |
| EQUIP REPAIR COST | ACRE | | | 0.77 |
| IRRIG FUEL COST | ACRE | | | 4.21 |
| IRRIG LUBE COST | ACRE | | | 1.13 |
| IRRIG REPAIR COST | ACRE | | | 4.34 |
| TOTAL OPERATING COST | | | | 47.86 |
| RETURNS TO LAND,LABOR,CAPITAL,MACHINERY, OVERHEAD,RISK,AND MANAGEMENT | | | | 74.89 |
| CAPITAL COST: | | | | |
| ANNUAL OPERATING CAPITAL | | 0.100 | 22.009 | 2.20 |
| TRACTOR INVESTMENT | | 0.100 | 13.547 | 1.35 |
| EQUIPMENT INVESTMENT | | 0.100 | 10.106 | 1.01 |
| IRRIGATION SYSTEM INVESTMENT | | 0.100 | 59.580 | 5.96 |
| TOTAL INTEREST CHARGE | | | | 10.52 |
| RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT | | | | 64.36 |
| OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE) | | | | |
| TRACTOR | DOL. | | | 1.62 |
| EQUIPMENT | DOL. | | | 1.40 |
| IRRIGATION SYSTEM | DOL. | | | 9.41 |
| TOTAL OWNERSHIP COST | | | | 12.43 |
| RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT | | | | 51.93 |
| LABOR COST: | | | | |
| MACHINERY LABOR | HR. | 3.000 | 1.400 | 4.20 |
| IRRIGATION LABOR | HR. | 3.000 | 0.936 | 2.81 |
| TOTAL LABOR COST | | | | 7.01 |
| RETURNS TO LAND, OVERHEAD, RISK AND MANAGEMENT | | | | 44.92 |

PANHANDLE ENERGY BUDGETS

ENTERPRISE 76 AREA AND COUNTY 12 DETAIL 00 IRIG. LEVEL 5 LAND CLASS 1
GRAZING 3 MACH. COMP. 1 IRIG. SYSTEM 5 PRICE VECT 1 INDIV. NUMBER 0
ANNUAL CAPITAL MONTH: 6
DATE PRINTED: 03/05/75

## TABLE XLIII (Continued)

| LINE | 1 JAN | 2 FEB | 3 MAR | 4 APR | 5 MAY | 6 JUN | 7 JUL | 8 AUG | 9 SEP | 10 OCT | 11 NOV | 12 DEC | 13 PRICE | 14 WEIGHT | 15 UNIT CODE | 16 ITEM CODE | 17 TYPE | 18 CONT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PRODUCTION | | | | | NUMBER OF UNITS | | | | | | | | | | | | | |
| 1 WHEAT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 55.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.050 | 0.0 | 2. | 76. | 2. | 0. |
| 2 GRAZING | 0.20 | 0.20 | 0.20 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.20 | 0.20 | 10.000 | 0.0 | 10. | 89. | 2. | 0. |
| OPERATING INPUTS | | | | | RATE/UNIT | | | | | | | | PRICE | NUMBER UNITS | UNIT CODE | ITEM CODE | TYPE | CONT |
| 11 WHEAT SEED | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 5.000 | 0.0 | 2. | 176. | 3. | 0. |
| 12 NITROGEN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 100.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.140 | 0.0 | 12. | 211. | 3. | 0. |
| 13 CUSTOM COMBINE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 9.800 | 0.0 | 7. | 305. | 3. | 0. |
| 14 CUSTOM HAULING | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 55.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.100 | 0.0 | 2. | 306. | 3. | 0. |
| MACHINERY REQUIREMENTS | | | | | | TIMES OVER | | | | | | | XXXXX | XXXXX | POWER UNIT | MACH CODE | TYPE | CONT |
| 38 OFFSET DISK | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 37. | 4. | 0. |
| 39 COTTON STRIPPER | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 24. | 4. | 0. |
| 40 LAND PLANE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.50 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 77. | 4. | 0. |
| 41 ANHYDROUS APPLIC | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 73. | 4. | 0. |
| 42 CULTIBEDDER TILL | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 51. | 4. | 0. |
| 43 CULTIBEDDER TILL | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 51. | 4. | 0. |
| 44 DRILL WO/FERT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 61. | 4. | 0. |
| 49 ACIN IRRIG WATER | 0.0 | 0.0 | 0.0 | 3.00 | 6.00 | 0.0 | 0.0 | 0.0 | 5.00 | 0.0 | 4.00 | 0.0 | | | | | | |

PANHANDLE ENERGY BUDGETS

MACHINERY COMPLEMENT 1
EQUIPMENT COMPLEMENT 1

***NO NAME CHANGES HAVE BEEN STORED WITH THIS BUDGET***

***NO COMPLEMENT CHANGES HAVE BEEN STORED WITH THIS BUDGET***

MONTHLY SUMMARY OF RECEIPTS AND EXPENSES

| CATEGORY | UNIT | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TOTAL RECEIPTS | ACRE | 2.00 | 2.00 | 2.00 | 0.0 | 0.0 | 112.75 | 0.0 | 0.0 | 0.0 | 0.0 | 2.00 | 2.00 | 122.75 |
| TOTAL EXPENSES | ACRE | 0.0 | 0.0 | 0.0 | 1.61 | 3.23 | 15.70 | 0.0 | 16.08 | 9.08 | 0.0 | 2.15 | 0.0 | 47.86 |
| RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT | | | | | | | | | | | | | | 74.89 |
| ANNUAL CAPITAL | DOL. | 0.0 | 0.0 | 0.0 | 0.27 | 0.27 | 0.0 | 0.0 | 13.40 | 6.81 | 0.0 | 1.26 | 0.0 | 22.01 |
| LABOR REQUIREMENTS BY MONTH | | | | | | | | | | | | | | |
| MACHINERY LABOR | HR. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.16 | 0.0 | 0.75 | 0.49 | 0.0 | 0.0 | 0.0 | 1.40 |
| IRRIGATION LABOR | HR. | 0.0 | 0.0 | 0.0 | 0.16 | 0.31 | 0.0 | 0.0 | 0.0 | 0.26 | 0.0 | 0.21 | 0.0 | 0.94 |
| TOTAL LABOR | HR. | 0.0 | 0.0 | 0.0 | 0.16 | 0.31 | 0.16 | 0.0 | 0.75 | 0.75 | 0.0 | 0.21 | 0.0 | 2.34 |
| IRRIGATION WATER | INCH | 0.0 | 0.0 | 0.0 | 3.00 | 6.00 | 0.0 | 0.0 | 0.0 | 5.00 | 0.0 | 4.00 | 0.0 | 18.00 |

MACHINERY FIXED AND VARIABLE COSTS PER HOUR

| MACHINE | CODE | DEPR | INSUR. | TAX | TOTAL FIXED | REPAIR | FUEL | LUB. | TOTAL VARIABLE | INT. | HR/TIME |
|---|---|---|---|---|---|---|---|---|---|---|---|
| TRACTOR(4) | 4 | 1.05 | 0.06 | 0.16 | 1.27 | 0.72 | 1.49 | 0.22 | 2.44 | 1.06 | 1.00 |
| OFFSET DISK | 37 | 1.66 | 0.07 | 0.21 | 1.94 | 0.43 | 0.0 | 0.0 | 0.43 | 1.24 | 0.13 |
| LAND PLANE | 77 | 0.64 | 0.06 | 0.13 | 0.84 | 1.15 | 0.0 | 0.0 | 1.15 | 1.03 | 0.47 |
| ANHYDROUS APPLIC | 73 | 0.56 | 0.03 | 0.07 | 0.66 | 0.37 | 0.0 | 0.0 | 0.37 | 0.43 | 0.26 |
| CULTIBEDDER TILL | 51 | 0.69 | 0.03 | 0.09 | 0.80 | 0.95 | 0.0 | 0.0 | 0.95 | 0.51 | 0.11 |
| CULTIBEDDER TILL | 51 | 0.69 | 0.03 | 0.09 | 0.80 | 0.95 | 0.0 | 0.0 | 0.95 | 0.51 | 0.11 |
| DRILL WO/FERT | 61 | 1.65 | 0.07 | 0.21 | 1.93 | 0.44 | 0.0 | 0.0 | 0.44 | 1.24 | 0.18 |

| OPERATION | ITEM NO. | DATE | TIMES OVER | LABOR HOURS | MACHINE HOURS | FUEL,OIL,LUB., REPAIR PER ACRE | FIXED COSTS PER ACRE |
|---|---|---|---|---|---|---|---|
| COTTON STRIPPER | 4,24 | JUL | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 |
| OFFSET DISK | 4,37 | AUG | 1.00 | 0.157 | 0.129 | 0.40 | 0.74 |
| LAND PLANE | 4,77 | AUG | 0.50 | 0.283 | 0.234 | 0.90 | 1.04 |
| ANHYDROUS APPLIC | 4,73 | AUG | 1.00 | 0.310 | 0.257 | 0.78 | 0.94 |
| CULTIBEDDER TILL | 4,51 | SEP | 1.00 | 0.139 | 0.115 | 0.42 | 0.45 |
| CULTIBEDDER TILL | 4,51 | SEP | 1.00 | 0.139 | 0.115 | 0.42 | 0.45 |
| DRILL WO/FERT | 4,61 | SEP | 1.00 | 0.217 | 0.179 | 0.56 | 1.03 |
| OFFSET DISK | 4,37 | JUN | 1.00 | 0.157 | 0.129 | 0.40 | 0.74 |
| TOTAL | | | | 1.400 | 1.157 | 3.88 | 5.38 |

# TABLE XLIV

## CONVENTIONAL TILLAGE CORN SILAGE ON SANDY LOAM SOIL UNDER CIRCULAR SPRINKLER IRRIGATION

| CATEGORY | UNITS | PRICE | QUANTITY | VALUE |
|---|---|---|---|---|
| PRODUCTION: | | | | |
| CORN SILAGE | TONS | 5.500 | 20.000 | 110.00 |
| TOTAL RECEIPTS | | | | 110.00 |
| OPERATING INPUTS: | | | | |
| SILAGE SEED | LBS. | 0.520 | 20.000 | 10.40 |
| NITROGEN | LBS. | 0.300 | 100.000 | 30.00 |
| NITROGEN | LBS. | 0.140 | 100.000 | 14.00 |
| PHOSPHATE | LBS. | 0.250 | 50.000 | 12.50 |
| PRE-MERGE HERB | LBS. | 2.820 | 2.000 | 5.64 |
| INSECTICIDE | ACRE | 8.000 | 1.000 | 8.00 |
| TRACTOR FUEL COST | ACRE | | | 2.62 |
| TRACT REPAIR COST | ACRE | | | 1.27 |
| TRACTOR LUBE COST | ACRE | | | 0.39 |
| EQUIP REPAIR COST | ACRE | | | 0.81 |
| IRRIG FUEL COST | ACRE | | | 8.13 |
| IRRIG LUBE COST | ACRE | | | 1.63 |
| IRRIG REPAIR COST | ACRE | | | 10.25 |
| TOTAL OPERATING COST | | | | 105.64 |
| RETURNS TO LAND,LABOR,CAPITAL,MACHINERY, OVERHEAD,RISK,AND MANAGEMENT | | | | 4.36 |
| CAPITAL COST: | | | | |
| ANNUAL OPERATING CAPITAL | | 0.100 | 32.279 | 3.23 |
| TRACTOR INVESTMENT | | 0.100 | 18.618 | 1.86 |
| EQUIPMENT INVESTMENT | | 0.100 | 9.435 | 0.94 |
| IRRIGATION SYSTEM INVESTMENT | | 0.100 | 96.024 | 9.60 |
| TOTAL INTEREST CHARGE | | | | 15.64 |
| RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT | | | | -11.27 |
| OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE) | | | | |
| TRACTOR | DOL. | | | 2.23 |
| EQUIPMENT | DOL. | | | 1.49 |
| IRRIGATION SYSTEM | DOL. | | | 25.05 |
| TOTAL OWNERSHIP COST | | | | 28.76 |
| RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT | | | | -40.03 |
| LABOR COST: | | | | |
| MACHINERY LABOR | HR. | 3.000 | 2.037 | 6.11 |
| IRRIGATION LABOR | HR. | 3.000 | 1.248 | 3.74 |
| TOTAL LABOR COST | | | | 9.85 |
| RETURNS TO LAND, OVERHEAD, RISK AND MANAGEMENT | | | | -49.89 |

PANHANDLE ENERGY BUDGETS

ENTERPRISE 86 AREA AND COUNTY 12 DETAIL 00 IRIG. LEVEL 6 LAND CLASS 8
GRAZING 0 MACH. COMP. 1 IRIG. SYSTEM 4 PRICE VECT 1 INDIV. NUMBER 0
ANNUAL CAPITAL MONTH: 9
DATE PRINTED: 03/05/75

# TABLE XLIV (Continued)

| LINE | 1 JAN | 2 FEB | 3 MAR | 4 APR | 5 MAY | 6 JUN | 7 JUL | 8 AUG | 9 SEP | 10 OCT | 11 NOV | 12 DEC | 13 PRICE | 14 WEIGHT | 15 UNIT CODE | 16 ITEM CODE | 17 TYPE | 18 CONT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PRODUCTION | | | | | NUMBER OF UNITS | | | | | | | | | | | | | |
| 1 CORN SILAGE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 20.00 | 0.0 | 0.0 | 0.0 | 5.500 | 0.0 | 3. | 161. | 2. | 0. |
| OPERATING INPUTS | | | | | | RATE/UNIT | | | | | | | PRICE | NUMBER UNITS | UNIT CODE | ITEM CODE | TYPE | CONT |
| 11 SILAGE SEED | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 20.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.520 | 0.0 | 12. | 186. | 3. | 0. |
| 12 NITROGEN | 0.0 | 0.0 | 0.0 | 100.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.300 | 0.0 | 12. | 211. | 3. | 0. |
| 13 NITROGEN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 50.00 | 50.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.140 | 0.0 | 12. | 211. | 3. | 0. |
| 14 PHOSPHATE | 0.0 | 0.0 | 0.0 | 50.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.250 | 0.0 | 12. | 214. | 3. | 0. |
| 15 PRE-MERGE HERB | 0.0 | 0.0 | 0.0 | 2.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.820 | 0.0 | 12. | 254. | 3. | 0. |
| 16 INSECTICIDE | 0.0 | 0.0 | 0.0 | 0.0 | 0.50 | 0.0 | 0.50 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 8.000 | 0.0 | 7. | 240. | 3. | 0. |
| MACHINERY REQUIREMENTS | | | | | | TIMES OVER | | | | | | | XXXXX | XXXXX | POWER UNIT | MACH CODE | TYPE | CONT |
| 38 OFFSET DISK | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 4. | 37. | 4. | 0. |
| 39 CHISEL | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 4. | 42. | 4. | 0. |
| 40 DRY FERT SPREAD | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 71. | 4. | 0. |
| 41 ANHYDROUS APPLIC | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 73. | 4. | 0. |
| 42 SPRAYER | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2. | 74. | 4. | 0. |
| 43 CULTIBEDDER PLNT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 67. | 4. | 0. |
| 44 ROTARY HOE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 57. | 4. | 0. |
| 49 ACIN IRRIG WATER | 0.0 | 0.0 | 0.0 | 0.0 | 6.00 | 3.60 | 7.20 | 7.20 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | | |

PANHANDLE ENERGY BUDGETS

MACHINERY COMPLEMENT 1
EQUIPMENT COMPLEMENT 1

***NO NAME CHANGES HAVE BEEN STORED WITH THIS BUDGET***

***NC COMPLEMENT CHANGES HAVE BEEN STORED WITH THIS BUDGET***

MONTHLY SUMMARY OF RECEIPTS AND EXPENSES

| CATEGORY | UNIT | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TOTAL RECEIPTS | ACRE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 110.00 | 0.0 | 0.0 | 0.0 | 110.00 |
| TOTAL EXPENSES | ACRE | 0.0 | 0.0 | 1.00 | 48.42 | 9.00 | 14.65 | 17.79 | 13.79 | 0.0 | 0.0 | 1.00 | 0.0 | 105.64 |
| RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT | | | | | | | | | | | | | | 4.36 |
| ANNUAL CAPITAL | DOL. | 0.0 | 0.0 | 0.50 | 20.17 | 3.00 | 3.66 | 2.96 | 1.15 | 0.0 | 0.0 | 0.83 | 0.0 | 32.28 |
| LABOR REQUIREMENTS BY MONTH | | | | | | | | | | | | | | |
| MACHINERY LABOR | HR. | 0.0 | 0.0 | 0.52 | 0.11 | 0.0 | 0.37 | 0.31 | 0.31 | 0.0 | 0.0 | 0.41 | 0.0 | 2.04 |
| IRRIGATION LABOR | HR. | 0.0 | 0.0 | 0.0 | 0.0 | 0.31 | 0.19 | 0.37 | 0.37 | 0.0 | 0.0 | 0.0 | 0.0 | 1.25 |
| TOTAL LABOR | HR. | 0.0 | 0.0 | 0.52 | 0.11 | 0.31 | 0.56 | 0.68 | 0.68 | 0.0 | 0.0 | 0.41 | 0.0 | 3.28 |
| IRRIGATION WATER | INCH | 0.0 | 0.0 | 0.0 | 0.0 | 6.00 | 3.60 | 7.20 | 7.20 | 0.0 | 0.0 | 0.0 | 0.0 | 24.00 |

MACHINERY FIXED AND VARIABLE COSTS PER HOUR

| MACHINE | CODE | DEPR | INSUR. | TAX | TOTAL FIXED | REPAIR | FUEL | LUB. | TOTAL VARIABLE | INT. | HR/TIME |
|---|---|---|---|---|---|---|---|---|---|---|---|
| TRACTOR(2) | 2 | 0.73 | 0.04 | 0.11 | 0.88 | 0.50 | 1.04 | 0.16 | 1.69 | 0.74 | 1.00 |
| TRACTOR(4) | 4 | 1.05 | 0.06 | 0.16 | 1.27 | 0.72 | 1.49 | 0.22 | 2.44 | 1.06 | 1.00 |
| OFFSET DISK | 37 | 1.66 | 0.07 | 0.21 | 1.94 | 0.43 | 0.0 | 0.0 | 0.43 | 1.24 | 0.13 |
| CHISEL | 42 | 0.52 | 0.02 | 0.06 | 0.61 | 0.14 | 0.0 | 0.0 | 0.14 | 0.39 | 0.21 |
| DRY FERT SPREAD | 71 | 0.68 | 0.03 | 0.08 | 0.80 | 0.29 | 0.0 | 0.0 | 0.29 | 0.51 | 0.09 |
| ANHYDROUS APPLIC | 73 | 0.56 | 0.03 | 0.07 | 0.66 | 0.37 | 0.0 | 0.0 | 0.37 | 0.43 | 0.26 |
| SPRAYER | 74 | 0.40 | 0.02 | 0.05 | 0.47 | 0.11 | 0.0 | 0.0 | 0.11 | 0.31 | 0.30 |
| CULTIBEDDER PLNT | 67 | 1.24 | 0.05 | 0.13 | 1.42 | 0.77 | 0.0 | 0.0 | 0.77 | 0.82 | 0.15 |
| ROTARY HOE | 57 | 0.48 | 0.02 | 0.06 | 0.56 | 1.98 | 0.0 | 0.0 | 1.98 | 0.36 | 0.16 |

| OPERATION | ITEM NO. | DATE | TIMES OVER | LABOR HOURS | MACHINE HOURS | FUEL,OIL,LUB., REPAIR PER ACRE | FIXED COSTS PER ACRE |
|---|---|---|---|---|---|---|---|
| OFFSET DISK | 4,37 | NOV | 1.00 | 0.157 | 0.129 | 0.40 | 0.74 |
| CHISEL | 4,42 | NOV | 1.00 | 0.254 | 0.210 | 0.59 | 0.75 |
| OFFSET DISK | 4,37 | MAR | 1.00 | 0.157 | 0.129 | 0.40 | 0.74 |
| SPRAYER | 2,74 | MAR | 1.00 | 0.365 | 0.302 | 0.60 | 0.77 |
| DRY FERT SPREAD | 4,71 | APR | 1.00 | 0.112 | 0.093 | 0.28 | 0.36 |
| CULTIBEDDER PLNT | 4,67 | JUN | 1.00 | 0.184 | 0.152 | 0.52 | 0.73 |
| ROTARY HOE | 4,57 | JUN | 1.00 | 0.188 | 0.155 | 0.72 | 0.54 |
| ANHYDROUS APPLIC | 4,73 | JUL | 1.00 | 0.310 | 0.257 | 0.78 | 0.94 |
| ANHYDROUS APPLIC | 4,73 | AUG | 1.00 | 0.310 | 0.257 | 0.78 | 0.94 |
| TOTAL | | | | 2.037 | 1.683 | 5.09 | 6.52 |

# TABLE XLV

## CONVENTIONAL TILLAGE GRAIN SORGHUM ON CLAY LOAM SOIL UNDER MODERATE SURFACE IRRIGATION

| CATEGORY | UNITS | PRICE | QUANTITY | VALUE |
|---|---|---|---|---|
| PRODUCTION: | | | | |
| MILO | CWT. | 2.340 | 42.000 | 98.28 |
| MILO STUBBLE | AUMS | 6.000 | 1.000 | 6.00 |
| TOTAL RECEIPTS | | | | 104.28 |
| OPERATING INPUTS: | | | | |
| MILO SEED | LBS. | 0.270 | 7.000 | 1.89 |
| NITROGEN | LBS. | 0.140 | 100.000 | 14.00 |
| INSECTICIDE | ACRE | 2.200 | 1.000 | 2.20 |
| HERBICIDE | ACRE | 5.630 | 1.000 | 5.63 |
| CUSTOM COMBINE | ACRE | 10.000 | 1.000 | 10.00 |
| CUSTOM HAULING | CWT. | 0.100 | 42.000 | 4.20 |
| TRACTOR FUEL COST | ACRE | | | 3.09 |
| TRACT REPAIR COST | ACRE | | | 1.50 |
| TRACTOR LUBE COST | ACRE | | | 0.46 |
| EQUIP REPAIR COST | ACRE | | | 0.93 |
| IRRIG FUEL COST | ACRE | | | 2.57 |
| IRRIG LUBE COST | ACRE | | | 0.69 |
| IRRIG REPAIR COST | ACRE | | | 2.65 |
| TOTAL OPERATING COST | | | | 49.82 |
| RETURNS TO LAND,LABOR,CAPITAL,MACHINERY, OVERHEAD,RISK,AND MANAGEMENT | | | | 54.46 |
| CAPITAL COST: | | | | |
| ANNUAL OPERATING CAPITAL | | 0.100 | 13.690 | 1.37 |
| TRACTOR INVESTMENT | | 0.100 | 21.999 | 2.20 |
| EQUIPMENT INVESTMENT | | 0.100 | 11.958 | 1.20 |
| IRRIGATION SYSTEM INVESTMENT | | 0.100 | 36.410 | 3.64 |
| TOTAL INTEREST CHARGE | | | | 8.41 |
| RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT | | | | 46.06 |
| OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE) | | | | |
| TRACTOR | DOL. | | | 2.63 |
| EQUIPMENT | DOL. | | | 1.70 |
| IRRIGATION SYSTEM | DOL. | | | 5.75 |
| TOTAL OWNERSHIP COST | | | | 10.09 |
| RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT | | | | 35.97 |
| LABOR COST: | | | | |
| MACHINERY LABOR | HR. | 3.000 | 2.274 | 6.82 |
| IRRIGATION LABOR | HR. | 3.000 | 0.572 | 1.72 |
| TOTAL LABOR COST | | | | 8.54 |
| RETURNS TO LAND, OVERHEAD, RISK AND MANAGEMENT | | | | 27.43 |

PANHANDLE ENERGY BUDGETS

ENTERPRISE 73 AREA AND COUNTY 12 DETAIL 00 IRIG. LEVEL 3 LAND CLASS 1
GRAZING 3 MACH. COMP. 1 IRIG. SYSTEM 5 PRICE VECT 1 INDIV. NUMBER 1
ANNUAL CAPITAL MONTH:10
DATE PRINTED: 03/05/75

# TABLE XLV (Continued)

| LINE | 1 JAN | 2 FEB | 3 MAR | 4 APR | 5 MAY | 6 JUN | 7 JUL | 8 AUG | 9 SEP | 10 OCT | 11 NOV | 12 DEC | 13 PRICE | 14 WEIGHT | 15 UNIT CODE | 16 ITEM CODE | 17 TYPE | 18 CONT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PRODUCTION | | | | | NUMBER OF UNITS | | | | | | | | | | | | | |
| 1 MILO | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 42.00 | 0.0 | 0.0 | 2.340 | 0.0 | 16. | 73. | 2. | 0. |
| 2 MILO STUBBLE | 0.30 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.40 | 0.30 | 6.000 | 0.0 | 10. | 157. | 2. | 0. |
| OPERATING INPUTS | | | | | RATE/UNIT | | | | | | | | PRICE | NUMBER UNITS | UNIT CODE | ITEM CODE | TYPE | CONT |
| 11 MILO SEED | 0.0 | 0.C | 0.0 | 0.0 | 0.0 | 7.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.270 | 0.0 | 12. | 173. | 3. | 0. |
| 12 NITROGEN | 0.0 | 0.0 | 0.0 | 0.0 | 100.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.140 | 0.0 | 12. | 211. | 3. | 0. |
| 13 INSECTICIDE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.200 | 0.0 | 7. | 240. | 3. | 0. |
| 14 HERBICIDE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 5.630 | 0.0 | 7. | 250. | 3. | 0. |
| 15 CUSTOM COMBINE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 10.000 | 0.0 | 7. | 305. | 3. | 0. |
| 16 CUSTOM HAULING | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 42.00 | 0.0 | 0.0 | 0.100 | 0.0 | 16. | 306. | 3. | 0. |
| MACHINERY REQUIREMENTS | | | | | TIMES OVER | | | | | | | | XXXXX | XXXXX | POWER UNIT | MACH CODE | TYPE | CONT |
| 38 OFFSET DISK | 0.0 | 0.0 | 1.00 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 37. | 4. | 0. |
| 39 CHISEL | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 42. | 4. | 0. |
| 40 LAND PLANE | 0.0 | 0.0 | 0.0 | 0.50 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 77. | 4. | 0. |
| 41 CULTIBEDDER TILL | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 51. | 4. | 0. |
| 42 ANHYDROUS APPLIC | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 73. | 4. | 0. |
| 43 CULTIBEDDER PLNT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 67. | 4. | 0. |
| 44 CULTIBEDDER TILL | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 51. | 4. | 0. |
| 45 FIELD CULTIVATOR | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 46. | 4. | 0. |
| 46 SPRAYER | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 74. | 4. | 0. |
| 49 ACIN IRRIG WATER | 0.0 | 0.0 | 0.0 | 0.0 | 6.00 | 5.00 | 0.C | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | | |

PANHANDLE ENERGY BUDGETS

MACHINERY COMPLEMENT 1
EQUIPMENT COMPLEMENT 1

***NO NAME CHANGES HAVE BEEN STORED WITH THIS BUDGET***

***NO COMPLEMENT CHANGES HAVE BEEN STORED WITH THIS BUDGET***

MONTHLY SUMMARY OF RECEIPTS AND EXPENSES

| CATEGORY | UNIT | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TOTAL RECEIPTS | ACRE | 1.80 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 98.28 | 2.40 | 1.80 | 104.28 |
| TOTAL EXPENSES | ACRE | 0.0 | 0.0 | 1.00 | 1.30 | 18.43 | 12.69 | 2.20 | 0.0 | 0.0 | 14.20 | 0.0 | 0.0 | 49.82 |
| RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT | | | | | | | | | | | | | | 54.46 |
| ANNUAL CAPITAL | DOL. | 0.0 | 0.0 | 0.58 | 0.65 | 7.68 | 4.23 | 0.55 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 13.69 |
| LABOR REQUIREMENTS BY MONTH | | | | | | | | | | | | | | |
| MACHINERY LABOR | HR. | 0.0 | 0.0 | 0.41 | 0.44 | 0.45 | 0.98 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.27 |
| IRRIGATION LABOR | HR. | 0.0 | 0.0 | 0.0 | 0.0 | 0.31 | 0.26 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.57 |
| TOTAL LABOR | HR. | 0.0 | 0.0 | 0.41 | 0.44 | 0.76 | 1.24 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.85 |
| IRRIGATION WATER | INCH | 0.0 | 0.0 | 0.0 | 0.0 | 6.00 | 5.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 11.00 |

MACHINERY FIXED AND VARIABLE COSTS PER HOUR

| MACHINE | CODE | DEPR | INSUR. | TAX | TOTAL FIXED | REPAIR | FUEL | LUB. | TOTAL VARIABLE | INT. | HR/TIME |
|---|---|---|---|---|---|---|---|---|---|---|---|
| TRACTOR(4) | 4 | 1.05 | 0.06 | 0.16 | 1.27 | 0.72 | 1.49 | 0.22 | 2.44 | 1.06 | 1.00 |
| OFFSET DISK | 37 | 1.66 | 0.07 | 0.21 | 1.94 | 0.43 | 0.0 | 0.0 | 0.43 | 1.24 | 0.13 |
| CHISEL | 42 | 0.52 | 0.02 | 0.06 | 0.61 | 0.14 | 0.0 | 0.0 | 0.14 | 0.39 | 0.21 |
| LAND PLANE | 77 | 0.64 | 0.06 | 0.13 | 0.84 | 1.15 | 0.0 | 0.0 | 1.15 | 1.03 | 0.47 |
| CULTIBEDDER TILL | 51 | 0.69 | 0.03 | 0.09 | 0.80 | 0.95 | 0.0 | 0.0 | 0.95 | 0.51 | 0.11 |
| ANHYDROUS APPLIC | 73 | 0.56 | 0.03 | 0.07 | 0.66 | 0.37 | 0.0 | 0.0 | 0.37 | 0.43 | 0.26 |
| CULTIBEDDER PLNT | 67 | 1.24 | 0.05 | 0.13 | 1.42 | 0.77 | 0.0 | 0.0 | 0.77 | 0.82 | 0.15 |
| CULTIBEDDER TILL | 51 | 0.69 | 0.03 | 0.09 | 0.80 | 0.95 | 0.0 | 0.0 | 0.95 | 0.51 | 0.11 |
| FIELD CULTIVATOR | 46 | 0.60 | 0.03 | 0.07 | 0.70 | 0.25 | 0.0 | 0.0 | 0.25 | 0.45 | 0.24 |
| SPRAYER | 74 | 0.40 | 0.02 | 0.05 | 0.47 | 0.11 | 0.0 | 0.0 | 0.11 | 0.31 | 0.30 |

| OPERATION | ITEM NO. | DATE | TIMES OVER | LABOR HOURS | MACHINE HOURS | FUEL,OIL,LUB., REPAIR PER ACRE | FIXED COSTS PER ACRE |
|---|---|---|---|---|---|---|---|
| OFFSET DISK | 4,37 | MAR | 1.00 | 0.157 | 0.129 | 0.40 | 0.74 |
| CHISEL | 4,42 | MAR | 1.00 | 0.254 | 0.210 | 0.59 | 0.75 |
| OFFSET DISK | 4,37 | APR | 1.00 | 0.157 | 0.129 | 0.40 | 0.74 |
| LAND PLANE | 4,77 | APR | 0.50 | 0.283 | 0.234 | 0.90 | 1.04 |
| CULTIBEDDER TILL | 4,51 | MAY | 1.00 | 0.139 | 0.115 | 0.42 | 0.45 |
| ANHYDROUS APPLIC | 4,73 | MAY | 1.00 | 0.310 | 0.257 | 0.78 | 0.94 |
| CULTIBEDDER PLNT | 4,67 | JUN | 1.00 | 0.184 | 0.152 | 0.52 | 0.73 |
| CULTIBEDDER TILL | 4,51 | JUN | 1.00 | 0.139 | 0.115 | 0.42 | 0.45 |
| FIELD CULTIVATOR | 4,46 | JUN | 1.00 | 0.288 | 0.238 | 0.70 | 0.89 |
| SPRAYER | 4,74 | JUN | 1.00 | 0.365 | 0.302 | 0.84 | 1.01 |
| TOTAL | | | | 2.274 | 1.880 | 5.98 | 7.73 |

# TABLE XLVI

## CONVENTIONAL TILLAGE RYE GRAZE-OUT ON SANDY LOAM SOIL UNDER CIRCULAR SPRINKLER IRRIGATION

| CATEGORY | UNITS | PRICE | QUANTITY | VALUE |
|---|---|---|---|---|
| PRODUCTION: | | | | |
| GRAZE-OUT | AUMS | 10.000 | 6.000 | 60.00 |
| TOTAL RECEIPTS | | | | 60.00 |
| OPERATING INPUTS: | | | | |
| RYE SEED | BU. | 5.000 | 1.000 | 5.00 |
| NITROGEN | LBS. | 0.140 | 40.000 | 5.60 |
| NITROGEN | LBS. | 0.300 | 40.000 | 12.00 |
| PHOSPHATE | LBS. | 0.250 | 40.000 | 10.00 |
| TRACTOR FUEL COST | ACRE | | | 1.96 |
| TRACT REPAIR COST | ACRE | | | 0.95 |
| TRACTOR LUBE COST | ACRE | | | 0.29 |
| EQUIP REPAIR COST | ACRE | | | 0.45 |
| IRRIG FUEL COST | ACRE | | | 6.10 |
| IRRIG LUBE COST | ACRE | | | 1.22 |
| IRRIG REPAIR COST | ACRE | | | 9.47 |
| TOTAL OPERATING COST | | | | 53.04 |
| RETURNS TO LAND,LABOR,CAPITAL,MACHINERY, OVERHEAD,RISK,AND MANAGEMENT | | | | 6.96 |
| CAPITAL COST: | | | | |
| ANNUAL OPERATING CAPITAL | | 0.100 | 23.957 | 2.40 |
| TRACTOR INVESTMENT | | 0.100 | 13.933 | 1.39 |
| EQUIPMENT INVESTMENT | | 0.100 | 9.874 | 0.99 |
| IRRIGATION SYSTEM INVESTMENT | | 0.100 | 96.030 | 9.60 |
| TOTAL INTEREST CHARGE | | | | 14.38 |
| RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT | | | | -7.42 |
| OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE) | | | | |
| TRACTOR | DOL. | | | 1.67 |
| EQUIPMENT | DOL. | | | 1.54 |
| IRRIGATION SYSTEM | DOL. | | | 7.05 |
| TOTAL OWNERSHIP COST | | | | 10.25 |
| RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT | | | | -17.67 |
| LABOR COST: | | | | |
| MACHINERY LABOR | HR. | 3.000 | 1.440 | 4.32 |
| IRRIGATION LABOR | HR. | 3.000 | 0.936 | 2.81 |
| TOTAL LABOR COST | | | | 7.13 |
| RETURNS TO LAND, OVERHEAD, RISK AND MANAGEMENT | | | | -24.80 |

PANHANDLE ENERGY BUDGETS

ENTERPRISE 89 AREA AND COUNTY 12 DETAIL 00 IRIG. LEVEL 5 LAND CLASS 3
GRAZING 5 MACH. COMP. 1 IRIG. SYSTEM 4 PRICE VECT 1 INDIV. NUMBER 0
ANNUAL CAPITAL MONTH: 6
DATE PRINTED: 03/05/75

TABLE XLVI (Continued)

| LINE | 1 JAN | 2 FEB | 3 MAR | 4 APR | 5 MAY | 6 JUN | 7 JUL | 8 AUG | 9 SEP | 10 OCT | 11 NOV | 12 DEC | 13 PRICE | 14 WEIGHT | 15 UNIT CODE | 16 ITEM CODE | 17 TYPE | 18 CONT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PRODUCTION | | | | | NUMBER OF UNITS | | | | | | | | | | | | | |
| 1 GRAZE-OUT | 0.25 | 0.25 | 0.75 | 0.90 | 1.60 | 0.0 | 0.0 | 0.0 | 0.0 | 0.60 | 0.90 | 0.75 | 10.000 | 0.0 | 10. | 75. | 2. | 0. |
| OPERATING INPUTS | | | | | RATE/UNIT | | | | | | | | PRICE | NUMBER UNITS | UNIT CODE | ITEM CODE | TYPE | CONT |
| 11 RYE SEED | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 5.000 | 0.0 | 2. | 175. | 3. | 0. |
| 12 NITROGEN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 40.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.140 | 0.0 | 12. | 211. | 3. | 0. |
| 13 NITROGEN | 0.0 | 20.00 | 20.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.300 | 0.0 | 12. | 211. | 3. | 0. |
| 14 PHOSPHATE | 0.0 | 20.00 | 20.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.250 | 0.0 | 12. | 214. | 3. | 0. |
| MACHINERY REQUIREMENTS | | | | | | TIMES OVER | | | | | | | XXXXX | XXXXX | POWER UNIT | MACH CODE | TYPE | CONT |
| 38 OFFSET DISK | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 37. | 4. | 0. |
| 39 CHISEL | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 42. | 4. | 0. |
| 40 SWEEP | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 41. | 4. | 0. |
| 41 ANHYDROUS APPLIC | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 73. | 4. | 0. |
| 42 DRY FERT SPREAD | 0.0 | 1.00 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 71. | 4. | 0. |
| 43 DRILL WO/FERT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 61. | 4. | 0. |
| 49 ACIN IRRIG WATER | 0.0 | 0.0 | 3.00 | 3.00 | 3.00 | 0.0 | 0.0 | 3.00 | 0.0 | 3.00 | 3.00 | 0.0 | | | | | | |

PANHANDLE ENERGY BUDGETS

MACHINERY COMPLEMENT 1
EQUIPMENT COMPLEMENT 1

***NO NAME CHANGES HAVE BEEN STORED WITH THIS BUDGET***

***NC COMPLEMENT CHANGES HAVE BEEN STORED WITH THIS BUDGET***

MONTHLY SUMMARY OF RECEIPTS AND EXPENSES

| CATEGORY | UNIT | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TOTAL RECEIPTS | ACRE | 2.50 | 2.50 | 7.50 | 9.00 | 16.00 | 0.0 | 0.0 | 0.0 | 0.0 | 6.00 | 9.00 | 7.50 | 60.00 |
| TOTAL EXPENSES | ACRE | 0.0 | 11.28 | 14.07 | 2.80 | 2.80 | 1.00 | 0.35 | 9.59 | 5.56 | 2.80 | 2.60 | 0.0 | 53.04 |
| RETURNS TC LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT | | | | | | | | | | | | | | 6.96 |
| ANNUAL CAPITAL | DOL. | 0.0 | 3.76 | 3.52 | 0.47 | 0.23 | 0.0 | 0.32 | 7.99 | 4.17 | 1.87 | 1.63 | 0.0 | 23.96 |
| LABOR REQUIREMENTS BY MONTH | | | | | | | | | | | | | | |
| MACHINERY LABOR | HR. | 0.0 | 0.11 | 0.11 | 0.0 | 0.0 | 0.41 | 0.12 | 0.47 | 0.22 | 0.0 | 0.0 | 0.0 | 1.44 |
| IRRIGATION LABOR | HR. | 0.0 | 0.0 | 0.16 | 0.16 | 0.16 | 0.0 | 0.0 | 0.16 | 0.0 | 0.16 | 0.16 | 0.0 | 0.94 |
| TOTAL LABOR | HR. | 0.0 | 0.11 | 0.27 | 0.16 | 0.16 | 0.41 | 0.12 | 0.62 | 0.22 | 0.16 | 0.16 | 0.0 | 2.38 |
| IRRIGATION WATER | INCH | 0.0 | 0.0 | 3.00 | 3.00 | 3.00 | 0.0 | 0.0 | 3.00 | 0.0 | 3.00 | 3.00 | 0.0 | 18.00 |

MACHINERY FIXED AND VARIABLE COSTS PER HOUR

| MACHINE | CODE | DEPR | INSUR. | TAX | TOTAL FIXED | REPAIR | FUEL | LUB. | TOTAL VARIABLE | INT. | HR/TIME |
|---|---|---|---|---|---|---|---|---|---|---|---|
| TRACTOR(4) | 4 | 1.05 | 0.06 | 0.16 | 1.27 | 0.72 | 1.49 | 0.22 | 2.44 | 1.06 | 1.00 |
| OFFSET DISK | 37 | 1.66 | 0.07 | 0.21 | 1.94 | 0.43 | 0.0 | 0.0 | 0.43 | 1.24 | 0.13 |
| CHISEL | 42 | 0.52 | 0.02 | 0.06 | 0.61 | 0.14 | 0.0 | 0.0 | 0.14 | 0.39 | 0.21 |
| SWEEP | 41 | 2.12 | 0.09 | 0.26 | 2.48 | 0.83 | 0.0 | 0.0 | 0.83 | 1.57 | 0.10 |
| ANHYDROUS APPLIC | 73 | 0.56 | 0.03 | 0.07 | 0.66 | 0.37 | 0.0 | 0.0 | 0.37 | 0.43 | 0.26 |
| DRY FERT SPREAD | 71 | 0.68 | 0.03 | 0.08 | 0.80 | 0.29 | 0.0 | 0.0 | 0.29 | 0.51 | 0.09 |
| DRILL WO/FERT | 61 | 1.65 | 0.07 | 0.21 | 1.93 | 0.44 | 0.0 | 0.0 | 0.44 | 1.24 | 0.18 |

| OPERATION | ITEM NO. | DATE | TIMES OVER | LABOR HOURS | MACHINE HOURS | FUEL,OIL,LUB., REPAIR PER ACRE | FIXED COSTS PER ACRE |
|---|---|---|---|---|---|---|---|
| SWEEP | 4,41 | JUL | 1.00 | 0.122 | 0.101 | 0.35 | 0.67 |
| OFFSET DISK | 4,37 | AUG | 1.00 | 0.157 | 0.129 | 0.40 | 0.74 |
| ANHYDROUS APPLIC | 4,73 | AUG | 1.00 | 0.310 | 0.257 | 0.78 | 0.94 |
| DRILL WO/FERT | 4,61 | SEP | 1.00 | 0.217 | 0.179 | 0.56 | 1.03 |
| DRY FERT SPREAD | 4,71 | FEB | 1.00 | 0.112 | 0.093 | 0.28 | 0.36 |
| DRY FERT SPREAD | 4,71 | MAR | 1.00 | 0.112 | 0.093 | 0.28 | 0.36 |
| OFFSET DISK | 4,37 | JUN | 1.00 | 0.157 | 0.129 | 0.40 | 0.74 |
| CHISEL | 4,42 | JUN | 1.00 | 0.254 | 0.210 | 0.59 | 0.75 |
| TOTAL | | | | 1.440 | 1.190 | 3.65 | 5.59 |

# TABLE XLVII

## CONVENTIONAL TILLAGE GRAIN SORGHUM ON CLAY LOAM SOIL UNDER HEAVY SURFACE IRRIGATION

| CATEGORY | UNITS | PRICE | QUANTITY | VALUE |
|---|---|---|---|---|
| PRODUCTION: | | | | |
| MILO | CWT. | 2.340 | 62.000 | 145.08 |
| MILO STUBBLE | AUMS | 6.000 | 1.000 | 6.00 |
| TOTAL RECEIPTS | | | | 151.08 |
| OPERATING INPUTS: | | | | |
| MILO SEED | LBS. | 0.270 | 10.000 | 2.70 |
| NITROGEN | LBS. | 0.300 | 125.000 | 37.50 |
| NITROGEN | LBS. | 0.140 | 25.000 | 3.50 |
| HERBICIDE | ACRE | 5.630 | 1.000 | 5.63 |
| INSECTICIDE | ACRE | 2.200 | 1.000 | 2.20 |
| CUSTOM COMBINE | ACRE | 10.000 | 1.000 | 10.00 |
| CUSTOM HAULING | CWT. | 0.100 | 62.000 | 6.20 |
| TRACTOR FUEL COST | ACRE | | | 3.57 |
| TRACT REPAIR COST | ACRE | | | 1.73 |
| TRACTOR LUBE COST | ACRE | | | 0.54 |
| EQUIP REPAIR COST | ACRE | | | 1.12 |
| IRRIG FUEL COST | ACRE | | | 5.85 |
| IRRIG LUBE COST | ACRE | | | 1.07 |
| IRRIG REPAIR COST | ACRE | | | 2.91 |
| TOTAL OPERATING COST | | | | 84.52 |
| RETURNS TO LAND,LABOR,CAPITAL,MACHINERY, OVERHEAD,RISK,AND MANAGEMENT | | | | 66.56 |
| CAPITAL COST: | | | | |
| ANNUAL OPERATING CAPITAL | | 0.100 | 29.316 | 2.93 |
| TRACTOR INVESTMENT | | 0.100 | 25.417 | 2.54 |
| EQUIPMENT INVESTMENT | | 0.100 | 13.702 | 1.37 |
| IRRIGATION SYSTEM INVESTMENT | | 0.100 | 55.656 | 5.57 |
| TOTAL INTEREST CHARGE | | | | 12.41 |
| RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT | | | | 54.15 |
| OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE) | | | | |
| TRACTOR | DOL. | | | 3.04 |
| EQUIPMENT | DOL. | | | 1.99 |
| IRRIGATION SYSTEM | DOL. | | | 11.72 |
| TOTAL OWNERSHIP COST | | | | 16.75 |
| RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT | | | | 37.40 |
| LABOR COST: | | | | |
| MACHINERY LABOR | HR. | 3.000 | 2.739 | 8.22 |
| IRRIGATION LABOR | HR. | 3.000 | 1.248 | 3.74 |
| TOTAL LABOR COST | | | | 11.96 |
| RETURNS TO LAND, OVERHEAD, RISK AND MANAGEMENT | | | | 25.44 |

PANHANDLE ENERGY BUDGETS

ENTERPRISE 73 AREA AND COUNTY 12 DETAIL 00 IRIG. LEVEL 6 LAND CLASS 1
GRAZING 3 MACH. COMP. 1 IRIG. SYSTEM 5 PRICE VECT 1 INDIV. NUMBER 0
ANNUAL CAPITAL MONTH: 10
DATE PRINTED: 03/05/75

# TABLE XLVII (Continued)

| LINE | 1 JAN | 2 FEB | 3 MAR | 4 APR | 5 MAY | 6 JUN | 7 JUL | 8 AUG | 9 SEP | 10 OCT | 11 NOV | 12 DEC | 13 PRICE | 14 WEIGHT | 15 UNIT CODE | 16 ITEM CODE | 17 TYPE | 18 CONT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PRODUCTION | | | | | NUMBER OF UNITS | | | | | | | | | | | | | |
| 1 MILO | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 62.00 | 0.0 | 0.0 | 2.340 | 0.0 | 16. | 73. | 2. | 0. |
| 2 MILO STUBBLE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.50 | 0.50 | 6.000 | 0.0 | 10. | 157. | 2. | 0. |
| OPERATING INPUTS | | | | | RATE/UNIT | | | | | | | | PRICE | NUMBER UNITS | UNIT CODE | ITEM CODE | TYPE | CONT |
| 11 MILO SEED | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 10.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.270 | 0.0 | 12. | 173. | 3. | 0. |
| 12 NITROGEN | 0.0 | 0.0 | 0.0 | 125.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.300 | 0.0 | 12. | 211. | 3. | 0. |
| 13 NITROGEN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 25.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.140 | 0.0 | 12. | 211. | 3. | 0. |
| 14 HERBICIDE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 5.630 | 0.0 | 7. | 250. | 3. | 0. |
| 15 INSECTICIDE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.200 | 0.0 | 7. | 240. | 3. | 0. |
| 16 CUSTOM COMBINE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 10.000 | 0.0 | 7. | 305. | 3. | 0. |
| 17 CUSTOM HAULING | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 62.00 | 0.0 | 0.0 | 0.100 | 0.0 | 16. | 306. | 3. | 0. |
| MACHINERY REQUIREMENTS | | | | | | TIMES OVER | | | | | | | XXXXX | XXXXX | POWER UNIT | MACH CODE | TYPE | CONT |
| 38 STALK SHREDDER | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 4. | 81. | 4. | 0. |
| 39 OFFSET DISK | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 4. | 37. | 4. | 0. |
| 40 CHISEL | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 4. | 42. | 4. | 0. |
| 41 LAND PLANE | 0.0 | 0.0 | 0.50 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 77. | 4. | 0. |
| 42 CULTIBEDDER TILL | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 51. | 4. | 0. |
| 43 CULTIBEDDER TILL | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 51. | 4. | 0. |
| 44 DRY FERT SPREAD | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 71. | 4. | 0. |
| 45 ANHYDROUS APPLIC | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 73. | 4. | 0. |
| 46 CULTIBEDDER PLNT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 67. | 4. | 0. |
| 47 FIELD CULTIVATOR | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 46. | 4. | 0. |
| 48 SPRAYER | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2. | 74. | 4. | 0. |
| 49 ACIN IRRIG WATER | 0.0 | 0.0 | 0.0 | 0.0 | 6.00 | 3.60 | 7.20 | 7.20 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | | |

PANHANDLE ENERGY BUDGETS

MACHINERY COMPLEMENT 1
EQUIPMENT COMPLEMENT 1

***NO NAME CHANGES HAVE BEEN STORED WITH THIS BUDGET***

***NO COMPLEMENT CHANGES HAVE BEEN STORED WITH THIS BUDGET***

MONTHLY SUMMARY OF RECEIPTS AND EXPENSES

| CATEGORY | UNIT | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TOTAL RECEIPTS | ACRE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 145.08 | 3.00 | 3.00 | 151.08 |
| TOTAL EXPENSES | ACRE | 0.0 | 0.0 | 1.30 | 38.19 | 2.87 | 12.04 | 9.43 | 2.95 | 0.0 | 16.20 | 1.53 | 0.0 | 84.52 |
| RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT | | | | | | | | | | | | | | 66.56 |
| ANNUAL CAPITAL | DOL. | 0.0 | 0.0 | 0.76 | 19.10 | 1.20 | 4.01 | 2.36 | 0.49 | 0.0 | 0.0 | 1.40 | 0.0 | 29.32 |
| LABOR REQUIREMENTS BY MONTH | | | | | | | | | | | | | | |
| MACHINERY LABOR | HR. | 0.0 | 0.0 | 0.44 | 0.25 | 0.14 | 0.98 | 0.31 | 0.0 | 0.0 | 0.0 | 0.62 | 0.0 | 2.74 |
| IRRIGATION LABOR | HR. | 0.0 | 0.0 | 0.0 | 0.0 | 0.31 | 0.19 | 0.37 | 0.37 | 0.0 | 0.0 | 0.0 | 0.0 | 1.25 |
| TOTAL LABOR | HR. | 0.0 | 0.0 | 0.44 | 0.25 | 0.45 | 1.16 | 0.68 | 0.37 | 0.0 | 0.0 | 0.62 | 0.0 | 3.99 |
| IRRIGATION WATER | INCH | 0.0 | 0.0 | 0.0 | 0.0 | 6.00 | 3.60 | 7.20 | 7.20 | 0.0 | 0.0 | 0.0 | 0.0 | 24.00 |

MACHINERY FIXED AND VARIABLE COSTS PER HOUR

| MACHINE | CODE | DEPR | INSUR. | TAX | TOTAL FIXED | REPAIR | FUEL | LUB. | TOTAL VARIABLE | INT. | HR/TIME |
|---|---|---|---|---|---|---|---|---|---|---|---|
| TRACTOR(2) | 2 | 0.73 | 0.04 | 0.11 | 0.88 | 0.50 | 1.04 | 0.16 | 1.69 | 0.74 | 1.00 |
| TRACTOR(4) | 4 | 1.05 | 0.06 | 0.16 | 1.27 | 0.72 | 1.49 | 0.22 | 2.44 | 1.06 | 1.00 |
| STALK SHREDDER | 81 | 0.59 | 0.02 | 0.06 | 0.68 | 0.33 | 0.0 | 0.0 | 0.33 | 0.39 | 0.18 |
| OFFSET DISK | 37 | 1.66 | 0.07 | 0.21 | 1.94 | 0.43 | 0.0 | 0.0 | 0.43 | 1.24 | 0.13 |
| CHISEL | 42 | 0.52 | 0.02 | 0.06 | 0.61 | 0.14 | 0.0 | 0.0 | 0.14 | 0.39 | 0.21 |
| LAND PLANE | 77 | 0.64 | 0.06 | 0.13 | 0.84 | 1.15 | 0.0 | 0.0 | 1.15 | 1.03 | 0.47 |
| CULTIBEDDER TILL | 51 | 0.69 | 0.03 | 0.09 | 0.80 | 0.95 | 0.0 | 0.0 | 0.95 | 0.51 | 0.11 |
| CULTIBEDDER TILL | 51 | 0.69 | 0.03 | 0.09 | 0.80 | 0.95 | 0.0 | 0.0 | 0.95 | 0.51 | 0.11 |
| DRY FERT SPREAD | 71 | 0.68 | 0.03 | 0.08 | 0.80 | 0.29 | 0.0 | 0.0 | 0.29 | 0.51 | 0.09 |
| ANHYDROUS APPLIC | 73 | 0.56 | 0.03 | 0.07 | 0.66 | 0.37 | 0.0 | 0.0 | 0.37 | 0.43 | 0.26 |
| CULTIBEDDER PLNT | 67 | 1.24 | 0.05 | 0.13 | 1.42 | 0.77 | 0.0 | 0.0 | 0.77 | 0.82 | 0.15 |
| FIELD CULTIVATOR | 46 | 0.60 | 0.03 | 0.07 | 0.70 | 0.25 | 0.0 | 0.0 | 0.25 | 0.45 | 0.24 |
| SPRAYER | 74 | 0.40 | 0.02 | 0.05 | 0.47 | 0.11 | 0.0 | 0.0 | 0.11 | 0.31 | 0.30 |

| OPERATION | ITEM NO. | DATE | TIMES OVER | LABOR HOURS | MACHINE HOURS | FUEL,OIL,LUB., REPAIR PER ACRE | FIXED COSTS PER ACRE |
|---|---|---|---|---|---|---|---|
| STALK SHREDDER | 4,81 | NOV | 1.00 | 0.214 | 0.177 | 0.53 | 0.64 |
| OFFSET DISK | 4,37 | NOV | 1.00 | 0.157 | 0.129 | 0.40 | 0.74 |
| CHISEL | 4,42 | NOV | 1.00 | 0.254 | 0.210 | 0.59 | 0.75 |
| OFFSET DISK | 4,37 | MAR | 1.00 | 0.157 | 0.129 | 0.40 | 0.74 |
| LAND PLANE | 4,77 | MAR | 0.50 | 0.283 | 0.234 | 0.90 | 1.04 |
| CULTIBEDDER TILL | 4,51 | APR | 1.00 | 0.139 | 0.115 | 0.42 | 0.45 |
| DRY FERT SPREAD | 4,71 | APR | 1.00 | 0.112 | 0.093 | 0.28 | 0.36 |
| CULTIBEDDER TILL | 4,51 | MAY | 1.00 | 0.139 | 0.115 | 0.42 | 0.45 |
| CULTIBEDDER TILL | 4,51 | JUN | 1.00 | 0.139 | 0.115 | 0.42 | 0.45 |
| CULTIBEDDER PLNT | 4,67 | JUN | 1.00 | 0.184 | 0.152 | 0.52 | 0.73 |
| FIELD CULTIVATOR | 4,46 | JUN | 1.00 | 0.288 | 0.238 | 0.70 | 0.89 |
| SPRAYER | 2,74 | JUN | 1.00 | 0.365 | 0.302 | 0.60 | 0.77 |
| ANHYDROUS APPLIC | 4,73 | JUL | 1.00 | 0.310 | 0.257 | 0.78 | 0.94 |
| TOTAL | | | | 2.739 | 2.264 | 6.96 | 8.94 |

# TABLE XLVIII

## CONVENTIONAL TILLAGE GRAZED WHEAT ON CLAY LOAM SOIL WITH SURFACE IRRIGATION

| CATEGORY | UNITS | PRICE | QUANTITY | VALUE |
|---|---|---|---|---|
| PRODUCTION: | | | | |
| GRAZED WHEAT | AUMS | 10.000 | 6.000 | 60.00 |
| TOTAL RECEIPTS | | | | 60.00 |
| OPERATING INPUTS: | | | | |
| WHEAT SEED | BU. | 5.000 | 1.000 | 5.00 |
| NITROGEN | LBS. | 0.140 | 40.000 | 5.60 |
| NITROGEN | LBS. | 0.300 | 40.000 | 12.00 |
| PHOSPHATE | LBS. | 0.250 | 40.000 | 10.00 |
| TRACTOR FUEL COST | ACRE | | | 1.96 |
| TRACT REPAIR COST | ACRE | | | 0.95 |
| TRACTOR LUBE COST | ACRE | | | 0.29 |
| EQUIP REPAIR COST | ACRE | | | 0.45 |
| IRRIG FUEL COST | ACRE | | | 4.21 |
| IRRIG LUBE COST | ACRE | | | 1.13 |
| IRRIG REPAIR COST | ACRE | | | 4.34 |
| TOTAL OPERATING COST | | | | 45.93 |
| RETURNS TO LAND,LABOR,CAPITAL,MACHINERY, OVERHEAD,RISK,AND MANAGEMENT | | | | 14.07 |
| CAPITAL COST: | | | | |
| ANNUAL OPERATING CAPITAL | | 0.100 | 20.898 | 2.09 |
| TRACTOR INVESTMENT | | 0.100 | 13.933 | 1.39 |
| EQUIPMENT INVESTMENT | | 0.100 | 9.874 | 0.99 |
| IRRIGATION SYSTEM INVESTMENT | | 0.100 | 59.580 | 5.96 |
| TOTAL INTEREST CHARGE | | | | 10.43 |
| RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT | | | | 3.64 |
| OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE) | | | | |
| TRACTOR | DOL. | | | 1.67 |
| EQUIPMENT | DOL. | | | 1.54 |
| IRRIGATION SYSTEM | DOL. | | | 9.41 |
| TOTAL OWNERSHIP COST | | | | 12.62 |
| RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT | | | | -8.98 |
| LABOR COST: | | | | |
| MACHINERY LABOR | HR. | 3.000 | 1.440 | 4.32 |
| IRRIGATION LABOR | HR. | 3.000 | 0.936 | 2.81 |
| TOTAL LABOR COST | | | | 7.13 |
| RETURNS TO LAND, OVERHEAD, RISK AND MANAGEMENT | | | | -16.11 |

PANHANDLE ENERGY BUDGETS

ENTERPRISE 89 AREA AND COUNTY 12 DETAIL 00 IRIG. LEVEL 5 LAND CLASS 1
GRAZING 6 MACH. COMP. 1 IRIG. SYSTEM 5 PRICE VECT 1 INDIV. NUMBER 0
ANNUAL CAPITAL MONTH: 6
DATE PRINTED: 03/05/75

# TABLE XLVIII (Continued)

| LINE | 1 JAN | 2 FEB | 3 MAR | 4 APR | 5 MAY | 6 JUN | 7 JUL | 8 AUG | 9 SEP | 10 OCT | 11 NOV | 12 DEC | 13 PRICE | 14 WEIGHT | 15 UNIT CODE | 16 ITEM CODE | 17 TYPE | 18 CONT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PRODUCTION | | | | | NUMBER OF UNITS | | | | | | | | | | | | | |
| 1 GRAZED WHEAT | 0.25 | 0.25 | 0.75 | 0.90 | 1.60 | 0.0 | 0.0 | 0.0 | 0.0 | 0.60 | 0.90 | 0.75 | 10.000 | 0.0 | 10. | 76. | 2. | 0. |
| OPERATING INPUTS | | | | | RATE/UNIT | | | | | | | | PRICE | NUMBER UNITS | UNIT CODE | ITEM CODE | TYPE | CONT |
| 11 WHEAT SEED | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 5.000 | 0.0 | 2. | 176. | 3. | 0. |
| 12 NITROGEN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 40.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.140 | 0.0 | 12. | 211. | 3. | 0. |
| 13 NITROGEN | 0.0 | 20.00 | 20.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.300 | 0.0 | 12. | 211. | 3. | 0. |
| 14 PHOSPHATE | 0.0 | 20.00 | 20.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.250 | 0.0 | 12. | 214. | 3. | 0. |
| MACHINERY REQUIREMENTS | | | | | | TIMES OVER | | | | | | | XXXXX | XXXXX | POWER UNIT | MACH CODE | TYPE | CONT |
| 38 OFFSET DISK | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 37. | 4. | 0. |
| 39 CHISEL | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 42. | 4. | 0. |
| 40 SWEEP | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 41. | 4. | 0. |
| 41 ANHYDROUS APPLIC | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 73. | 4. | 0. |
| 42 DRY FERT SPREAD | 0.0 | 1.00 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 71. | 4. | 0. |
| 43 DRILL WO/FERT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 61. | 4. | 0. |
| 49 ACIN IRRIG WATER | 0.0 | 0.0 | 3.00 | 3.00 | 3.00 | 0.0 | 0.0 | 3.00 | 0.0 | 3.00 | 3.00 | 0.0 | | | | | | |

PANHANDLE ENERGY BUDGETS

MACHINERY COMPLEMENT 1
EQUIPMENT COMPLEMENT 3

***NO NAME CHANGES HAVE BEEN STORED WITH THIS BUDGET***

***NC COMPLEMENT CHANGES HAVE BEEN STORED WITH THIS BUDGET***

MONTHLY SUMMARY OF RECEIPTS AND EXPENSES

| CATEGORY | UNIT | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TOTAL RECEIPTS | ACRE | 2.50 | 2.50 | 7.50 | 9.00 | 16.00 | 0.0 | 0.0 | 0.0 | 0.0 | 6.00 | 9.00 | 7.50 | 60.00 |
| TOTAL EXPENSES | ACRE | 0.0 | 11.28 | 12.89 | 1.61 | 1.61 | 1.00 | 0.35 | 8.40 | 5.56 | 1.61 | 1.61 | 0.0 | 45.93 |
| RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT | | | | | | | | | | | | | | 14.07 |
| ANNUAL CAPITAL | DOL. | 0.0 | 3.76 | 3.22 | 0.27 | 0.13 | 0.0 | 0.32 | 7.00 | 4.17 | 1.08 | 0.94 | 0.0 | 20.90 |
| LABOR REQUIREMENTS BY MONTH | | | | | | | | | | | | | | |
| MACHINERY LABOR | HR. | 0.0 | 0.11 | 0.11 | 0.0 | 0.0 | 0.41 | 0.12 | 0.47 | 0.22 | 0.0 | 0.0 | 0.0 | 1.44 |
| IRRIGATION LABOR | HR. | 0.0 | 0.0 | 0.16 | 0.16 | 0.16 | 0.0 | 0.0 | 0.16 | 0.0 | 0.16 | 0.16 | 0.0 | 0.94 |
| TOTAL LABOR | HR. | 0.0 | 0.11 | 0.27 | 0.16 | 0.16 | 0.41 | 0.12 | 0.62 | 0.22 | 0.16 | 0.16 | 0.0 | 2.38 |
| IRRIGATION WATER | INCH | 0.0 | 0.0 | 3.00 | 3.00 | 3.00 | 0.0 | 0.0 | 3.00 | 0.0 | 3.00 | 3.00 | 0.0 | 18.00 |

MACHINERY FIXED AND VARIABLE COSTS PER HOUR

| MACHINE | CODE | DEPR | INSUR. | TAX | TOTAL FIXED | REPAIR | FUEL | LUB. | TOTAL VARIABLE | INT. | HR/TIME |
|---|---|---|---|---|---|---|---|---|---|---|---|
| TRACTOR(4) | 4 | 1.05 | 0.06 | 0.16 | 1.27 | 0.72 | 1.49 | 0.22 | 2.44 | 1.06 | 1.00 |
| OFFSET DISK | 37 | 1.66 | 0.07 | 0.21 | 1.94 | 0.43 | 0.0 | 0.0 | 0.43 | 1.24 | 0.13 |
| CHISEL | 42 | 0.52 | 0.02 | 0.06 | 0.61 | 0.14 | 0.0 | 0.0 | 0.14 | 0.39 | 0.21 |
| SWEEP | 41 | 2.12 | 0.09 | 0.26 | 2.48 | 0.83 | 0.0 | 0.0 | 0.83 | 1.57 | 0.10 |
| ANHYDROUS APPLIC | 73 | 0.56 | 0.03 | 0.07 | 0.66 | 0.37 | 0.0 | 0.0 | 0.37 | 0.43 | 0.26 |
| DRY FERT SPREAD | 71 | 0.68 | 0.03 | 0.08 | 0.80 | 0.29 | 0.0 | 0.0 | 0.29 | 0.51 | 0.09 |
| DRILL WO/FERT | 61 | 1.65 | 0.07 | 0.21 | 1.93 | 0.44 | 0.0 | 0.0 | 0.44 | 1.24 | 0.18 |

| OPERATION | ITEM NO. | DATE | TIMES OVER | LABOR HOURS | MACHINE HOURS | FUEL,OIL,LUB., REPAIR PER ACRE | FIXED COSTS PER ACRE |
|---|---|---|---|---|---|---|---|
| SWEEP | 4,41 | JUL | 1.00 | 0.122 | 0.101 | 0.35 | 0.67 |
| OFFSET DISK | 4,37 | AUG | 1.00 | 0.157 | 0.129 | 0.40 | 0.74 |
| ANHYDROUS APPLIC | 4,73 | AUG | 1.00 | 0.310 | 0.257 | 0.78 | 0.94 |
| DRILL WO/FERT | 4,61 | SEP | 1.00 | 0.217 | 0.179 | 0.56 | 1.03 |
| DRY FERT SPREAD | 4,71 | FEB | 1.00 | 0.112 | 0.093 | 0.28 | 0.36 |
| DRY FERT SPREAD | 4,71 | MAR | 1.00 | 0.112 | 0.093 | 0.28 | 0.36 |
| OFFSET DISK | 4,37 | JUN | 1.00 | 0.157 | 0.129 | 0.40 | 0.74 |
| CHISEL | 4,42 | JUN | 1.00 | 0.254 | 0.210 | 0.59 | 0.75 |
| TOTAL | | | | 1.440 | 1.190 | 3.65 | 5.59 |

# TABLE XLIX

## CONVENTIONAL TILLAGE SUDAN HAY ON CLAY LOAM SOIL WITH SURFACE IRRIGATION

| CATEGORY | UNITS | PRICE | QUANTITY | VALUE |
|---|---|---|---|---|
| PRODUCTION: | | | | |
| SUDAN | TONS | 22.000 | 5.000 | 110.00 |
| TOTAL RECEIPTS | | | | 110.00 |
| OPERATING INPUTS: | | | | |
| SUDAN SEED | LBS. | 0.270 | 10.000 | 2.70 |
| NITROGEN | LBS. | 0.140 | 100.000 | 14.00 |
| SWATHING | ACRE | 3.160 | 2.000 | 6.32 |
| BALER | BL. | 0.280 | 150.000 | 42.00 |
| BALE-LOADER | BL. | 0.150 | 150.000 | 22.50 |
| TRACTOR FUEL COST | ACRE | | | 1.64 |
| TRACT REPAIR COST | ACRE | | | 0.79 |
| TRACTOR LUBE COST | ACRE | | | 0.25 |
| EQUIP REPAIR COST | ACRE | | | 0.79 |
| IRRIG FUEL COST | ACRE | | | 8.13 |
| IRRIG LUBE COST | ACRE | | | 1.63 |
| IRRIG REPAIR COST | ACRE | | | 12.62 |
| TOTAL OPERATING COST | | | | 113.37 |
| RETURNS TO LAND,LABOR,CAPITAL,MACHINERY, OVERHEAD,RISK,AND MANAGEMENT | | | | -3.37 |
| CAPITAL COST: | | | | |
| ANNUAL OPERATING CAPITAL | | 0.100 | 21.233 | 2.12 |
| TRACTOR INVESTMENT | | 0.100 | 11.659 | 1.17 |
| EQUIPMENT INVESTMENT | | 0.100 | 6.544 | 0.65 |
| IRRIGATION SYSTEM INVESTMENT | | 0.100 | 128.040 | 12.80 |
| TOTAL INTEREST CHARGE | | | | 16.75 |
| RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT | | | | -20.12 |
| OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE) | | | | |
| TRACTOR | DOL. | | | 1.39 |
| EQUIPMENT | DOL. | | | 1.04 |
| IRRIGATION SYSTEM | DOL. | | | 9.39 |
| TOTAL OWNERSHIP COST | | | | 11.83 |
| RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT | | | | -31.95 |
| LABOR COST: | | | | |
| MACHINERY LABOR | HR. | 3.000 | 1.205 | 3.62 |
| IRRIGATION LABOR | HR. | 3.000 | 1.248 | 3.74 |
| TOTAL LABOR COST | | | | 7.36 |
| RETURNS TO LAND, OVERHEAD, RISK AND MANAGEMENT | | | | -39.31 |

PANHANDLE ENERGY BUDGETS.

ENTERPRISE 87 AREA AND COUNTY 12 DETAIL 00 IRIG. LEVEL 6 LAND CLASS 1
GRAZING 7 MACH. COMP. 1 IRIG. SYSTEM 4 PRICE VECT 1 INDIV. NUMBER 0
ANNUAL CAPITAL MONTH: 9
DATE PRINTED: 03/05/75

# TABLE XLIX (Continued)

| LINE | 1 JAN | 2 FEB | 3 MAR | 4 APR | 5 MAY | 6 JUN | 7 JUL | 8 AUG | 9 SEP | 10 OCT | 11 NOV | 12 DEC | 13 PRICE | 14 WEIGHT | 15 UNIT CODE | 16 ITEM CODE | 17 TYPE | 18 CONT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PRODUCTICN | | | | | NUMBER OF UNITS | | | | | | | | | | | | | |
| 1 SUDAN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.50 | 1.50 | 0.0 | 0.0 | 0.0 | 0.0 | 22.000 | 0.0 | 3. | 87. | 2. | 0. |
| OPERATING INPUTS | | | | | RATE/UNIT | | | | | | | | PRICE | NUMBER UNITS | UNIT CODE | ITEM CODE | TYPE | CONT |
| 11 SUDAN SEED | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 10.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.270 | 0.0 | 12. | 187. | 3. | 0. |
| 12 NITROGEN | 0.0 | 0.0 | 0.0 | 0.0 | 100.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.140 | 0.0 | 12. | 211. | 3. | 0. |
| 13 SWATHING | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 3.160 | 0.0 | 7. | 392. | 3. | 0. |
| 14 BALER | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 105.00 | 45.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.280 | 0.0 | 6. | 388. | 3. | 0. |
| 15 BALE-LOADER | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 105.00 | 45.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.150 | 0.0 | 6. | 389. | 3. | 0. |
| MACHINERY REQUIREMENTS | | | | | TIMES OVER | | | | | | | | XXXXX | XXXXX | POWER UNIT | MACH CODE | TYPE | CONT |
| 38 OFFSET DISK | 0.0 | 0.0 | 1.00 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 37. | 4. | 0. |
| 39 M.B. PLOW | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 32. | 4. | 0. |
| 40 CULTIBEDDER PLNT | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 67. | 4. | 0. |
| 41 ROW CULTIVATOR | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 45. | 4. | 0. |
| 49 ACIN IRRIG WATER | 0.0 | 0.0 | 0.0 | 0.0 | 6.00 | 3.60 | 7.20 | 7.20 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | | |

PANHANDLE ENERGY BUDGETS.

MACHINERY COMPLEMENT 1
EQUIPMENT COMPLEMENT 1

***NO NAME CHANGES HAVE BEEN STORED WITH THIS BUDGET***

***NO COMPLEMENT CHANGES HAVE BEEN STORED WITH THIS BUDGET***

MONTHLY SUMMARY OF RECEIPTS AND EXPENSES

| CATEGORY | UNIT | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TOTAL RECEIPTS | ACRE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 77.00 | 33.00 | 0.0 | 0.0 | 0.0 | 0.0 | 110.00 |
| TOTAL EXPENSES | ACRE | 0.0 | 1.43 | 0.40 | 0.0 | 21.22 | 6.06 | 55.03 | 29.23 | 0.0 | 0.0 | 0.0 | 0.0 | 113.37 |
| RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT | | | | | | | | | | | | | | -3.37 |
| ANNUAL CAPITAL | DOL. | 0.0 | 0.84 | 0.20 | 0.0 | 7.07 | 1.51 | 9.17 | 2.44 | 0.0 | 0.0 | 0.0 | 0.0 | 21.23 |

LABOR REQUIREMENTS BY MONTH

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MACHINERY LABOR | HR. | 0.0 | 0.42 | 0.16 | 0.0 | 0.63 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.21 |
| IRRIGATION LABOR | HR. | 0.0 | 0.0 | 0.0 | 0.0 | 0.31 | 0.19 | 0.37 | 0.37 | 0.0 | 0.0 | 0.0 | 0.0 | 1.25 |
| TOTAL LABOR | HR. | 0.0 | 0.42 | 0.16 | 0.0 | 0.94 | 0.19 | 0.37 | 0.37 | 0.0 | 0.0 | 0.0 | 0.0 | 2.45 |
| IRRIGATION WATER | INCH | 0.0 | 0.0 | 0.0 | 0.0 | 6.00 | 3.60 | 7.20 | 7.20 | 0.0 | 0.0 | 0.0 | 0.0 | 24.00 |

MACHINERY FIXED AND VARIABLE COSTS PER HOUR

| MACHINE | CODE | DEPR | INSUR. | TAX | TOTAL FIXED | REPAIR | FUEL | LUB. | TOTAL VARIABLE | INT. | HR/TIME |
|---|---|---|---|---|---|---|---|---|---|---|---|
| TRACTOR(4) | 4 | 1.05 | 0.06 | 0.16 | 1.27 | 0.72 | 1.49 | 0.22 | 2.44 | 1.06 | 1.00 |
| OFFSET DISK | 37 | 1.66 | 0.07 | 0.21 | 1.94 | 0.43 | 0.0 | 0.0 | 0.43 | 1.24 | 0.13 |
| M.B. PLOW | 32 | 0.39 | 0.02 | 0.05 | 0.46 | 1.44 | 0.0 | 0.0 | 1.44 | 0.29 | 0.35 |
| CULTIBEDDER PLNT | 67 | 1.24 | 0.05 | 0.13 | 1.42 | 0.77 | 0.0 | 0.0 | 0.77 | 0.82 | 0.15 |
| ROW CULTIVATOR | 45 | 0.60 | 0.03 | 0.07 | 0.70 | 0.25 | 0.0 | 0.0 | 0.25 | 0.45 | 0.24 |

| OPERATION | ITEM NO. | DATE | TIMES OVER | LABOR HOURS | MACHINE HOURS | FUEL,OIL,LUB., REPAIR PER ACRE | FIXED COSTS PER ACRE |
|---|---|---|---|---|---|---|---|
| M.B. PLOW | 4,32 | FEB | 1.00 | 0.420 | 0.347 | 1.43 | 1.15 |
| OFFSET DISK | 4,37 | MAR | 1.00 | 0.157 | 0.129 | 0.40 | 0.74 |
| OFFSET DISK | 4,37 | MAY | 1.00 | 0.157 | 0.129 | 0.40 | 0.74 |
| CULTIBEDDER PLNT | 4,67 | MAY | 1.00 | 0.184 | 0.152 | 0.52 | 0.73 |
| ROW CULTIVATOR | 4,45 | MAY | 1.00 | 0.288 | 0.238 | 0.70 | 0.89 |
| TOTAL | | | | 1.205 | 0.996 | 3.46 | 4.26 |

# TABLE L

## CONVENTIONAL TILLAGE SOYBEANS ON CLAY LOAM SOILS WITH SURFACE IRRIGATION

| CATEGORY | UNITS | PRICE | QUANTITY | VALUE |
|---|---|---|---|---|
| PRODUCTION: | | | | |
| SOYBEANS | BU. | 3.280 | 45.000 | 147.60 |
| TOTAL RECEIPTS | | | | 147.60 |
| OPERATING INPUTS: | | | | |
| SOYBEAN SEED | LBS. | 0.170 | 90.000 | 15.30 |
| NITROGEN | LBS. | 0.140 | 50.000 | 7.00 |
| CUSTOM COMBINE | ACRE | 9.700 | 1.000 | 9.70 |
| CUSTOM HAULING | BU. | 0.100 | 45.000 | 4.50 |
| HERBICIDE | LBS. | 7.250 | 1.000 | 7.25 |
| TRACTOR FUEL COST | ACRE | | | 2.49 |
| TRACT REPAIR COST | ACRE | | | 1.20 |
| TRACTOR LUBE COST | ACRE | | | 0.37 |
| EQUIP REPAIR COST | ACRE | | | 0.53 |
| IRRIG FUEL COST | ACRE | | | 8.13 |
| IRRIG LUBE COST | ACRE | | | 1.63 |
| IRRIG REPAIR COST | ACRE | | | 10.25 |
| TOTAL OPERATING COST | | | | 68.36 |
| RETURNS TO LAND,LABOR,CAPITAL,MACHINERY, OVERHEAD,RISK,AND MANAGEMENT | | | | 79.24 |
| CAPITAL COST: | | | | |
| ANNUAL OPERATING CAPITAL | | 0.100 | 17.419 | 1.74 |
| TRACTOR INVESTMENT | | 0.100 | 17.728 | 1.77 |
| EQUIPMENT INVESTMENT | | 0.100 | 10.542 | 1.05 |
| IRRIGATION SYSTEM INVESTMENT | | 0.100 | 96.024 | 9.60 |
| TOTAL INTEREST CHARGE | | | | 14.17 |
| RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT | | | | 65.07 |
| OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE) | | | | |
| TRACTOR | DOL. | | | 2.12 |
| EQUIPMENT | DOL. | | | 1.66 |
| IRRIGATION SYSTEM | DOL. | | | 25.05 |
| TOTAL OWNERSHIP COST | | | | 28.83 |
| RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT | | | | 36.24 |
| LABOR COST: | | | | |
| MACHINERY LABOR | HR. | 3.000 | 1.833 | 5.50 |
| IRRIGATION LABOR | HR. | 3.000 | 1.248 | 3.74 |
| TOTAL LABOR COST | | | | 9.24 |
| RETURNS TO LAND, OVERHEAD, RISK AND MANAGEMENT | | | | 27.00 |

PANHANDLE ENERGY BUDGETS

ENTERPRISE 98 AREA AND COUNTY 12 DETAIL 00 IRIG. LEVEL 6 LAND CLASS 1
GRAZING 0 MACH. COMP. 1 IRIG. SYSTEM 4 PRICE VECT 1 INDIV. NUMBER 0
ANNUAL CAPITAL MONTH:10
DATE PRINTED: 03/05/75

# TABLE L (Continued)

| LINE | 1 JAN | 2 FEB | 3 MAR | 4 APR | 5 MAY | 6 JUN | 7 JUL | 8 AUG | 9 SEP | 10 OCT | 11 NOV | 12 DEC | 13 PRICE | 14 WEIGHT | 15 UNIT CODE | 16 ITEM CODE | 17 TYPE | 18 CONT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PRODUCTION | | | | | NUMBER OF UNITS | | | | | | | | | | | | | |
| 1 SOYBEANS | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 45.00 | 0.0 | 0.0 | 3.280 | 0.0 | 2. | 98. | 2. | 0. |
| OPERATING INPUTS | | | | | RATE/UNIT | | | | | | | | PRICE | NUMBER UNITS | UNIT CODE | ITEM CODE | TYPE | CONT |
| 11 SOYBEAN SEED | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 90.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.170 | 0.0 | 12. | 198. | 3. | 0. |
| 12 NITROGEN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 50.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.140 | 0.0 | 12. | 211. | 3. | 0. |
| 13 CUSTOM COMBINE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 9.700 | 0.0 | 7. | 305. | 3. | 0. |
| 14 CUSTOM HAULING | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 45.00 | 0.0 | 0.0 | 0.100 | 0.0 | 2. | 306. | 3. | 0. |
| 15 HERBICIDE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 7.250 | 0.0 | 12. | 250. | 3. | 0. |
| MACHINERY REQUIREMENTS | | | | | | TIMES OVER | | | | | | | XXXXX | XXXXX | POWER UNIT | MACH CODE | TYPE | CONT |
| 38 CHISEL | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 42. | 4. | 0. |
| 39 OFFSET DISK | 0.0 | 0.0 | 1.00 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 37. | 4. | 0. |
| 40 SPRINGTOOTH | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 55. | 4. | 0. |
| 41 LISTER | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 48. | 4. | 0. |
| 42 ROD WEEDER | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 59. | 4. | 0. |
| 43 CULTIBEDDER PLNT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 67. | 4. | 0. |
| 44 FIELD CULTIVATOR | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 46. | 4. | 0. |
| 49 ACIN IRRIG WATER | 0.0 | 0.C | 0.0 | 0.0 | 6.00 | 3.60 | 7.20 | 7.20 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | | |

PANHANDLE ENERGY BUDGETS

MACHINERY COMPLEMENT 1
EQUIPMENT COMPLEMENT 1

***NO NAME CHANGES HAVE BEEN STORED WITH THIS BUDGET***

***NO COMPLEMENT CHANGES HAVE BEEN STORED WITH THIS BUDGET***

| CATEGORY | UNIT | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MONTHLY SUMMARY OF RECEIPTS AND EXPENSES | | | | | | | | | | | | | | |
| TOTAL RECEIPTS | ACRE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 147.60 | 0.0 | 0.0 | 147.60 |
| TOTAL EXPENSES | ACRE | 0.0 | 0.0 | 1.00 | 1.41 | 5.28 | 33.77 | 6.70 | 6.00 | 0.0 | 14.20 | 0.0 | 0.0 | 68.36 |
| RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT | | | | | | | | | | | | | | 79.24 |
| ANNUAL CAPITAL | DOL. | 0.0 | 0.0 | 0.58 | 0.71 | 2.20 | 11.26 | 1.68 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 17.42 |
| LABOR REQUIREMENTS BY MONTH | | | | | | | | | | | | | | |
| MACHINERY LABOR | HR. | 0.0 | 0.0 | 0.41 | 0.55 | 0.11 | 0.47 | 0.29 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.83 |
| IRRIGATION LABOR | HR. | 0.0 | 0.0 | 0.0 | 0.0 | 0.31 | 0.19 | 0.37 | 0.37 | 0.0 | 0.0 | 0.0 | 0.0 | 1.25 |
| TOTAL LABOR | HR. | 0.0 | 0.0 | 0.41 | 0.55 | 0.43 | 0.66 | 0.66 | 0.37 | 0.0 | 0.0 | 0.0 | 0.0 | 3.08 |
| IRRIGATION WATER | INCH | 0.0 | 0.0 | 0.0 | 0.0 | 6.00 | 3.60 | 7.20 | 7.20 | 0.0 | 0.0 | 0.0 | 0.0 | 24.00 |

MACHINERY FIXED AND VARIABLE COSTS PER HOUR

| MACHINE | CODE | DEPR | INSUR. | TAX | TOTAL FIXED | REPAIR | FUEL | LUB. | TOTAL VARIABLE | INT. | HR/TIME |
|---|---|---|---|---|---|---|---|---|---|---|---|
| TRACTOR(4) | 4 | 1.05 | 0.06 | 0.16 | 1.27 | 0.72 | 1.49 | 0.22 | 2.44 | 1.06 | 1.00 |
| CHISEL | 42 | 0.52 | 0.02 | 0.06 | 0.61 | 0.14 | 0.0 | 0.0 | 0.14 | 0.39 | 0.21 |
| OFFSET DISK | 37 | 1.66 | 0.07 | 0.21 | 1.94 | 0.43 | 0.0 | 0.0 | 0.43 | 1.24 | 0.13 |
| SPRINGTOOTH | 55 | 0.46 | 0.02 | 0.06 | 0.53 | 0.33 | 0.0 | 0.0 | 0.33 | 0.34 | 0.07 |
| LISTER | 48 | 1.19 | 0.05 | 0.15 | 1.40 | 0.46 | 0.0 | 0.0 | 0.46 | 0.90 | 0.26 |
| ROD WEEDER | 59 | 0.80 | 0.04 | 0.10 | 0.93 | 0.21 | 0.0 | 0.0 | 0.21 | 0.60 | 0.09 |
| CULTIBEDDER PLNT | 67 | 1.24 | 0.05 | 0.13 | 1.42 | 0.77 | 0.0 | 0.0 | 0.77 | 0.82 | 0.15 |
| FIELD CULTIVATOR | 46 | 0.60 | 0.03 | 0.07 | 0.70 | 0.25 | 0.0 | 0.0 | 0.25 | 0.45 | 0.24 |

| OPERATION | ITEM NO. | DATE | TIMES OVER | LABOR HOURS | MACHINE HOURS | FUEL,OIL,LUB., REPAIR PER ACRE | FIXED COSTS PER ACRE |
|---|---|---|---|---|---|---|---|
| CHISEL | 4,42 | MAR | 1.00 | 0.254 | 0.210 | 0.59 | 0.75 |
| OFFSET DISK | 4,37 | MAR | 1.00 | 0.157 | 0.129 | 0.40 | 0.74 |
| OFFSET DISK | 4,37 | APR | 1.00 | 0.157 | 0.129 | 0.40 | 0.74 |
| SPRINGTOOTH | 4,55 | APR | 1.00 | 0.082 | 0.067 | 0.20 | 0.23 |
| LISTER | 4,48 | APR | 1.00 | 0.310 | 0.257 | 0.81 | 1.25 |
| ROD WEEDER | 4,59 | MAY | 1.00 | 0.114 | 0.094 | 0.27 | 0.39 |
| CULTIBEDDER PLNT | 4,67 | JUN | 1.00 | 0.184 | 0.152 | 0.52 | 0.73 |
| FIELD CULTIVATOR | 4,46 | JUN | 1.00 | 0.288 | 0.238 | 0.70 | 0.89 |
| FIELD CULTIVATOR | 4,46 | JUL | 1.00 | 0.288 | 0.238 | 0.70 | 0.89 |
| TOTAL | | | | 1.833 | 1.515 | 4.60 | 6.61 |

# TABLE LI

## REDUCED TILLAGE CORN ON SANDY LOAM SOIL UNDER CIRCULAR SPRINKLER IRRIGATION

| CATEGORY | UNITS | PRICE | QUANTITY | VALUE |
|---|---|---|---|---|
| PRODUCTION: | | | | |
| CORN | BU. | 1.380 | 135.000 | 186.30 |
| TOTAL RECEIPTS | | | | 186.30 |
| OPERATING INPUTS: | | | | |
| HERBICIDE | LBS. | 2.400 | 1.500 | 3.60 |
| CORN SEED | LBS. | 0.520 | 20.000 | 10.40 |
| NITROGEN | LBS. | 0.300 | 100.000 | 30.00 |
| PHOSPHATE | LBS. | 0.250 | 50.000 | 12.50 |
| INSECTICIDE | ACRE | 8.000 | 1.000 | 8.00 |
| HERBICIDE | PT. | 4.780 | 1.000 | 4.78 |
| NITROGEN | LBS. | 0.140 | 100.000 | 14.00 |
| CUSTOM COMBINE | BU. | 0.200 | 135.000 | 27.00 |
| CUSTOM HAULING | BU. | 0.100 | 135.000 | 13.50 |
| TRACTOR FUEL COST | ACRE | | | 2.83 |
| TRACT REPAIR COST | ACRE | | | 1.37 |
| TRACTOR LUBE COST | ACRE | | | 0.42 |
| EQUIP REPAIR COST | ACRE | | | 0.57 |
| IRRIG FUEL COST | ACRE | | | 8.13 |
| IRRIG LUBE COST | ACRE | | | 1.63 |
| IRRIG REPAIR COST | ACRE | | | 10.25 |
| TOTAL OPERATING COST | | | | 148.98 |
| RETURNS TO LAND,LABOR,CAPITAL,MACHINERY, OVERHEAD,RISK,AND MANAGEMENT | | | | 37.32 |
| CAPITAL COST: | | | | |
| ANNUAL OPERATING CAPITAL | | 0.100 | 44.616 | 4.46 |
| TRACTOR INVESTMENT | | 0.100 | 20.139 | 2.01 |
| EQUIPMENT INVESTMENT | | 0.100 | 9.143 | 0.91 |
| TOTAL INTEREST CHARGE | | | | 7.39 |
| RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT | | | | 29.93 |
| OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE) | | | | |
| TRACTOR | DOL. | | | 2.41 |
| EQUIPMENT | DOL. | | | 1.45 |
| IRRIGATION SYSTEM | DOL. | | | 33.06 |
| TOTAL OWNERSHIP COST | | | | 36.91 |
| RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT | | | | -6.99 |
| LABOR COST: | | | | |
| MACHINERY LABOR | HR. | 3.000 | 2.306 | 6.92 |
| IRRIGATION LABOR | HR. | 3.000 | 1.248 | 3.74 |
| TOTAL LABOR COST | | | | 10.66 |
| RETURNS TO LAND, OVERHEAD, RISK AND MANAGEMENT | | | | -17.65 |

PANHANDLE ENERGY BUDGETS
FIRST HERBICIDE AATREX SECOND HERBICIDE PARAQUAT

ENTERPRISE 72 AREA AND COUNTY 10 DETAIL 00 IRIG. LEVEL 6 LAND CLASS 8
GRAZING 2 MACH. COMP. 1 IRIG. SYSTEM 4 PRICE VECT 1 INDIV. NUMBER 0
ANNUAL CAPITAL MONTH: 10
DATE PRINTED: 03/05/75

# TABLE LI (Continued)

| LINE | 1 JAN | 2 FEB | 3 MAR | 4 APR | 5 MAY | 6 JUN | 7 JUL | 8 AUG | 9 SEP | 10 OCT | 11 NOV | 12 DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PRODUCTION | | | | | NUMBER OF UNITS | | | | | | | |
| 1 CORN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 135.00 | 0.0 | 0.0 |
| OPERATING INPUTS | | | | | RATE/UNIT | | | | | | | |
| 11 HERBICIDE | 0.0 | 0.0 | 1.50 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 12 CORN SEED | 0.0 | 0.0 | 0.0 | 20.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 13 NITROGEN | 0.0 | 0.0 | 0.0 | 100.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 14 PHOSPHATE | 0.0 | 0.0 | 0.0 | 50.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 15 INSECTICIDE | 0.0 | 0.0 | 0.0 | 0.0 | 0.50 | 0.0 | 0.50 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 16 HERBICIDE | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 17 NITROGEN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 50.00 | 50.00 | 0.0 | 0.0 | 0.0 | 0.0 |
| 18 CUSTOM COMBINE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 135.00 | 0.0 | 0.0 |
| 19 CUSTOM HAULING | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 135.00 | 0.0 | 0.0 |
| MACHINERY REQUIREMENTS | | | | | | TIMES OVER | | | | | | |
| 38 STALK SHREDDER | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 |
| 39 OFFSET DISK | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 |
| 40 SPRAYER | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 41 DRY FERT SPREAD | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 42 CULTIBEDDER PLNT | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 43 SPRAYER | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 44 ANHYDROUS APPLIC | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 45 FIELD CULTIVATOR | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 49 ACIN IRRIG WATER | 0.0 | 0.0 | 0.0 | 4.00 | 0.0 | 7.20 | 7.20 | 5.60 | 0.0 | 0.0 | 0.0 | 0.0 |

| LINE | 13 PRICE | 14 WEIGHT | 15 UNIT CODE | 16 ITEM CODE | 17 TYPE | 18 CONT |
|---|---|---|---|---|---|---|
| PRODUCTION | | | | | | |
| 1 CORN | 1.380 | 0.0 | 2. | 72. | 2. | 0. |
| OPERATING INPUTS | PRICE | NUMBER UNITS | UNIT CODE | ITEM CODE | TYPE | CONT |
| 11 HERBICIDE | 2.400 | 0.0 | 12. | 250. | 3. | 0. |
| 12 CORN SEED | 0.520 | 0.0 | 12. | 172. | 3. | 0. |
| 13 NITROGEN | 0.300 | 0.0 | 12. | 211. | 3. | 0. |
| 14 PHOSPHATE | 0.250 | 0.0 | 12. | 214. | 3. | 0. |
| 15 INSECTICIDE | 8.000 | 0.0 | 7. | 240. | 3. | 0. |
| 16 HERBICIDE | 4.780 | 0.0 | 13. | 250. | 3. | 0. |
| 17 NITROGEN | 0.140 | 0.0 | 12. | 211. | 3. | 0. |
| 18 CUSTOM COMBINE | 0.200 | 0.0 | 2. | 305. | 3. | 0. |
| 19 CUSTOM HAULING | 0.100 | 0.0 | 2. | 306. | 3. | 0. |
| MACHINERY REQUIREMENTS | XXXXX | XXXXX | POWER UNIT | MACH CODE | TYPE | CONT |
| 38 STALK SHREDDER | 0.0 | 0.0 | 4. | 81. | 4. | 0. |
| 39 OFFSET DISK | 0.0 | 0.0 | 4. | 37. | 4. | 0. |
| 40 SPRAYER | 0.0 | 0.0 | 2. | 74. | 4. | 0. |
| 41 DRY FERT SPREAD | 0.0 | 0.0 | 4. | 71. | 4. | 0. |
| 42 CULTIBEDDER PLNT | 0.0 | 0.0 | 4. | 67. | 4. | 0. |
| 43 SPRAYER | 0.0 | 0.0 | 2. | 74. | 4. | 0. |
| 44 ANHYDROUS APPLIC | 0.0 | 0.0 | 4. | 73. | 4. | 0. |
| 45 FIELD CULTIVATOR | 0.0 | 0.0 | 4. | 46. | 4. | 0. |

PANHANDLE ENERGY BUDGETS
FIRST HERBICIDE AATREX SECOND HERBICIDE PARAQUAT

MACHINERY COMPLEMENT 1
EQUIPMENT COMPLEMENT 1

***NO NAME CHANGES HAVE BEEN STORED WITH THIS BUDGET***

***NO COMPLEMENT CHANGES HAVE BEEN STORED WITH THIS BUDGET***

MONTHLY SUMMARY OF RECEIPTS AND EXPENSES

| CATEGORY | UNIT | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TOTAL RECEIPTS | ACRE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 186.30 | 0.0 | 0.0 | 186.30 |
| TOTAL EXPENSES | ACRE | 0.0 | 0.0 | 4.20 | 57.04 | 9.38 | 7.48 | 17.79 | 11.67 | 0.0 | 40.50 | 0.94 | 0.0 | 148.98 |
| RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT | | | | | | | | | | | | | | 37.32 |
| ANNUAL CAPITAL | DOL. | 0.0 | 0.0 | 2.45 | 28.52 | 3.91 | 2.49 | 4.45 | 1.94 | 0.0 | 0.0 | 0.86 | 0.0 | 44.62 |
| LABOR REQUIREMENTS BY MONTH | | | | | | | | | | | | | | |
| MACHINERY LABOR | HR. | 0.0 | 0.0 | 0.36 | 0.30 | 0.36 | 0.60 | 0.31 | 0.0 | 0.0 | 0.0 | 0.37 | 0.0 | 2.31 |
| IRRIGATION LABOR | HR. | 0.0 | 0.0 | 0.0 | 0.21 | 0.0 | 0.37 | 0.37 | 0.29 | 0.0 | 0.0 | 0.0 | 0.0 | 1.25 |
| TOTAL LABOR | HR. | 0.0 | 0.0 | 0.36 | 0.50 | 0.36 | 0.97 | 0.68 | 0.29 | 0.0 | 0.0 | 0.37 | 0.0 | 3.55 |
| IRRIGATION WATER | INCH | 0.0 | 0.0 | 0.0 | 4.00 | 0.0 | 7.20 | 7.20 | 5.60 | 0.0 | 0.0 | 0.0 | 0.0 | 24.00 |

MACHINERY FIXED AND VARIABLE COSTS PER HOUR

| MACHINE | CODE | DEPR | INSUR. | TAX | TOTAL FIXED | REPAIR | FUEL | LUB. | TOTAL VARIABLE | INT. | HP/TIME |
|---|---|---|---|---|---|---|---|---|---|---|---|
| TRACTOR(2) | 2 | 0.73 | 0.04 | 0.11 | 0.88 | 0.50 | 1.04 | 0.16 | 1.69 | 0.74 | 1.00 |
| TRACTOR(4) | 4 | 1.05 | 0.06 | 0.16 | 1.27 | 0.72 | 1.49 | 0.22 | 2.44 | 1.06 | 1.00 |
| STALK SHREDDER | 81 | 0.59 | 0.02 | 0.06 | 0.68 | 0.33 | 0.0 | 0.0 | 0.33 | 0.39 | 0.18 |
| OFFSET DISK | 37 | 1.66 | 0.07 | 0.21 | 1.94 | 0.43 | 0.0 | 0.0 | 0.43 | 1.24 | 0.13 |
| SPRAYER | 74 | 0.40 | 0.02 | 0.05 | 0.47 | 0.11 | 0.0 | 0.0 | 0.11 | 0.31 | 0.30 |
| DRY FERT SPREAD | 71 | 0.68 | 0.03 | 0.08 | 0.80 | 0.29 | 0.0 | 0.0 | 0.29 | 0.51 | 0.09 |
| CULTIBEDDER PLNT | 67 | 1.24 | 0.05 | 0.13 | 1.42 | 0.77 | 0.0 | 0.0 | 0.77 | 0.82 | 0.15 |
| SPRAYER | 74 | 0.40 | 0.02 | 0.05 | 0.47 | 0.11 | 0.0 | 0.0 | 0.11 | 0.31 | 0.30 |
| ANHYDROUS APPLIC | 73 | 0.56 | 0.03 | 0.07 | 0.66 | 0.37 | 0.0 | 0.0 | 0.37 | 0.43 | 0.26 |
| FIELD CULTIVATOR | 46 | 0.60 | 0.03 | 0.07 | 0.70 | 0.25 | 0.0 | 0.0 | 0.25 | 0.45 | 0.24 |

| OPERATION | ITEM NO. | DATE | TIMES OVER | LABOR HOURS | MACHINE HOURS | FUEL, OIL, LUB., REPAIR PER ACRE | FIXED COSTS PER ACRE |
|---|---|---|---|---|---|---|---|
| STALK SHREDDER | 4,81 | NOV | 1.00 | 0.214 | 0.177 | 0.53 | 0.64 |
| OFFSET DISK | 4,37 | NOV | 1.00 | 0.157 | 0.129 | 0.40 | 0.74 |
| SPRAYER | 2,74 | MAR | 1.00 | 0.365 | 0.302 | 0.60 | 0.77 |
| DRY FERT SPREAD | 4,71 | APR | 1.00 | 0.112 | 0.093 | 0.28 | 0.36 |
| CULTIBEDDER PLNT | 4,67 | APR | 1.00 | 0.184 | 0.152 | 0.52 | 0.73 |
| SPRAYER | 2,74 | MAY | 1.00 | 0.365 | 0.302 | 0.60 | 0.77 |
| ANHYDROUS APPLIC | 4,73 | JUN | 1.00 | 0.310 | 0.257 | 0.78 | 0.94 |
| FIELD CULTIVATOR | 4,46 | JUN | 1.00 | 0.288 | 0.238 | 0.70 | 0.89 |
| ANHYDROUS APPLIC | 4,73 | JUL | 1.00 | 0.310 | 0.257 | 0.78 | 0.94 |
| TOTAL | | | | 2.306 | 1.905 | 5.19 | 6.79 |

TABLE LII

REDUCED TILLAGE CORN SILAGE AND RYE GRAZE DOUBLE CROP ON SANDY LOAM SOIL UNDER CIRCULAR SPRINKLER IRRIGATION

| CATEGORY | UNITS | PRICE | QUANTITY | VALUE |
|---|---|---|---|---|
| PRODUCTION: | | | | |
| CORN SILAGE | TONS | 5.500 | 20.000 | 110.00 |
| GRAZE-OUT | AUMS | 10.000 | 4.100 | 41.00 |
| TOTAL RECEIPTS | | | | 151.00 |
| OPERATING INPUTS: | | | | |
| HERBICIDE | LBS. | 2.400 | 1.500 | 3.60 |
| NITROGEN | LBS. | 0.300 | 100.000 | 30.00 |
| PHOSPHATE | LBS. | 0.250 | 50.000 | 12.50 |
| CORN SEED | LBS. | 0.520 | 20.000 | 10.40 |
| INSECTICIDE | ACRE | 8.000 | 1.000 | 8.00 |
| NITROGEN | LBS. | 0.140 | 100.000 | 14.00 |
| RYE SEED | BU. | 5.000 | 1.000 | 5.00 |
| NITROGEN | LBS. | 0.140 | 80.000 | 11.20 |
| TRACTOR FUEL COST | ACRE | | | 1.73 |
| TRACT REPAIR COST | ACRE | | | 0.84 |
| TRACTOR LUBE COST | ACRE | | | 0.26 |
| EQUIP REPAIR COST | ACRE | | | 0.55 |
| IRRIG FUEL COST | ACRE | | | 11.52 |
| IRRIG LUBE COST | ACRE | | | 2.31 |
| IRRIG REPAIR COST | ACRE | | | 16.20 |
| TOTAL OPERATING COST | | | | 128.11 |
| RETURNS TO LAND,LABOR,CAPITAL,MACHINERY, OVERHEAD,RISK,AND MANAGEMENT | | | | 22.89 |
| CAPITAL COST: | | | | |
| ANNUAL OPERATING CAPITAL | | 0.100 | 32.071 | 3.21 |
| TRACTOR INVESTMENT | | 0.100 | 12.329 | 1.23 |
| EQUIPMENT INVESTMENT | | 0.100 | 7.076 | 0.71 |
| IRRIGATION SYSTEM INVESTMENT | | 0.100 | 158.712 | 15.87 |
| TOTAL INTEREST CHARGE | | | | 21.02 |
| RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT | | | | 1.87 |
| OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE) | | | | |
| TRACTOR | DOL. | | | 1.47 |
| EQUIPMENT | DOL. | | | 1.12 |
| IRRIGATION SYSTEM | DOL. | | | 24.40 |
| TOTAL OWNERSHIP COST | | | | 26.99 |
| RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT | | | | -25.12 |
| LABOR COST: | | | | |
| MACHINERY LABOR | HR. | 3.000 | 1.386 | 4.16 |
| IRRIGATION LABOR | HR. | 3.000 | 1.768 | 5.30 |
| TOTAL LABOR COST | | | | 9.46 |
| RETURNS TO LAND, OVERHEAD, RISK AND MANAGEMENT | | | | -34.59 |

PANHANDLE ENERGY BUDGETS
HERBICIDE AATREX

ENTERPRISE 86 AREA AND COUNTY 10 DETAIL 00 IRIG. LEVEL 6 LAND CLASS 8
GRAZING 5 MACH. COMP. 1 IRIG. SYSTEM 4 PRICE VECT 1 INDIV. NUMBER 0
ANNUAL CAPITAL MONTH: 9
DATE PRINTED: 03/05/75

# TABLE LII (Continued)

| LINE | 1 JAN | 2 FEB | 3 MAR | 4 APR | 5 MAY | 6 JUN | 7 JUL | 8 AUG | 9 SEP | 10 OCT | 11 NOV | 12 DEC | 13 PRICE | 14 WEIGHT | 15 UNIT CODE | 16 ITEM CODE | 17 TYPE | 18 CONT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PRODUCTION | | | | | NUMBER OF UNITS | | | | | | | | | | | | | |
| 1 CORN SILAGE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 20.00 | 0.0 | 0.0 | 0.0 | 5.500 | 0.0 | 3. | 161. | 2. | 0. |
| 2 GRAZE-OUT | 0.25 | 0.25 | 0.75 | 0.90 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.60 | 0.60 | 0.75 | 10.000 | 0.0 | 10. | 75. | 2. | 0. |
| OPERATING INPUTS | | | | | RATE/UNIT | | | | | | | | PRICE | NUMBER UNITS | UNIT CODE | ITEM CODE | TYPE | CONT |
| 11 HERBICIDE | 0.0 | 0.0 | 0.0 | 0.0 | 1.50 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.400 | 0.0 | 12. | 250. | 3. | 0. |
| 12 NITROGEN | 0.0 | 0.0 | 0.0 | 0.0 | 100.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.300 | 0.0 | 12. | 211. | 3. | 0. |
| 13 PHOSPHATE | 0.0 | 0.0 | 0.0 | 0.0 | 50.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.250 | 0.0 | 12. | 214. | 3. | 0. |
| 14 CORN SEED | 0.0 | 0.0 | 0.0 | 0.0 | 20.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.520 | 0.0 | 12. | 172. | 3. | 0. |
| 15 INSECTICIDE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.50 | 0.50 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 8.000 | 0.0 | 7. | 240. | 3. | 0. |
| 16 NITROGEN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 100.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.140 | 0.0 | 12. | 211. | 3. | 0. |
| 17 RYE SEED | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 5.000 | 0.0 | 2. | 175. | 3. | 0. |
| 18 NITROGEN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 80.00 | 0.0 | 0.0 | 0.0 | 0.140 | 0.0 | 12. | 211. | 3. | 0. |
| MACHINERY REQUIREMENTS | | | | | | TIMES OVER | | | | | | | XXXXX | XXXXX | POWER UNIT | MACH CODE | TYPE | CONT |
| 38 DRY FERT SPREAD | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 71. | 4. | 0. |
| 39 CULTIBEDDER PLNT | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 67. | 4. | 0. |
| 40 SPRAYER | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2. | 74. | 4. | 0. |
| 41 ANHYDROUS APPLIC | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 73. | 4. | 0. |
| 42 CULTIBEDDER AYHD | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 95. | 4. | 0. |
| 43 DRILL WO/FERT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 61. | 4. | 0. |
| 49 ACIN IRRIG WATER | 0.0 | 0.0 | 3.00 | 3.00 | 3.00 | 3.60 | 7.20 | 7.20 | 3.00 | 0.0 | 4.00 | 0.0 | | | | | | |

PANHANDLE ENERGY BUDGETS
HERBICIDE AATREX

MACHINERY COMPLEMENT 1
EQUIPMENT COMPLEMENT 1

***NO NAME CHANGES HAVE BEEN STORED WITH THIS BUDGET***

***NO COMPLEMENT CHANGES HAVE BEEN STORED WITH THIS BUDGET***

| CATEGORY | UNIT | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MONTHLY SUMMARY OF RECEIPTS AND EXPENSES | | | | | | | | | | | | | | |
| TOTAL RECEIPTS | ACRE | 2.50 | 2.50 | 7.50 | 9.00 | 0.0 | 0.0 | 0.0 | 0.0 | 110.00 | 6.00 | 6.00 | 7.50 | 151.00 |
| TOTAL EXPENSES | ACRE | 0.0 | 0.0 | 2.65 | 2.65 | 60.55 | 7.18 | 25.14 | 6.36 | 20.05 | 0.0 | 3.53 | 0.0 | 128.11 |
| RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT | | | | | | | | | | | | | | 22.89 |
| ANNUAL CAPITAL | DOL. | 0.0 | 0.0 | 1.32 | 1.10 | 20.18 | 1.79 | 4.19 | 0.53 | 0.0 | 0.0 | 2.94 | 0.0 | 32.07 |
| LABOR REQUIREMENTS BY MONTH | | | | | | | | | | | | | | |
| MACHINERY LABOR | HR. | 0.0 | 0.0 | 0.0 | 0.0 | 0.66 | 0.0 | 0.31 | 0.0 | 0.41 | 0.0 | 0.0 | 0.0 | 1.39 |
| IRRIGATION LABOR | HR. | 0.0 | 0.0 | 0.16 | 0.16 | 0.16 | 0.19 | 0.37 | 0.37 | 0.16 | 0.0 | 0.21 | 0.0 | 1.77 |
| TOTAL LABOR | HR. | 0.0 | 0.0 | 0.16 | 0.16 | 0.82 | 0.19 | 0.68 | 0.37 | 0.57 | 0.0 | 0.21 | 0.0 | 3.15 |
| IRRIGATION WATER | INCH | 0.0 | 0.0 | 3.00 | 3.00 | 3.00 | 3.60 | 7.20 | 7.20 | 3.00 | 0.0 | 4.00 | 0.0 | 34.00 |

MACHINERY FIXED AND VARIABLE COSTS PER HOUR

| MACHINE | CODE | DEPR | INSUR. | TAX | TOTAL FIXED | REPAIR | FUEL | LUB. | TOTAL VARIABLE | INT. | HR/TIME |
|---|---|---|---|---|---|---|---|---|---|---|---|
| TRACTOR(2) | 2 | 0.73 | 0.04 | 0.11 | 0.88 | 0.50 | 1.04 | 0.16 | 1.69 | 0.74 | 1.00 |
| TRACTOR(4) | 4 | 1.05 | 0.06 | 0.16 | 1.27 | 0.72 | 1.49 | 0.22 | 2.44 | 1.06 | 1.00 |
| DRY FERT SPREAD | 71 | 0.68 | 0.03 | 0.08 | 0.80 | 0.29 | 0.0 | 0.0 | 0.29 | 0.51 | 0.09 |
| CULTIBEDDER PLNT | 67 | 1.24 | 0.05 | 0.13 | 1.42 | 0.77 | 0.0 | 0.0 | 0.77 | 0.82 | 0.15 |
| SPRAYER | 74 | 0.40 | 0.02 | 0.05 | 0.47 | 0.11 | 0.0 | 0.0 | 0.11 | 0.31 | 0.30 |
| ANHYDROUS APPLIC | 73 | 0.56 | 0.03 | 0.07 | 0.66 | 0.37 | 0.0 | 0.0 | 0.37 | 0.43 | 0.26 |
| CULTIBEDDER AYHD | 95 | 0.90 | 0.04 | 0.11 | 1.05 | 1.24 | 0.0 | 0.0 | 1.24 | 0.67 | 0.16 |
| DRILL WO/FERT | 61 | 1.65 | 0.07 | 0.21 | 1.93 | 0.44 | 0.0 | 0.0 | 0.44 | 1.24 | 0.18 |

| OPERATION | ITEM NO. | DATE | TIMES OVER | LABOR HOURS | MACHINE HOURS | FUEL,OIL,LUB., REPAIR PER ACRE | FIXED COSTS PER ACRE |
|---|---|---|---|---|---|---|---|
| DRY FERT SPREAD | 4,71 | MAY | 1.00 | 0.112 | 0.093 | 0.28 | 0.36 |
| CULTIBEDDER PLNT | 4,67 | MAY | 1.00 | 0.184 | 0.152 | 0.52 | 0.73 |
| SPRAYER | 2,74 | MAY | 1.00 | 0.365 | 0.302 | 0.60 | 0.77 |
| ANHYDROUS APPLIC | 4,73 | JUL | 1.00 | 0.310 | 0.257 | 0.78 | 0.94 |
| CULTIBEDDER AYHD | 4,95 | SEP | 1.00 | 0.198 | 0.164 | 0.64 | 0.70 |
| DRILL WO/FERT | 4,61 | SEP | 1.00 | 0.217 | 0.179 | 0.56 | 1.03 |
| TOTAL | | | | 1.386 | 1.146 | 3.38 | 4.53 |

# TABLE LIII

## REDUCED TILLAGE WHEAT (CON. RED. CON.) TWO YEAR ROTATION ON CLAY LOAM SOIL WITH SURFACE IRRIGATION

| CATEGORY | UNITS | PRICE | QUANTITY | VALUE |
|---|---|---|---|---|
| PRODUCTION: | | | | |
| WHEAT | LBS. | 2.050 | 55.000 | 112.75 |
| GRAZING | AUMS | 10.000 | 1.000 | 10.00 |
| WHEAT | BU. | 2.050 | 58.000 | 118.90 |
| GRAZING | AUMS | 10.000 | 1.000 | 10.00 |
| TOTAL RECEIPTS | | | | 251.65 |
| OPERATING INPUTS: | | | | |
| WHEAT SEED | BU. | 5.000 | 1.000 | 5.00 |
| NITROGEN | LBS. | 0.140 | 100.000 | 14.00 |
| CUSTOM COMBINE | ACRE | 9.800 | 1.000 | 9.80 |
| CUSTOM HAULING | BU. | 0.100 | 55.000 | 5.50 |
| HERBICIDE | LBS. | 8.000 | 0.500 | 4.00 |
| HERBICIDE | LBS. | 9.550 | 0.500 | 4.77 |
| WHEAT SEED | BU. | 5.000 | 1.000 | 5.00 |
| NITROGEN | LBS. | 0.140 | 100.000 | 14.00 |
| CUSTOM COMBINE | ACRE | 10.280 | 1.000 | 10.28 |
| CUSTOM HAULING | BU. | 0.100 | 58.000 | 5.80 |
| TRACTOR FUEL COST | ACRE | | | 3.24 |
| TRACT REPAIR COST | ACRE | | | 1.57 |
| TRACTOR LUBE COST | ACRE | | | 0.49 |
| EQUIP REPAIR COST | ACRE | | | 1.23 |
| IRRIG FUEL COST | ACRE | | | 7.96 |
| IRRIG LUBE COST | ACRE | | | 2.14 |
| IRRIG REPAIR COST | ACRE | | | 8.19 |
| TOTAL OPERATING COST | | | | 102.97 |
| RETURNS TO LAND,LABOR,CAPITAL,MACHINERY, OVERHEAD,RISK,AND MANAGEMENT | | | | 148.68 |
| CAPITAL COST: | | | | |
| ANNUAL OPERATING CAPITAL | | 0.100 | 48.383 | 4.84 |
| TRACTOR INVESTMENT | | 0.100 | 23.057 | 2.31 |
| EQUIPMENT INVESTMENT | | 0.100 | 17.908 | 1.79 |
| IRRIGATION SYSTEM INVESTMENT | | 0.100 | 112.540 | 11.25 |
| TOTAL INTEREST CHARGE | | | | 20.19 |
| RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT | | | | 128.49 |
| OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE) | | | | |
| TRACTOR | DOL. | | | 2.76 |
| EQUIPMENT | DOL. | | | 2.62 |
| IRRIGATION SYSTEM | DOL. | | | 17.78 |
| TOTAL OWNERSHIP COST | | | | 23.15 |
| RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT | | | | 105.34 |
| LABOR COST: | | | | |
| MACHINERY LABOR | HR. | 3.000 | 2.607 | 7.82 |
| IRRIGATION LABOR | HR. | 3.000 | 1.768 | 5.30 |
| TOTAL LABOR COST | | | | 13.13 |
| RETURNS TO LAND, OVERHEAD, RISK AND MANAGEMENT | | | | 92.21 |

PANHANDLE ENERGY BUDGETS CON IS YEAR 1: REDUCED YEAR 2
3 BU/AC. INCREASE WITH REDUCED TILLAGE
HERBICIDE 1 IS 2,4-D. HERBICIDE 2 IS PARAQUAT.
ENTERPRISE 16 AREA AND COUNTY 10 DETAIL 00 IRIG. LEVEL 5 LAND CLASS 1
GRAZING 3 MACH. COMP. 1 IRIG. SYSTEM 5 PRICE VECT 1 INDIV. NUMBER 0
ANNUAL CAPITAL MONTH: 6
DATE PRINTED: 03/05/75

# TABLE LIII (Continued)

| LINE | 1 JAN | 2 FEB | 3 MAR | 4 APR | 5 MAY | 6 JUN | 7 JUL | 8 AUG | 9 SEP | 10 OCT | 11 NOV | 12 DEC | 13 PRICE | 14 WEIGHT | 15 UNIT CODE | 16 ITEM CODE | 17 TYPE | 18 CONT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PRODUCTION | | | | | NUMBER OF UNITS | | | | | | | | | | | | | |
| 1 WHEAT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 55.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.050 | 0.0 | 12. | 76. | 2. | 1. |
| 2 GRAZING | 0.20 | 0.20 | 0.20 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.20 | 0.20 | 10.000 | 0.0 | 10. | 89. | 2. | 1. |
| 3 WHEAT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 58.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.050 | 0.0 | 2. | 76. | 2. | 2. |
| 4 GRAZING | 0.20 | 0.20 | 0.20 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.20 | 0.20 | 10.000 | 0.0 | 10. | 89. | 2. | 2. |
| OPERATING INPUTS | | | | | RATE/UNIT | | | | | | | | PRICE | NUMBER UNITS | UNIT CODE | ITEM CODE | TYPE | CONT |
| 11 WHEAT SEED | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 5.000 | 0.0 | 2. | 176. | 3. | 1. |
| 12 NITROGEN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 100.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.140 | 0.0 | 12. | 211. | 3. | 1. |
| 13 CUSTOM COMBINE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 9.800 | 0.0 | 7. | 305. | 3. | 1. |
| 14 CUSTOM HAULING | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 55.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.100 | 0.0 | 2. | 306. | 3. | 1. |
| 15 HERBICIDE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.50 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 8.000 | 0.0 | 12. | 250. | 3. | 2. |
| 16 HERBICIDE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.50 | 0.0 | 0.0 | 0.0 | 0.0 | 9.550 | 0.0 | 12. | 250. | 3. | 2. |
| 17 WHEAT SEED | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 5.000 | 0.0 | 2. | 176. | 3. | 2. |
| 18 NITROGEN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 100.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.140 | 0.0 | 12. | 211. | 3. | 2. |
| 19 CUSTOM COMBINE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 10.280 | 0.0 | 7. | 305. | 3. | 2. |
| 20 CUSTOM HAULING | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 58.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.100 | 0.0 | 2. | 306. | 3. | 2. |
| MACHINERY REQUIREMENTS | | | | | | TIMES OVER | | | | | | | XXXXX | XXXXX | POWER UNIT | MACH CODE | TYPE | CONT |
| 38 OFFSET DISK | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.00 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 37. | 4. | 1. |
| 39 LAND PLANE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.50 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 77. | 4. | 1. |
| 40 CULTIBEDDER AYHD | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 95. | 4. | 1. |
| 41 CULTIBEDDER TILL | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 51. | 4. | 1. |
| 42 DRILL WO/FERT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 61. | 4. | 1. |
| 43 OFFSET DISK | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 37. | 4. | 2. |
| 44 SPRAYER | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2. | 74. | 4. | 2. |
| 45 CULTIBEDDER AYHD | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 95. | 4. | 2. |
| 46 DRILL WO/FERT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 61. | 4. | 2. |
| 49 ACIN IRRIG WATER | C.C | C.C | 0.0 | 8.00 | 12.00 | 0.0 | 0.0 | 0.0 | 6.00 | 0.0 | 8.00 | 0.0 | | | | | | |

PANHANDLE ENERGY BUDGETS CON IS YEAR 1: REDUCED YEAR 2
3 BU/AC. INCREASE WITH REDUCED TILLAGE
HERBICIDE 1 IS 2,4-D. HERBICIDE 2 IS PARAQUAT.

MACHINERY COMPLEMENT 1
EQUIPMENT COMPLEMENT 1

***NO NAME CHANGES HAVE BEEN STORED WITH THIS BUDGET***

***AC COMPLEMENT CHANGES HAVE BEEN STORED WITH THIS BUDGET***

MONTHLY SUMMARY OF RECEIPTS AND EXPENSES

| CATEGORY | UNIT | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TOTAL RECEIPTS | ACRE | 4.00 | 4.00 | 4.00 | 0.0 | 0.0 | 231.65 | 0.0 | 0.0 | 0.0 | 0.0 | 4.00 | 4.00 | 251.65 |
| TOTAL EXPENSES | ACRE | 0.0 | 0.0 | 0.0 | 4.30 | 6.46 | 32.48 | 4.60 | 34.79 | 15.22 | 0.0 | 4.30 | 0.0 | 102.97 |
| RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT | | | | | | | | | | | | | | 148.68 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ANNUAL CAPITAL | DOL. | 0.0 | 0.0 | 0.0 | 0.72 | 0.54 | 0.0 | 4.21 | 28.99 | 11.42 | 0.0 | 2.51 | 0.0 | 48.38 |

LABOR REQUIREMENTS BY MONTH

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MACHINERY LABOR | HR. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.47 | 0.36 | 1.00 | 0.77 | 0.0 | 0.0 | 0.0 | 2.61 |
| IRRIGATION LABOR | HR. | 0.0 | 0.0 | 0.0 | 0.42 | 0.62 | 0.0 | 0.0 | 0.0 | 0.31 | 0.0 | 0.42 | 0.0 | 1.77 |
| TOTAL LABOR | HR. | 0.0 | 0.0 | 0.0 | 0.42 | 0.62 | 0.47 | 0.36 | 1.00 | 1.08 | 0.0 | 0.42 | 0.0 | 4.38 |
| IRRIGATION WATER | INCH | 0.0 | 0.0 | 0.0 | 8.00 | 12.00 | 0.0 | 0.0 | 0.0 | 6.00 | 0.0 | 8.00 | 0.0 | 34.00 |

MACHINERY FIXED AND VARIABLE COSTS PER HOUR

| MACHINE | CODE | DEPR | INSUR. | TAX | TOTAL FIXED | REPAIR | FUEL | LUB. | TOTAL VARIABLE | INT. | HR/TIME |
|---|---|---|---|---|---|---|---|---|---|---|---|
| TRACTOR(2) | 2 | 0.73 | 0.04 | 0.11 | 0.88 | 0.50 | 1.04 | 0.16 | 1.69 | 0.74 | 1.00 |
| TRACTOR(4) | 4 | 1.05 | 0.06 | 0.16 | 1.27 | 0.72 | 1.49 | 0.22 | 2.44 | 1.06 | 1.00 |
| OFFSET DISK | 37 | 1.66 | 0.07 | 0.21 | 1.94 | 0.43 | 0.0 | 0.0 | 0.43 | 1.24 | 0.13 |
| LAND PLANE | 77 | 0.64 | 0.06 | 0.13 | 0.84 | 1.15 | 0.0 | 0.0 | 1.15 | 1.03 | 0.47 |
| CULTIBEDDER AYHD | 95 | 0.90 | 0.04 | 0.11 | 1.05 | 1.24 | 0.0 | 0.0 | 1.24 | 0.67 | 0.16 |
| CULTIBEDDER TILL | 51 | 0.69 | 0.03 | 0.09 | 0.80 | 0.95 | 0.0 | 0.0 | 0.95 | 0.51 | 0.11 |
| DRILL WO/FERT | 61 | 1.65 | 0.07 | 0.21 | 1.93 | 0.44 | 0.0 | 0.0 | 0.44 | 1.24 | 0.18 |
| OFFSET DISK | 37 | 1.66 | 0.07 | 0.21 | 1.94 | 0.43 | 0.0 | 0.0 | 0.43 | 1.24 | 0.13 |
| SPRAYER | 74 | 0.40 | 0.02 | 0.05 | 0.47 | 0.11 | 0.0 | 0.0 | 0.11 | 0.31 | 0.30 |
| CULTIBEDDER AYHD | 95 | 0.90 | 0.04 | 0.11 | 1.05 | 1.24 | 0.0 | 0.0 | 1.24 | 0.67 | 0.16 |
| DRILL WO/FERT | 61 | 1.65 | 0.07 | 0.21 | 1.93 | 0.44 | 0.0 | 0.0 | 0.44 | 1.24 | 0.18 |

| OPERATION | ITEM NO. | DATE | TIMES OVER | LABOR HOURS | MACHINE HOURS | FUEL,OIL,LUB., REPAIR PER ACRE | FIXED COSTS PER ACRE |
|---|---|---|---|---|---|---|---|
| SPRAYER | 2,74 | JUL | 1.00 | 0.365 | 0.302 | 0.60 | 0.77 |
| OFFSET DISK | 4,37 | AUG | 1.00 | 0.157 | 0.129 | 0.40 | 0.74 |
| LAND PLANE | 4,77 | AUG | 0.50 | 0.283 | 0.234 | 0.90 | 1.04 |
| CULTIBEDDER AYHD | 4,95 | AUG | 1.00 | 0.198 | 0.164 | 0.64 | 0.70 |
| SPRAYER | 2,74 | AUG | 1.00 | 0.365 | 0.302 | 0.60 | 0.77 |
| CULTIBEDDER TILL | 4,51 | SEP | 1.00 | 0.139 | 0.115 | 0.42 | 0.45 |
| DRILL WO/FERT | 4,61 | SEP | 1.00 | 0.217 | 0.179 | 0.56 | 1.03 |
| CULTIBEDDER AYHD | 4,95 | SEP | 1.00 | 0.198 | 0.164 | 0.64 | 0.70 |
| DRILL WO/FERT | 4,61 | SEP | 1.00 | 0.217 | 0.179 | 0.56 | 1.03 |
| OFFSET DISK | 4,37 | JUN | 2.00 | 0.313 | 0.259 | 0.81 | 1.49 |
| OFFSET DISK | 4,37 | JUN | 1.00 | 0.157 | 0.129 | 0.40 | 0.74 |
| TOTAL | | | | 2.607 | 2.155 | 6.53 | 9.47 |

# TABLE LIV

## REDUCED TILLAGE WHEAT AND GRAIN SORGHUM DOUBLE CROP ON CLAY LOAM SOIL WITH SURFACE IRRIGATION

| CATEGORY | UNITS | PRICE | QUANTITY | VALUE |
|---|---|---|---|---|
| PRODUCTION: | | | | |
| WHEAT | BU. | 2.050 | 50.000 | 102.50 |
| MILO | CWT. | 2.340 | 48.000 | 112.32 |
| TOTAL RECEIPTS | | | | 214.82 |
| OPERATING INPUTS: | | | | |
| NITROGEN | LBS. | 0.140 | 120.000 | 16.80 |
| WHEAT SEED | BU. | 5.000 | 1.000 | 5.00 |
| CUSTOM COMBINE | ACRE | 9.400 | 1.000 | 9.40 |
| CUSTOM HAULING | BU. | 0.100 | 50.000 | 5.00 |
| MILO SEED | LBS. | 0.270 | 7.000 | 1.89 |
| HERBICIDE | LBS. | 2.400 | 1.500 | 3.60 |
| NITROGEN | LBS. | 0.140 | 120.000 | 16.80 |
| INSECTICIDE | ACRE | 2.200 | 1.000 | 2.20 |
| CUSTOM COMBINE | ACRE | 10.000 | 1.000 | 10.00 |
| CUSTOM HAULING | CWT. | 0.100 | 48.000 | 4.80 |
| TRACTOR FUEL COST | ACRE | | | 1.87 |
| TRACT REPAIR COST | ACRE | | | 0.90 |
| TRACTOR LUBE COST | ACRE | | | 0.28 |
| EQUIP REPAIR COST | ACRE | | | 0.59 |
| IRRIG FUEL COST | ACRE | | | 6.79 |
| IRRIG LUBE COST | ACRE | | | 1.83 |
| IRRIG REPAIR COST | ACRE | | | 6.99 |
| TOTAL OPERATING COST | | | | 94.73 |
| RETURNS TO LAND,LABOR,CAPITAL,MACHINERY, OVERHEAD,RISK,AND MANAGEMENT | | | | 120.09 |
| CAPITAL COST: | | | | |
| ANNUAL OPERATING CAPITAL | | 0.100 | 34.075 | 3.41 |
| TRACTOR INVESTMENT | | 0.100 | 13.311 | 1.33 |
| EQUIPMENT INVESTMENT | | 0.100 | 7.291 | 0.73 |
| IRRIGATION SYSTEM INVESTMENT | | 0.100 | 95.990 | 9.60 |
| TOTAL INTEREST CHARGE | | | | 15.07 |
| RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT | | | | 105.02 |
| OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE) | | | | |
| TRACTOR | DOL. | | | 1.59 |
| EQUIPMENT | DOL. | | | 1.16 |
| IRRIGATION SYSTEM | DOL. | | | 15.17 |
| TOTAL OWNERSHIP COST | | | | 17.92 |
| RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT | | | | 87.10 |
| LABOR COST: | | | | |
| MACHINERY LABOR | HR. | 3.000 | 1.488 | 4.46 |
| IRRIGATION LABOR | HR. | 3.000 | 1.508 | 4.52 |
| TOTAL LABOR COST | | | | 8.99 |
| RETURNS TO LAND, OVERHEAD, RISK AND MANAGEMENT | | | | 78.11 |

PANHANDLE ENERGY BUDGETS
HERBICIDE AATREX
GRAIN SORGHUM 600 POUND INCREASE PER ACRE
ENTERPRISE 73 AREA AND COUNTY 10 DETAIL 00 IRIG. LEVEL 5 LAND CLASS 1
GRAZING 3 MACH. COMP. 1 IRIG. SYSTEM 5 PRICE VECT 1 INDIV. NUMBER 0
ANNUAL CAPITAL MONTH: 6
DATE PRINTED: 03/05/75

# TABLE LIV (Continued)

| LINE | 1 JAN | 2 FEB | 3 MAR | 4 APR | 5 MAY | 6 JUN | 7 JUL | 8 AUG | 9 SEP | 10 OCT | 11 NOV | 12 DEC | 13 PRICE | 14 WEIGHT | 15 UNIT CODE | 16 ITEM CODE | 17 TYPE | 18 CONT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PRODUCTION | | | | | NUMBER OF UNITS | | | | | | | | | | | | | |
| 1 WHEAT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 50.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.050 | 0.0 | 2. | 76. | 2. | 0. |
| 2 MILO | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 48.00 | 0.0 | 0.0 | 2.340 | 0.0 | 16. | 73. | 2. | 0. |
| OPERATING INPUTS | | | | | RATE/UNIT | | | | | | | | PRICE | NUMBER UNITS | UNIT CODE | ITEM CODE | TYPE | CONT |
| 11 NITROGEN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 120.00 | 0.0 | 0.0 | 0.140 | 0.0 | 12. | 211. | 3. | 0. |
| 12 WHEAT SEED | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 5.000 | 0.0 | 2. | 176. | 3. | 0. |
| 13 CUSTOM COMBINE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 9.400 | 0.0 | 7. | 305. | 3. | 0. |
| 14 CUSTOM HAULING | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 50.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.100 | 0.0 | 2. | 306. | 3. | 0. |
| 15 MILO SEED | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 7.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.270 | 0.0 | 12. | 173. | 3. | 0. |
| 16 HERBICIDE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.50 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.400 | 0.0 | 12. | 250. | 3. | 0. |
| 17 NITROGEN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 120.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.140 | 0.0 | 12. | 211. | 3. | 0. |
| 18 INSECTICIDE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.200 | 0.0 | 7. | 240. | 3. | 0. |
| 19 CUSTOM COMBINE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 10.000 | 0.0 | 7. | 305. | 3. | 0. |
| 20 CUSTOM HAULING | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 48.00 | 0.0 | 0.0 | 0.100 | 0.0 | 16. | 306. | 3. | 0. |
| MACHINERY REQUIREMENTS | | | | | | TIMES OVER | | | | | | | XXXXX | XXXXX | POWER UNIT | MACH CODE | TYPE | CONT |
| 38 STALK SHREDDER | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 81. | 4. | 0. |
| 39 CULTIBEDDER AYHD | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 95. | 4. | 0. |
| 40 DRILL WO/FERT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 61. | 4. | 0. |
| 41 CULTIBEDDER PLNT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 67. | 4. | 0. |
| 42 SPRAYER | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2. | 74. | 4. | 0. |
| 43 ANHYDROUS APPLIC | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 73. | 4. | 0. |
| 49 ACIN IRRIG WATER | 0.0 | 0.0 | 3.00 | 3.00 | 3.00 | 6.00 | 5.00 | 0.0 | 3.00 | 3.00 | 3.00 | 0.0 | | | | | | |

PANHANDLE ENERGY BUDGETS
HERBICIDE AATREX
GRAIN SORGHUM 600 POUND INCREASE PER ACRE

MACHINERY COMPLEMENT 1
EQUIPMENT COMPLEMENT 1

***NO NAME CHANGES HAVE BEEN STORED WITH THIS BUDGET***

***NO COMPLEMENT CHANGES HAVE BEEN STORED WITH THIS BUDGET***

MONTHLY SUMMARY OF RECEIPTS AND EXPENSES

| CATEGORY | UNIT | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TOTAL RECEIPTS | ACRE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 102.50 | 0.0 | 0.0 | 0.0 | 112.32 | 0.0 | 0.0 | 214.82 |
| TOTAL EXPENSES | ACRE | 0.0 | 0.0 | 1.61 | 1.61 | 1.61 | 41.82 | 4.89 | 0.0 | 1.61 | 39.95 | 1.61 | 0.0 | 94.73 |
| RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT | | | | | | | | | | | | | | 120.09 |
| ANNUAL CAPITAL | DOL. | 0.0 | 0.0 | 0.40 | 0.27 | 0.13 | 0.0 | 4.48 | 0.0 | 1.21 | 26.63 | 0.94 | 0.0 | 34.08 |
| LABOR REQUIREMENTS BY MONTH | | | | | | | | | | | | | | |
| MACHINERY LABOR | HR. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.86 | 0.0 | 0.0 | 0.0 | 0.63 | 0.0 | 0.0 | 1.49 |
| IRRIGATION LABOR | HR. | 0.0 | 0.0 | 0.16 | 0.16 | 0.16 | 0.31 | 0.26 | 0.0 | 0.16 | 0.16 | 0.16 | 0.0 | 1.51 |
| TOTAL LABOR | HR. | 0.0 | 0.0 | 0.16 | 0.16 | 0.16 | 1.17 | 0.26 | 0.0 | 0.16 | 0.78 | 0.16 | 0.0 | 3.00 |
| IRRIGATION WATER | INCH | 0.0 | 0.0 | 3.00 | 3.00 | 3.00 | 6.00 | 5.00 | 0.0 | 3.00 | 3.00 | 3.00 | 0.0 | 29.00 |

MACHINERY FIXED AND VARIABLE COSTS PER HOUR

| MACHINE | CODE | DEPR | INSUR. | TAX | TOTAL FIXED | REPAIR | FUEL | LUB. | TOTAL VARIABLE | INT. | HP/TIME |
|---|---|---|---|---|---|---|---|---|---|---|---|
| TRACTOR(2) | 2 | 0.73 | 0.04 | 0.11 | 0.88 | 0.50 | 1.04 | 0.16 | 1.69 | 0.74 | 1.00 |
| TRACTOR(4) | 4 | 1.05 | 0.06 | 0.16 | 1.27 | 0.72 | 1.49 | 0.22 | 2.44 | 1.06 | 1.00 |
| STALK SHREDDER | 81 | 0.59 | 0.02 | 0.06 | 0.68 | 0.33 | 0.0 | 0.0 | 0.33 | 0.39 | 0.18 |
| CULTIBEDDER AYHD | 95 | 0.90 | 0.04 | 0.11 | 1.05 | 1.24 | 0.0 | 0.0 | 1.24 | 0.67 | 0.16 |
| DRILL WO/FERT | 61 | 1.65 | 0.07 | 0.21 | 1.93 | 0.44 | 0.0 | 0.0 | 0.44 | 1.24 | 0.18 |
| CULTIBEDDER PLNT | 67 | 1.24 | 0.05 | 0.13 | 1.42 | 0.77 | 0.0 | 0.0 | 0.77 | 0.82 | 0.15 |
| SPRAYER | 74 | 0.40 | 0.02 | 0.05 | 0.47 | 0.11 | 0.0 | 0.0 | 0.11 | 0.31 | 0.30 |
| ANHYDROUS APPLIC | 73 | 0.56 | 0.03 | 0.07 | 0.66 | 0.37 | 0.0 | 0.0 | 0.37 | 0.43 | 0.26 |

| OPERATION | ITEM NO. | DATE | TIMES OVER | LABOR HOURS | MACHINE HOURS | FUEL,OIL,LUB., REPAIR PER ACRE | FIXED COSTS PER ACRE |
|---|---|---|---|---|---|---|---|
| STALK SHREDDER | 4,81 | OCT | 1.00 | 0.214 | 0.177 | 0.53 | 0.64 |
| CULTIBEDDER AYHD | 4,95 | OCT | 1.00 | 0.198 | 0.164 | 0.64 | 0.70 |
| DRILL WO/FERT | 4,61 | OCT | 1.00 | 0.217 | 0.179 | 0.56 | 1.03 |
| CULTIBEDDER PLNT | 4,67 | JUN | 1.00 | 0.184 | 0.152 | 0.52 | 0.73 |
| SPRAYER | 2,74 | JUN | 1.00 | 0.365 | 0.302 | 0.60 | 0.77 |
| ANHYDROUS APPLIC | 4,73 | JUN | 1.00 | 0.310 | 0.257 | 0.78 | 0.94 |
| TOTAL | | | | 1.488 | 1.230 | 3.64 | 4.81 |

TABLE LV

REDUCED TILLAGE WHEAT-FALLOW-SORGHUM THREE YEAR ROTATION ON CLAY LOAM SOIL WITH HEAVY SURFACE IRRIGATION

| CATEGORY | UNITS | PRICE | QUANTITY | VALUE |
|---|---|---|---|---|
| PRODUCTION: | | | | |
| WHEAT | BU. | 2.050 | 55.000 | 112.75 |
| GRAZING | AUMS | 10.000 | 1.000 | 10.00 |
| MILO | CWT. | 2.340 | 62.000 | 145.08 |
| MILO STUBBLE | AUMS | 6.000 | 1.400 | 8.40 |
| TOTAL RECEIPTS | | | | 276.23 |
| OPERATING INPUTS: | | | | |
| NITROGEN | LBS. | 0.140 | 120.000 | 16.80 |
| WHEAT SEED | BU. | 5.000 | 1.000 | 5.00 |
| CUSTOM COMBINE | ACRE | 9.800 | 1.000 | 9.80 |
| CUSTOM HAULING | BU. | 0.100 | 55.000 | 5.50 |
| HERBICIDE | LBS. | 2.400 | 3.000 | 7.20 |
| MILO SEED | LBS. | 0.270 | 10.000 | 2.70 |
| NITROGEN | LBS. | 0.140 | 125.000 | 17.50 |
| INSECTICIDE | ACRE | 2.200 | 1.000 | 2.20 |
| CUSTOM COMBINE | ACRE | 10.000 | 1.000 | 10.00 |
| CUSTOM HAULING | LBS. | 0.100 | 62.000 | 6.20 |
| TRACTOR FUEL COST | ACRE | | | 2.14 |
| TRACT REPAIR COST | ACRE | | | 1.04 |
| TRACTOR LUBE COST | ACRE | | | 0.32 |
| EQUIP REPAIR COST | ACRE | | | 0.73 |
| IRRIG FUEL COST | ACRE | | | 8.60 |
| IRRIG LUBE COST | ACRE | | | 7.75 |
| IRRIG REPAIR COST | ACRE | | | 6.52 |
| TOTAL OPERATING COST | | | | 110.00 |
| RETURNS TO LAND,LABOR,CAPITAL,MACHINERY, OVERHEAD,RISK,AND MANAGEMENT | | | | 166.23 |
| CAPITAL COST: | | | | |
| ANNUAL OPERATING CAPITAL | | 0.100 | 49.217 | 4.92 |
| TRACTOR INVESTMENT | | 0.100 | 15.247 | 1.52 |
| EQUIPMENT INVESTMENT | | 0.100 | 8.849 | 0.88 |
| IRRIGATION SYSTEM INVESTMENT | | 0.100 | 101.322 | 10.13 |
| TOTAL INTEREST CHARGE | | | | 17.46 |
| RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT | | | | 148.77 |
| OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE) | | | | |
| TRACTOR | DOL. | | | 1.82 |
| EQUIPMENT | DOL. | | | 1.32 |
| IRRIGATION SYSTEM | DOL. | | | 23.57 |
| TOTAL OWNERSHIP COST | | | | 26.71 |
| RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT | | | | 122.05 |
| LABOR COST: | | | | |
| MACHINERY LABOR | HR. | 3.000 | 1.323 | 3.97 |
| IRRIGATION LABOR | HR. | 3.000 | 1.872 | 5.62 |
| TOTAL LABOR COST | | | | 9.59 |
| RETURNS TO LAND, OVERHEAD, RISK AND MANAGEMENT | | | | 112.47 |

PANHANDLE ENERGY BUDGETS
HERBICIDE AATREX

ENTERPRISE 73 AREA AND COUNTY 10 DETAIL 00 IRIG. LEVEL 6 LAND CLASS 1
GRAZING 3 MACH. COMP. 1 IRIG. SYSTEM 5 PRICE VECT 1 INDIV. NUMBER 0
ANNUAL CAPITAL MONTH: 6
DATE PRINTED: 03/05/75

# TABLE LV (Continued)

| LINE | 1 JAN | 2 FEB | 3 MAR | 4 APR | 5 MAY | 6 JUN | 7 JUL | 8 AUG | 9 SEP | 10 OCT | 11 NOV | 12 DEC | 13 PRICE | 14 WEIGHT | 15 UNIT CODE | 16 ITEM CODE | 17 TYPE | 18 CONT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PRODUCTION | | | | | NUMBER OF UNITS | | | | | | | | | | | | | |
| 1 WHEAT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 55.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.050 | 0.0 | 2. | 76. | 2. | 1. |
| 2 GRAZING | 0.20 | 0.20 | 0.20 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.20 | 0.20 | 10.000 | 0.0 | 10. | 89. | 2. | 1. |
| 3 MILO | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 62.00 | 0.0 | 0.0 | 2.340 | 0.0 | 16. | 73. | 2. | 3. |
| 4 MILO STUBBLE | 0.40 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.50 | 0.50 | 6.000 | 0.0 | 10. | 157. | 2. | 3. |
| OPERATING INPUTS | | | | | RATE/UNIT | | | | | | | | PRICE | NUMBER UNITS | UNIT CODE | ITEM CODE | TYPE | CONT |
| 11 NITROGEN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 120.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.140 | 0.0 | 12. | 211. | 3. | 1. |
| 12 WHEAT SEED | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 5.000 | 0.0 | 2. | 176. | 3. | 1. |
| 13 CUSTOM COMBINE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 9.800 | 0.0 | 7. | 305. | 3. | 1. |
| 14 CUSTOM HAULING | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 55.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.100 | 0.0 | 2. | 306. | 3. | 1. |
| 15 HERBICIDE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.400 | 0.0 | 12. | 250. | 3. | 1. |
| 16 MILO SEED | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 10.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.270 | 0.0 | 12. | 173. | 3. | 3. |
| 17 NITROGEN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 125.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.140 | 0.0 | 12. | 211. | 3. | 3. |
| 18 INSECTICIDE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.200 | 0.0 | 7. | 240. | 3. | 3. |
| 19 CUSTOM COMBINE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 10.000 | 0.0 | 7. | 305. | 3. | 3. |
| 20 CUSTOM HAULING | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 62.00 | 0.0 | 0.0 | 0.100 | 0.0 | 12. | 306. | 3. | 3. |
| MACHINERY REQUIREMENTS | | | | | | TIMES OVER | | | | | | | XXXXX | XXXXX | POWER UNIT | MACH CODE | TYPE | CONT |
| 38 ROD WEEDER | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 59. | 4. | 1. |
| 39 SWEEP AYHD | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 90. | 4. | 1. |
| 40 DRILL WO/FERT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 61. | 4. | 1. |
| 41 SPRAYER | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2. | 74. | 4. | 1. |
| 42 CULTIBEDDER PLNT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 67. | 4. | 3. |
| 43 SWEEP AYHD | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 90. | 4. | 3. |
| 44 CULTIBEDDER TILL | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.50 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 51. | 4. | 0. |
| 49 ACIN IRRIG WATER | 0.0 | 0.0 | 3.00 | 3.00 | 8.00 | 3.60 | 7.20 | 7.20 | 0.0 | 0.0 | 4.00 | 0.0 | | | | | | |

PANHANDLE ENERGY BUDGETS
HERBICIDE AATREX

MACHINERY COMPLEMENT 1
EQUIPMENT COMPLEMENT 1

***NO NAME CHANGES HAVE BEEN STORED WITH THIS BUDGET***

***NC COMPLEMENT CHANGES HAVE BEEN STORED WITH THIS BUDGET***

MONTHLY SUMMARY OF RECEIPTS AND EXPENSES

| CATEGORY | UNIT | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TOTAL RECEIPTS | ACRE | 4.40 | 2.00 | 2.00 | 0.0 | 0.0 | 112.75 | 0.0 | 0.0 | 0.0 | 145.08 | 5.00 | 5.00 | 276.23 |
| TOTAL EXPENSES | ACRE | 0.0 | 0.0 | 1.91 | 1.91 | 5.08 | 39.46 | 14.23 | 22.28 | 5.48 | 16.20 | 2.54 | 0.0 | 110.00 |
| RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT | | | | | | | | | | | | | | 166.23 |
| ANNUAL CAPITAL | DOL. | 0.0 | 0.0 | 0.48 | 0.32 | 0.42 | 0.0 | 13.04 | 18.56 | 4.11 | 10.80 | 1.48 | 0.0 | 49.22 |
| LABOR REQUIREMENTS BY MONTH | | | | | | | | | | | | | | |
| MACHINERY LABOR | HR. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.61 | 0.11 | 0.38 | 0.22 | 0.0 | 0.0 | 0.0 | 1.32 |
| IRRIGATION LABOR | HR. | 0.0 | 0.0 | 0.16 | 0.16 | 0.42 | 0.19 | 0.37 | 0.37 | 0.0 | 0.0 | 0.21 | 0.0 | 1.87 |
| TOTAL LABOR | HR. | 0.0 | 0.0 | 0.16 | 0.16 | 0.42 | 0.80 | 0.85 | 0.76 | 0.22 | 0.0 | 0.21 | 0.0 | 3.20 |
| IRRIGATION WATER | INCH | 0.0 | 0.0 | 3.00 | 3.00 | 8.00 | 3.60 | 7.20 | 7.20 | 0.0 | 0.0 | 4.00 | 0.0 | 36.00 |

MACHINERY FIXED AND VARIABLE COSTS PER HOUR

| MACHINE | CODE | DEPR | INSUR. | TAX | TOTAL FIXED | REPAIR | FUEL | LUB. | TOTAL VARIABLE | INT. | HR/TIME |
|---|---|---|---|---|---|---|---|---|---|---|---|
| TRACTOR(2) | 2 | 0.73 | 0.04 | 0.11 | 0.88 | 0.50 | 1.04 | 0.16 | 1.69 | 0.74 | 1.00 |
| TRACTOR(4) | 4 | 1.05 | 0.06 | 0.16 | 1.27 | 0.72 | 1.49 | 0.22 | 2.44 | 1.06 | 1.00 |
| ROD WEEDER | 59 | 0.80 | 0.04 | 0.10 | 0.93 | 0.21 | 0.0 | 0.0 | 0.21 | 0.60 | 0.09 |
| SWEEP AYHD | 90 | 0.63 | 0.03 | 0.11 | 0.77 | 0.78 | 0.0 | 0.0 | 0.78 | 0.58 | 0.26 |
| DRILL WO/FERT | 61 | 1.65 | 0.07 | 0.21 | 1.93 | 0.44 | 0.0 | 0.0 | 0.44 | 1.24 | 0.18 |
| SPRAYER | 74 | 0.40 | 0.02 | 0.05 | 0.47 | 0.11 | 0.0 | 0.0 | 0.11 | 0.31 | 0.30 |
| CULTIBEDDER PLNT | 67 | 1.24 | 0.05 | 0.13 | 1.42 | 0.77 | 0.0 | 0.0 | 0.77 | 0.82 | 0.15 |
| SWEEP AYHD | 90 | 0.63 | 0.03 | 0.11 | 0.77 | 0.78 | 0.0 | 0.0 | 0.78 | 0.58 | 0.26 |
| CULTIBEDDER TILL | 51 | 0.69 | 0.03 | 0.09 | 0.80 | 0.95 | 0.0 | 0.0 | 0.95 | 0.51 | 0.11 |

| OPERATION | ITEM NO. | DATE | TIMES OVER | LABOR HOURS | MACHINE HOURS | FUEL,OIL,LUB., REPAIR PER ACRE | FIXED COSTS PER ACRE |
|---|---|---|---|---|---|---|---|
| ROD WEEDER | 4,59 | JUL | 1.00 | 0.114 | 0.094 | 0.27 | 0.39 |
| SPRAYER | 2,74 | JUL | 1.00 | 0.365 | 0.302 | 0.60 | 0.77 |
| SWEEP AYHD | 4,90 | AUG | 1.00 | 0.313 | 0.258 | 0.90 | 1.01 |
| CULTIBEDDER TILL | 4,51 | AUG | 0.50 | 0.069 | 0.057 | 0.21 | 0.22 |
| DRILL WO/FERT | 4,61 | SEP | 1.00 | 0.217 | 0.179 | 0.56 | 1.03 |
| ROD WEEDER | 4,59 | JUN | 1.00 | 0.114 | 0.094 | 0.27 | 0.39 |
| CULTIBEDDER PLNT | 4,67 | JUN | 1.00 | 0.184 | 0.152 | 0.52 | 0.73 |
| SWEEP AYHD | 4,90 | JUN | 1.00 | 0.313 | 0.258 | 0.90 | 1.01 |
| TOTAL | | | | 1.688 | 1.395 | 4.23 | 5.55 |

# TABLE LVI

## REDUCED TILLAGE WHEAT-FALLOW-SORGHUM THREE YEAR ROTATION ON CLAY LOAM SOIL WITH MODERATE SURFACE IRRIGATION

| CATEGORY | UNITS | PRICE | QUANTITY | VALUE |
|---|---|---|---|---|
| PRODUCTION: | | | | |
| WHEAT | BU. | 2.050 | 55.000 | 112.75 |
| GRAZING | AUMS | 10.000 | 1.000 | 10.00 |
| MILO | CWT. | 2.340 | 48.000 | 112.32 |
| MILO STUBBLE | AUMS | 6.000 | 1.000 | 6.00 |
| TOTAL RECEIPTS | | | | 241.07 |
| OPERATING INPUTS: | | | | |
| NITROGEN | LBS. | 0.140 | 120.000 | 16.80 |
| WHEAT SEED | BU. | 5.000 | 1.000 | 5.00 |
| CUSTOM COMBINE | ACRE | 9.800 | 1.000 | 9.80 |
| CUSTOM HAULING | BU. | 0.100 | 55.000 | 5.50 |
| HERBICIDE | LBS. | 2.400 | 3.000 | 7.20 |
| MILO SEED | LBS. | 0.270 | 7.000 | 1.89 |
| NITROGEN | LBS. | 0.140 | 120.000 | 16.80 |
| INSECTICIDE | ACRE | 2.200 | 1.000 | 2.20 |
| CUSTOM COMBINE | ACRE | 10.000 | 1.000 | 10.00 |
| CUSTOM HAULING | LBS. | 0.100 | 48.000 | 4.80 |
| TRACTOR FUEL COST | ACRE | | | 2.14 |
| TRACT REPAIR COST | ACRE | | | 1.04 |
| TRACTOR LUBE COST | ACRE | | | 0.32 |
| EQUIP REPAIR COST | ACRE | | | 0.73 |
| IRRIG FUEL COST | ACRE | | | 6.79 |
| IRRIG LUBE COST | ACRE | | | 1.83 |
| IRRIG REPAIR COST | ACRE | | | 6.99 |
| TOTAL OPERATING COST | | | | 99.82 |
| RETURNS TO LAND,LABOR,CAPITAL,MACHINERY, OVERHEAD,RISK,AND MANAGEMENT | | | | 141.25 |
| CAPITAL COST: | | | | |
| ANNUAL OPERATING CAPITAL | | 0.100 | 43.810 | 4.38 |
| TRACTOR INVESTMENT | | 0.100 | 15.247 | 1.52 |
| EQUIPMENT INVESTMENT | | 0.100 | 8.849 | 0.88 |
| IRRIGATION SYSTEM INVESTMENT | | 0.100 | 95.990 | 9.60 |
| TOTAL INTEREST CHARGE | | | | 16.39 |
| RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT | | | | 124.86 |
| OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE) | | | | |
| TRACTOR | DOL. | | | 1.82 |
| EQUIPMENT | DOL. | | | 1.32 |
| IRRIGATION SYSTEM | DOL. | | | 15.17 |
| TOTAL OWNERSHIP COST | | | | 18.31 |
| RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT | | | | 106.55 |
| LABOR COST: | | | | |
| MACHINERY LABOR | HR. | 3.000 | 1.323 | 3.97 |
| IRRIGATION LABOR | HR. | 3.000 | 1.508 | 4.52 |
| TOTAL LABOR COST | | | | 8.49 |
| RETURNS TO LAND, OVERHEAD, RISK AND MANAGEMENT | | | | 98.06 |

PANHANDLE ENERGY BUDGETS
HERBICIDE AATREX
GRAIN SORGHUM 600 POUND INCREASE PER ACRE
ENTERPRISE 73 AREA AND COUNTY 10 DETAIL 00 IRIG. LEVEL 3 LAND CLASS 1
GRAZING 3 MACH. COMP. 1 IRIG. SYSTEM 5 PRICE VECT 1 INDIV. NUMBER 0
ANNUAL CAPITAL MONTH: 6
DATE PRINTED: 03/05/75

# TABLE LVI (Continued)

| LINE | 1 JAN | 2 FEB | 3 MAR | 4 APR | 5 MAY | 6 JUN | 7 JUL | 8 AUG | 9 SEP | 10 OCT | 11 NOV | 12 DEC | 13 PRICE | 14 WEIGHT | 15 UNIT CODE | 16 ITEM CODE | 17 TYPE | 18 CONT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PRODUCTION | | | | | NUMBER OF UNITS | | | | | | | | | | | | | |
| 1 WHEAT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 55.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.050 | 0.0 | 2. | 76. | 2. | 1. |
| 2 GRAZING | 0.20 | 0.20 | 0.20 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.20 | 0.20 | 10.000 | 0.0 | 10. | 89. | 2. | 1. |
| 3 MILO | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 48.00 | 0.0 | 0.0 | 2.340 | 0.0 | 16. | 73. | 2. | 3. |
| 4 MILO STUBBLE | 0.30 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.40 | 0.30 | 6.000 | 0.0 | 10. | 157. | 2. | 3. |
| OPERATING INPUTS | | | | | RATE/UNIT | | | | | | | | PRICE | NUMBER UNITS | UNIT CODE | ITEM CODE | TYPE | CONT |
| 11 NITROGEN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 120.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.140 | 0.0 | 12. | 211. | 3. | 1. |
| 12 WHEAT SEED | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 5.000 | 0.0 | 2. | 176. | 3. | 1. |
| 13 CUSTOM COMBINE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 9.800 | 0.0 | 7. | 305. | 3. | 1. |
| 14 CUSTOM HAULING | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 55.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.100 | 0.0 | 2. | 306. | 3. | 1. |
| 15 HERBICIDE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.400 | 0.0 | 12. | 250. | 3. | 1. |
| 16 MILO SEED | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 7.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.270 | 0.0 | 12. | 173. | 3. | 3. |
| 17 NITROGEN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 120.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.140 | 0.0 | 12. | 211. | 3. | 3. |
| 18 INSECTICIDE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.200 | 0.0 | 7. | 240. | 3. | 3. |
| 19 CUSTOM COMBINE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 10.000 | 0.0 | 7. | 305. | 3. | 3. |
| 20 CUSTOM HAULING | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 48.00 | 0.0 | 0.0 | 0.100 | 0.0 | 12. | 306. | 3. | 3. |
| MACHINERY REQUIREMENTS | | | | | | TIMES OVER | | | | | | | XXXXX | XXXXX | POWER UNIT | MACH CODE | TYPE | CONT |
| 38 ROD WEEDER | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 59. | 4. | 1. |
| 39 SWEEP AYHD | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 90. | 4. | 1. |
| 40 DRILL WO/FERT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 61. | 4. | 1. |
| 41 SPRAYER | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2. | 74. | 4. | 1. |
| 42 CULTIBEDDER PLNT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 67. | 4. | 3. |
| 43 SWEEP AYHD | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 90. | 4. | 3. |
| 44 CULTIBEDDER TILL | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.50 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 51. | 4. | 0. |
| 49 ACIN IRRIG WATER | 0.0 | 0.0 | 3.00 | 3.00 | 8.00 | 3.00 | 4.00 | 4.00 | 0.0 | 4.00 | 0.0 | 0.0 | | | | | | |

PANHANDLE ENERGY BUDGETS
HERBICIDE AATREX
GRAIN SORGHUM 600 POUND INCREASE PER ACRE

MACHINERY COMPLEMENT 1
EQUIPMENT COMPLEMENT 1

***NO NAME CHANGES HAVE BEEN STORED WITH THIS BUDGET***

***AC COMPLEMENT CHANGES HAVE BEEN STORED WITH THIS BUDGET***

| CATEGORY | UNIT | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MONTHLY SUMMARY OF RECEIPTS AND EXPENSES | | | | | | | | | | | | | | |
| TOTAL RECEIPTS | ACRE | 3.80 | 2.00 | 2.00 | 0.0 | 0.0 | 112.75 | 0.0 | 0.0 | 0.0 | 112.32 | 4.40 | 3.80 | 241.07 |
| TOTAL EXPENSES | ACRE | 0.0 | 0.0 | 1.61 | 1.61 | 4.30 | 37.28 | 11.80 | 19.85 | 5.48 | 16.95 | 0.0 | 0.0 | 99.82 |
| RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT | | | | | | | | | | | | | | 141.25 |
| ANNUAL CAPITAL | DOL. | 0.0 | 0.0 | 0.40 | 0.27 | 0.36 | 0.0 | 10.82 | 16.55 | 4.11 | 11.30 | 0.0 | 0.0 | 43.81 |
| LABOR REQUIREMENTS BY MONTH | | | | | | | | | | | | | | |
| MACHINERY LABOR | HR. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.61 | 0.11 | 0.38 | 0.22 | 0.0 | 0.0 | 0.0 | 1.32 |
| IRRIGATION LABOR | HR. | 0.0 | 0.0 | 0.16 | 0.16 | 0.42 | 0.16 | 0.21 | 0.21 | 0.0 | 0.21 | 0.0 | 0.0 | 1.51 |
| TOTAL LABOR | HR. | 0.0 | 0.0 | 0.16 | 0.16 | 0.42 | 0.77 | 0.69 | 0.59 | 0.22 | 0.21 | 0.0 | 0.0 | 2.83 |
| IRRIGATION WATER | INCH | 0.0 | 0.0 | 3.00 | 3.00 | 8.00 | 3.00 | 4.00 | 4.00 | 0.0 | 4.00 | 0.0 | 0.0 | 29.00 |

MACHINERY FIXED AND VARIABLE COSTS PER HOUR

| MACHINE | CODE | DEPR | INSUR. | TAX | TOTAL FIXED | REPAIR | FUEL | LUB. | TOTAL VARIABLE | INT. | HR/TIME |
|---|---|---|---|---|---|---|---|---|---|---|---|
| TRACTOR(2) | 2 | 0.73 | 0.04 | 0.11 | 0.88 | 0.50 | 1.04 | 0.16 | 1.69 | 0.74 | 1.00 |
| TRACTOR(4) | 4 | 1.05 | 0.06 | 0.16 | 1.27 | 0.72 | 1.49 | 0.22 | 2.44 | 1.06 | 1.00 |
| ROD WEEDER | 59 | 0.80 | 0.04 | 0.10 | 0.93 | 0.21 | 0.0 | 0.0 | 0.21 | 0.60 | 0.09 |
| SWEEP AYHD | 90 | 0.63 | 0.03 | 0.11 | 0.77 | 0.78 | 0.0 | 0.0 | 0.78 | 0.58 | 0.26 |
| DRILL WO/FERT | 61 | 1.65 | 0.07 | 0.21 | 1.93 | 0.44 | 0.0 | 0.0 | 0.44 | 1.24 | 0.18 |
| SPRAYER | 74 | 0.40 | 0.02 | 0.05 | 0.47 | 0.11 | 0.0 | 0.0 | 0.11 | 0.31 | 0.30 |
| CULTIBEDDER PLNT | 67 | 1.24 | 0.05 | 0.13 | 1.42 | 0.77 | 0.0 | 0.0 | 0.77 | 0.82 | 0.15 |
| SWEEP AYHD | 90 | 0.63 | 0.03 | 0.11 | 0.77 | 0.78 | 0.0 | 0.0 | 0.78 | 0.58 | 0.26 |
| CULTIBEDDER TILL | 51 | 0.69 | 0.03 | 0.09 | 0.80 | 0.95 | 0.0 | 0.0 | 0.95 | 0.51 | 0.11 |

| OPERATION | ITEM NO. | DATE | TIMES OVER | LABOR HOURS | MACHINE HOURS | FUEL,OIL,LUB., REPAIR PER ACRE | FIXED COSTS PER ACRE |
|---|---|---|---|---|---|---|---|
| ROD WEEDER | 4,59 | JUL | 1.00 | 0.114 | 0.094 | 0.27 | 0.39 |
| SPRAYER | 2,74 | JUL | 1.00 | 0.365 | 0.302 | 0.60 | 0.77 |
| SWEEP AYHD | 4,90 | AUG | 1.00 | 0.313 | 0.258 | 0.90 | 1.01 |
| CULTIBEDDER TILL | 4,51 | AUG | 0.50 | 0.069 | 0.057 | 0.21 | 0.22 |
| DRILL WO/FERT | 4,61 | SEP | 1.00 | 0.217 | 0.179 | 0.56 | 1.03 |
| ROD WEEDER | 4,59 | JUN | 1.00 | 0.114 | 0.094 | 0.27 | 0.39 |
| CULTIBEDDER PLNT | 4,67 | JUN | 1.00 | 0.184 | 0.152 | 0.52 | 0.73 |
| SWEEP AYHD | 4,90 | JUN | 1.00 | 0.313 | 0.258 | 0.90 | 1.01 |
| TOTAL | | | | 1.688 | 1.395 | 4.23 | 5.55 |

# TABLE LVII

## REDUCED TILLAGE WHEAT AND SUDAN HAY DOUBLE CROP ON CLAY LOAM SOIL WITH SURFACE IRRIGATION

| CATEGORY | UNITS | PRICE | QUANTITY | VALUE |
|---|---|---|---|---|
| PRODUCTION: | | | | |
| WHEAT PASTURE | AUMS | 10.000 | 5.250 | 52.50 |
| SUDAN | TONS | 22.000 | 3.500 | 77.00 |
| TOTAL RECEIPTS | | | | 129.50 |
| OPERATING INPUTS: | | | | |
| SUDAN SEED | LBS. | 0.270 | 10.000 | 2.70 |
| NITROGEN | LBS. | 0.140 | 100.000 | 14.00 |
| HERBICIDE | LBS. | 8.000 | 0.500 | 4.00 |
| SWATHING | ACRE | 3.160 | 1.000 | 3.16 |
| BALER | BL. | 0.280 | 105.000 | 29.40 |
| BALE-LOADER | BL. | 0.150 | 105.000 | 15.75 |
| NITROGEN | LBS. | 0.140 | 80.000 | 11.20 |
| WHEAT SEED | BU. | 5.000 | 1.000 | 5.00 |
| TRACTOR FUEL COST | ACRE | | | 1.31 |
| TRACT REPAIR COST | ACRE | | | 0.63 |
| TRACTOR LUBE COST | ACRE | | | 0.20 |
| EQUIP REPAIR COST | ACRE | | | 0.46 |
| IRRIG FUEL COST | ACRE | | | 8.60 |
| IRRIG LUBE COST | ACRE | | | 1.94 |
| IRRIG REPAIR COST | ACRE | | | 6.52 |
| TOTAL OPERATING COST | | | | 104.87 |
| RETURNS TO LAND,LABOR,CAPITAL,MACHINERY, OVERHEAD,RISK,AND MANAGEMENT | | | | 24.63 |
| CAPITAL COST: | | | | |
| ANNUAL OPERATING CAPITAL | | 0.100 | 16.109 | 1.61 |
| TRACTOR INVESTMENT | | 0.100 | 9.327 | 0.93 |
| EQUIPMENT INVESTMENT | | 0.100 | 5.978 | 0.60 |
| IRRIGATION SYSTEM INVESTMENT | | 0.100 | 101.142 | 10.11 |
| TOTAL INTEREST CHARGE | | | | 13.26 |
| RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT | | | | 11.38 |
| OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE) | | | | |
| TRACTOR | DOL. | | | 1.11 |
| EQUIPMENT | DOL. | | | 0.95 |
| IRRIGATION SYSTEM | DOL. | | | 18.80 |
| TOTAL OWNERSHIP COST | | | | 20.87 |
| RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT | | | | -9.49 |
| LABOR COST: | | | | |
| MACHINERY LABOR | HR. | 3.000 | 1.076 | 3.23 |
| IRRIGATION LABOR | HR. | 3.000 | 1.872 | 5.62 |
| TOTAL LABOR COST | | | | 8.84 |
| RETURNS TO LAND, OVERHEAD, RISK AND MANAGEMENT | | | | -18.33 |

PANHANDLE ENERGY BUDGETS
HERBICIDE FOR SUDAN 2,4-D

ENTERPRISE 76 AREA AND COUNTY 10 DETAIL 00 IRIG. LEVEL 6 LAND CLASS 1
GRAZING 6 MACH. COMP. 1 IRIG. SYSTEM 5 PRICE VECT 1 INDIV. NUMBER 0
ANNUAL CAPITAL MONTH: 9
DATE PRINTED: 03/05/75

# TABLE LVII (Continued)

| LINE | 1 JAN | 2 FEB | 3 MAR | 4 APR | 5 MAY | 6 JUN | 7 JUL | 8 AUG | 9 SEP | 10 OCT | 11 NOV | 12 DEC | 13 PRICE | 14 WEIGHT | 15 UNIT CODE | 16 ITEM CODE | 17 TYPE | 18 CONT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PRODUCTION | | | | | NUMBER OF UNITS | | | | | | | | | | | | | |
| 1 WHEAT PASTURE | 0.25 | 0.25 | 0.75 | 0.90 | 1.60 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.75 | 0.75 | 10.000 | 0.0 | 10. | 151. | 2. | 0. |
| 2 SUDAN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.50 | 0.0 | 0.0 | 0.0 | 0.0 | 22.000 | 0.0 | 3. | 87. | 2. | 0. |
| OPERATING INPUTS | | | | | RATE/UNIT | | | | | | | | PRICE | NUMBER UNITS | UNIT CODE | ITEM CODE | TYPE | CONT |
| 11 SUDAN SEED | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 10.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.270 | 0.0 | 12. | 187. | 3. | 0. |
| 12 NITROGEN | 0.0 | 0.0 | 0.0 | 0.0 | 100.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.140 | 0.0 | 12. | 211. | 3. | 0. |
| 13 HERBICIDE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.50 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 8.000 | 0.0 | 12. | 250. | 3. | 0. |
| 14 SWATHING | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 3.160 | 0.0 | 7. | 392. | 3. | 0. |
| 15 BALER | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 105.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.280 | 0.0 | 6. | 388. | 3. | 0. |
| 16 BALE-LOADER | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 105.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.150 | 0.0 | 6. | 389. | 3. | 0. |
| 17 NITROGEN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 80.00 | 0.0 | 0.0 | 0.0 | 0.140 | 0.0 | 12. | 211. | 3. | 0. |
| 18 WHEAT SEED | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 5.000 | 0.0 | 2. | 176. | 3. | 0. |
| MACHINERY REQUIREMENTS | | | | | | TIMES OVER | | | | | | | XXXXX | XXXXX | POWER UNIT | MACH CODE | TYPE | CONT |
| 38 DRY FERT SPREAD | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 71. | 4. | 0. |
| 39 CULTIBEDDER PLNT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 67. | 4. | 0. |
| 40 SPRAYER | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2. | 74. | 4. | 0. |
| 41 CULTIBEDDER AYHD | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 95. | 4. | 0. |
| 42 DRILL WO/FERT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 61. | 4. | 0. |
| 49 ACIN IRRIG WATER | 0.0 | 0.0 | 4.00 | 4.00 | 4.00 | 4.00 | 8.00 | 4.00 | 4.00 | 4.00 | 0.0 | 0.0 | | | | | | |

PANHANDLE ENERGY BUDGETS
HERBICIDE FOR SUDAN 2,4-D

MACHINERY COMPLEMENT 1
EQUIPMENT COMPLEMENT 1

***NO NAME CHANGES HAVE BEEN STORED WITH THIS BUDGET***

***NO COMPLEMENT CHANGES HAVE BEEN STORED WITH THIS BUDGET***

MONTHLY SUMMARY OF RECEIPTS AND EXPENSES

| CATEGORY | UNIT | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TOTAL RECEIPTS | ACRE | 2.50 | 2.50 | 7.50 | 9.00 | 16.00 | 0.0 | 0.0 | 77.00 | 0.0 | 0.0 | 7.50 | 7.50 | 129.50 |
| TOTAL EXPENSES | ACRE | 0.0 | 0.0 | 1.90 | 1.90 | 16.17 | 9.72 | 3.79 | 50.21 | 19.30 | 1.90 | 0.0 | 0.0 | 104.87 |
| RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT | | | | | | | | | | | | | | 24.63 |
| ANNUAL CAPITAL | DOL. | 0.0 | 0.0 | 0.95 | 0.79 | 5.39 | 2.43 | 0.63 | 4.18 | 0.0 | 1.74 | 0.0 | 0.0 | 16.11 |
| LABOR REQUIREMENTS BY MONTH | | | | | | | | | | | | | | |
| MACHINERY LABOR | HR. | 0.0 | 0.0 | 0.0 | 0.0 | 0.11 | 0.55 | 0.0 | 0.0 | 0.41 | 0.0 | 0.0 | 0.0 | 1.08 |
| IRRIGATION LABOR | HR. | 0.0 | 0.0 | 0.21 | 0.21 | 0.21 | 0.21 | 0.42 | 0.21 | 0.21 | 0.21 | 0.0 | 0.0 | 1.87 |
| TOTAL LABOR | HR. | 0.0 | 0.0 | 0.21 | 0.21 | 0.32 | 0.76 | 0.42 | 0.21 | 0.62 | 0.21 | 0.0 | 0.0 | 2.95 |
| IRRIGATION WATER | INCH | 0.0 | 0.0 | 4.00 | 4.00 | 4.00 | 4.00 | 8.00 | 4.00 | 4.00 | 4.00 | 0.0 | 0.0 | 36.00 |

MACHINERY FIXED AND VARIABLE COSTS PER HOUR

| MACHINE | CODE | DEPR | INSUR. | TAX | TOTAL FIXED | REPAIR | FUEL | LUB. | TOTAL VARIABLE | INT. | HR/TIME |
|---|---|---|---|---|---|---|---|---|---|---|---|
| TRACTOR(2) | 2 | 0.73 | 0.04 | 0.11 | 0.88 | 0.50 | 1.04 | 0.16 | 1.69 | 0.74 | 1.00 |
| TRACTOR(4) | 4 | 1.05 | 0.06 | 0.16 | 1.27 | 0.72 | 1.49 | 0.22 | 2.44 | 1.06 | 1.00 |
| DRY FERT SPREAD | 71 | 0.68 | 0.03 | 0.08 | 0.80 | 0.29 | 0.0 | 0.0 | 0.29 | 0.51 | 0.09 |
| CULTIBEDDER PLNT | 67 | 1.24 | 0.05 | 0.13 | 1.42 | 0.77 | 0.0 | 0.0 | 0.77 | 0.82 | 0.15 |
| SPRAYER | 74 | 0.40 | 0.02 | 0.05 | 0.47 | 0.11 | 0.0 | 0.0 | 0.11 | 0.31 | 0.30 |
| CULTIBEDDER AYHD | 95 | 0.90 | 0.04 | 0.11 | 1.05 | 1.24 | 0.0 | 0.0 | 1.24 | 0.67 | 0.16 |
| DRILL WO/FERT | 61 | 1.65 | 0.07 | 0.21 | 1.93 | 0.44 | 0.0 | 0.0 | 0.44 | 1.24 | 0.18 |

| OPERATION | ITEM NO. | DATE | TIMES OVER | LABOR HOURS | MACHINE HOURS | FUEL,OIL,LUB., REPAIR PER ACRE | FIXED COSTS PER ACRE |
|---|---|---|---|---|---|---|---|
| DRY FERT SPREAD | 4,71 | MAY | 1.00 | 0.112 | 0.093 | 0.28 | 0.36 |
| CULTIBEDDER PLNT | 4,67 | JUN | 1.00 | 0.184 | 0.152 | 0.52 | 0.73 |
| SPRAYER | 2,74 | JUN | 1.00 | 0.365 | 0.302 | 0.60 | 0.77 |
| CULTIBEDDER AYHD | 4,95 | SEP | 1.00 | 0.198 | 0.164 | 0.64 | 0.70 |
| DRILL WO/FERT | 4,61 | SEP | 1.00 | 0.217 | 0.179 | 0.56 | 1.03 |
| TOTAL | | | | 1.076 | 0.889 | 2.60 | 3.59 |

# TABLE LVIII

## REDUCED TILLAGE CORN SILAGE AND RYE GRAZE DOUBLE CROP ON CLAY LOAM SOIL WITH SURFACE IRRIGATION

| CATEGORY | UNITS | PRICE | QUANTITY | VALUE |
|---|---|---|---|---|
| PRODUCTION: | | | | |
| WHEAT PASTURE | AUMS | 10.000 | 4.100 | 41.00 |
| CORN SILAGE | TONS | 5.500 | 20.000 | 110.00 |
| TOTAL RECEIPTS | | | | 151.00 |
| OPERATING INPUTS: | | | | |
| NITROGEN | LBS. | 0.140 | 80.000 | 11.20 |
| RYE SEED | BU. | 5.000 | 1.000 | 5.00 |
| CORN SEED | LBS. | 0.520 | 20.000 | 10.40 |
| NITROGEN | LBS. | 0.140 | 100.000 | 14.00 |
| HERBICIDE | LBS. | 8.000 | 0.250 | 2.00 |
| INSECTICIDE | ACRE | 8.000 | 1.000 | 8.00 |
| NITROGEN | LBS. | 0.140 | 100.000 | 14.00 |
| TRACTOR FUEL COST | ACRE | | | 2.40 |
| TRACT REPAIR COST | ACRE | | | 1.16 |
| TRACTOR LUBE COST | ACRE | | | 0.36 |
| EQUIP REPAIR COST | ACRE | | | 0.79 |
| IRRIG FUEL COST | ACRE | | | 11.65 |
| IRRIG LUBE COST | ACRE | | | 2.25 |
| IRRIG REPAIR COST | ACRE | | | 10.96 |
| TOTAL OPERATING COST | | | | 94.17 |
| RETURNS TO LAND,LABOR,CAPITAL,MACHINERY, OVERHEAD,RISK,AND MANAGEMENT | | | | 56.83 |
| CAPITAL COST: | | | | |
| ANNUAL OPERATING CAPITAL | | 0.100 | 22.253 | 2.23 |
| TRACTOR INVESTMENT | | 0.100 | 17.053 | 1.71 |
| EQUIPMENT INVESTMENT | | 0.100 | 9.187 | 0.92 |
| IRRIGATION SYSTEM INVESTMENT | | 0.100 | 126.400 | 12.64 |
| TOTAL INTEREST CHARGE | | | | 17.49 |
| RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT | | | | 39.34 |
| OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE) | | | | |
| TRACTOR | DOL. | | | 2.04 |
| EQUIPMENT | DOL. | | | 1.41 |
| IRRIGATION SYSTEM | DOL. | | | 30.64 |
| TOTAL OWNERSHIP COST | | | | 34.09 |
| RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT | | | | 5.25 |
| LABOR COST: | | | | |
| MACHINERY LABOR | HR. | 3.000 | 1.875 | 5.62 |
| IRRIGATION LABOR | HR. | 3.000 | 2.080 | 6.24 |
| TOTAL LABOR COST | | | | 11.86 |
| RETURNS TO LAND, OVERHEAD, RISK AND MANAGEMENT | | | | -6.61 |

PANHANDLE ENERGY BUDGETS
HERBICIDE BANVEL D

ENTERPRISE 86 AREA AND COUNTY 10 DETAIL 00 IRIG. LEVEL 6 LAND CLASS 1
GRAZING 6 MACH. COMP. 1 IRIG. SYSTEM 5 PRICE VECT 1 INDIV. NUMBER 0
ANNUAL CAPITAL MONTH: 9
DATE PRINTED: 03/05/75

# TABLE LVIII (Continued)

| LINE | 1 JAN | 2 FEB | 3 MAR | 4 APR | 5 MAY | 6 JUN | 7 JUL | 8 AUG | 9 SEP | 10 OCT | 11 NOV | 12 DEC | 13 PRICE | 14 WEIGHT | 15 UNIT CODE | 16 ITEM CODE | 17 TYPE | 18 CONT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PRODUCTION | | | | | NUMBER OF UNITS | | | | | | | | | | | | | |
| 1 WHEAT PASTURE | 0.25 | 0.25 | 0.75 | 0.90 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.60 | 0.60 | 0.75 | 10.000 | 0.0 | 10. | 151. | 2. | 0. |
| 2 CORN SILAGE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 20.00 | 0.0 | 0.0 | 0.0 | 5.500 | 0.0 | 3. | 161. | 2. | 0. |
| OPERATING INPUTS | | | | | | RATE/UNIT | | | | | | | PRICE | NUMBER UNITS | UNIT CODE | ITEM CODE | TYPE | CONT |
| 11 NITROGEN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 80.00 | 0.0 | 0.0 | 0.0 | 0.140 | 0.0 | 12. | 211. | 3. | 0. |
| 12 RYE SEED | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 5.000 | 0.0 | 2. | 175. | 3. | 0. |
| 13 CORN SEED | 0.0 | 0.0 | 0.0 | 0.0 | 20.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.520 | 0.0 | 12. | 172. | 3. | 0. |
| 14 NITROGEN | 0.0 | 0.0 | 0.0 | 0.0 | 100.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.140 | 0.0 | 12. | 211. | 3. | 0. |
| 15 HERBICIDE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.25 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 8.000 | 0.0 | 12. | 250. | 3. | 0. |
| 16 INSECTICIDE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.50 | 0.50 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 8.000 | 0.0 | 7. | 240. | 3. | 0. |
| 17 NITROGEN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 100.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.140 | 0.0 | 12. | 211. | 3. | 0. |
| MACHINERY REQUIREMENTS | | | | | | TIMES OVER | | | | | | | XXXXX | XXXXX | POWER UNIT | MACH CODE | TYPE | CONT |
| 38 CULTIBEDDER AYHD | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 95. | 4. | 0. |
| 39 DRILL WO/FERT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 61. | 4. | 0. |
| 40 CULTIBEDDER PLNT | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 67. | 4. | 0. |
| 41 SWEEP AYHD | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 90. | 4. | 0. |
| 42 SPRAYER | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2. | 74. | 4. | 0. |
| 43 ANHYDROUS APPLIC | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 73. | 4. | 0. |
| 44 FIELD CULTIVATOR | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 46. | 4. | 0. |
| 49 ACIN IRRIG WATER | 0.0 | 0.0 | 4.00 | 8.00 | 4.00 | 0.0 | 8.00 | 8.00 | 4.00 | 0.0 | 4.00 | 0.0 | | | | | | |

PANHANDLE ENERGY BUDGETS
HERBICIDE BANVEL D

MACHINERY COMPLEMENT 1
EQUIPMENT COMPLEMENT 1

***NO NAME CHANGES HAVE BEEN STORED WITH THIS BUDGET***

***NO COMPLEMENT CHANGES HAVE BEEN STORED WITH THIS BUDGET***

| MONTHLY SUMMARY OF RECEIPTS AND EXPENSES | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CATEGORY | UNIT | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL |
| TOTAL RECEIPTS | ACRE | 2.50 | 2.50 | 7.50 | 9.00 | 0.0 | 0.0 | 0.0 | 0.0 | 110.00 | 6.00 | 6.00 | 7.50 | 151.00 |
| TOTAL EXPENSES | ACRE | 0.0 | 0.0 | 2.49 | 4.97 | 28.31 | 22.08 | 8.97 | 4.97 | 19.89 | 0.0 | 2.49 | 0.0 | 94.17 |
| RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT | | | | | | | | | | | | | | 56.83 |
| ANNUAL CAPITAL | DOL. | 0.0 | 0.0 | 1.24 | 2.07 | 9.44 | 5.52 | 1.50 | 0.41 | 0.0 | 0.0 | 2.07 | 0.0 | 22.25 |
| LABOR REQUIREMENTS BY MONTH | | | | | | | | | | | | | | |
| MACHINERY LABOR | HR. | 0.0 | 0.0 | 0.0 | 0.0 | 0.50 | 0.96 | 0.0 | 0.0 | 0.41 | 0.0 | 0.0 | 0.0 | 1.87 |
| IRRIGATION LABOR | HR. | 0.0 | 0.0 | 0.21 | 0.42 | 0.21 | 0.0 | 0.42 | 0.42 | 0.21 | 0.0 | 0.21 | 0.0 | 2.08 |
| TOTAL LABOR | HR. | 0.0 | 0.0 | 0.21 | 0.42 | 0.70 | 0.96 | 0.42 | 0.42 | 0.62 | 0.0 | 0.21 | 0.0 | 3.95 |
| IRRIGATION WATER | INCH | 0.0 | 0.0 | 4.00 | 8.00 | 4.00 | 0.0 | 8.00 | 8.00 | 4.00 | 0.0 | 4.00 | 0.0 | 40.00 |

MACHINERY FIXED AND VARIABLE COSTS PER HOUR

| MACHINE | CODE | DEPR | INSUR. | TAX | TOTAL FIXED | REPAIR | FUEL | LUB. | TOTAL VARIABLE | INT. | HR/TIME |
|---|---|---|---|---|---|---|---|---|---|---|---|
| TRACTOR(2) | 2 | 0.73 | 0.04 | 0.11 | 0.88 | 0.50 | 1.04 | 0.16 | 1.69 | 0.74 | 1.00 |
| TRACTOR(4) | 4 | 1.05 | 0.06 | 0.16 | 1.27 | 0.72 | 1.49 | 0.22 | 2.44 | 1.06 | 1.00 |
| CULTIBEDDER AYHD | 95 | 0.90 | 0.04 | 0.11 | 1.05 | 1.24 | 0.0 | 0.0 | 1.24 | 0.67 | 0.16 |
| DRILL WO/FERT | 61 | 1.65 | 0.07 | 0.21 | 1.93 | 0.44 | 0.0 | 0.0 | 0.44 | 1.24 | 0.18 |
| CULTIBEDDER PLNT | 67 | 1.24 | 0.05 | 0.13 | 1.42 | 0.77 | 0.0 | 0.0 | 0.77 | 0.82 | 0.15 |
| SWEEP AYHD | 90 | 0.63 | 0.03 | 0.11 | 0.77 | 0.78 | 0.0 | 0.0 | 0.78 | 0.58 | 0.26 |
| SPRAYER | 74 | 0.40 | 0.02 | 0.05 | 0.47 | 0.11 | 0.0 | 0.0 | 0.11 | 0.31 | 0.30 |
| ANHYDROUS APPLIC | 73 | 0.56 | 0.03 | 0.07 | 0.66 | 0.37 | 0.0 | 0.0 | 0.37 | 0.43 | 0.26 |
| FIELD CULTIVATOR | 46 | 0.60 | 0.03 | 0.07 | 0.70 | 0.25 | 0.0 | 0.0 | 0.25 | 0.45 | 0.24 |

| OPERATION | ITEM NO. | DATE | TIMES OVER | LABOR HOURS | MACHINE HOURS | FUEL,OIL,LUB., REPAIR PER ACRE | FIXED COSTS PER ACRE |
|---|---|---|---|---|---|---|---|
| CULTIBEDDER PLNT | 4,67 | MAY | 1.00 | 0.184 | 0.152 | 0.52 | 0.73 |
| SWEEP AYHD | 4,90 | MAY | 1.00 | 0.313 | 0.258 | 0.90 | 1.01 |
| SPRAYER | 2,74 | JUN | 1.00 | 0.365 | 0.302 | 0.60 | 0.77 |
| ANHYDROUS APPLIC | 4,73 | JUN | 1.00 | 0.310 | 0.257 | 0.78 | 0.94 |
| FIELD CULTIVATOR | 4,46 | JUN | 1.00 | 0.288 | 0.238 | 0.70 | 0.89 |
| CULTIBEDDER AYHD | 4,95 | SEP | 1.00 | 0.198 | 0.164 | 0.64 | 0.70 |
| DRILL WO/FERT | 4,61 | SEP | 1.00 | 0.217 | 0.179 | 0.56 | 1.03 |
| TOTAL | | | | 1.875 | 1.549 | 4.70 | 6.07 |

# TABLE LIX

## REDUCED TILLAGE WHEAT AND SOYBEAN DOUBLE CROP ON SANDY LOAM SOIL UNDER CIRCULAR SPRINKLER IRRIGATION

| CATEGORY | UNITS | PRICE | QUANTITY | VALUE |
|---|---|---|---|---|
| PRODUCTION: | | | | |
| WHEAT | BU. | 2.050 | 50.000 | 102.50 |
| SOYBEANS | BU. | 3.280 | 35.000 | 114.80 |
| TOTAL RECEIPTS | | | | 217.30 |
| OPERATING INPUTS: | | | | |
| NITROGEN | LBS. | 0.300 | 120.000 | 36.00 |
| PHOSPHATE | LBS. | 0.250 | 50.000 | 12.50 |
| WHEAT SEED | BU. | 5.000 | 1.000 | 5.00 |
| CUSTOM COMBINE | ACRE | 9.400 | 1.000 | 9.40 |
| CUSTOM HAULING | BU. | 0.100 | 50.000 | 5.00 |
| SOYBEAN SEED | LBS. | 0.170 | 90.000 | 15.30 |
| HERBICIDE | ACRE | 10.000 | 1.000 | 10.00 |
| CUSTOM COMBINE | ACRE | 9.700 | 1.000 | 9.70 |
| CUSTOM HAULING | BU. | 0.100 | 35.000 | 3.50 |
| TRACTOR FUEL COST | ACRE | | | 1.10 |
| TRACT REPAIR COST | ACRE | | | 0.53 |
| TRACTOR LUBE COST | ACRE | | | 0.16 |
| EQUIP REPAIR COST | ACRE | | | 0.39 |
| IRRIG FUEL COST | ACRE | | | 11.22 |
| IRRIG LUBE COST | ACRE | | | 2.31 |
| IRRIG REPAIR COST | ACRE | | | 17.49 |
| TOTAL OPERATING COST | | | | 139.60 |
| RETURNS TO LAND,LABOR,CAPITAL,MACHINERY, OVERHEAD,RISK,AND MANAGEMENT | | | | 77.70 |
| CAPITAL COST: | | | | |
| ANNUAL OPERATING CAPITAL | | 0.100 | 22.144 | 2.21 |
| TRACTOR INVESTMENT | | 0.100 | 7.818 | 0.78 |
| EQUIPMENT INVESTMENT | | 0.100 | 6.140 | 0.61 |
| IRRIGATION SYSTEM INVESTMENT | | 0.100 | 174.900 | 17.49 |
| TOTAL INTEREST CHARGE | | | | 21.10 |
| RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT | | | | 56.60 |
| OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE) | | | | |
| TRACTOR | DOL. | | | 0.93 |
| EQUIPMENT | DOL. | | | 0.98 |
| IRRIGATION SYSTEM | DOL. | | | 45.87 |
| TOTAL OWNERSHIP COST | | | | 47.78 |
| RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT | | | | 8.82 |
| LABOR COST: | | | | |
| MACHINERY LABOR | HR. | 3.000 | 0.808 | 2.42 |
| IRRIGATION LABOR | HR. | 3.000 | 1.716 | 5.15 |
| TOTAL LABOR COST | | | | 7.57 |
| RETURNS TO LAND, OVERHEAD, RISK AND MANAGEMENT | | | | 1.24 |

PANHANDLE ENERGY BUDGETS
PRE-MERGE HERBICIDE LASSO AND SENCOR AIR APPLICATION

ENTERPRISE 98 AREA AND COUNTY 10 DETAIL 00 IRIG. LEVEL 8 LAND CLASS 8
GRAZING 6 MACH. COMP. 1 IRIG. SYSTEM 4 PRICE VECT 1 INDIV. NUMBER 0
ANNUAL CAPITAL MONTH:10
DATE PRINTED: 03/05/75

# TABLE LIX (Continued)

| LINE | 1 JAN | 2 FEB | 3 MAR | 4 APR | 5 MAY | 6 JUN | 7 JUL | 8 AUG | 9 SEP | 10 OCT | 11 NOV | 12 DEC | 13 PRICE | 14 WEIGHT | 15 UNIT CODE | 16 ITEM CODE | 17 TYPE | 18 CONT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PRODUCTION | | | | | NUMBER OF UNITS | | | | | | | | | | | | | |
| 1 WHEAT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 50.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.050 | 0.0 | 2. | 76. | 2. | 0. |
| 2 SOYBEANS | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 35.00 | 0.0 | 0.0 | 3.280 | 0.0 | 2. | 98. | 2. | 0. |
| OPERATING INPUTS | | | | | RATE/UNIT | | | | | | | | PRICE | NUMBER UNITS | UNIT CODE | ITEM CODE | TYPE | CONT |
| 11 NITROGEN | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 120.00 | 0.0 | 0.0 | 0.300 | 0.0 | 12. | 211. | 3. | 0. |
| 12 PHOSPHATE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 50.00 | 0.0 | 0.0 | 0.250 | 0.0 | 12. | 214. | 3. | 0. |
| 13 WHEAT SEED | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 5.000 | 0.0 | 2. | 176. | 3. | 0. |
| 14 CUSTOM COMBINE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 9.400 | 0.0 | 7. | 305. | 3. | 0. |
| 15 CUSTOM HAULING | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 50.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.100 | 0.0 | 2. | 306. | 3. | 0. |
| 16 SOYBEAN SEED | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 90.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.170 | 0.0 | 12. | 198. | 3. | 0. |
| 17 HERBICIDE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 10.000 | 0.0 | 7. | 250. | 3. | 0. |
| 18 CUSTOM COMBINE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 9.700 | 0.0 | 7. | 305. | 3. | 0. |
| 19 CUSTOM HAULING | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 35.00 | 0.0 | 0.0 | 0.100 | 0.0 | 2. | 306. | 3. | 0. |
| MACHINERY REQUIREMENTS | | | | | | TIMES OVER | | | | | | | XXXXX | XXXXX | POWER UNIT | MACH CODE | TYPE | CONT |
| 38 DRY FERT SPREAD | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 71. | 4. | 0. |
| 39 OFFSET DISK | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 37. | 4. | 0. |
| 40 CULTIBEDDER TILL | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 51. | 4. | 0. |
| 41 DRILL WO/FERT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 61. | 4. | 0. |
| 42 CULTIBEDDER PLNT | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4. | 67. | 4. | 0. |
| 49 ACIN IRRIG WATER | 0.0 | 0.0 | 3.00 | 3.00 | 6.00 | 0.0 | 7.00 | 8.00 | 0.0 | 3.00 | 3.00 | 0.0 | | | | | | |

PANHANDLE ENERGY BUDGETS
PRE-MERGE HERBICIDE LASSO AND SENCOR AIR APPLICATION

MACHINERY COMPLEMENT 1
EQUIPMENT COMPLEMENT 1

***NO NAME CHANGES HAVE BEEN STORED WITH THIS BUDGET***

***NC COMPLEMENT CHANGES HAVE BEEN STORED WITH THIS BUDGET***

| CATEGORY | UNIT | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MONTHLY SUMMARY OF RECEIPTS AND EXPENSES | | | | | | | | | | | | | | |
| TOTAL RECEIPTS | ACRE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 102.50 | 0.0 | 0.0 | 0.0 | 114.80 | 0.0 | 0.0 | 217.30 |
| TOTAL EXPENSES | ACRE | 0.0 | 0.0 | 2.82 | 2.82 | 5.64 | 14.40 | 32.40 | 7.52 | 0.0 | 71.18 | 2.82 | 0.0 | 139.60 |
| RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT | | | | | | | | | | | | | | 77.70 |
| ANNUAL CAPITAL | DOL. | 0.0 | 0.0 | 1.64 | 1.41 | 2.35 | 4.80 | 8.10 | 1.25 | 0.0 | 0.0 | 2.58 | 0.0 | 22.14 |
| LABOR REQUIREMENTS BY MONTH | | | | | | | | | | | | | | |
| MACHINERY LABOR | HR. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.18 | 0.0 | 0.0 | 0.62 | 0.0 | 0.0 | 0.81 |
| IRRIGATION LABOR | HR. | 0.0 | 0.0 | 0.16 | 0.16 | 0.31 | 0.0 | 0.36 | 0.42 | 0.0 | 0.16 | 0.16 | 0.0 | 1.72 |
| TOTAL LABOR | HR. | 0.0 | 0.0 | 0.16 | 0.16 | 0.31 | 0.0 | 0.55 | 0.42 | 0.0 | 0.78 | 0.16 | 0.0 | 2.52 |
| IRRIGATION WATER | INCH | 0.0 | 0.0 | 3.00 | 3.00 | 6.00 | 0.0 | 7.00 | 8.00 | 0.0 | 3.00 | 3.00 | 0.0 | 33.00 |

MACHINERY FIXED AND VARIABLE COSTS PER HOUR

| MACHINE | CODE | DEPR | INSUR. | TAX | TOTAL FIXED | REPAIR | FUEL | LUB. | TOTAL VARIABLE | INT. | HR/TIME |
|---|---|---|---|---|---|---|---|---|---|---|---|
| TRACTOR(4) | 4 | 1.05 | 0.06 | 0.16 | 1.27 | 0.72 | 1.49 | 0.22 | 2.44 | 1.06 | 1.00 |
| DRY FERT SPREAD | 71 | 0.68 | 0.03 | 0.08 | 0.80 | 0.29 | 0.0 | 0.0 | 0.29 | 0.51 | 0.09 |
| OFFSET DISK | 37 | 1.66 | 0.07 | 0.21 | 1.94 | 0.43 | 0.0 | 0.0 | 0.43 | 1.24 | 0.13 |
| CULTIBEDDER TILL | 51 | 0.69 | 0.03 | 0.09 | 0.80 | 0.95 | 0.0 | 0.0 | 0.95 | 0.51 | 0.11 |
| DRILL WO/FERT | 61 | 1.65 | 0.07 | 0.21 | 1.93 | 0.44 | 0.0 | 0.0 | 0.44 | 1.24 | 0.18 |
| CULTIBEDDER PLNT | 67 | 1.24 | 0.05 | 0.13 | 1.42 | 0.77 | 0.0 | 0.0 | 0.77 | 0.82 | 0.15 |

| OPERATION | ITEM NO. | DATE | TIMES OVER | LABOR HOURS | MACHINE HOURS | FUEL,OIL,LUB., REPAIR PER ACRE | FIXED COSTS PER ACRE |
|---|---|---|---|---|---|---|---|
| CULTIBEDDER PLNT | 4,67 | JUL | 1.00 | 0.184 | 0.152 | 0.52 | 0.73 |
| DRY FERT SPREAD | 4,71 | OCT | 1.00 | 0.112 | 0.093 | 0.28 | 0.36 |
| OFFSET DISK | 4,37 | OCT | 1.00 | 0.157 | 0.129 | 0.40 | 0.74 |
| CULTIBEDDER TILL | 4,51 | OCT | 1.00 | 0.139 | 0.115 | 0.42 | 0.45 |
| DRILL WO/FERT | 4,61 | OCT | 1.00 | 0.217 | 0.179 | 0.56 | 1.03 |
| TOTAL | | | | 0.808 | 0.668 | 2.18 | 3.31 |

TABLE LX

FARM MACHINERY ITEMS FOR REPRESENTATIVE FARMS

| Item | Size[A/] | Farm I | Farm II | Farm III |
|---|---|---|---|---|
| | --------------- | Number | --------------------- | |
| Large tractor | 115 | 1 | 1 | 3 |
| Medium tractor | 75 | 0 | 1 | 1 |
| Small tractor | 55 | 1 | 1 | 1 |
| Dry fertilizer spdr. | 25 | 1 | 1 | 2 |
| Anhydrous applicator | 18 | 1 | 1 | 2 |
| Cultibedder anhydrous | 18 | 1 | 1 | 2 |
| Sweep anhydrous | 12 | 1 | 1 | 2 |
| Grain drill | 18 | 1 | 2 | 3 |
| Cultibedder planter | 18 | 1 | 1 | 2 |
| Sweeps | 24 | 1 | 2 | 3 |
| Chisel | 12 | 1 | 1 | 2 |
| Offset disc | 16 | 1 | 2 | 3 |
| Tandem disc | 14 | 1 | 1 | 2 |
| Shredder | 12 | 1 | 1 | 2 |
| Land float | 10 | 1 | 1 | 2 |
| Sprayer | 12 | 1 | 1 | 1 |
| Row cultivator | 18 | 1 | 1 | 2 |
| Cultibedder tiller | 18 | 1 | 1 | 2 |
| Rod weeder | 18 | 1 | 1 | 2 |
| Rotary hoe | 18 | 1 | 1 | 1 |
| Mold board plow (4-16") | 5 1/3 | 1 | 1 | 2 |
| Spike harrow | 20 | 1 | 1 | 1 |

[A/]All items are measured in feet of width except the tractors which are measured in horsepower.

# APPENDIX B

# LINEAR PROGRAMMING TABLEAU AND EXPLANATION OF ROWS AND COLUMNS

# TABLE LXI

## LINEAR PROGRAMMING TABLEAU FOR SPECIFIED CROPS AND REPRESENTATIVE FARMS

| | CCG | CCS | CWG | CWGO | CSMI | CSHI | CRGO | CSH | 1....1 |
|---|---|---|---|---|---|---|---|---|---|
| OBJ1 | 125.62000- | 84.33000- | 42.28000- | 39.80000- | 48.17000- | 77.81000- | 39.78000- | 92.23000- | OBJ1 |
| OBJ2 | 8.06627 | 8.05615 | 4.30228 | 4.14223 | 3.21702 | 5.98873 | 5.49292 | 6.77974 | OBJ2 |
| OBJ3 | . | . | . | . | . | . | . | . | OBJ3 |
| OBJ4 | 2.51101 | 5.46385 | 1.51378 | .61850 | 3.49481 | 3.86319 | .73219- | 3.71026 | OBJ4 |
| CCL | . | . | 1.00000 | 1.00000 | 1.00000 | 1.00000 | . | 1.00000 | CCL |
| CSL | 1.00000 | 1.00000 | . | . | . | . | 1.00000 | . | CSL |
| JAL | . | . | . | . | . | . | . | . | JAL |
| FBL | . | . | . | .11000 | . | . | .11000 | .57000 | FBL |
| MRL | .18000 | .54000 | . | .27000 | .43000 | .46000 | .27000 | .18000 | MRL |
| APL | .42000 | .11000 | .16000 | .16000 | .46000 | .25000 | .16000 | . | APL |
| MYL | .87000 | .31000 | .31000 | .16000 | .76000 | .45000 | .16000 | .74000 | MYL |
| JNL | .56000 | .63000 | .18000 | .43000 | 1.24000 | 1.17000 | .43000 | .19000 | JNL |
| JYL | .68000 | .68000 | .29000 | .29000 | . | .68000 | .29000 | .37000 | JYL |
| AGL | .50000 | .68000 | .77000 | .49000 | . | .37000 | .65000 | .37000 | AGL |
| STL | . | . | .75000 | .22000 | . | . | .22000 | . | STL |
| OCL | .21000 | . | . | .16000 | . | . | .16000 | . | OCL |
| NVL | . | .43000 | .21000 | .16000 | . | .65000 | .16000 | . | NVL |
| DCL | . | . | . | . | . | . | . | . | DCL |
| OC | 42.70000 | 31.05000 | 22.66000 | 21.22000 | 13.72000 | 29.44000 | 24.28000 | 20.98000 | OC |
| IC | 28.54000 | 28.52000 | 26.95000 | 24.35000 | 33.20000 | 39.45000 | 24.35000 | 15.63000 | IC |
| MRI | . | . | . | 3.00000 | . | . | 3.00000 | . | MRI |
| API | 6.00000 | . | 3.00000 | 3.00000 | . | . | 3.00000 | . | API |
| MYI | 7.20000 | 6.00000 | 6.00000 | 3.00000 | 6.00000 | 6.00000 | 3.00000 | 6.00000 | MYI |
| JNI | 7.20000 | 3.60000 | . | . | 5.00000 | 3.60000 | . | 3.60000 | JNI |
| JYI | 3.60000 | 7.20000 | . | . | . | 7.20000 | . | 7.20000 | JYI |
| AGI | . | 7.20000 | . | 3.00000 | . | 7.20000 | 3.00000 | 7.20000 | AGI |
| STI | . | . | 5.00000 | . | . | . | . | . | STI |
| OCI | . | . | . | 3.00000 | . | . | 3.00000 | . | OCI |
| NVI | . | . | 4.00000 | 3.00000 | . | . | 3.00000 | . | NVI |
| TIW | 24.00000 | 24.00000 | 18.00000 | 18.00000 | 11.00000 | 24.00000 | 18.00000 | 24.00000 | TIW |
| NI | 2.00000 | 2.00000 | 1.00000 | .80000 | 1.00000 | 1.50000 | .80000 | 1.00000 | NI |
| PI | .50000 | .50000 | . | .40000 | . | . | .40000 | . | PI |
| HI | 2.00000 | 2.00000 | . | . | 1.50000 | 1.50000 | . | . | HI |
| II | 1.00000 | 1.00000 | . | . | 1.00000 | 1.00000 | . | . | II |
| DI | 9.10000 | 8.90000 | 7.60000 | 7.20000 | 10.20000 | 12.20000 | 7.20000 | 5.20000 | DI |
| OI | 3.15000 | 3.14000 | 2.28000 | 2.26000 | 1.78000 | 2.53000 | 2.40000 | 2.88000 | OI |
| NGI | 20.32500 | 20.32500 | 10.52500 | 10.32500 | 6.42500 | 14.62500 | 15.25000 | 20.32500 | NGI |
| MI | 23.06000 | 23.03000 | 11.64000 | 9.74000 | 8.03000 | 12.29000 | 10.90000 | 15.45000 | MI |
| WG | . | . | 55.00000- | . | . | . | . | . | WG |
| SGGONM | . | . | 1.00000- | . | . | . | . | . | SGGONM |
| SGGOOM | . | . | . | 6.00000- | . | . | 6.00000- | . | SGGOOM |
| CG | 120.00000- | . | . | . | . | . | . | . | CG |
| CS | . | 20.00000- | . | . | . | . | . | . | CS |
| GS | . | . | . | . | 42.00000- | 62.00000- | . | . | GS |
| GSS | . | . | . | . | 1.00000- | 1.40000- | . | . | GSS |
| SH | . | . | . | . | . | . | . | 5.00000- | SH |
| SB | . | . | . | . | . | . | . | . | SB |
| MCT | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | MCT |
| MMT | . | . | . | . | . | . | . | . | MMT |
| CSIS | 1.00000 | 1.00000 | . | . | . | . | 1.00000 | . | CSIS |
| SIS | . | . | 1.00000 | 1.00000 | 1.00000 | 1.00000 | . | 1.00000 | SIS |
| LNGW | . | . | . | . | . | . | . | . | LNGW |

| | CCG | CCS | CWG | CWGO | CSMI | CSHI | CRGO | CSH | 1....2 |
|---|---|---|---|---|---|---|---|---|---|
| LSI | . | . | . | . | . | . | . | . | LSI |
| LCSI | . | . | . | . | . | . | . | . | LCSI |
| LLJ | . | . | . | . | . | . | . | . | LLJ |
| LLO | . | . | . | . | . | . | . | . | LLO |
| LLS | . | . | . | . | . | . | . | . | LLS |
| FVS42 | . | . | . | . | . | . | . | . | FVS42 |
| FVS752 | . | . | . | . | . | . | . | . | FVS752 |
| FVS101 | . | . | . | . | . | . | . | . | FVS101 |
| FVS43 | . | . | . | . | . | . | . | . | FVS43 |
| FVS753 | . | . | . | . | . | . | . | . | FVS753 |
| FVS102 | . | . | . | . | . | . | . | . | FVS102 |
| FVS46 | . | . | . | . | . | . | . | . | FVS46 |
| FVS756 | . | . | . | . | . | . | . | . | FVS756 |
| FVS104 | . | . | . | . | . | . | . | . | FVS104 |
| FVC42 | . | . | . | . | . | . | . | . | FVC42 |
| FVC752 | . | . | . | . | . | . | . | . | FVC752 |
| FVC101 | . | . | . | . | . | . | . | . | FVC101 |
| FVC43 | . | . | . | . | . | . | . | . | FVC43 |
| FVC753 | . | . | . | . | . | . | . | . | FVC753 |
| FVC102 | . | . | . | . | . | . | . | . | FVC102 |
| FVC46 | . | . | . | . | . | . | . | . | FVC46 |
| FVC756 | . | . | . | . | . | . | . | . | FVC756 |
| FVC104 | . | . | . | . | . | . | . | . | FVC104 |
| NRC1 | . | . | . | . | . | . | . | . | NRC1 |
| NRC4 | . | . | . | . | . | . | . | . | NRC4 |
| NRC7 | . | . | . | . | . | . | . | . | NRC7 |
| NRC2 | . | . | . | . | . | . | . | . | NRC2 |
| NRC5 | . | . | . | . | . | . | . | . | NRC5 |
| NRC8 | . | . | . | . | . | . | . | . | NRC8 |
| NRC3 | . | . | . | . | . | . | . | . | NRC3 |
| NRC6 | . | . | . | . | . | . | . | . | NRC6 |
| NRC9 | . | . | . | . | . | . | . | . | NRC9 |
| NRS1 | . | . | . | . | . | . | . | . | NRS1 |
| NRS4 | . | . | . | . | . | . | . | . | NRS4 |
| NRS7 | . | . | . | . | . | . | . | . | NRS7 |
| NRS2 | . | . | . | . | . | . | . | . | NRS2 |
| NRS5 | . | . | . | . | . | . | . | . | NRS5 |
| NRS8 | . | . | . | . | . | . | . | . | NRS8 |
| NRS3 | . | . | . | . | . | . | . | . | NRS3 |
| NRS6 | . | . | . | . | . | . | . | . | NRS6 |
| NRS9 | . | . | . | . | . | . | . | . | NRS9 |

## TABLE LXI (Continued)

| | CSB | MCG | MSRCSL | MSRSCL | MWG2RCMC | MWGSDC | MWGSBDC | MWGOSHDC | 2....1 |
|---|---|---|---|---|---|---|---|---|---|
| OBJ1 | 52.05000- | 132.79000- | 95.47000- | 67.56000- | 44.95000- | 81.87000- | 110.45000- | 89.88000- | OBJ1 |
| OBJ2 | 6.78097 | 8.06161 | 10.67030 | 9.17814 | 4.00920 | 7.26216 | 9.44250 | 6.44794 | OBJ2 |
| OBJ3 | . | . | . | . | . | . | . | . | OBJ3 |
| OBJ4 | 2.21257- | 3.83783 | 6.10287 | 7.55503 | 1.94384 | 4.13424 | 1.32330- | 5.06070 | OBJ4 |
| CCL | 1.00000 | . | . | 1.00000 | 1.00000 | 1.00000 | . | 1.00000 | CCL |
| CSL | . | 1.00000 | 1.00000 | . | . | . | 1.00000 | . | CSL |
| JAL | . | . | . | . | . | . | . | . | JAL |
| FBL | . | . | . | . | . | . | . | . | FBL |
| MRL | .43000 | .36000 | .16000 | .21000 | . | .16000 | .16000 | .21000 | MRL |
| APL | .57000 | .51000 | .16000 | .42000 | .21000 | .16000 | .16000 | .21000 | APL |
| MYL | .42000 | .36000 | .82000 | .71000 | .31000 | .16000 | .31000 | .32000 | MYL |
| JNL | .66000 | .97000 | .19000 | .96000 | .27000 | 1.17000 | . | .76000 | JNL |
| JYL | .66000 | .68000 | .68000 | .42000 | .18000 | .26000 | .54000 | .42000 | JYL |
| AGL | .37000 | .29000 | .37000 | .42000 | .51000 | . | .42000 | .21000 | AGL |
| STL | . | . | .57000 | .62000 | .54000 | .16000 | . | .62000 | STL |
| OCL | . | . | . | . | . | .79000 | .81000 | .21000 | OCL |
| NVL | . | .39000 | .21000 | .21000 | .21000 | .16000 | .16000 | . | NVL |
| DCL | . | . | . | . | . | . | . | . | DCL |
| OC | 17.45000 | 44.64000 | 30.34000 | 20.52000 | 24.21000 | 34.08000 | 22.14000 | 16.11000 | OC |
| IC | 27.52000 | 28.91000 | 19.41000 | 26.24000 | 19.63000 | 20.60000 | 13.59000 | 15.31000 | IC |
| MRI | . | . | 3.00000 | 4.00000 | . | 3.00000 | 3.00000 | 4.00000 | MRI |
| API | . | 4.00000 | 3.00000 | 8.00000 | 4.00000 | 3.00000 | 3.00000 | 4.00000 | API |
| MYI | 6.00000 | . | 3.00000 | 4.00000 | 6.00000 | 3.00000 | 6.00000 | 4.00000 | MYI |
| JNI | 3.60000 | 7.20000 | 3.60000 | . | . | 6.00000 | . | 4.00000 | JNI |
| JYI | 7.20000 | 7.20000 | 7.20000 | 8.00000 | . | 5.00000 | 7.00000 | 8.00000 | JYI |
| AGI | 7.20000 | 5.60000 | 7.20000 | 8.00000 | . | . | 8.00000 | 4.00000 | AGI |
| STI | . | . | 3.00000 | 4.00000 | 3.00000 | 3.00000 | . | 4.00000 | STI |
| OCI | . | . | . | . | . | 3.00000 | 3.00000 | 4.00000 | OCI |
| NVI | . | . | 4.00000 | 4.00000 | 4.00000 | 3.00000 | 3.00000 | . | NVI |
| TIW | 24.00000 | 24.00000 | 34.00000 | 40.00000 | 17.00000 | 29.00000 | 33.00000 | 36.00000 | TIW |
| NI | .50000 | 2.00000 | 2.80000 | 2.80000 | 1.00000 | 2.40000 | 1.20000 | 1.80000 | NI |
| PI | . | .50000 | .50000 | . | . | . | .50000 | . | PI |
| HI | 1.00000 | 1.50000 | 1.50000 | .25000 | 1.00000 | 1.50000 | 2.50000 | .50000 | HI |
| II | . | 1.00000 | 1.00000 | 1.00000 | . | 1.00000 | . | . | II |
| DI | 8.20000 | 9.20000 | 5.60000 | 7.70000 | 5.40000 | 6.00000 | 3.60000 | 4.20000 | DI |
| OI | 3.08000 | 3.16000 | 3.90000 | 4.05000 | 1.98000 | 3.23000 | 3.76000 | 3.31000 | OI |
| NGI | 20.32500 | 20.32500 | 28.12500 | 29.12500 | 9.95000 | 16.97500 | 28.05000 | 21.50000 | NGI |
| MI | 22.77000 | 22.83000 | 24.17000 | 44.26000 | 8.99000 | 14.62000 | 25.79000 | 14.93000 | MI |
| WG | . | . | . | . | 56.50000- | 50.00000- | 50.00000- | . | WG |
| SGGONM | . | . | . | . | 1.00000- | . | . | . | SGGONM |
| SGGOOM | . | . | 4.10000- | 4.10000- | . | . | . | 5.25000- | SGGOOM |
| CG | . | 135.00000- | . | . | . | . | . | . | CG |
| CS | . | . | 20.00000- | 20.00000- | . | . | . | . | CS |
| GS | . | . | . | . | . | 48.00000- | . | . | GS |
| GSS | . | . | . | . | . | . | . | . | GSS |
| SH | . | . | . | . | . | . | . | 3.50000- | SH |
| SB | 45.00000- | . | . | . | . | . | 35.00000- | . | SB |
| MCT | 1.00000 | . | . | . | . | . | . | . | MCT |
| MMT | . | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | MMT |
| CSIS | . | 1.00000 | 1.00000 | . | . | . | 1.00000 | . | CSIS |
| SIS | 1.00000 | . | . | 1.00000 | 1.00000 | 1.00000 | . | 1.00000 | SIS |
| LNGW | . | . | . | . | . | . | . | . | LNGW |

| | CSB | MCG | MSRCSL | MSRSCL | MWG2RCMC | MWGSDC | MWGSBDC | MWGOSHDC | 2....2 |
|---|---|---|---|---|---|---|---|---|---|
| LSI | . | . | . | . | . | . | . | . | LSI |
| LCSI | . | . | . | . | . | . | . | . | LCSI |
| LLJ | . | . | . | . | . | 1.17000 | . | .96000 | LLJ |
| LLO | . | . | . | . | . | .79000 | .81000 | . | LLO |
| LLS | . | . | . | . | . | . | . | .62000 | LLS |
| FVS42 | . | . | . | . | . | . | . | . | FVS42 |
| FVS752 | . | . | . | . | . | . | . | . | FVS752 |
| FVS101 | . | . | . | . | . | . | . | . | FVS101 |
| FVS43 | . | . | . | . | . | . | . | . | FVS43 |
| FVS753 | . | . | . | . | . | . | . | . | FVS753 |
| FVS102 | . | . | . | . | . | . | . | . | FVS102 |
| FVS46 | . | . | . | . | . | . | . | . | FVS46 |
| FVS756 | . | . | . | . | . | . | . | . | FVS756 |
| FVS104 | . | . | . | . | . | . | . | . | FVS104 |
| FVC42 | . | . | . | . | . | . | . | . | FVC42 |
| FVC752 | . | . | . | . | . | . | . | . | FVC752 |
| FVC101 | . | . | . | . | . | . | . | . | FVC101 |
| FVC43 | . | . | . | . | . | . | . | . | FVC43 |
| FVC753 | . | . | . | . | . | . | . | . | FVC753 |
| FVC102 | . | . | . | . | . | . | . | . | FVC102 |
| FVC46 | . | . | . | . | . | . | . | . | FVC46 |
| FVC756 | . | . | . | . | . | . | . | . | FVC756 |
| FVC104 | . | . | . | . | . | . | . | . | FVC104 |
| NRC1 | . | . | . | . | . | . | . | . | NRC1 |
| NRC4 | . | . | . | . | . | . | . | . | NRC4 |
| NRC7 | . | . | . | . | . | . | . | . | NRC7 |
| NRC2 | . | . | . | . | . | . | . | . | NRC2 |
| NRC5 | . | . | . | . | . | . | . | . | NRC5 |
| NRC8 | . | . | . | . | . | . | . | . | NRC8 |
| NRC3 | . | . | . | . | . | . | . | . | NRC3 |
| NRC6 | . | . | . | . | . | . | . | . | NRC6 |
| NRC9 | . | . | . | . | . | . | . | . | NRC9 |
| NRS1 | . | . | . | . | . | . | . | . | NRS1 |
| NRS4 | . | . | . | . | . | . | . | . | NRS4 |
| NRS7 | . | . | . | . | . | . | . | . | NRS7 |
| NRS2 | . | . | . | . | . | . | . | . | NRS2 |
| NRS5 | . | . | . | . | . | . | . | . | NRS5 |
| NRS8 | . | . | . | . | . | . | . | . | NRS8 |
| NRS3 | . | . | . | . | . | . | . | . | NRS3 |
| NRS6 | . | . | . | . | . | . | . | . | NRS6 |
| NRS9 | . | . | . | . | . | . | . | . | NRS9 |

# TABLE LXI (Continued)

| | MWFS3HI | MWFS3MI | DLW | DLWS | DLGSS | DLGSC | DLSGGO | DLSGGOS | 3....1 |
|---|---|---|---|---|---|---|---|---|---|
| OBJ1 | 30.09000- | 29.12000- | 25.58000- | 25.58000- | 28.06000- | 17.82000- | 20.90000- | 20.90000- | OBJ1 |
| OBJ2 | 2.84934 | 2.26461 | .65315 | .65315 | .72258 | .30047 | .60292 | .60292 | OBJ2 |
| OBJ3 | . | . | . | . | . | . | . | . | OBJ3 |
| OBJ4 | 2.30638 | 2.19056 | 1.13134 | 1.13134 | 2.81714 | 1.81626 | 1.30130 | 1.30130 | OBJ4 |
| CCL | 1.00000 | 1.00000 | 1.00000 | . | . | 1.00000 | 1.00000 | . | CCL |
| CSL | . | . | . | 1.00000 | 1.00000 | . | . | 1.00000 | CSL |
| JAL | . | . | . | . | . | . | . | . | JAL |
| FBL | . | . | . | . | . | . | . | . | FBL |
| MRL | .05000 | . | . | . | .41000 | .41000 | . | . | MRL |
| APL | .05000 | .05000 | . | . | .16000 | .16000 | . | . | APL |
| MYL | .14000 | .14000 | . | . | . | . | . | . | MYL |
| JNL | .27000 | .26000 | .12000 | .12000 | .34000 | .36000 | .25000 | .25000 | JNL |
| JYL | .16000 | .11000 | . | . | .29000 | .29000 | .18000 | .18000 | JYL |
| AGL | .25000 | .20000 | .12000 | .12000 | . | . | .12000 | .12000 | AGL |
| STL | .07000 | .07000 | .11000 | .11000 | . | . | .33000 | .33000 | STL |
| OCL | . | . | . | . | . | . | . | . | OCL |
| NVL | .07000 | . | . | . | . | . | . | . | NVL |
| DCL | . | . | . | . | . | . | . | . | DCL |
| OC | 16.41000 | 14.47000 | 10.31000 | 10.31000 | 11.62000 | 8.36000 | 14.82000 | 14.82000 | OC |
| IC | 8.04000 | 8.03000 | 7.19000 | 7.19000 | 19.52000 | 19.14000 | 14.76000 | 14.76000 | IC |
| MRI | 1.00000 | . | . | . | . | . | . | . | MRI |
| API | 1.00000 | 1.00000 | . | . | . | . | . | . | API |
| MYI | 2.70000 | 2.70000 | . | . | . | . | . | . | MYI |
| JNI | 1.20000 | 1.00000 | . | . | . | . | . | . | JNI |
| JYI | 2.40000 | 1.30000 | . | . | . | . | . | . | JYI |
| AGI | 2.40000 | 1.30000 | . | . | . | . | . | . | AGI |
| STI | . | . | . | . | . | . | . | . | STI |
| OCI | . | 1.30000 | . | . | . | . | . | . | OCI |
| NVI | 1.30000 | . | . | . | . | . | . | . | NVI |
| TIW | 12.00000 | 8.60000 | . | . | . | . | . | . | TIW |
| NI | .81000 | .80000 | .60000 | .60000 | .50000 | . | .30000 | .30000 | NI |
| PI | . | . | . | . | . | . | .30000 | .30000 | PI |
| HI | 1.00000 | 1.00000 | . | . | . | . | . | . | HI |
| II | 1.00000 | 1.00000 | . | . | 1.00000 | . | . | . | II |
| DI | 2.30000 | 2.30000 | 1.30000 | 1.30000 | 5.20000 | 5.40000 | 3.90000 | 3.90000 | DI |
| OI | 1.26000 | 1.00000 | .13000 | .13000 | .52000 | .54000 | .39000 | .39000 | OI |
| NGI | 7.16700 | 5.06700 | . | . | . | . | . | . | NGI |
| MI | 5.29000 | 4.37000 | 1.04000 | 1.04000 | 2.07000 | 2.03000 | 1.53000 | 1.53000 | MI |
| WG | 18.30000- | 13.30000- | 16.50000- | 16.50000- | . | . | . | . | WG |
| SGGONM | .33000- | .33000- | .35000- | .35000- | . | . | . | . | SGGONM |
| SGGOOM | . | . | . | . | . | . | 1.90000- | 1.90000- | SGGOOM |
| CG | . | . | . | . | . | . | . | . | CG |
| CS | . | . | . | . | . | . | . | . | CS |
| GS | 20.67000- | 16.00000- | . | . | 21.00000- | 11.00000- | . | . | GS |
| GSS | .46000- | .33000- | . | . | .75000- | .75000- | . | . | GSS |
| SH | . | . | . | . | . | . | . | . | SH |
| SB | . | . | . | . | . | . | . | . | SB |
| MCT | . | . | . | . | . | . | . | . | MCT |
| MMT | 1.00000 | 1.00000 | . | . | . | . | . | . | MMT |
| CSIS | . | . | . | . | . | . | . | . | CSIS |
| SIS | 1.00000 | 1.00000 | . | . | . | . | . | . | SIS |
| LNGW | . | . | . | . | . | . | . | . | LNGW |

| | MWFS3HI | MWFS3MI | DLW | DLWS | DLGSS | DLGSC | DLSGGO | DLSGGOS | 3....2 |
|---|---|---|---|---|---|---|---|---|---|
| LSI | . | . | . | . | . | . | . | . | LSI |
| LCSI | . | . | . | . | . | . | . | . | LCSI |
| LLJ | . | . | . | . | . | . | . | . | LLJ |
| LLO | . | . | . | . | . | . | . | . | LLO |
| LLS | . | . | . | . | . | . | . | . | LLS |
| FVS42 | . | . | . | . | . | . | . | . | FVS42 |
| FVS752 | . | . | . | . | . | . | . | . | FVS752 |
| FVS101 | . | . | . | . | . | . | . | . | FVS101 |
| FVS43 | . | . | . | . | . | . | . | . | FVS43 |
| FVS753 | . | . | . | . | . | . | . | . | FVS753 |
| FVS102 | . | . | . | . | . | . | . | . | FVS102 |
| FVS46 | . | . | . | . | . | . | . | . | FVS46 |
| FVS756 | . | . | . | . | . | . | . | . | FVS756 |
| FVS104 | . | . | . | . | . | . | . | . | FVS104 |
| FVC42 | . | . | . | . | . | . | . | . | FVC42 |
| FVC752 | . | . | . | . | . | . | . | . | FVC752 |
| FVC101 | . | . | . | . | . | . | . | . | FVC101 |
| FVC43 | . | . | . | . | . | . | . | . | FVC43 |
| FVC753 | . | . | . | . | . | . | . | . | FVC753 |
| FVC102 | . | . | . | . | . | . | . | . | FVC102 |
| FVC46 | . | . | . | . | . | . | . | . | FVC46 |
| FVC756 | . | . | . | . | . | . | . | . | FVC756 |
| FVC104 | . | . | . | . | . | . | . | . | FVC104 |
| NRC1 | . | . | . | . | . | . | . | . | NRC1 |
| NRC4 | . | . | . | . | . | . | . | . | NRC4 |
| NRC7 | . | . | . | . | . | . | . | . | NRC7 |
| NRC2 | . | . | . | . | . | . | . | . | NRC2 |
| NRC5 | . | . | . | . | . | . | . | . | NRC5 |
| NRC8 | . | . | . | . | . | . | . | . | NRC8 |
| NRC3 | . | . | . | . | . | . | . | . | NRC3 |
| NRC6 | . | . | . | . | . | . | . | . | NRC6 |
| NRC9 | . | . | . | . | . | . | . | . | NRC9 |
| NRS1 | . | . | . | . | . | . | . | . | NRS1 |
| NRS4 | . | . | . | . | . | . | . | . | NRS4 |
| NRS7 | . | . | . | . | . | . | . | . | NRS7 |
| NRS2 | . | . | . | . | . | . | . | . | NRS2 |
| NRS5 | . | . | . | . | . | . | . | . | NRS5 |
| NRS8 | . | . | . | . | . | . | . | . | NRS8 |
| NRS3 | . | . | . | . | . | . | . | . | NRS3 |
| NRS6 | . | . | . | . | . | . | . | . | NRS6 |
| NRS9 | . | . | . | . | . | . | . | . | NRS9 |

## TABLE LXI (Continued)

| | CGSL | CSSL | WGSL | GSSL | SHSL | SBSL | SGGONMSL | SGGOOMSL | 4.....1 |
|---|---|---|---|---|---|---|---|---|---|
| OBJ1 | 1.38000 | 5.50000 | 2.05000 | 2.34000 | 22.00000 | 3.28000 | 10.00000 | 10.00000 | OBJ1 |
| OBJ2 | . | . | . | . | . | . | . | . | OBJ2 |
| OBJ3 | .08814 | .67600 | .09132 | .14230 | 2.09800 | .10152 | .79346 | .79346 | OBJ3 |
| OBJ4 | . | . | . | . | . | . | . | . | OBJ4 |
| CCL | . | . | . | . | . | . | . | . | CCL |
| CSL | . | . | . | . | . | . | . | . | CSL |
| JAL | . | . | . | . | . | . | . | . | JAL |
| FBL | . | . | . | . | . | . | . | . | FBL |
| MRL | . | . | . | . | . | . | . | . | MRL |
| APL | . | . | . | . | . | . | . | . | APL |
| MYL | . | . | . | . | . | . | . | . | MYL |
| JNL | . | . | . | . | . | . | . | . | JNL |
| JYL | . | . | . | . | . | . | . | . | JYL |
| AGL | . | . | . | . | . | . | . | . | AGL |
| STL | . | . | . | . | . | . | . | . | STL |
| OCL | . | . | . | . | . | . | . | . | OCL |
| NVL | . | . | . | . | . | . | . | . | NVL |
| DCL | . | . | . | . | . | . | . | . | DCL |
| OC | . | . | . | . | . | . | . | . | OC |
| IC | . | . | . | . | . | . | . | . | IC |
| MRI | . | . | . | . | . | . | . | . | MRI |
| API | . | . | . | . | . | . | . | . | API |
| MYI | . | . | . | . | . | . | . | . | MYI |
| JNI | . | . | . | . | . | . | . | . | JNI |
| JYI | . | . | . | . | . | . | . | . | JYI |
| AGI | . | . | . | . | . | . | . | . | AGI |
| STI | . | . | . | . | . | . | . | . | STI |
| OCI | . | . | . | . | . | . | . | . | OCI |
| NVI | . | . | . | . | . | . | . | . | NVI |
| TIW | . | . | . | . | . | . | . | . | TIW |
| NI | . | . | . | . | . | . | . | . | NI |
| PI | . | . | . | . | . | . | . | . | PI |
| HI | . | . | . | . | . | . | . | . | HI |
| II | . | . | . | . | . | . | . | . | II |
| DI | . | . | . | . | . | . | . | . | DI |
| OI | . | . | . | . | . | . | . | . | OI |
| NGI | . | . | . | . | . | . | . | . | NGI |
| MI | . | . | . | . | . | . | . | . | MI |
| WG | . | . | 1.00000 | . | . | . | . | . | WG |
| SGGONM | . | . | . | . | . | . | 1.00000 | . | SGGONM |
| SGGOOM | . | . | . | . | . | . | . | 1.00000 | SGGOOM |
| CG | 1.00000 | . | . | . | . | . | . | . | CG |
| CS | . | 1.00000 | . | . | . | . | . | . | CS |
| GS | . | . | . | 1.00000 | . | . | . | . | GS |
| GSS | . | . | . | . | . | . | . | . | GSS |
| SH | . | . | . | . | 1.00000 | . | . | . | SH |
| SB | . | . | . | . | . | 1.00000 | . | . | SB |
| MCT | . | . | . | . | . | . | . | . | MCT |
| MMT | . | . | . | . | . | . | . | . | MMT |
| CSIS | . | . | . | . | . | . | . | . | CSIS |
| SIS | . | . | . | . | . | . | . | . | SIS |
| LNGW | . | . | . | . | . | . | . | . | LNGW |

| | CGSL | CSSL | WGSL | GSSL | SHSL | SBSL | SGGONMSL | SGGOOMSL | 4....2 |
|---|---|---|---|---|---|---|---|---|---|
| LSI | . | . | . | . | . | . | . | . | LSI |
| LCSI | . | . | . | . | . | . | . | . | LCSI |
| LLJ | . | . | . | . | . | . | . | . | LLJ |
| LLO | . | . | . | . | . | . | . | . | LLO |
| LLS | . | . | . | . | . | . | . | . | LLS |
| FVS42 | . | . | . | . | . | . | . | . | FVS42 |
| FVS752 | . | . | . | . | . | . | . | . | FVS752 |
| FVS101 | . | . | . | . | . | . | . | . | FVS101 |
| FVS43 | . | . | . | . | . | . | . | . | FVS43 |
| FVS753 | . | . | . | . | . | . | . | . | FVS753 |
| FVS102 | . | . | . | . | . | . | . | . | FVS102 |
| FVS46 | . | . | . | . | . | . | . | . | FVS46 |
| FVS756 | . | . | . | . | . | . | . | . | FVS756 |
| FVS104 | . | . | . | . | . | . | . | . | FVS104 |
| FVC42 | . | . | . | . | . | . | . | . | FVC42 |
| FVC752 | . | . | . | . | . | . | . | . | FVC752 |
| FVC101 | . | . | . | . | . | . | . | . | FVC101 |
| FVC43 | . | . | . | . | . | . | . | . | FVC43 |
| FVC753 | . | . | . | . | . | . | . | . | FVC753 |
| FVC102 | . | . | . | . | . | . | . | . | FVC102 |
| FVC46 | . | . | . | . | . | . | . | . | FVC46 |
| FVC756 | . | . | . | . | . | . | . | . | FVC756 |
| FVC104 | . | . | . | . | . | . | . | . | FVC104 |
| NRC1 | . | . | . | . | . | . | . | . | NRC1 |
| NRC4 | . | . | . | . | . | . | . | . | NRC4 |
| NRC7 | . | . | . | . | . | . | . | . | NRC7 |
| NRC2 | . | . | . | . | . | . | . | . | NRC2 |
| NRC5 | . | . | . | . | . | . | . | . | NRC5 |
| NRC8 | . | . | . | . | . | . | . | . | NRC8 |
| NRC3 | . | . | . | . | . | . | . | . | NRC3 |
| NRC6 | . | . | . | . | . | . | . | . | NRC6 |
| NRC9 | . | . | . | . | . | . | . | . | NRC9 |
| NRS1 | . | . | . | . | . | . | . | . | NRS1 |
| NRS4 | . | . | . | . | . | . | . | . | NRS4 |
| NRS7 | . | . | . | . | . | . | . | . | NRS7 |
| NRS2 | . | . | . | . | . | . | . | . | NRS2 |
| NRS5 | . | . | . | . | . | . | . | . | NRS5 |
| NRS8 | . | . | . | . | . | . | . | . | NRS8 |
| NRS3 | . | . | . | . | . | . | . | . | NRS3 |
| NRS6 | . | . | . | . | . | . | . | . | NRS6 |
| NRS9 | . | . | . | . | . | . | . | . | NRS9 |

# TABLE LXI (Continued)

| | GSNJSL | BOC | BIC | BJAL | BFBL | BMRL | BAPL | BMYL | S....1 |
|---|---|---|---|---|---|---|---|---|---|
| OBJ1 | 4.00000 | .10000- | .08000- | 3.00000- | 3.00000- | 3.00000- | 3.00000- | 3.00000- | OBJ1 |
| OBJ2 | . | . | . | . | . | . | . | . | OBJ2 |
| OBJ3 | .73523 | . | . | . | . | . | . | . | OBJ3 |
| OBJ4 | . | . | . | . | . | . | . | . | OBJ4 |
| CCL | . | . | . | . | . | . | . | . | CCL |
| CSL | . | . | . | . | . | . | . | . | CSL |
| JAL | . | . | . | 1.00000- | . | . | . | . | JAL |
| FBL | . | . | . | . | 1.00000- | . | . | . | FBL |
| MRL | . | . | . | . | . | 1.00000- | . | . | MRL |
| APL | . | . | . | . | . | . | 1.00000- | . | APL |
| MYL | . | . | . | . | . | . | . | 1.00000- | MYL |
| JNL | . | . | . | . | . | . | . | . | JNL |
| JYL | . | . | . | . | . | . | . | . | JYL |
| AGL | . | . | . | . | . | . | . | . | AGL |
| STL | . | . | . | . | . | . | . | . | STL |
| OCL | . | . | . | . | . | . | . | . | OCL |
| NVL | . | . | . | . | . | . | . | . | NVL |
| DCL | . | . | . | . | . | . | . | . | DCL |
| OC | . | 1.00000- | . | . | . | . | . | . | OC |
| IC | . | . | 1.00000- | . | . | . | . | . | IC |
| MRI | . | . | . | . | . | . | . | . | MRI |
| API | . | . | . | . | . | . | . | . | API |
| MYI | . | . | . | . | . | . | . | . | MYI |
| JNI | . | . | . | . | . | . | . | . | JNI |
| JYI | . | . | . | . | . | . | . | . | JYI |
| AGI | . | . | . | . | . | . | . | . | AGI |
| STI | . | . | . | . | . | . | . | . | STI |
| OCI | . | . | . | . | . | . | . | . | OCI |
| NVI | . | . | . | . | . | . | . | . | NVI |
| TIW | . | . | . | . | . | . | . | . | TIW |
| NI | . | . | . | . | . | . | . | . | NI |
| PI | . | . | . | . | . | . | . | . | PI |
| HI | . | . | . | . | . | . | . | . | HI |
| II | . | . | . | . | . | . | . | . | II |
| DI | . | . | . | . | . | . | . | . | DI |
| OI | . | . | . | . | . | . | . | . | OI |
| NGI | . | . | . | . | . | . | . | . | NGI |
| MI | . | . | . | . | . | . | . | . | MI |
| WG | . | . | . | . | . | . | . | . | WG |
| SGGONM | . | . | . | . | . | . | . | . | SGGONM |
| SGGOOM | . | . | . | . | . | . | . | . | SGGOOM |
| CG | . | . | . | . | . | . | . | . | CG |
| CS | . | . | . | . | . | . | . | . | CS |
| GS | . | . | . | . | . | . | . | . | GS |
| GSS | 1.00000 | . | . | . | . | . | . | . | GSS |
| SH | . | . | . | . | . | . | . | . | SH |
| SB | . | . | . | . | . | . | . | . | SB |
| MCT | . | . | . | . | . | . | . | . | MCT |
| MMT | . | . | . | . | . | . | . | . | MMT |
| CSIS | . | . | . | . | . | . | . | . | CSIS |
| SIS | . | . | . | . | . | . | . | . | SIS |
| LNGW | . | . | . | . | . | . | . | . | LNGW |

| | GSNJSL | BOC | BIC | BJAL | BFBL | BMRL | BAPL | BMYL | S....2 |
|---|---|---|---|---|---|---|---|---|---|
| LSI | . | . | . | . | . | . | . | . | LSI |
| LCSI | . | . | . | . | . | . | . | . | LCSI |
| LLJ | . | . | . | . | . | . | . | . | LLJ |
| LLO | . | . | . | . | . | . | . | . | LLO |
| LLS | . | . | . | . | . | . | . | . | LLS |
| FVS42 | . | . | . | . | . | . | . | . | FVS42 |
| FVS752 | . | . | . | . | . | . | . | . | FVS752 |
| FVS101 | . | . | . | . | . | . | . | . | FVS101 |
| FVS43 | . | . | . | . | . | . | . | . | FVS43 |
| FVS753 | . | . | . | . | . | . | . | . | FVS753 |
| FVS102 | . | . | . | . | . | . | . | . | FVS102 |
| FVS46 | . | . | . | . | . | . | . | . | FVS46 |
| FVS756 | . | . | . | . | . | . | . | . | FVS756 |
| FVS104 | . | . | . | . | . | . | . | . | FVS104 |
| FVC42 | . | . | . | . | . | . | . | . | FVC42 |
| FVC752 | . | . | . | . | . | . | . | . | FVC752 |
| FVC101 | . | . | . | . | . | . | . | . | FVC101 |
| FVC43 | . | . | . | . | . | . | . | . | FVC43 |
| FVC753 | . | . | . | . | . | . | . | . | FVC753 |
| FVC102 | . | . | . | . | . | . | . | . | FVC102 |
| FVC46 | . | . | . | . | . | . | . | . | FVC46 |
| FVC756 | . | . | . | . | . | . | . | . | FVC756 |
| FVC104 | . | . | . | . | . | . | . | . | FVC104 |
| NRC1 | . | . | . | . | . | . | . | . | NRC1 |
| NRC4 | . | . | . | . | . | . | . | . | NRC4 |
| NRC7 | . | . | . | . | . | . | . | . | NRC7 |
| NRC2 | . | . | . | . | . | . | . | . | NRC2 |
| NRC5 | . | . | . | . | . | . | . | . | NRC5 |
| NRC8 | . | . | . | . | . | . | . | . | NRC8 |
| NRC3 | . | . | . | . | . | . | . | . | NRC3 |
| NRC6 | . | . | . | . | . | . | . | . | NRC6 |
| NRC9 | . | . | . | . | . | . | . | . | NRC9 |
| NRS1 | . | . | . | . | . | . | . | . | NRS1 |
| NRS4 | . | . | . | . | . | . | . | . | NRS4 |
| NRS7 | . | . | . | . | . | . | . | . | NRS7 |
| NRS2 | . | . | . | . | . | . | . | . | NRS2 |
| NRS5 | . | . | . | . | . | . | . | . | NRS5 |
| NRS8 | . | . | . | . | . | . | . | . | NRS8 |
| NRS3 | . | . | . | . | . | . | . | . | NRS3 |
| NRS6 | . | . | . | . | . | . | . | . | NRS6 |
| NRS9 | . | . | . | . | . | . | . | . | NRS9 |

# TABLE LXI (Continued)

| | BJNL | BJYL | BAGL | BSTL | BOCL | BNVL | BDCL | BN | 6....1 |
|---|---|---|---|---|---|---|---|---|---|
| OBJ1 | 3.00000- | 3.00000- | 3.00000- | 3.00000- | 3.00000- | 3.00000- | 3.00000- | . | OBJ1 |
| OBJ2 | . | . | . | . | . | . | . | . | OBJ2 |
| OBJ3 | . | . | . | . | . | . | . | . | OBJ3 |
| OBJ4 | . | . | . | . | . | . | . | . | OBJ4 |
| CCL | . | . | . | . | . | . | . | . | CCL |
| CSL | . | . | . | . | . | . | . | . | CSL |
| JAL | . | . | . | . | . | . | . | . | JAL |
| FBL | . | . | . | . | . | . | . | . | FBL |
| MRL | . | . | . | . | . | . | . | . | MRL |
| APL | . | . | . | . | . | . | . | . | APL |
| MYL | . | . | . | . | . | . | . | . | MYL |
| JNL | 1.00000- | . | . | . | . | . | . | . | JNL |
| JYL | . | 1.00000- | . | . | . | . | . | . | JYL |
| AGL | . | . | 1.00000- | . | . | . | . | . | AGL |
| STL | . | . | . | 1.00000- | . | . | . | . | STL |
| OCL | . | . | . | . | 1.00000- | . | . | . | OCL |
| NVL | . | . | . | . | . | 1.00000- | . | . | NVL |
| DCL | . | . | . | . | . | . | 1.00000- | . | DCL |
| OC | . | . | . | . | . | . | . | . | OC |
| IC | . | . | . | . | . | . | . | . | IC |
| MRI | . | . | . | . | . | . | . | . | MRI |
| API | . | . | . | . | . | . | . | . | API |
| MYI | . | . | . | . | . | . | . | . | MYI |
| JNI | . | . | . | . | . | . | . | . | JNI |
| JYI | . | . | . | . | . | . | . | . | JYI |
| AGI | . | . | . | . | . | . | . | . | AGI |
| STI | . | . | . | . | . | . | . | . | STI |
| OCI | . | . | . | . | . | . | . | . | OCI |
| NVI | . | . | . | . | . | . | . | . | NVI |
| TIW | . | . | . | . | . | . | . | . | TIW |
| NI | . | . | . | . | . | . | . | 1.00000- | NI |
| PI | . | . | . | . | . | . | . | . | PI |
| HI | . | . | . | . | . | . | . | . | HI |
| II | . | . | . | . | . | . | . | . | II |
| DI | . | . | . | . | . | . | . | . | DI |
| OI | . | . | . | . | . | . | . | . | OI |
| NGI | . | . | . | . | . | . | . | . | NGI |
| MI | . | . | . | . | . | . | . | . | MI |
| WG | . | . | . | . | . | . | . | . | WG |
| SGGONM | . | . | . | . | . | . | . | . | SGGONM |
| SGGOOM | . | . | . | . | . | . | . | . | SGGOOM |
| CG | . | . | . | . | . | . | . | . | CG |
| CS | . | . | . | . | . | . | . | . | CS |
| GS | . | . | . | . | . | . | . | . | GS |
| GSS | . | . | . | . | . | . | . | . | GSS |
| SH | . | . | . | . | . | . | . | . | SH |
| SB | . | . | . | . | . | . | . | . | SB |
| MCT | . | . | . | . | . | . | . | . | MCT |
| MMT | . | . | . | . | . | . | . | . | MMT |
| CSIS | . | . | . | . | . | . | . | . | CSIS |
| SIS | . | . | . | . | . | . | . | . | SIS |
| LNGW | . | . | . | . | . | . | . | . | LNGW |

| | 3JNL | BJYL | EAGL | BSTL | BOCL | BNVL | BDCL | BN | 6....2 |
|---|---|---|---|---|---|---|---|---|---|
| LSI | . | . | . | . | . | . | . | . | LSI |
| LCSI | . | . | . | . | . | . | . | . | LCSI |
| LLJ | . | . | . | . | . | . | . | . | LLJ |
| LLO | . | . | . | . | . | . | . | . | LLO |
| LLS | . | . | . | . | . | . | . | . | LLS |
| FVS42 | . | . | . | . | . | . | . | . | FVS42 |
| FVS752 | . | . | . | . | . | . | . | . | FVS752 |
| FVS101 | . | . | . | . | . | . | . | . | FVS101 |
| FVS43 | . | . | . | . | . | . | . | . | FVS43 |
| FVS753 | . | . | . | . | . | . | . | . | FVS753 |
| FVS102 | . | . | . | . | . | . | . | . | FVS102 |
| FVS46 | . | . | . | . | . | . | . | . | FVS46 |
| FVS756 | . | . | . | . | . | . | . | . | FVS756 |
| FVS104 | . | . | . | . | . | . | . | . | FVS104 |
| FVC42 | . | . | . | . | . | . | . | . | FVC42 |
| FVC752 | . | . | . | . | . | . | . | . | FVC752 |
| FVC101 | . | . | . | . | . | . | . | . | FVC101 |
| FVC43 | . | . | . | . | . | . | . | . | FVC43 |
| FVC753 | . | . | . | . | . | . | . | . | FVC753 |
| FVC102 | . | . | . | . | . | . | . | . | FVC102 |
| FVC46 | . | . | . | . | . | . | . | . | FVC46 |
| FVC756 | . | . | . | . | . | . | . | . | FVC756 |
| FVC104 | . | . | . | . | . | . | . | . | FVC104 |
| NRC1 | . | . | . | . | . | . | . | . | NRC1 |
| NRC4 | . | . | . | . | . | . | . | . | NRC4 |
| NRC7 | . | . | . | . | . | . | . | . | NRC7 |
| NRC2 | . | . | . | . | . | . | . | . | NRC2 |
| NRC5 | . | . | . | . | . | . | . | . | NRC5 |
| NRC8 | . | . | . | . | . | . | . | . | NRC8 |
| NRC3 | . | . | . | . | . | . | . | . | NRC3 |
| NRC6 | . | . | . | . | . | . | . | . | NRC6 |
| NRC9 | . | . | . | . | . | . | . | . | NRC9 |
| NRS1 | . | . | . | . | . | . | . | . | NRS1 |
| NRS4 | . | . | . | . | . | . | . | . | NRS4 |
| NRS7 | . | . | . | . | . | . | . | . | NRS7 |
| NRS2 | . | . | . | . | . | . | . | . | NRS2 |
| NRS5 | . | . | . | . | . | . | . | . | NRS5 |
| NRS8 | . | . | . | . | . | . | . | . | NRS8 |
| NRS3 | . | . | . | . | . | . | . | . | NRS3 |
| NRS6 | . | . | . | . | . | . | . | . | NRS6 |
| NRS9 | . | . | . | . | . | . | . | . | NRS9 |

TABLE LXI (Continued)

| | BP | BH | BI | BD | BO | BNG | BM | NGFCS42 | 7....1 |
|---|---|---|---|---|---|---|---|---|---|
| OBJ1 | . | . | . | . | . | . | . | 2050.8800- | OBJ1 |
| OBJ2 | . | . | . | . | . | . | . | . | OBJ2 |
| OBJ3 | . | . | . | . | . | . | . | . | OBJ3 |
| OBJ4 | . | . | . | . | . | . | . | . | OBJ4 |
| CCL | . | . | . | . | . | . | . | . | CCL |
| CSL | . | . | . | . | . | . | . | . | CSL |
| JAL | . | . | . | . | . | . | . | . | JAL |
| FBL | . | . | . | . | . | . | . | . | FBL |
| MRL | . | . | . | . | . | . | . | . | MRL |
| APL | . | . | . | . | . | . | . | . | APL |
| MYL | . | . | . | . | . | . | . | . | MYL |
| JNL | . | . | . | . | . | . | . | . | JNL |
| JYL | . | . | . | . | . | . | . | . | JYL |
| AGL | . | . | . | . | . | . | . | . | AGL |
| STL | . | . | . | . | . | . | . | . | STL |
| OCL | . | . | . | . | . | . | . | . | OCL |
| NVL | . | . | . | . | . | . | . | . | NVL |
| DCL | . | . | . | . | . | . | . | . | DCL |
| OC | . | . | . | . | . | . | . | . | OC |
| IC | . | . | . | . | . | . | . | 13969.480 | IC |
| MRI | . | . | . | . | . | . | . | . | MRI |
| API | . | . | . | . | . | . | . | . | API |
| MYI | . | . | . | . | . | . | . | . | MYI |
| JNI | . | . | . | . | . | . | . | . | JNI |
| JYI | . | . | . | . | . | . | . | . | JYI |
| AGI | . | . | . | . | . | . | . | . | AGI |
| STI | . | . | . | . | . | . | . | . | STI |
| OCI | . | . | . | . | . | . | . | . | OCI |
| NVI | . | . | . | . | . | . | . | . | NVI |
| TIW | . | . | . | . | . | . | . | . | TIW |
| NI | . | . | . | . | . | . | . | . | NI |
| PI | 1.00000- | . | . | . | . | . | . | . | PI |
| HI | . | 1.00000- | . | . | . | . | . | . | HI |
| II | . | . | 1.00000- | . | . | . | . | . | II |
| DI | . | . | . | 1.00000- | . | . | . | . | DI |
| OI | . | . | . | . | 1.00000- | . | . | . | OI |
| NGI | . | . | . | . | . | 1.00000- | . | . | NGI |
| MI | . | . | . | . | . | . | 1.00000- | . | MI |
| WG | . | . | . | . | . | . | . | . | WG |
| SGGONM | . | . | . | . | . | . | . | . | SGGONM |
| SGGOOM | . | . | . | . | . | . | . | . | SGGOOM |
| CG | . | . | . | . | . | . | . | . | CG |
| CS | . | . | . | . | . | . | . | . | CS |
| GS | . | . | . | . | . | . | . | . | GS |
| GSS | . | . | . | . | . | . | . | . | GSS |
| SH | . | . | . | . | . | . | . | . | SH |
| SB | . | . | . | . | . | . | . | . | SB |
| MCT | . | . | . | . | . | . | . | . | MCT |
| MMT | . | . | . | . | . | . | . | . | MMT |
| CSIS | . | . | . | . | . | . | . | . | CSIS |
| SIS | . | . | . | . | . | . | . | . | SIS |
| LNGW | . | . | . | . | . | . | . | 10000.000- | LNGW |

| | BP | BH | BI | BD | BO | BNG | BM | NGFCS42 | 7....2 |
|---|---|---|---|---|---|---|---|---|---|
| LSI | . | . | . | . | . | . | . | 1.00000 | LSI |
| LCSI | . | . | . | . | . | . | . | . | LCSI |
| LLJ | . | . | . | . | . | . | . | . | LLJ |
| LLO | . | . | . | . | . | . | . | . | LLO |
| LLS | . | . | . | . | . | . | . | . | LLS |
| FVS42 | . | . | . | . | . | . | . | . | FVS42 |
| FVS752 | . | . | . | . | . | . | . | . | FVS752 |
| FVS101 | . | . | . | . | . | . | . | . | FVS101 |
| FVS43 | . | . | . | . | . | . | . | . | FVS43 |
| FVS753 | . | . | . | . | . | . | . | . | FVS753 |
| FVS102 | . | . | . | . | . | . | . | . | FVS102 |
| FVS46 | . | . | . | . | . | . | . | . | FVS46 |
| FVS756 | . | . | . | . | . | . | . | . | FVS756 |
| FVS104 | . | . | . | . | . | . | . | . | FVS104 |
| FVC42 | . | . | . | . | . | . | . | . | FVC42 |
| FVC752 | . | . | . | . | . | . | . | . | FVC752 |
| FVC101 | . | . | . | . | . | . | . | . | FVC101 |
| FVC43 | . | . | . | . | . | . | . | . | FVC43 |
| FVC753 | . | . | . | . | . | . | . | . | FVC753 |
| FVC102 | . | . | . | . | . | . | . | . | FVC102 |
| FVC46 | . | . | . | . | . | . | . | . | FVC46 |
| FVC756 | . | . | . | . | . | . | . | . | FVC756 |
| FVC104 | . | . | . | . | . | . | . | . | FVC104 |
| NRC1 | . | . | . | . | . | . | . | 1.00000 | NRC1 |
| NRC4 | . | . | . | . | . | . | . | . | NRC4 |
| NRC7 | . | . | . | . | . | . | . | . | NRC7 |
| NRC2 | . | . | . | . | . | . | . | . | NRC2 |
| NRC5 | . | . | . | . | . | . | . | . | NRC5 |
| NRC8 | . | . | . | . | . | . | . | . | NRC8 |
| NRC3 | . | . | . | . | . | . | . | . | NRC3 |
| NRC6 | . | . | . | . | . | . | . | . | NRC6 |
| NRC9 | . | . | . | . | . | . | . | . | NRC9 |
| NRS1 | . | . | . | . | . | . | . | . | NRS1 |
| NRS4 | . | . | . | . | . | . | . | . | NRS4 |
| NRS7 | . | . | . | . | . | . | . | . | NRS7 |
| NRS2 | . | . | . | . | . | . | . | . | NRS2 |
| NRS5 | . | . | . | . | . | . | . | . | NRS5 |
| NRS8 | . | . | . | . | . | . | . | . | NRS8 |
| NRS3 | . | . | . | . | . | . | . | . | NRS3 |
| NRS6 | . | . | . | . | . | . | . | . | NRS6 |
| NRS9 | . | . | . | . | . | . | . | . | NRS9 |

TABLE LXI (Continued)

| | NGVCS42 | NGFCS752 | NGVCS752 | NGFCS101 | NGVCS101 | NGFCS43 | NGVCS43 | NGFCS753 | 8....1 |
|---|---|---|---|---|---|---|---|---|---|
| OBJ1 | .36090- | 4367.3000- | .47380- | 2529.8600- | .50300- | 3076.3200- | .36090- | 6550.5500- | OBJ1 |
| OBJ2 | . | . | . | . | . | . | . | . | OBJ2 |
| OBJ3 | . | . | . | . | . | . | . | . | OBJ3 |
| OBJ4 | . | . | . | . | . | . | . | . | OBJ4 |
| CCL | . | . | . | . | . | . | . | . | CCL |
| CSL | . | . | . | . | . | . | . | . | CSL |
| JAL | . | . | . | . | . | . | . | . | JAL |
| FBL | . | . | . | . | . | . | . | . | FBL |
| MRL | . | . | . | . | . | . | . | . | MRL |
| APL | . | . | . | . | . | . | . | . | APL |
| MYL | . | . | . | . | . | . | . | . | MYL |
| JNL | . | . | . | . | . | . | . | . | JNL |
| JYL | . | . | . | . | . | . | . | . | JYL |
| AGL | . | . | . | . | . | . | . | . | AGL |
| STL | . | . | . | . | . | . | . | . | STL |
| OCL | . | . | . | . | . | . | . | . | OCL |
| NVL | . | . | . | . | . | . | . | . | NVL |
| DCL | . | . | . | . | . | . | . | . | DCL |
| OC | . | . | . | . | . | . | . | . | OC |
| IC | . | 29852.280 | . | 16441.190 | . | 20954.220 | . | 44778.420 | IC |
| MRI | . | . | . | . | . | . | . | . | MRI |
| API | . | . | . | . | . | . | . | . | API |
| MYI | . | . | . | . | . | . | . | . | MYI |
| JNI | . | . | . | . | . | . | . | . | JNI |
| JYI | . | . | . | . | . | . | . | . | JYI |
| AGI | . | . | . | . | . | . | . | . | AGI |
| STI | . | . | . | . | . | . | . | . | STI |
| OCI | . | . | . | . | . | . | . | . | OCI |
| NVI | . | . | . | . | . | . | . | . | NVI |
| TIW | 1.00000- | . | 1.00000- | . | 1.00000- | . | 1.00000- | . | TIW |
| NI | . | . | . | . | . | . | . | . | NI |
| PI | . | . | . | . | . | . | . | . | PI |
| HI | . | . | . | . | . | . | . | . | HI |
| II | . | . | . | . | . | . | . | . | II |
| DI | . | . | . | . | . | . | . | . | DI |
| OI | . | . | . | . | . | . | . | . | OI |
| NGI | . | . | . | . | . | . | . | . | NGI |
| MI | . | . | . | . | . | . | . | . | MI |
| WG | . | . | . | . | . | . | . | . | WG |
| SGGONM | . | . | . | . | . | . | . | . | SGGONM |
| SGGOOM | . | . | . | . | . | . | . | . | SGGOOM |
| CG | . | . | . | . | . | . | . | . | CG |
| CS | . | . | . | . | . | . | . | . | CS |
| GS | . | . | . | . | . | . | . | . | GS |
| GSS | . | . | . | . | . | . | . | . | GSS |
| SH | . | . | . | . | . | . | . | . | SH |
| SB | . | . | . | . | . | . | . | . | SB |
| MCT | . | . | . | . | . | . | . | . | MCT |
| MMT | . | . | . | . | . | . | . | . | MMT |
| CSIS | . | . | . | . | . | . | . | . | CSIS |
| SIS | . | . | . | . | . | . | . | . | SIS |
| LNGW | 1.00000 | 20000.000- | 1.00000 | 12000.000- | 1.00000 | 15000.000- | 1.00000 | 30000.000- | LNGW |

| | NGVCS42 | NGFCS752 | NGVCS752 | NGFCS101 | NGVCS101 | NGFCS43 | NGVCS43 | NGFCS753 | 8....2 |
|---|---|---|---|---|---|---|---|---|---|
| LSI | . | 1.00000 | . | 1.00000 | . | 1.00000 | . | 1.00000 | LSI |
| LCSI | . | . | . | . | . | . | . | . | LCSI |
| LLJ | . | . | . | . | . | . | . | . | LLJ |
| LLO | . | . | . | . | . | . | . | . | LLO |
| LLS | . | . | . | . | . | . | . | . | LLS |
| FVS42 | 1.00000 | . | . | . | . | . | . | . | FVS42 |
| FVS752 | . | . | 1.00000 | . | . | . | . | . | FVS752 |
| FVS101 | . | . | . | . | 1.00000 | . | . | . | FVS101 |
| FVS43 | . | . | . | . | . | . | 1.00000 | . | FVS43 |
| FVS753 | . | . | . | . | . | . | . | . | FVS753 |
| FVS102 | . | . | . | . | . | . | . | . | FVS102 |
| FVS46 | . | . | . | . | . | . | . | . | FVS46 |
| FVS756 | . | . | . | . | . | . | . | . | FVS756 |
| FVS104 | . | . | . | . | . | . | . | . | FVS104 |
| FVC42 | . | . | . | . | . | . | . | . | FVC42 |
| FVC752 | . | . | . | . | . | . | . | . | FVC752 |
| FVC101 | . | . | . | . | . | . | . | . | FVC101 |
| FVC43 | . | . | . | . | . | . | . | . | FVC43 |
| FVC753 | . | . | . | . | . | . | . | . | FVC753 |
| FVC102 | . | . | . | . | . | . | . | . | FVC102 |
| FVC46 | . | . | . | . | . | . | . | . | FVC46 |
| FVC756 | . | . | . | . | . | . | . | . | FVC756 |
| FVC104 | . | . | . | . | . | . | . | . | FVC104 |
| NRC1 | . | . | . | . | . | . | . | . | NRC1 |
| NRC4 | . | 1.00000 | . | . | . | . | . | . | NRC4 |
| NRC7 | . | . | . | 1.00000 | . | . | . | . | NRC7 |
| NRC2 | . | . | . | . | . | 1.00000 | . | . | NRC2 |
| NRC5 | . | . | . | . | . | . | . | 1.00000 | NRC5 |
| NRC8 | . | . | . | . | . | . | . | . | NRC8 |
| NRC3 | . | . | . | . | . | . | . | . | NRC3 |
| NRC6 | . | . | . | . | . | . | . | . | NRC6 |
| NRC9 | . | . | . | . | . | . | . | . | NRC9 |
| NRS1 | . | . | . | . | . | . | . | . | NRS1 |
| NRS4 | . | . | . | . | . | . | . | . | NRS4 |
| NRS7 | . | . | . | . | . | . | . | . | NRS7 |
| NRS2 | . | . | . | . | . | . | . | . | NRS2 |
| NRS5 | . | . | . | . | . | . | . | . | NRS5 |
| NRS8 | . | . | . | . | . | . | . | . | NRS8 |
| NRS3 | . | . | . | . | . | . | . | . | NRS3 |
| NRS6 | . | . | . | . | . | . | . | . | NRS6 |
| NRS9 | . | . | . | . | . | . | . | . | NRS9 |

TABLE LXI (Continued)

| | NGVCS753 | NGFCS102 | NGVCS102 | NGFCS46 | NGVCS46 | NGFCS756 | NGVCS756 | NGFCS104 | 9....1 |
|---|---|---|---|---|---|---|---|---|---|
| OBJ1 | .47380- | 5059.7200- | .50300- | 6152.6400- | .36090- | 13101.900- | .47380- | 10119.440- | OBJ1 |
| OBJ2 | . | . | . | . | . | . | . | . | OBJ2 |
| OBJ3 | . | . | . | . | . | . | . | . | OBJ3 |
| OBJ4 | . | . | . | . | . | . | . | . | OBJ4 |
| CCL | . | . | . | . | . | . | . | . | CCL |
| CSL | . | . | . | . | . | . | . | . | CSL |
| JAL | . | . | . | . | . | . | . | . | JAL |
| FBL | . | . | . | . | . | . | . | . | FBL |
| MRL | . | . | . | . | . | . | . | . | MRL |
| APL | . | . | . | . | . | . | . | . | APL |
| MYL | . | . | . | . | . | . | . | . | MYL |
| JNL | . | . | . | . | . | . | . | . | JNL |
| JYL | . | . | . | . | . | . | . | . | JYL |
| AGL | . | . | . | . | . | . | . | . | AGL |
| STL | . | . | . | . | . | . | . | . | STL |
| OCL | . | . | . | . | . | . | . | . | OCL |
| NVL | . | . | . | . | . | . | . | . | NVL |
| DCL | . | . | . | . | . | . | . | . | DCL |
| OC | . | . | . | . | . | . | . | . | OC |
| IC | . | 32682.380 | . | 41908.440 | . | 89556.840 | . | 65764.760 | IC |
| MRI | . | . | . | . | . | . | . | . | MRI |
| API | . | . | . | . | . | . | . | . | API |
| MYI | . | . | . | . | . | . | . | . | MYI |
| JNI | . | . | . | . | . | . | . | . | JNI |
| JYI | . | . | . | . | . | . | . | . | JYI |
| AGI | . | . | . | . | . | . | . | . | AGI |
| STI | . | . | . | . | . | . | . | . | STI |
| OCI | . | . | . | . | . | . | . | . | OCI |
| NVI | . | . | . | . | . | . | . | . | NVI |
| TIW | 1.00000- | . | 1.00000- | . | 1.00000- | . | 1.00000- | . | TIW |
| NI | . | . | . | . | . | . | . | . | NI |
| PI | . | . | . | . | . | . | . | . | PI |
| HI | . | . | . | . | . | . | . | . | HI |
| II | . | . | . | . | . | . | . | . | II |
| DI | . | . | . | . | . | . | . | . | DI |
| OI | . | . | . | . | . | . | . | . | OI |
| NGI | . | . | . | . | . | . | . | . | NGI |
| MI | . | . | . | . | . | . | . | . | MI |
| WG | . | . | . | . | . | . | . | . | WG |
| SGGONM | . | . | . | . | . | . | . | . | SGGONM |
| SGGOOM | . | . | . | . | . | . | . | . | SGGOOM |
| CG | . | . | . | . | . | . | . | . | CG |
| CS | . | . | . | . | . | . | . | . | CS |
| GS | . | . | . | . | . | . | . | . | GS |
| GSS | . | . | . | . | . | . | . | . | GSS |
| SH | . | . | . | . | . | . | . | . | SH |
| SB | . | . | . | . | . | . | . | . | SB |
| MCT | . | . | . | . | . | . | . | . | MCT |
| MMT | . | . | . | . | . | . | . | . | MMT |
| CSIS | . | . | . | . | . | . | . | . | CSIS |
| SIS | . | . | . | . | . | . | . | . | SIS |
| LNGW | 1.00000 | 25000.000- | 1.00000 | 30000.000- | 1.00000 | 56000.000- | 1.00000 | 50000.000- | LNGW |

| | NGVCS753 | NGFCS102 | NGVCS102 | NGFCS46 | NGVCS46 | NGFCS756 | NGVCS756 | NGFCS104 | 9....2 |
|---|---|---|---|---|---|---|---|---|---|
| LSI | . | 1.00000 | . | 1.00000 | . | 1.00000 | . | 1.00000 | LSI |
| LCSI | . | . | . | . | . | . | . | . | LCSI |
| LLJ | . | . | . | . | . | . | . | . | LLJ |
| LLO | . | . | . | . | . | . | . | . | LLO |
| LLS | . | . | . | . | . | . | . | . | LLS |
| FVS42 | . | . | . | . | . | . | . | . | FVS42 |
| FVS752 | . | . | . | . | . | . | . | . | FVS752 |
| FVS101 | . | . | . | . | . | . | . | . | FVS101 |
| FVS43 | . | . | . | . | . | . | . | . | FVS43 |
| FVS753 | 1.00000 | . | . | . | . | . | . | . | FVS753 |
| FVS102 | . | . | 1.00000 | . | . | . | . | . | FVS102 |
| FVS46 | . | . | . | . | 1.00000 | . | . | . | FVS46 |
| FVS756 | . | . | . | . | . | . | 1.00000 | . | FVS756 |
| FVS104 | . | . | . | . | . | . | . | . | FVS104 |
| FVC42 | . | . | . | . | . | . | . | . | FVC42 |
| FVC752 | . | . | . | . | . | . | . | . | FVC752 |
| FVC101 | . | . | . | . | . | . | . | . | FVC101 |
| FVC43 | . | . | . | . | . | . | . | . | FVC43 |
| FVC753 | . | . | . | . | . | . | . | . | FVC753 |
| FVC102 | . | . | . | . | . | . | . | . | FVC102 |
| FVC46 | . | . | . | . | . | . | . | . | FVC46 |
| FVC756 | . | . | . | . | . | . | . | . | FVC756 |
| FVC104 | . | . | . | . | . | . | . | . | FVC104 |
| NRC1 | . | . | . | . | . | . | . | . | NRC1 |
| NRC4 | . | . | . | . | . | . | . | . | NRC4 |
| NRC7 | . | . | . | . | . | . | . | . | NRC7 |
| NRC2 | . | . | . | . | . | . | . | . | NRC2 |
| NRC5 | . | . | . | . | . | . | . | . | NRC5 |
| NRC8 | . | 1.00000 | . | . | . | . | . | . | NRC8 |
| NRC3 | . | . | . | 1.00000 | . | . | . | . | NRC3 |
| NRC6 | . | . | . | . | . | 1.00000 | . | . | NRC6 |
| NRC9 | . | . | . | . | . | . | . | 1.00000 | NRC9 |
| NRS1 | . | . | . | . | . | . | . | . | NRS1 |
| NRS4 | . | . | . | . | . | . | . | . | NRS4 |
| NRS7 | . | . | . | . | . | . | . | . | NRS7 |
| NRS2 | . | . | . | . | . | . | . | . | NRS2 |
| NRS5 | . | . | . | . | . | . | . | . | NRS5 |
| NRS8 | . | . | . | . | . | . | . | . | NRS8 |
| NRS3 | . | . | . | . | . | . | . | . | NRS3 |
| NRS6 | . | . | . | . | . | . | . | . | NRS6 |
| NRS9 | . | . | . | . | . | . | . | . | NRS9 |

# TABLE LXI (Continued)

| | NGVCS104 | NGFCC42 | NGVCC42 | NGFCC752 | NGVCC752 | NGFCC101 | NGVCC101 | NGFCC43 | 10....1 |
|---|---|---|---|---|---|---|---|---|---|
| OBJ1 | .50300- | 5815.0600- | .65070- | 11646.240- | .92760- | 6087.2100- | .83460- | 13138.560- | OBJ1 |
| OBJ2 | . | . | . | . | . | . | . | . | OBJ2 |
| OBJ3 | . | . | . | . | . | . | . | . | OBJ3 |
| OBJ4 | . | . | . | . | . | . | . | . | OBJ4 |
| CCL | . | . | . | . | . | . | . | . | CCL |
| CSL | . | . | . | . | . | . | . | . | CSL |
| JAL | . | . | . | . | . | . | . | . | JAL |
| FBL | . | . | . | . | . | . | . | . | FBL |
| MRL | . | . | . | . | . | . | . | . | MRL |
| APL | . | . | . | . | . | . | . | . | APL |
| MYL | . | . | . | . | . | . | . | . | MYL |
| JNL | . | . | . | . | . | . | . | . | JNL |
| JYL | . | . | . | . | . | . | . | . | JYL |
| AGL | . | . | . | . | . | . | . | . | AGL |
| STL | . | . | . | . | . | . | . | . | STL |
| OCL | . | . | . | . | . | . | . | . | OCL |
| NVL | . | . | . | . | . | . | . | . | NVL |
| DCL | . | . | . | . | . | . | . | . | DCL |
| OC | . | . | . | . | . | . | . | . | OC |
| IC | . | 29711.700 | . | 61746.620 | . | 32175.570 | . | 67442.550 | IC |
| MRI | . | . | . | . | . | . | . | . | MRI |
| API | . | . | . | . | . | . | . | . | API |
| MYI | . | . | . | . | . | . | . | . | MYI |
| JNI | . | . | . | . | . | . | . | . | JNI |
| JYI | . | . | . | . | . | . | . | . | JYI |
| AGI | . | . | . | . | . | . | . | . | AGI |
| STI | . | . | . | . | . | . | . | . | STI |
| OCI | . | . | . | . | . | . | . | . | OCI |
| NVI | . | . | . | . | . | . | . | . | NVI |
| TIW | 1.00000- | . | 1.00000- | . | 1.00000- | . | 1.00000- | . | TIW |
| NI | . | . | . | . | . | . | . | . | NI |
| PI | . | . | . | . | . | . | . | . | PI |
| HI | . | . | . | . | . | . | . | . | HI |
| II | . | . | . | . | . | . | . | . | II |
| DI | . | . | . | . | . | . | . | . | DI |
| OI | . | . | . | . | . | . | . | . | OI |
| NGI | . | . | . | . | . | . | . | . | NGI |
| MI | . | . | . | . | . | . | . | . | MI |
| WG | . | . | . | . | . | . | . | . | WG |
| SGGONM | . | . | . | . | . | . | . | . | SGGONM |
| SGGOOM | . | . | . | . | . | . | . | . | SGGOOM |
| CG | . | . | . | . | . | . | . | . | CG |
| CS | . | . | . | . | . | . | . | . | CS |
| GS | . | . | . | . | . | . | . | . | GS |
| GSS | . | . | . | . | . | . | . | . | GSS |
| SH | . | . | . | . | . | . | . | . | SH |
| SB | . | . | . | . | . | . | . | . | SB |
| MCT | . | . | . | . | . | . | . | . | MCT |
| MMT | . | . | . | . | . | . | . | . | MMT |
| CSIS | . | . | . | . | . | . | . | . | CSIS |
| SIS | . | . | . | . | . | . | . | . | SIS |
| LNGW | 1.00000 | 10000.000- | 1.00000 | 20000.000- | 1.00000 | 12000.000- | 1.00000 | 15000.000- | LNGW |

| | NGVCS104 | NGFCC42 | NGVCC42 | NGFCC752 | NGVCC752 | NGFCC101 | NGVCC101 | NGFCC43 | 10....2 |
|---|---|---|---|---|---|---|---|---|---|
| LSI | . | . | . | . | . | . | . | . | LSI |
| LCSI | . | 1.00000 | . | 1.00000 | . | 1.00000 | . | 1.00000 | LCSI |
| LLJ | . | . | . | . | . | . | . | . | LLJ |
| LLO | . | . | . | . | . | . | . | . | LLO |
| LLS | . | . | . | . | . | . | . | . | LLS |
| FVS42 | . | . | . | . | . | . | . | . | FVS42 |
| FVS752 | . | . | . | . | . | . | . | . | FVS752 |
| FVS101 | . | . | . | . | . | . | . | . | FVS101 |
| FVS43 | . | . | . | . | . | . | . | . | FVS43 |
| FVS753 | . | . | . | . | . | . | . | . | FVS753 |
| FVS102 | . | . | . | . | . | . | . | . | FVS102 |
| FVS46 | . | . | . | . | . | . | . | . | FVS46 |
| FVS756 | . | . | . | . | . | . | . | . | FVS756 |
| FVS104 | 1.00000 | . | . | . | . | . | . | . | FVS104 |
| FVC42 | . | . | 1.00000 | . | . | . | . | . | FVC42 |
| FVC752 | . | . | . | . | 1.00000 | . | . | . | FVC752 |
| FVC101 | . | . | . | . | . | . | 1.00000 | . | FVC101 |
| FVC43 | . | . | . | . | . | . | . | . | FVC43 |
| FVC753 | . | . | . | . | . | . | . | . | FVC753 |
| FVC102 | . | . | . | . | . | . | . | . | FVC102 |
| FVC46 | . | . | . | . | . | . | . | . | FVC46 |
| FVC756 | . | . | . | . | . | . | . | . | FVC756 |
| FVC104 | . | . | . | . | . | . | . | . | FVC104 |
| NRC1 | . | . | . | . | . | . | . | . | NRC1 |
| NRC4 | . | . | . | . | . | . | . | . | NRC4 |
| NRC7 | . | . | . | . | . | . | . | . | NRC7 |
| NRC2 | . | . | . | . | . | . | . | . | NRC2 |
| NRC5 | . | . | . | . | . | . | . | . | NRC5 |
| NRC8 | . | . | . | . | . | . | . | . | NRC8 |
| NRC3 | . | . | . | . | . | . | . | . | NRC3 |
| NRC6 | . | . | . | . | . | . | . | . | NRC6 |
| NRC9 | . | . | . | . | . | . | . | . | NRC9 |
| NRS1 | . | 1.00000 | . | . | . | . | . | . | NRS1 |
| NRS4 | . | . | . | 1.00000 | . | . | . | . | NRS4 |
| NRS7 | . | . | . | . | . | 1.00000 | . | . | NRS7 |
| NRS2 | . | . | . | . | . | . | . | 1.00000 | NRS2 |
| NRS5 | . | . | . | . | . | . | . | . | NRS5 |
| NRS8 | . | . | . | . | . | . | . | . | NRS8 |
| NRS3 | . | . | . | . | . | . | . | . | NRS3 |
| NRS6 | . | . | . | . | . | . | . | . | NRS6 |
| NRS9 | . | . | . | . | . | . | . | . | NRS9 |

# TABLE LXI (Continued)

| | NGVCC43 | NGFCC753 | NGVCC753 | NGFCC102 | NGVCC102 | NGFCC46 | NGVCC46 | NGFCC756 | 11....1 |
|---|---|---|---|---|---|---|---|---|---|
| OBJ1 | .69570- | 17469.360- | .92760- | 12174.420- | .83460- | 26277.120- | .69570- | 34938.720- | OBJ1 |
| OBJ2 | . | . | . | . | . | . | . | . | OBJ2 |
| OBJ3 | . | . | . | . | . | . | . | . | OBJ3 |
| OBJ4 | . | . | . | . | . | . | . | . | OBJ4 |
| CCL | . | . | . | . | . | . | . | . | CCL |
| CSL | . | . | . | . | . | . | . | . | CSL |
| JAL | . | . | . | . | . | . | . | . | JAL |
| FBL | . | . | . | . | . | . | . | . | FBL |
| MRL | . | . | . | . | . | . | . | . | MRL |
| APL | . | . | . | . | . | . | . | . | APL |
| MYL | . | . | . | . | . | . | . | . | MYL |
| JNL | . | . | . | . | . | . | . | . | JNL |
| JYL | . | . | . | . | . | . | . | . | JYL |
| AGL | . | . | . | . | . | . | . | . | AGL |
| STL | . | . | . | . | . | . | . | . | STL |
| OCL | . | . | . | . | . | . | . | . | OCL |
| NVL | . | . | . | . | . | . | . | . | NVL |
| DCL | . | . | . | . | . | . | . | . | DCL |
| OC | . | . | . | . | . | . | . | . | OC |
| IC | . | 92619.930 | . | 64351.140 | . | 134885.10 | . | 185239.86 | IC |
| MRI | . | . | . | . | . | . | . | . | MRI |
| API | . | . | . | . | . | . | . | . | API |
| MYI | . | . | . | . | . | . | . | . | MYI |
| JNI | . | . | . | . | . | . | . | . | JNI |
| JYI | . | . | . | . | . | . | . | . | JYI |
| AGI | . | . | . | . | . | . | . | . | AGI |
| STI | . | . | . | . | . | . | . | . | STI |
| OCI | . | . | . | . | . | . | . | . | OCI |
| NVI | . | . | . | . | . | . | . | . | NVI |
| TIW | 1.00000- | . | 1.00000- | . | 1.00000- | . | 1.00000- | . | TIW |
| NI | . | . | . | . | . | . | . | . | NI |
| PI | . | . | . | . | . | . | . | . | PI |
| HI | . | . | . | . | . | . | . | . | HI |
| II | . | . | . | . | . | . | . | . | II |
| DI | . | . | . | . | . | . | . | . | DI |
| OI | . | . | . | . | . | . | . | . | OI |
| NGI | . | . | . | . | . | . | . | . | NGI |
| MI | . | . | . | . | . | . | . | . | MI |
| WG | . | . | . | . | . | . | . | . | WG |
| SGGUNM | . | . | . | . | . | . | . | . | SGGONM |
| SGGOOM | . | . | . | . | . | . | . | . | SGGOOM |
| CG | . | . | . | . | . | . | . | . | CG |
| CS | . | . | . | . | . | . | . | . | CS |
| GS | . | . | . | . | . | . | . | . | GS |
| GSS | . | . | . | . | . | . | . | . | GSS |
| SH | . | . | . | . | . | . | . | . | SH |
| SB | . | . | . | . | . | . | . | . | SB |
| MCT | . | . | . | . | . | . | . | . | MCT |
| MMT | . | . | . | . | . | . | . | . | MMT |
| CSIS | . | . | . | . | . | . | . | . | CSIS |
| SIS | . | . | . | . | . | . | . | . | SIS |
| LNGW | 1.00000 | 30000.000- | 1.00000 | 25000.000- | 1.00000 | 30000.000- | 1.00000 | 56000.000- | LNGW |

| | NGVCC43 | NGFCC753 | NGVCC753 | NGFCC102 | NGVCC102 | NGFCC46 | NGVCC46 | NGFCC756 | 11....2 |
|---|---|---|---|---|---|---|---|---|---|
| LSI | . | . | . | . | . | . | . | . | LSI |
| LCSI | . | 1.00000 | . | 1.00000 | . | 1.00000 | . | 1.00000 | LCSI |
| LLJ | . | . | . | . | . | . | . | . | LLJ |
| LLO | . | . | . | . | . | . | . | . | LLO |
| LLS | . | . | . | . | . | . | . | . | LLS |
| FVS42 | . | . | . | . | . | . | . | . | FVS42 |
| FVS752 | . | . | . | . | . | . | . | . | FVS752 |
| FVS101 | . | . | . | . | . | . | . | . | FVS101 |
| FVS43 | . | . | . | . | . | . | . | . | FVS43 |
| FVS753 | . | . | . | . | . | . | . | . | FVS753 |
| FVS102 | . | . | . | . | . | . | . | . | FVS102 |
| FVS46 | . | . | . | . | . | . | . | . | FVS46 |
| FVS756 | . | . | . | . | . | . | . | . | FVS756 |
| FVS104 | . | . | . | . | . | . | . | . | FVS104 |
| FVC42 | . | . | . | . | . | . | . | . | FVC42 |
| FVC752 | . | . | . | . | . | . | . | . | FVC752 |
| FVC101 | . | . | . | . | . | . | . | . | FVC101 |
| FVC43 | 1.00000 | . | . | . | . | . | . | . | FVC43 |
| FVC753 | . | . | 1.00000 | . | . | . | . | . | FVC753 |
| FVC102 | . | . | . | . | 1.00000 | . | . | . | FVC102 |
| FVC46 | . | . | . | . | . | . | 1.00000 | . | FVC46 |
| FVC756 | . | . | . | . | . | . | . | . | FVC756 |
| FVC104 | . | . | . | . | . | . | . | . | FVC104 |
| NRC1 | . | . | . | . | . | . | . | . | NRC1 |
| NRC4 | . | . | . | . | . | . | . | . | NRC4 |
| NRC7 | . | . | . | . | . | . | . | . | NRC7 |
| NRC2 | . | . | . | . | . | . | . | . | NRC2 |
| NRC5 | . | . | . | . | . | . | . | . | NRC5 |
| NRC8 | . | . | . | . | . | . | . | . | NRC8 |
| NRC3 | . | . | . | . | . | . | . | . | NRC3 |
| NRC6 | . | . | . | . | . | . | . | . | NRC6 |
| NRC9 | . | . | . | . | . | . | . | . | NRC9 |
| NRS1 | . | . | . | . | . | . | . | . | NRS1 |
| NRS4 | . | . | . | . | . | . | . | . | NRS4 |
| NRS7 | . | . | . | . | . | . | . | . | NRS7 |
| NRS2 | . | . | . | . | . | . | . | . | NRS2 |
| NRS5 | . | 1.00000 | . | . | . | . | . | . | NRS5 |
| NRS8 | . | . | . | 1.00000 | . | . | . | . | NRS8 |
| NRS3 | . | . | . | . | . | 1.00000 | . | . | NRS3 |
| NRS6 | . | . | . | . | . | . | . | 1.00000 | NRS6 |
| NRS9 | . | . | . | . | . | . | . | . | NRS9 |

# TABLE LXI (Continued)

| | NGVCC756 | NGFCC104 | NGVCC104 | RHSCS1A | RHSCS1B | RHSCS1C | RHSCS2A | RHSCS2B | 12....1 |
|---|---|---|---|---|---|---|---|---|---|
| OBJ1 | .92760- | 24348.840- | .83460- | . | . | . | . | . | OBJ1 |
| OBJ2 | . | . | . | . | . | . | . | . | OBJ2 |
| OBJ3 | . | . | . | . | . | . | . | . | OBJ3 |
| OBJ4 | . | . | . | . | . | . | . | . | OBJ4 |
| CCL | . | . | . | 560.00000 | 560.00000 | 560.00000 | 1440.0000 | 1440.0000 | CCL |
| CSL | . | . | . | . | . | . | . | . | CSL |
| JAL | . | . | . | 165.00000 | 165.00000 | 165.00000 | 143.00000 | 143.00000 | JAL |
| FBL | . | . | . | 150.00000 | 150.00000 | 150.00000 | 130.00000 | 130.00000 | FBL |
| MRL | . | . | . | 165.00000 | 165.00000 | 165.00000 | 143.00000 | 143.00000 | MRL |
| APL | . | . | . | 187.00000 | 187.00000 | 187.00000 | 165.00000 | 165.00000 | APL |
| MYL | . | . | . | 187.00000 | 187.00000 | 187.00000 | 165.00000 | 165.00000 | MYL |
| JNL | . | . | . | 209.00000 | 209.00000 | 209.00000 | 187.00000 | 187.00000 | JNL |
| JYL | . | . | . | 209.00000 | 209.00000 | 209.00000 | 187.00000 | 187.00000 | JYL |
| AGL | . | . | . | 209.00000 | 209.00000 | 209.00000 | 187.00000 | 187.00000 | AGL |
| STL | . | . | . | 209.00000 | 209.00000 | 209.00000 | 187.00000 | 187.00000 | STL |
| OCL | . | . | . | 209.00000 | 209.00000 | 209.00000 | 187.00000 | 187.00000 | OCL |
| NVL | . | . | . | 187.00000 | 187.00000 | 187.00000 | 165.00000 | 165.00000 | NVL |
| DCL | . | . | . | 165.00000 | 165.00000 | 165.00000 | 143.00000 | 143.00000 | DCL |
| OC | . | . | . | . | . | . | . | . | OC |
| IC | . | 128702.28 | . | . | . | . | . | . | IC |
| MRI | . | . | . | 1066.0000 | 2000.0000 | 1333.0000 | 1600.0000 | 3000.0000 | MRI |
| API | . | . | . | 1066.0000 | 2000.0000 | 1333.0000 | 1600.0000 | 3000.0000 | API |
| MYI | . | . | . | 1066.0000 | 2000.0000 | 1333.0000 | 1600.0000 | 3000.0000 | MYI |
| JNI | . | . | . | 1066.0000 | 2000.0000 | 1333.0000 | 1600.0000 | 3000.0000 | JNI |
| JYI | . | . | . | 1066.0000 | 2000.0000 | 1333.0000 | 1600.0000 | 3000.0000 | JYI |
| AGI | . | . | . | 1066.0000 | 2000.0000 | 1333.0000 | 1600.0000 | 3000.0000 | AGI |
| STI | . | . | . | 1066.0000 | 2000.0000 | 1333.0000 | 1600.0000 | 3000.0000 | STI |
| OCI | . | . | . | 1066.0000 | 2000.0000 | 1333.0000 | 1600.0000 | 3000.0000 | OCI |
| NVI | . | . | . | 1066.0000 | 2000.0000 | 1333.0000 | 1600.0000 | 3000.0000 | NVI |
| TIW | 1.00000- | . | 1.00000- | . | . | . | . | . | TIW |
| NI | . | . | . | . | . | . | . | . | NI |
| PI | . | . | . | . | . | . | . | . | PI |
| HI | . | . | . | . | . | . | . | . | HI |
| II | . | . | . | . | . | . | . | . | II |
| DI | . | . | . | . | . | . | . | . | DI |
| OI | . | . | . | . | . | . | . | . | OI |
| NGI | . | . | . | . | . | . | . | . | NGI |
| MI | . | . | . | . | . | . | . | . | MI |
| WG | . | . | . | . | . | . | . | . | WG |
| SGGONM | . | . | . | . | . | . | . | . | SGGONM |
| SGGOOM | . | . | . | . | . | . | . | . | SGGOOM |
| CG | . | . | . | . | . | . | . | . | CG |
| CS | . | . | . | . | . | . | . | . | CS |
| GS | . | . | . | . | . | . | . | . | GS |
| GSS | . | . | . | . | . | . | . | . | GSS |
| SH | . | . | . | . | . | . | . | . | SH |
| SB | . | . | . | . | . | . | . | . | SB |
| MCT | . | . | . | 560.00000 | 560.00000 | 560.00000 | 1440.0000 | 1440.0000 | MCT |
| MMT | . | . | . | 560.00000 | 560.00000 | 560.00000 | 1440.0000 | 1440.0000 | MMT |
| CSIS | . | . | . | . | . | . | . | . | CSIS |
| SIS | . | . | . | 560.00000 | 560.00000 | 560.00000 | 1440.0000 | 1440.0000 | SIS |
| LNGW | 1.00000 | 50000.000- | 1.00000 | . | . | . | . | . | LNGW |

| | NGVCC756 | NGFCC104 | NGVCC104 | RHSCS1A | RHSCS1B | RHSCS1C | RHSCS2A | RHSCS2B | 12....2 |
|---|---|---|---|---|---|---|---|---|---|
| LS1 | . | . | . | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | LS1 |
| LCS1 | . | 1.00000 | . | . | . | . | . | . | LCS1 |
| LLJ | . | . | . | 84.00000 | 84.00000 | 84.00000 | 168.00000 | 168.00000 | LLJ |
| LLO | . | . | . | 84.00000 | 84.00000 | 84.00000 | 168.00000 | 168.00000 | LLO |
| LLS | . | . | . | 84.00000 | 84.00000 | 84.00000 | 168.00000 | 168.00000 | LLS |
| FVS42 | . | . | . | 10000.000 | . | . | . | . | FVS42 |
| FVS752 | . | . | . | . | 20000.000 | . | . | . | FVS752 |
| FVS101 | . | . | . | . | . | 12000.000 | . | . | FVS101 |
| FVS43 | . | . | . | . | . | . | 15000.000 | . | FVS43 |
| FVS753 | . | . | . | . | . | . | . | 30000.000 | FVS753 |
| FVS102 | . | . | . | . | . | . | . | . | FVS102 |
| FVS46 | . | . | . | . | . | . | . | . | FVS46 |
| FVS756 | . | . | . | . | . | . | . | . | FVS756 |
| FVS104 | . | . | . | . | . | . | . | . | FVS104 |
| FVC42 | . | . | . | . | . | . | . | . | FVC42 |
| FVC752 | . | . | . | . | . | . | . | . | FVC752 |
| FVC101 | . | . | . | . | . | . | . | . | FVC101 |
| FVC43 | . | . | . | . | . | . | . | . | FVC43 |
| FVC753 | . | . | . | . | . | . | . | . | FVC753 |
| FVC102 | . | . | . | . | . | . | . | . | FVC102 |
| FVC46 | . | . | . | . | . | . | . | . | FVC46 |
| FVC756 | 1.00000 | . | . | . | . | . | . | . | FVC756 |
| FVC104 | . | . | 1.00000 | . | . | . | . | . | FVC104 |
| NRC1 | . | . | . | 1.00000 | . | . | . | . | NRC1 |
| NRC4 | . | . | . | . | 1.00000 | . | . | . | NRC4 |
| NRC7 | . | . | . | . | . | 1.00000 | . | . | NRC7 |
| NRC2 | . | . | . | . | . | . | 1.00000 | . | NRC2 |
| NRC5 | . | . | . | . | . | . | . | 1.00000 | NRC5 |
| NRC8 | . | . | . | . | . | . | . | . | NRC8 |
| NRC3 | . | . | . | . | . | . | . | . | NRC3 |
| NRC6 | . | . | . | . | . | . | . | . | NRC6 |
| NRC9 | . | . | . | . | . | . | . | . | NRC9 |
| NRS1 | . | . | . | . | . | . | . | . | NRS1 |
| NRS4 | . | . | . | . | . | . | . | . | NRS4 |
| NRS7 | . | . | . | . | . | . | . | . | NRS7 |
| NRS2 | . | . | . | . | . | . | . | . | NRS2 |
| NRS5 | . | . | . | . | . | . | . | . | NRS5 |
| NRS8 | . | . | . | . | . | . | . | . | NRS8 |
| NRS3 | . | . | . | . | . | . | . | . | NRS3 |
| NRS6 | . | . | . | . | . | . | . | . | NRS6 |
| NRS9 | . | 1.00000 | . | . | . | . | . | . | NRS9 |

# TABLE LXI (Continued)

| | RHSCS2C | RHSCS3A | RHSCS3B | RHSCS3C | RHSSC1A | RHSSC1B | RHSSC1C | RHSSC2A | 13....1 |
|---|---|---|---|---|---|---|---|---|---|
| OBJ1 | . | . | . | . | . | . | . | . | OBJ1 |
| OBJ2 | . | . | . | . | . | . | . | . | OBJ2 |
| OBJ3 | . | . | . | . | . | . | . | . | OBJ3 |
| OBJ4 | . | . | . | . | . | . | . | . | OBJ4 |
| CCL | 1440.0000 | 2680.0000 | 2680.0000 | 2680.0000 | . | . | . | . | CCL |
| CSL | . | . | . | . | 560.00000 | 560.00000 | 560.00000 | 1440.0000 | CSL |
| JAL | 143.00000 | 121.00000 | 121.00000 | 121.00000 | 165.00000 | 165.00000 | 165.00000 | 143.00000 | JAL |
| FBL | 130.00000 | 110.00000 | 110.00000 | 110.00000 | 150.00000 | 150.00000 | 150.00000 | 130.00000 | FBL |
| MRL | 143.00000 | 121.00000 | 121.00000 | 121.00000 | 165.00000 | 165.00000 | 165.00000 | 143.00000 | MRL |
| APL | 165.00000 | 143.00000 | 143.00000 | 143.00000 | 187.00000 | 187.00000 | 187.00000 | 165.00000 | APL |
| MYL | 165.00000 | 143.00000 | 143.00000 | 143.00000 | 187.00000 | 187.00000 | 187.00000 | 165.00000 | MYL |
| JNL | 187.00000 | 165.00000 | 165.00000 | 165.00000 | 209.00000 | 209.00000 | 209.00000 | 187.00000 | JNL |
| JYL | 187.00000 | 165.00000 | 165.00000 | 165.00000 | 209.00000 | 209.00000 | 209.00000 | 187.00000 | JYL |
| AGL | 187.00000 | 165.00000 | 165.00000 | 165.00000 | 209.00000 | 209.00000 | 209.00000 | 187.00000 | AGL |
| STL | 187.00000 | 165.00000 | 165.00000 | 165.00000 | 209.00000 | 209.00000 | 209.00000 | 187.00000 | STL |
| OCL | 187.00000 | 165.00000 | 165.00000 | 165.00000 | 209.00000 | 209.00000 | 209.00000 | 187.00000 | OCL |
| NVL | 165.00000 | 143.00000 | 143.00000 | 143.00000 | 187.00000 | 187.00000 | 187.00000 | 165.00000 | NVL |
| DCL | 143.00000 | 121.00000 | 121.00000 | 121.00000 | 165.00000 | 165.00000 | 165.00000 | 143.00000 | DCL |
| OC | . | . | . | . | . | . | . | . | OC |
| IC | . | . | . | . | . | . | . | . | IC |
| MRI | 2667.0000 | 3200.0000 | 6000.0000 | 5333.0000 | 1066.0000 | 2000.0000 | 1333.0000 | 1600.0000 | MRI |
| API | 2667.0000 | 3200.0000 | 6000.0000 | 5333.0000 | 1066.0000 | 2000.0000 | 1333.0000 | 1600.0000 | API |
| MYI | 2667.0000 | 3200.0000 | 6000.0000 | 5333.0000 | 1066.0000 | 2000.0000 | 1333.0000 | 1600.0000 | MYI |
| JNI | 2667.0000 | 3200.0000 | 6000.0000 | 5333.0000 | 1066.0000 | 2000.0000 | 1333.0000 | 1600.0000 | JNI |
| JYI | 2667.0000 | 3200.0000 | 6000.0000 | 5333.0000 | 1066.0000 | 2000.0000 | 1333.0000 | 1600.0000 | JYI |
| AGI | 2667.0000 | 3200.0000 | 6000.0000 | 5333.0000 | 1066.0000 | 2000.0000 | 1333.0000 | 1600.0000 | AGI |
| STI | 2667.0000 | 3200.0000 | 6000.0000 | 5333.0000 | 1066.0000 | 2000.0000 | 1333.0000 | 1600.0000 | STI |
| OCI | 2667.0000 | 3200.0000 | 6000.0000 | 5333.0000 | 1066.0000 | 2000.0000 | 1333.0000 | 1600.0000 | OCI |
| NVI | 2667.0000 | 3200.0000 | 6000.0000 | 5333.0000 | 1066.0000 | 2000.0000 | 1333.0000 | 1600.0000 | NVI |
| TIW | . | . | . | . | . | . | . | . | TIW |
| NI | . | . | . | . | . | . | . | . | NI |
| PI | . | . | . | . | . | . | . | . | PI |
| HI | . | . | . | . | . | . | . | . | HI |
| II | . | . | . | . | . | . | . | . | II |
| DI | . | . | . | . | . | . | . | . | DI |
| OI | . | . | . | . | . | . | . | . | OI |
| NGI | . | . | . | . | . | . | . | . | NGI |
| MI | . | . | . | . | . | . | . | . | MI |
| WG | . | . | . | . | . | . | . | . | WG |
| SGGONM | . | . | . | . | . | . | . | . | SGGONM |
| SGGOOM | . | . | . | . | . | . | . | . | SGGOOM |
| CG | . | . | . | . | . | . | . | . | CG |
| CS | . | . | . | . | . | . | . | . | CS |
| GS | . | . | . | . | . | . | . | . | GS |
| GSS | . | . | . | . | . | . | . | . | GSS |
| SH | . | . | . | . | . | . | . | . | SH |
| SB | . | . | . | . | . | . | . | . | SB |
| MCT | 1440.0000 | 2680.0000 | 2680.0000 | 2680.0000 | 560.00000 | 560.00000 | 560.00000 | 1440.0000 | MCT |
| MMT | 1440.0000 | 2680.0000 | 2680.0000 | 2680.0000 | 560.00000 | 560.00000 | 560.00000 | 1440.0000 | MMT |
| CSIS | . | . | . | . | 560.00000 | 560.00000 | 560.00000 | 1440.0000 | CSIS |
| SIS | 1440.0000 | 2680.0000 | 2680.0000 | 2680.0000 | . | . | . | . | SIS |
| LNGW | . | . | . | . | . | . | . | . | LNGW |

| | RHSCS2C | RHSCS3A | RHSCS3B | RHSCS3C | RHSSC1A | RHSSC1B | RHSSC1C | RHSSC2A | 13....2 |
|---|---|---|---|---|---|---|---|---|---|
| LSI | 1.00000 | 1.00000 | 1.00000 | 1.00000 | . | . | . | . | LSI |
| LCSI | . | . | . | . | 1.00000 | 1.00000 | 1.00000 | 1.00000 | LCSI |
| LLJ | 168.00000 | 336.00000 | 336.00000 | 336.00000 | 84.00000 | 84.00000 | 84.00000 | 168.00000 | LLJ |
| LLD | 168.00000 | 336.00000 | 336.00000 | 336.00000 | 84.00000 | 84.00000 | 84.00000 | 168.00000 | LLD |
| LLS | 168.00000 | 336.00000 | 336.00000 | 336.00000 | 84.00000 | 84.00000 | 84.00000 | 168.00000 | LLS |
| FVS42 | . | . | . | . | . | . | . | . | FVS42 |
| FVS752 | . | . | . | . | . | . | . | . | FVS752 |
| FVS101 | . | . | . | . | . | . | . | . | FVS101 |
| FVS43 | . | . | . | . | . | . | . | . | FVS43 |
| FVS753 | . | . | . | . | . | . | . | . | FVS753 |
| FVS102 | 25000.000 | . | . | . | . | . | . | . | FVS102 |
| FVS46 | . | 30000.000 | . | . | . | . | . | . | FVS46 |
| FVS756 | . | . | 56000.000 | . | . | . | . | . | FVS756 |
| FVS104 | . | . | . | 50000.000 | . | . | . | . | FVS104 |
| FVC42 | . | . | . | . | 10000.000 | . | . | . | FVC42 |
| FVC752 | . | . | . | . | . | 20000.000 | . | . | FVC752 |
| FVC101 | . | . | . | . | . | . | 12000.000 | . | FVC101 |
| FVC43 | . | . | . | . | . | . | . | 15000.000 | FVC43 |
| FVC753 | . | . | . | . | . | . | . | . | FVC753 |
| FVC102 | . | . | . | . | . | . | . | . | FVC102 |
| FVC46 | . | . | . | . | . | . | . | . | FVC46 |
| FVC756 | . | . | . | . | . | . | . | . | FVC756 |
| FVC104 | . | . | . | . | . | . | . | . | FVC104 |
| NRC1 | . | . | . | . | . | . | . | . | NRC1 |
| NRC4 | . | . | . | . | . | . | . | . | NRC4 |
| NRC7 | . | . | . | . | . | . | . | . | NRC7 |
| NRC2 | . | . | . | . | . | . | . | . | NRC2 |
| NRC5 | . | . | . | . | . | . | . | . | NRC5 |
| NRC8 | 1.00000 | . | . | . | . | . | . | . | NRC8 |
| NRC3 | . | 1.00000 | . | . | . | . | . | . | NRC3 |
| NRC6 | . | . | 1.00000 | . | . | . | . | . | NRC6 |
| NRC9 | . | . | . | 1.00000 | . | . | . | . | NRC9 |
| NRS1 | . | . | . | . | 1.00000 | . | . | . | NRS1 |
| NRS4 | . | . | . | . | . | 1.00000 | . | . | NRS4 |
| NRS7 | . | . | . | . | . | . | 1.00000 | . | NRS7 |
| NRS2 | . | . | . | . | . | . | . | 1.00000 | NRS2 |
| NRS5 | . | . | . | . | . | . | . | . | NRS5 |
| NRS8 | . | . | . | . | . | . | . | . | NRS8 |
| NRS3 | . | . | . | . | . | . | . | . | NRS3 |
| NRS6 | . | . | . | . | . | . | . | . | NRS6 |
| NRS9 | . | . | . | . | . | . | . | . | NRS9 |

# TABLE LXI (Continued)



| | RHSSC2B | RHSSC2C | RHSSC3A | RHSSC3B | RHSSC3C | |
|---|---|---|---|---|---|---|
| OBJ1 | . | . | . | . | . | OBJ1 |
| OBJ2 | . | . | . | . | . | OBJ2 |
| OBJ3 | . | . | . | . | . | OBJ3 |
| OBJ4 | . | . | . | . | . | OBJ4 |
| CCL | . | . | . | . | . | CCL |
| CSL | 1440.0000 | 1440.0000 | 2680.0000 | 2680.0000 | 2680.0000 | CSL |
| JAL | 143.00000 | 143.00000 | 121.00000 | 121.00000 | 121.00000 | JAL |
| FBL | 130.00000 | 130.00000 | 110.00000 | 110.00000 | 110.00000 | FBL |
| MRL | 143.00000 | 143.00000 | 121.00000 | 121.00000 | 121.00000 | MRL |
| APL | 165.00000 | 165.00000 | 143.00000 | 143.00000 | 143.00000 | APL |
| MYL | 165.00000 | 165.00000 | 143.00000 | 143.00000 | 143.00000 | MYL |
| JNL | 187.00000 | 187.00000 | 165.00000 | 165.00000 | 165.00000 | JNL |
| JYL | 187.00000 | 187.00000 | 165.00000 | 165.00000 | 165.00000 | JYL |
| AGL | 187.00000 | 187.00000 | 165.00000 | 165.00000 | 165.00000 | AGL |
| STL | 187.00000 | 187.00000 | 165.00000 | 165.00000 | 165.00000 | STL |
| OCL | 187.00000 | 187.00000 | 165.00000 | 165.00000 | 165.00000 | OCL |
| NVL | 165.00000 | 165.00000 | 143.00000 | 143.00000 | 143.00000 | NVL |
| DCL | 143.00000 | 143.00000 | 121.00000 | 121.00000 | 121.00000 | DCL |
| OC | . | . | . | . | . | OC |
| IC | . | . | . | . | . | IC |
| MRI | 3000.0000 | 2667.0000 | 3200.0000 | 6000.0000 | 5333.0000 | MRI |
| API | 3000.0000 | 2667.0000 | 3200.0000 | 6000.0000 | 5333.0000 | API |
| MYI | 3000.0000 | 2667.0000 | 3200.0000 | 6000.0000 | 5333.0000 | MYI |
| JNI | 3000.0000 | 2667.0000 | 3200.0000 | 6000.0000 | 5333.0000 | JNI |
| JYI | 3000.0000 | 2667.0000 | 3200.0000 | 6000.0000 | 5333.0000 | JYI |
| AGI | 3000.0000 | 2667.0000 | 3200.0000 | 6000.0000 | 5333.0000 | AGI |
| STI | 3000.0000 | 2667.0000 | 3200.0000 | 6000.0000 | 5333.0000 | STI |
| OCI | 3000.0000 | 2667.0000 | 3200.0000 | 6000.0000 | 5333.0000 | OCI |
| NVI | 3000.0000 | 2667.0000 | 3200.0000 | 6000.0000 | 5333.0000 | NVI |
| TIW | . | . | . | . | . | TIW |
| NI | . | . | . | . | . | NI |
| PI | . | . | . | . | . | PI |
| HI | . | . | . | . | . | HI |
| II | . | . | . | . | . | II |
| DI | . | . | . | . | . | DI |
| OI | . | . | . | . | . | OI |
| NGI | . | . | . | . | . | NGI |
| MI | . | . | . | . | . | MI |
| WG | . | . | . | . | . | WG |
| SGGONM | . | . | . | . | . | SGGONM |
| SGGOOM | . | . | . | . | . | SGGOOM |
| CG | . | . | . | . | . | CG |
| CS | . | . | . | . | . | CS |
| GS | . | . | . | . | . | GS |
| GSS | . | . | . | . | . | GSS |
| SH | . | . | . | . | . | SH |
| SB | . | . | . | . | . | SB |
| MCT | 1440.0000 | 1440.0000 | 2680.0000 | 2680.0000 | 2680.0000 | MCT |
| MMT | 1440.0000 | 1440.0000 | 2680.0000 | 2680.0000 | 2680.0000 | MMT |
| CSIS | 1440.0000 | 1440.0000 | 2680.0000 | 2680.0000 | 2680.0000 | CSIS |
| SIS | . | . | . | . | . | SIS |
| LNGW | . | . | . | . | . | LNGW |

| | RHSSC2B | RHSSC2C | RHSSC3A | RHSSC3B | RHSSC3C | |
|---|---|---|---|---|---|---|
| LSI | . | . | . | . | . | LSI |
| LCSI | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | LCSI |
| LLJ | 168.00000 | 168.00000 | 336.00000 | 336.00000 | 336.00000 | LLJ |
| LLO | 168.00000 | 168.00000 | 336.00000 | 336.00000 | 336.00000 | LLO |
| LLS | 168.00000 | 168.00000 | 336.00000 | 336.00000 | 336.00000 | LLS |
| FVS42 | . | . | . | . | . | FVS42 |
| FVS752 | . | . | . | . | . | FVS752 |
| FVS101 | . | . | . | . | . | FVS101 |
| FVS43 | . | . | . | . | . | FVS43 |
| FVS753 | . | . | . | . | . | FVS753 |
| FVS102 | . | . | . | . | . | FVS102 |
| FVS46 | . | . | . | . | . | FVS46 |
| FVS756 | . | . | . | . | . | FVS756 |
| FVS104 | . | . | . | . | . | FVS104 |
| FVC42 | . | . | . | . | . | FVC42 |
| FVC752 | . | . | . | . | . | FVC752 |
| FVC101 | . | . | . | . | . | FVC101 |
| FVC43 | . | . | . | . | . | FVC43 |
| FVC753 | 30000.000 | . | . | . | . | FVC753 |
| FVC102 | . | 25000.000 | . | . | . | FVC102 |
| FVC46 | . | . | 30000.000 | . | . | FVC46 |
| FVC756 | . | . | . | 56000.000 | . | FVC756 |
| FVC104 | . | . | . | . | 50000.000 | FVC104 |
| NRC1 | . | . | . | . | . | NRC1 |
| NRC4 | . | . | . | . | . | NRC4 |
| NRC7 | . | . | . | . | . | NRC7 |
| NRC2 | . | . | . | . | . | NRC2 |
| NRC5 | . | . | . | . | . | NRC5 |
| NRC8 | . | . | . | . | . | NRC8 |
| NRC3 | . | . | . | . | . | NRC3 |
| NRC6 | . | . | . | . | . | NRC6 |
| NRC9 | . | . | . | . | . | NRC9 |
| NRS1 | . | . | . | . | . | NRS1 |
| NRS4 | . | . | . | . | . | NRS4 |
| NRS7 | . | . | . | . | . | NRS7 |
| NRS2 | . | . | . | . | . | NRS2 |
| NRS5 | 1.00000 | . | . | . | . | NRS5 |
| NRS8 | . | 1.00000 | . | . | . | NRS8 |
| NRS3 | . | . | 1.00000 | . | . | NRS3 |
| NRS6 | . | . | . | 1.00000 | . | NRS6 |
| NRS9 | . | . | . | . | 1.00000 | NRS9 |

## Row and Column Identification

| Row Name | Explanation |
|---|---|
| OBJL | Net returns to land, labor, risk and management |
| OBJ2 | Fossil fuel energy inputs |
| OBJ3 | Energy (calorie) output |
| OBJ4 | Net kilocalories of energy |
| CCL | Cropland Clay loam |
| CSL | Cropland sandy loam |
| JAL | January labor |
| FBL | February labor |
| MRL | March labor |
| APL | April labor |
| MYL | May labor |
| JNL | June labor |
| JYL | July labor |
| AGL | August labor |
| STL | September labor |
| OCL | October labor |
| NVL | November labor |
| DCL | December labor |
| OC | Operating capital |
| IC | Investment capital |
| MRI | March irrigation |
| API | April irrigation |
| MYI | May irrigation |
| JNI | June irrigation |
| JYI | July irrigation |
| AGI | August irrigation |
| STI | September irrigation |
| OCI | October irrigation |
| NVI | November irrigation |
| TIW | Total irrigation water used |
| NI | Nitrogen input |
| PI | Phosphate input |

| Row Name | Explanation |
|---|---|
| HI | Herbicide input |
| II | Insecticide input |
| DI | Diesel input |
| OI | Oil input |
| NGI | Natural gas input |
| MI | Machinery input |
| WG | Wheat grain |
| SGGONM | Small grain graze-out November through March |
| SGGOOM | Small grain graze-out October through May |
| CG | Corn grain |
| CS | Corn silage |
| GS | Grain sorghum |
| GSS | Grain sorghum stubble |
| SH | Sudan hay |
| SB | Soybeans |
| MCT | Maximimum conventional tillage |
| MMT | Maximum minimum (reduced) tillage |
| CSIS | Circular sprinkler irrigation system |
| SIS | Surface irrigation system |
| LNGW | Limit natural gas water |
| LSI | Limit surface irrigation |
| LCSI | Limit circular sprinkler irrigation |
| LLJ | Limit labor June |
| LLO | Limit labor October |
| LLS | Limit labor September |
| FVS42 | Variable cost for surface irrigation 400 GPM and two wells. |
| FVS43 | Variable cost for surface irrigation 400 GPM and three wells |
| FVS46 | Variable cost for surface irrigation 400 GPM and six wells |
| FVS752 | Variable cost for surface irrigation 750 GPM and two wells |
| FVS753 | Variable cost for surface irrigation 750 GPM and three wells |
| FVS756 | Variable cost for surface irrigation 750 GPM and six wells |

| Row Name | Explanation |
|---|---|
| FVS101 | Variable cost for surface irrigation 1000 GPM and one well |
| FVS102 | Variable cost for surface irrigation 1000 GPM and two wells |
| FVS104 | Variable cost for surface irrigation 1000 GPM and four wells |
| FVC42 | Variable cost for circular sprinkler 400 GPM and two wells |
| FVC43 | Variable cost for circular sprinkler 400 GPM and three wells |
| FVC46 | Variable cost for circular sprinkler 400 GPM and three wells |
| FVC752 | Variable cost for circular sprinkler 750 GPM and two wells |
| FVC753 | Variable cost for circular sprinkler 750 GPM and three wells |
| FVC756 | Variable cost for circular sprinkler 750 GPM and six wells |
| FVC101 | Variable cost for circular sprinkler 1000 GPM and one well |
| FVC102 | Variable cost for circular sprinkler 1000 GPM and two wells |
| FVC104 | Variable cost for circular sprinkler 1000 GPM and four wells |
| NRC1 | Fixed irrigation cost for farm IA clay |
| NRC2 | Fixed irrigation cost for farm IIA clay |
| NRC3 | Fixed irrigation cost for farm IIIA clay |
| NRC4 | Fixed irrigation cost for farm IB clay |
| NRC5 | Fixed irrigation cost for farm IIB clay |
| NRC6 | Fixed irrigation cost for farm IIIB clay |
| NRC7 | Fixed irrigation cost for farm IC clay |
| NRC8 | Fixed irrigation cost for farm IIC clay |
| NRC9 | Fixed irrigation cost for farm IIIC clay |
| NRS1 | Fixed irrigation cost for farm IA sandy |
| NRS2 | Fixed irrigation cost for farm IIA sandy |
| NRS3 | Fixed irrigation cost for farm IIIA sandy |
| NRS4 | Fixed irrigation cost for farm IB sandy |
| NRS5 | Fixed irrigation cost for farm IIB sandy |

| Row Name | Explanation |
|---|---|
| NRS6 | Fixed irrigation cost for farm IIIB sandy |
| NRS7 | Fixed irrigation cost for farm IC sandy |
| NRS8 | Fixed irrigation cost for farm IIC sandy |
| NRS9 | Fixed irrigation cost for farm IIIC sandy |

| Column Name | |
|---|---|
| CCG | Conventional tillage irrigated corn grain |
| CCS | Conventional tillage irrigated corn silage |
| CWG | Conventional tillage irrigated wheat grain |
| CWGO | Conventional tillage irrigated wheat graze-out |
| CSMI | Conventional tillage moderate irrigated grain sorghum |
| CSHI | Conventional tillage heavy irrigated grain sorghum |
| CRGO | Conventional tillage irrigated rye graze-out |
| CSH | Conventional tillage irrigated sudan hay |
| CSB | Conventional tillage irrigated soybeans |
| MCG | Reduced tillage irrigated corn grain |
| MSRCSL | Reduced tillage silage and rye double crop, circular sprinkler on sandy loam soil |
| MSRSCL | Reduced tillage silage and rye double crop, surface irrigation on clay loam soil |
| MWG2RCMC | Reduced tillage irrigated two year rotation of conventional year one and reduced tillage year two |
| MWGSDC | Reduced tillage irrigated wheat and grain sorghum double crop |
| MWGSBDC | Reduced tillage irrigated wheat and soybean double crop |
| MWGOSHDC | Reduced tillage irrigated wheat graze-out and sudan hay double crop |
| MWFS3HI | Reduced tillage wheat-fallow-sorghum three year rotation under heavy irrigation |
| MWFS3MI | Reduced tillage wheat-fallow-sorghum three year rotation under moderate irrigation |
| DLW | Dryland wheat clay loam soil |
| DLWS | Dryland wheat sandy loam soil |

| Column Name | Explanation |
|---|---|
| DLGSS | Dryland sorghum sandy loam soil |
| DLGSC | Dryland sorghum clay loam soil |
| DLSGGO | Dryland small grain graze-out clay loam soil |
| DLSGGOS | Dryland small grain graze-out sandy loam soil |
| CGSL | Corn grain sell |
| CSSL | Corn silage sell |
| WGSL | Wheat grain sell |
| GSSL | Grain sorghum sell |
| SHSL | Sudan hay sell |
| SBSL | Soybean sell |
| SGGONMSL | Small grain graze-out November through March sell |
| SGGOOMSL | Small grain graze-out October through May sell |
| GSNJSL | Sorghum stubble November through January sell |
| BOG | Borrow operating capital |
| BIC | Borrow investment capital |
| BJAL | Buy January labor |
| BFBL | Buy February labor |
| BMRL | Buy March labor |
| BAPL | Buy April labor |
| BMYL | Buy May labor |
| BJNL | Buy June labor |
| BJYL | Buy July labor |
| BAGL | Buy August labor |
| BSTL | Buy September labor |
| BOCL | Buy October labor |
| BNVL | Buy November labor |
| BDCL | Buy December labor |
| BN | Buy nitrogen |
| BP | Buy phosphate |
| BH | Buy herbicide |
| BI | Buy insecticide |
| BD | Buy diesel |
| BO | Buy oil and lubes |
| BNG | Buy natural gas |

| Column Name | Explanation |
|---|---|
| BM | Buy machinery |
| NGFCS42 | Natural gas fixed cost surface irrigation 400 GPM and two wells, farm IA |
| NGVCS42 | Natural gas variable cost for surface irrigation 400 GPM and two wells, farm IA |
| NGFCS752 | Natural gas fixed cost for surface irrigation 750 GPM and two wells, farm IB |
| NGVCS752 | Natural gas variable cost for surface irrigation 750 GPM and two wells, farm IB |
| NGFCS101 | Natural gas fixed cost for surface irrigation 1000 GPM and one well for farm IC |
| NGVCS101 | Natural gas variable cost for surface irrigation 1000 GPM and one well for farm IC |
| NGFCS43 | Natural gas fixed cost surface irrigation 400 GPM and three wells for farm IIA |
| NGVCS43 | Natural gas variable cost surface irrigation 400 GPM and three wells for farm IIA. |
| NGFCS753 | Natural gas fixed cost surface irrigation 750 GPM and three wells for farm IIB |
| NGVCS753 | Natural gas variable cost for surface irrigation 750 GPM and three wells for farm IIB |
| NGFCS102 | Natural gas fixed cost for surface irrigation 1000 GPM and two wells for farm IIC |
| NGVCS102 | Natural gas variable cost for surface irrigation 1000 GPM and two wells for farm IIC. |
| NGFCS46 | Natural gas fixed cost for surface irrigation 400 GPM and six wells for farm IIIA |
| NGVCS46 | Natural gas variable cost for surface irrigation 400 GPM and six wells for farm IIIA |
| NGFCS756 | Natural gas fixed cost for surface irrigation 750 GPM and six wells for farm IIIB |
| NGVCS756 | Natural gas variable cost for surface irrigation 750 GPM and six wells for farm IIIB |
| NGFCS104 | Natural gas fixed cost for surface irrigation 1000 GPM and four wells for farm IIIC |
| NGVCS104 | Natural gas variable cost for surface irrigation 1000 GPM and six wells for farm IIIC |
| NGFCC42 | Natural gas fixed cost for sprinkler irrigation 400 GPM two wells for farm IA |
| NGVCC42 | Natural gas variable cost for sprinkler irrigation 400 GPM two wells for farm IA. |

| | |
|---|---|
| NGFCC752 | Natural gas fixed cost for sprinkler irrigation 750 GPM two wells for farm IE |
| NGVCC752 | Natural gas variable cost for sprinkler irrigation 750 GPM two wells for farm IB |
| NGFCC101 | Natural gas fixed cost for sprinkler irrigation 1000 GPM one well for farm IC |
| NGVCC101 | Natural gas variable cost for sprinkler irrigation 1000 GPM one well for farm IC |
| NGFCC43 | Natural gas fixed cost for sprinkler irrigation 400 GPM three wells for farm IIA |
| NGVCC43 | Natural gas variable cost for sprinkler irrigation 400 GPM three wells for farm IIA |
| NGFCC753 | Natural gas fixed cost for sprinkler irrigation 750 GPM three wells for farm IIB |
| NGVCC753 | Natural gas variable cost for sprinkler irrigation 750 GPM three wells for farm IIB |
| NGFCC102 | Natural gas fixed cost for sprinkler irrigation 1000 GPM two wells for farm IIC |
| NGVCC102 | Natural gas variable cost for sprinkler irrigation 1000 GPM two wells for farm IIC |
| NGFCC46 | Natural gas fixed cost for sprinkler irrigation 400 GPM six wells for farm IIIA |
| NGVCC46 | Natural gas variable cost for sprinkler irrigation 400 GPM six wells for farm IIIA |
| NGFCC756 | Natural gas fixed cost for sprinkler irrigation 750 GPM six wells for farm IIIB |
| NGVCC756 | Natural gas variable cost for sprinkler irrigation 750 GPM six wells for farm IIIB |
| NGFCC104 | Natural gas fixed cost for sprinkler irrigation 1000 GPM four wells for farm IIIC |
| NGVCC104 | Natural gas variable cost for sprinkler irrigation 1000 GPM four wells for farm IIIC |
| RHSCSIA | Right hand side for farm IA clay loam |
| RHSCSIB | Right hand side for farm IB clay loam |
| RHSCSIC | Right hand side for farm IC clay loam |
| RHSCS2A | Right hand side for farm IIA clay loam |
| RHSCS2B | Right hand side for farm IIB clay loam |
| RHSCS2C | Right hand side for farm IIC clay loam |
| RHSCS3A | Right hand side for farm IIIA clay loam |
| RHSCS3B | Right hand side for farm IIIB clay loam |
| RHSCS3C | Right hand side for farm IIIC clay loam |

| | |
|---|---|
| RHSSCIA | Right hand side for farm IA sandy loam |
| RHSSCIB | Right hand side for farm IB sandy loam |
| RHSSCIC | Right hand side for farm IC sandy loam |
| RHSSC2A | Right hand side for farm IIA sandy loam |
| RHSSC2B | Right hand side for farm IIB sandy loam |
| RHSSC2C | Right hand side for farm IIC sandy loam |
| RHSSC3A | Right hand side for farm IIIA sandy loam |
| RHSSC3B | Right hand side for farm IIIB sandy loam |
| RHSSC3C | Right hand side for farm IIIC sandy loam |

# APPENDIX C

## COMPLETE SOLUTION RESULTS FOR THE TWELVE SPECIFIED SITUATIONS

TABLE LXII

OPTIMAL SOLUTIONS FOR OBJECTIVE FUNCTION ONE FOR THE 560 ACRE CLAY LOAM FARMS

| Farm Size | | | 560 Acres | |
|---|---|---|---|---|
| Number of Wells | | Two | Two | One |
| Total GPM | | 800 | 1500 | 1000 |
| Solution Number | | IA | IB | IC |
| Identification | Units | | | |
| Net Returns | DOL. | 23,784.69 | 30,668.44 | 26,689.05 |
| Net Kilocalories | MILLION | 1,220.45594 | 925.59538 | 1,353.33517 |
| Irrigated Crops[A/] | | | | |
| CSB | AC | -- | 112.3 | -- |
| RWG2RCRC | AC | 9.2 | 29.0 | 3.6 |
| RWGSDC | AC | 71.8 | 71.7 | 71.7 |
| RWFS3HI | AC | 294.6 | 346.8 | 405.8 |
| Dryland Crops[A/] | | | | |
| DLW | AC | 184.4 | -- | 78.7 |
| Crop Products[B/] | | | | |
| SGGONM | AUM | 170 | 143 | 165 |
| GSNJ | AUM | 135 | 159 | 186 |
| Wheat | BU | 12,543 | 11,578 | 12,521 |
| Grain Sorghum | CWT | 9,535 | 10,616 | 11,835 |
| Soybeans | BU | -- | 5,056 | -- |
| Cropping System[C/] | | | | |
| Con Tillage | AC | -- | 112.3 | -- |
| Red Tillage | AC | 375.6 | 447.7 | 481.2 |
| Monthly Labor Requirements | | | | |
| March | HR. | 26 | 77 | 31 |
| April | HR. | 28 | 98 | 32 |
| May | HR. | 55 | 116 | 69 |
| June | HR. | 188 | 209 | 204 |
| July | HR. | 67 | 153 | 84 |
| August | HR. | 100 | 143 | 112 |
| September | HR. | 57 | 51 | 50 |
| October | HR. | 56 | 56 | 56 |
| November | HR. | 34 | 41 | 40 |
| Monthly Hired Labor | | | | |
| March | HR. | 34 | 41 | 40 |
| April | HR. | -- | -- | -- |
| May | HR. | -- | -- | -- |
| June | HR. | -- | 50 | -- |
| July | HR. | -- | -- | -- |
| August | HR. | -- | -- | -- |
| September | HR. | -- | -- | -- |
| October | HR. | -- | -- | -- |
| November | HR. | -- | -- | -- |

TABLE LXII (Continued)

| Solution Number: | | IA | IB | IC |
|---|---|---|---|---|
| Identification | Units | | | |
| Limited Labor Months | | | | |
| June 8-22 | HR. | 84 | 84 | 84 |
| September 15-29 | HR. | -- | -- | -- |
| October 1-15 | HR. | 56 | 56 | 56 |
| Monthly Irrigation Requirements | | | | |
| March | ACIN | 510 | 562 | 621 |
| April | ACIN | 547 | 678 | 635 |
| May | ACIN | 1,066 | 2,000 | 1,333 |
| June | ACIN | 784 | 1,251 | 917 |
| July | ACIN | 1,066 | 2,000 | 1,333 |
| August | ACIN | 707 | 1,641 | 974 |
| September | ACIN | 243 | 302 | 226 |
| October | ACIN | 215 | 215 | 215 |
| November | ACIN | 635 | 782 | 757 |
| Total Water Used | ACIN | 5,773 | 9,433 | 7,014 |
| SIS D/ | AC | 375.6 | 560.0 | 481.2 |
| Capital | | | | |
| Operating | DOL. | 9,405.10 | 10,801.60 | 10,006.40 |
| Investment | DOL. | 19,325.53 | 37,780.76 | 21,820.60 |
| Energy Inputs | | | | |
| Nitrogen | CWT | 530.8 | 538.5 | 551.9 |
| Phosphate | CWT | -- | -- | -- |
| Herbicide | LB. | 411.5 | 595.9 | 517.2 |
| Insecticide | LB. | 336.4 | 418.6 | 477.6 |
| Diesel | GALS. | 1,397.8 | 2,306.3 | 1,486.2 |
| Oil | QTS. | 645.3 | 1,072.3 | 760.7 |
| Natural Gas | 1000 CUFT. | 3,421.632 | 6,276.205 | 4,163.614 |
| Machinery | DOL. | 2,882.55 | 5,702.78 | 3,311.14 |

A/ CSB, Conventional tillage soybeans; RWG2RCRC, Reduced tillage wheat grain two year rotation of conventional tillage year one and reduced tillage year two; RWGSDC, Reduced tillage wheat grain sorghum double crop; RWFS3HI, Reduced tillage wheat-fallow-sorghum three year rotation heavy irrigation; DLW, Dryland tillage wheat.

B/ SGGONM, Small grain graze out November-March; GSNJ, Grain sorghum stubble graze November-January.

C/ For irrigated acreage only, Con refers to conventional and Red means reduced tillage.

D/ SIS, Surface irrigation system used.

# TABLE LXIII

## OPTIMAL SOLUTIONS FOR OBJECTIVE FUNCTION ONE FOR THE 1440 ACRE CLAY LOAM FARMS

| | | | | |
|---|---|---|---|---|
| Farm Size | | | 1440 Acres | |
| Number of Wells | | Three | Three | Two |
| Total GPM | | 1200 | 2250 | 2000 |
| Solution Number: | | IIA | IIB | IIC |
| Identification | Units | | | |
| Net Returns | DOL. | 42,604.86 | 59,018.70 | 55,629.66 |
| Net Kilocalories | MILLION | 2,538.17725 | 3,234.9227 | 3,069.19649 |
| Irrigated Crops[A/] | | | | |
| RWG2RCMC | AC | 29.5 | .3 | 7.1 |
| RWGSDC | AC | 143.6 | 143.6 | 143.6 |
| RWFS3HI | AC | 367.5 | 950.9 | 812.1 |
| Dryland Crops[A/] | | | | |
| DLW | AC | 899.4 | 345.2 | 477.0 |
| Crop Products[B/] | | | | |
| SGGONM | AUM | 465 | 434 | 442 |
| GSNJ | AUM | 169 | 437 | 373 |
| Wheat | BU | 30,411 | 30,295 | 30,322 |
| Grain Sorghum | CWT | 14,489 | 26,546 | 23,679 |
| Cropping System[C/] | | | | |
| Con Tillage | AC | -- | -- | -- |
| Red Tillage | AC | 540.6 | 1,094.8 | 962.9 |
| Monthly Labor Requirements | | | | |
| March | HR. | 41 | 70 | 63 |
| April | HR. | 47 | 70 | 65 |
| May | HR. | 83 | 156 | 138 |
| June | HR. | 187 | 187 | 187 |
| July | HR. | 101 | 187 | 168 |
| August | HR. | 187 | 187 | 187 |
| September | HR. | 163 | 127 | 136 |
| October | HR. | 113 | 113 | 113 |
| November | HR. | 54 | 89 | 81 |
| Monthly Hired Labor | | | | |
| March | HR. | -- | -- | -- |
| April | HR. | -- | -- | -- |
| May | HR. | -- | -- | -- |
| June | HR. | 196 | 279 | 259 |
| July | HR. | -- | 2 | -- |
| August | HR. | 27 | 92 | 76 |
| September | HR. | -- | -- | -- |
| October | HR. | -- | -- | -- |
| November | HR. | -- | -- | -- |

TABLE LXIII (Continued)

| Solution Number: | | IIA | IIB | IIC |
|---|---|---|---|---|
| Identification | Units | | | |
| Limited Labor Months | | | | |
| June 8-22 | HR. | 168 | 168 | 168 |
| September 15-29 | HR. | -- | -- | -- |
| October 1-15 | HR. | 113 | 113 | 113 |
| Monthly Irrigation Requirements | | | | |
| March | ACIN | 798 | 1,381 | 1,242 |
| April | ACIN | 916 | 1,382 | 1,271 |
| May | ACIN | 1,600 | 3,000 | 2,667 |
| June | ACIN | 1,302 | 2,002 | 1,836 |
| July | ACIN | 1,600 | 3,000 | 2,667 |
| August | ACIN | 882 | 2,282 | 1,949 |
| September | ACIN | 519 | 431 | 452 |
| October | ACIN | 430 | 430 | 430 |
| November | ACIN | 1,026 | 1,668 | 1,515 |
| Total Water Used | ACIN | 9,075 | 15,579 | 14,032 |
| SIS[D/] | AC | 540.6 | 1,094.8 | 962.9 |
| Capital | | | | |
| Operating | DOL. | 20,911.28 | 24,064.20 | 23,314.25 |
| Investment | DOL. | 33,912.57 | 57,869.77 | 45,942.10 |
| Energy Inputs | | | | |
| Nitrogen | CWT | 1,211.4 | 1,322.3 | 1,295.9 |
| Phosphate | CWT | -- | -- | -- |
| Herbicide | LB. | 612.4 | 1,166.6 | 1,034.7 |
| Insecticide | LB. | 511.1 | 1,094.4 | 955.7 |
| Diesel | GALS | 3,035.3 | 3,499.0 | 3,388.7 |
| Oil | QTS. | 1,102.2 | 1,707.4 | 1,563.4 |
| Natural Gas | 1000 CUFT. | 5,364.859 | 9,255.400 | 8,330.007 |
| Machinery | DOL. | 5,243.94 | 7,491.23 | 6,956.69 |

[A/] RWG2RCRC, Reduced tillage wheat grain two year rotation of conventional tillage year one and reduced tillage year two; RWGSDC, Reduced tillage wheat grain sorghum double crop; RWFS3HI, Reduced tillage wheat-fallow-sorghum three year rotation heavy irrigation; DLW, Dryland tillage wheat.

[B/] SGGONM, Small grain graze out November-March; GSNJ, Grain sorghum stubble graze November-January.

[C/] For irrigated acreage only, Con refers to conventional and Red means reduced tillage.

[D/] SIS, Surface irrigation system used.

# TABLE LXIV

## OPTIMAL SOLUTIONS FOR OBJECTIVE FUNCTION ONE FOR THE 2680 ACRE CLAY LOAM FARMS

| Farm Size | | | 2680 Acres | |
|---|---|---|---|---|
| Number of Wells | | Six | Six | Four |
| Total GPM | | 2400 | 4500 | 4000 |
| Solution Number | | IIIA | IIIB | IIIC |
| Identification | Units | | | |
| Net Returns | DOL. | 81,279.91 | 133,204.26 | 106,665.36 |
| Net Kilocalories | MILLION | 4,850.08669 | 6,243,57675 | 5,911.62751 |
| Irrigated Crops[A/] | | | | |
| RWG2RCMC | AC | 58.9 | .6 | 14.5 |
| RWGSDC | AC | 287.2 | 287.2 | 287.2 |
| RWFS3HI | AC | 735.0 | 1,901.7 | 1,623.8 |
| Dryland Crops[A/] | | | | |
| DLW | AC | 1,598.8 | 490.5 | 754.5 |
| Crop Products[B/] | | | | |
| SGGONM | AUM | 861 | 799 | 814 |
| GSNJ | AUM | 338 | 874 | 746 |
| Wheat | BU | 57,523 | 57,289 | 57,344 |
| Grain Sorghum | CWT | 28,978 | 53,093 | 47,348 |
| Cropping System[C/] | | | | |
| Con Tillage | AC | -- | -- | -- |
| Red Tillage | AC | 1,081.2 | 2,189.5 | 2,471.7 |
| Monthly Labor Requirements | | | | |
| March | HR. | 82 | 121 | 121 |
| April | HR. | 95 | 141 | 130 |
| May | HR. | 143 | 143 | 143 |
| June | HR. | 165 | 165 | 165 |
| July | HR. | 165 | 165 | 165 |
| August | HR. | 165 | 165 | 165 |
| September | HR. | 165 | 165 | 165 |
| October | HR. | 165 | 165 | 165 |
| November | HR. | 109 | 143 | 143 |
| Monthly Hired Labor | | | | |
| March | HR. | -- | 20 | 6 |
| April | HR. | -- | -- | -- |
| May | HR. | 24 | 169 | 134 |
| June | HR. | 577 | 743 | 703 |
| July | HR. | 37 | 214 | 172 |
| August | HR. | 240 | 369 | 338 |
| September | HR. | 140 | 68 | 85 |
| October | HR. | 61 | 61 | 61 |
| November | HR. | -- | 36 | 19 |

## TABLE LXIV (Continued)

| Solution Number: | | IIIA | IIIB | IIIC |
|---|---|---|---|---|
| Identification | Units | | | |
| Limited Labor Months | | | | |
| June 8-22 | HR. | 336 | 336 | 336 |
| September 15-29 | HR. | -- | -- | -- |
| October 1-15 | HR. | 226 | 226 | 226 |
| Monthly Irrigation Requirements | | | | |
| March | ACIN | 1,596 | 2,763 | 2,485 |
| April | ACIN | 1,832 | 2,765 | 2,543 |
| May | ACIN | 3,200 | 6,000 | 5,333 |
| June | ACIN | 2,605 | 4,005 | 3,671 |
| July | ACIN | 3,200 | 6,000 | 5,333 |
| August | ACIN | 1,764 | 4,564 | 3,897 |
| September | ACIN | 1,038 | 863 | 905 |
| October | ACIN | 861 | 861 | 861 |
| November | ACIN | 2,052 | 3,336 | 3,030 |
| Total Water Used | ACIN | 18,151 | 31,159 | 28,060 |
| SIS[D/] | AC | 1,081.2 | 2,189.5 | 2,471.7 |
| Capital | | | | |
| Operating | DOL. | 39,760.12 | 46,066.39 | 44,564.25 |
| Investment | DOL. | 66,387.14 | 114,301.54 | 90,446.10 |
| Energy Inputs | | | | |
| Nitrogen | CWT | 2,302.9 | 2,524.5 | 2,471.7 |
| Phosphate | CWT | -- | -- | -- |
| Herbicide | LB. | 1,224.3 | 2,333.1 | 2,069.1 |
| Insecticide | LB. | 1,022.2 | 2,188.9 | 1,910.9 |
| Diesel | GALS. | 5,810.3 | 6,788.1 | 6,517.1 |
| Oil | QTS. | 2,178.4 | 3,388.8 | 3,100.4 |
| Natural Gas | 1000 CUFT. | 10,729.717 | 18,510.801 | 16,657.236 |
| Machinery | DOL. | 10,279.88 | 14,774.46 | 13,703.78 |

[A/] RWG2RCRC, Reduced tillage wheat grain two year rotation of conventional tillage year one and reduced tillage year two; RWGSDC, Reduced tillage wheat grain sorghum double crop; RWFS3HI, Reduced tillage wheat-fallow-sorghum three year rotation heavy irrigation; DLW, Dryland tillage wheat.

[B/] SGGONM, Small grain graze out November-March; GSNJ, Grain sorghum stubble graze November-January.

[C/] For irrigated acreage only, Con refers to conventional and Red means reduced tillage.

[D/] SIS, Surface irrigation system used.

# TABLE LXV

## OPTIMAL SOLUTIONS FOR OBJECTIVE FUNCTION ONE FOR THE 560 ACRE SANDY LOAM FARMS

| Farm Size | | 560 Acres | | |
|---|---|---|---|---|
| Number of Wells | | Two | Two | One |
| Total GPM | | 800 | 1500 | 1000 |
| Solution Number: | | IA | IB | IC |
| Identification | Units | | | |
| Net Returns | DOL. | 10,366.67 | 866.56 | 9,276.58 |
| Net Kilocalories | MILLION | 1,191.30269 | 1,328,83645 | 1,234.28077 |
| Irrigated Crops[A/] | | | | |
| RCG | AC | 42.2 | 176.9 | 84.3 |
| RWGSBDC | AC | 103.7 | 103.7 | 103.7 |
| Dryland Crops[A/] | | | | |
| DLGSS | AC | 414.1 | 279.3 | 371.9 |
| Crop Products[B/] | | | | |
| GSNJ | AUM | 310 | 209 | 278 |
| Corn | BU | 5,698 | 23,889 | 11,833 |
| Wheat | BU | 5,185 | 5,185 | 5,185 |
| Grain Sorghum | CWT | 8,696 | 5,866 | 7,812 |
| Soybeans | BU | 3,629 | 3,629 | 3,629 |
| Croping System[C/] | | | | |
| Con Tillage | AC | -- | -- | -- |
| Red Tillage | AC | 145.9 | 280.7 | 188.0 |
| Monthly Labor Requirements | | | | |
| March | HR. | 165 | 165 | 165 |
| April | HR. | 104 | 151 | 119 |
| May | HR. | 47 | 95 | 62 |
| June | HR. | 181 | 209 | 208 |
| July | HR. | 204 | 209 | 209 |
| August | HR. | 55 | 94 | 68 |
| September | HR. | -- | -- | -- |
| October | HR. | 84 | 84 | 84 |
| November | HR. | 83 | 85 | 49 |
| Monthly Hired Labor | | | | |
| March | HR. | 36 | 29 | 34 |
| April | HR. | -- | -- | -- |
| May | HR. | -- | -- | -- |
| June | HR. | -- | 57 | -- |
| July | HR. | -- | 48 | 12 |
| August | HR. | -- | -- | -- |
| September | HR. | -- | -- | -- |
| October | HR. | -- | -- | -- |
| November | HR. | -- | -- | -- |

TABLE LXV (Continued)

| Solution Number: | | IA | IB | IC |
|---|---|---|---|---|
| Identification | Units | | | |
| Limited Labor Months | | | | |
| June 8-22 | HR. | -- | -- | -- |
| September 15-29 | HR. | -- | -- | -- |
| October 1-15 | HR. | 84 | 84 | 84 |
| Monthly Irrigation Requirements | | | | |
| March | ACIN | 311 | 311 | 311 |
| April | ACIN | 479 | 1,018 | 648 |
| May | ACIN | 622 | 622 | 622 |
| June | ACIN | 303 | 1,274 | 607 |
| July | ACIN | 1,029 | 2,000 | 1,333 |
| August | ACIN | 1,029 | 1,820 | 1,301 |
| September | ACIN | -- | -- | -- |
| October | ACIN | 311 | 311 | 311 |
| November | ACIN | 311 | 311 | 311 |
| Total Water Used | ACIN | 4,435 | 7,669 | 5,445 |
| CSIS[D/] | AC | 149.9 | 280.7 | 188.0 |
| Capital | | | | |
| Operating | DOL. | 8,991.90 | 13,441.21 | 10,382.27 |
| Investment | DOL. | 40,424.28 | 73,724.46 | 43,283.53 |
| Energy Inputs | | | | |
| Nitrogen | CWT | 415.9 | 518.0 | 479.1 |
| Phosphate | CWT | 72.9 | 140.3 | 94.0 |
| Herbicide | LB. | 322.6 | 524.7 | 385.7 |
| Insecticide | LB | 456.3 | 456.3 | 456.3 |
| Diesel | GALS. | 2,914.9 | 3,453.9 | 3,083.3 |
| Oil | QTS. | 738.6 | 1,094.4 | 849.4 |
| Natural Gas | 1000 CUFT. | 3,766.786 | 6,505.493 | 4,622.608 |
| Machinery | DOL. | 4,495.31 | 7,292.63 | 5,369.45 |

[A/]RCG, Reduced tillage corn grain; RWGSBDC, Reduced tillage wheat grain soybean double crop; DLGSS, Dryland grain sorghum sandy soil.

[B/]GSNJ, Grain sorghum stubble graze November-January.

[C/]For irrigated acreage only, Con refers to conventional and Red means reduced tillage.

[D/]CSIS, Circular sprinkler irrigation system used.

# TABLE LXVI

## OPTIMAL SOLUTIONS FOR OBJECTIVE FUNCTION ONE FOR THE 1440 ACRE SANDY LOAM FARMS

| | | | | |
|---|---|---|---|---|
| Farm Size | | | 1440 Acres | |
| Number of Wells | | Three | Three | Two |
| Total GPM | | 1220 | 2250 | 2000 |
| Solution Number: | | IIA | IIB | IIC |
| Identification | Units | | | |
| Net Returns | DOL. | 21,132.11 | 13,646.22 | 22,073.18 |
| Net Kilocalories | MILLION | 3,228.59608 | 3,197.9264 | 3,370.18875 |
| Irrigated Crops[A/] | | | | |
| RWGSBDC | AC | 200.0 | 207.4 | 207.4 |
| RCG | AC | -- | -- | 168.8 |
| Dryland Crops[A/] | | | | |
| DLGSS | AUM | 1,240 | 1,232 | 1,063 |
| Crop Products[B/] | | | | |
| GSNJ | AC | 930.0 | 924.4 | 797.8 |
| Wheat | BU | 10,000 | 10,370 | 10,370 |
| Grain Sorghum | CWT | 26,040 | 25,884 | 22,340 |
| Soybeans | BU | 7,000 | 7,259 | 7,259 |
| Corn | BU | -- | -- | 22,784 |
| Cropping System[C/] | | | | |
| Con Tillage | AC | -- | -- | -- |
| Red Tillage | AC | 200 | 207.4 | 376.2 |
| Monthly Labor Requirements | | | | |
| March | HR. | 143 | 143 | 143 |
| April | HR. | 165 | 165 | 165 |
| May | HR. | 62 | 64 | 125 |
| June | HR. | 187 | 187 | 187 |
| July | HR. | 187 | 187 | 187 |
| August | HR. | 84 | 87 | 136 |
| September | HR. | -- | -- | -- |
| October | HR. | 162 | 168 | 168 |
| November | HR. | 32 | 33 | 99 |
| Monthly Hired Labor | | | | |
| March | HR. | 397 | 395 | 387 |
| April | HR. | 65 | 65 | 124 |
| May | HR. | -- | -- | -- |
| June | HR. | 234 | 232 | 338 |
| July | HR. | 280 | 282 | 348 |
| August | HR. | -- | -- | -- |
| September | HR. | -- | -- | -- |
| October | HR. | -- | -- | -- |
| November | HR. | -- | -- | -- |

TABLE LXVI (Continued)

| Solution Number: | | IIA | IIB | IIC |
|---|---|---|---|---|
| Identification | Units | | | |
| Limited Labor Months | | | | |
| June 8-22 | HR. | -- | -- | -- |
| September 15-29 | HR. | -- | -- | -- |
| October 1-15 | HR. | 162 | 168 | 168 |
| Monthly Irrigation Requirements | | | | |
| March | ACIN | 600 | 622 | 622 |
| April | ACIN | 600 | 622 | 1,297 |
| May | ACIN | 1,200 | 1,244 | 1,244 |
| June | ACIN | -- | -- | 1,215 |
| July | ACIN | 1,400 | 1,451 | 2,667 |
| August | ACIN | 1,600 | 1,659 | 2,604 |
| September | ACIN | -- | -- | -- |
| October | ACIN | 600 | 622 | 622 |
| November | ACIN | 600 | 622 | 622 |
| Total Water Used | ACIN | 6,600 | 6,844 | 10,894 |
| CSIS[D/] | AC | 200.0 | 207.4 | 376.2 |
| Capital | | | | |
| Operating | DOL. | 18,836.80 | 18,914.73 | 24,487.53 |
| Investment | DOL. | 94,365.35 | 119,498.80 | 92,814.77 |
| Energy Inputs | | | | |
| Nitrogen | CWT | 860.0 | 865.2 | 1,118.3 |
| Phosphate | CWT | 100.0 | 103.7 | 188.1 |
| Herbicide | LB. | 500.0 | 518.3 | 771.7 |
| Insecticide | LB. | 1,240.0 | 1,232.6 | 1,232.6 |
| Diesel | GALS. | 7,168.0 | 7,156.1 | 7,831.2 |
| Oil | QTS. | 1,396.8 | 1,420.8 | 1,866.4 |
| Natural Gas | 1000 CUFT. | 5,610.000 | 5,817.777 | 9,248.039 |
| Machinery | DOL. | 7,724.80 | 7,900.50 | 11,404.18 |

A/RCG, Reduced tillage corn grain; RWGSBDC, Reduced tillage wheat grain soybean double crop; DLGSS, Dryland grain sorghum sandy soil.

B/GSNJ, Grain sorghum stubble graze November-January.

C/For irrigated acreage only, Con refers to conventional and Red means reduced tillage.

D/CSIS, Circular sprinkler irrigation system used.

# TABLE LXVII

## OPTIMAL SOLUTIONS FOR OBJECTIVE FUNCTION ONE FOR THE 2680 ACRE SANDY LOAM FARMS

| Farm Size | | 2680 Acres | | |
|---|---|---|---|---|
| Number of Wells | | Six | Six | Four |
| Total GPM | | 2400 | 4500 | 4000 |
| Solution Number: | | IIIA | IIIB | IIIC |
| Identification | Units | | | |
| Net Returns | DOL. | 35,916.94 | 20,890.50 | 37,297.12 |
| Net Kilocalories | MILLION | 5,893.76376 | 5,832.42388 | 5,873.27252 |
| Irrigated Crops[A/] | | | | |
| RCG | AC | -- | -- | 40.0 |
| RWGSBDC | AC | 400.0 | 414.8 | 414.8 |
| Dryland Crops[A/] | | | | |
| DLGSS | AC | 2,280.0 | 2,265.2 | 2,225.2 |
| Crop Products[B/] | | | | |
| GSNJ | AUM | 1,710 | 1,698 | 1,668 |
| Wheat | BU | 20,000 | 20,741 | 20,741 |
| Grain Sorghum | CWT | 47,880 | 47,569 | 46,728 |
| Soybeans | BU | 14,000 | 14,519 | 14,519 |
| Corn | BU | -- | -- | 5,403 |
| Cropping System[C/] | | | | |
| Con Tillage | AC | -- | -- | -- |
| Red Tillage | AC | 400 | 414.8 | 454.8 |
| Monthly Labor Requirements | | | | |
| March | HR. | 121 | 121 | 121 |
| April | HR. | 143 | 143 | 143 |
| May | HR. | 124 | 128 | 143 |
| June | HR. | 165 | 165 | 165 |
| July | HR. | 165 | 165 | 165 |
| August | HR. | 165 | 165 | 165 |
| September | HR. | -- | -- | -- |
| October | HR. | 165 | 165 | 165 |
| November | HR. | 64 | 66 | 81 |
| Monthly Hired Labor | | | | |
| March | HR. | 877 | 874 | 872 |
| April | HR. | 285 | 285 | 299 |
| May | HR. | -- | -- | -- |
| June | HR. | 610 | 605 | 630 |
| July | HR. | 712 | 715 | 731 |
| August | HR. | 3 | 9 | 20 |
| September | HR. | -- | -- | -- |
| October | HR. | -- | 171 | 171 |
| November | HR. | -- | -- | -- |

TABLE LXVII (Continued)

| Solution Number: | | IIIA | IIIB | IIIC |
|---|---|---|---|---|
| Identification | Units | | | |
| Limited Labor Months | | | | |
| June 8-22 | HR. | -- | -- | -- |
| September 15-29 | HR. | -- | -- | -- |
| October 1-15 | HR. | 324 | 336 | 336 |
| Monthly Irrigation Requirements | | | | |
| March | ACIN | 1,200 | 1,244 | 1,244 |
| April | ACIN | 1,200 | 1,244 | 1,404 |
| May | ACIN | 2,400 | 2,488 | 2,488 |
| June | ACIN | -- | -- | 288 |
| July | ACIN | 2,800 | 2,903 | 3,191 |
| August | ACIN | 3,200 | 3,318 | 3,542 |
| September | ACIN | -- | -- | -- |
| October | ACIN | 1,200 | 1,244 | 1,244 |
| November | ACIN | 1,200 | 1,244 | 1,244 |
| Total Water Used | ACIN | 13,320 | 13,688 | 14,649 |
| CSIS[D/] | AC | 400 | 414.8 | 454.8 |
| Capital | | | | |
| Operating | DOL. | 35,349.60 | 35,505.45 | 36,826.93 |
| Investment | DOL. | 184,826.70 | 235,093.61 | 178,931.82 |
| Energy Inputs | | | | |
| Nitrogen | CWT | 1,620.0 | 1,630.4 | 1,690.4 |
| Phosphate | CWT | 200.0 | 207.4 | 277.4 |
| Herbicide | LB. | 1,000.0 | 1,037.0 | 1,097.1 |
| Insecticide | LB. | 2,280.0 | 2,265.2 | 2,265.2 |
| Diesel | GALS. | 13,296.0 | 13,272.3 | 13,432.4 |
| Oil | QTS. | 2,689.3 | 2,737.6 | 2,843.3 |
| Natural Gas | 1000 CUFT. | 11,220.000 | 11,635.555 | 12,448.973 |
| Machinery | DOL. | 15,035.60 | 15,387.01 | 16,217.83 |

[A/] RCG, Reduced tillage corn grain; RWGSBDC, Reduced tillage wheat grain soybean double crop; DLGSS, Dryland grain sorghum sandy soil.

[B/] GSNJ, Grain sorghum stubble graze November-January.

[C/] For irrigated acreage only, Con refers to conventional and Red means reduced tillage.

[D/] CSIS, Circular sprinkler irrigation system used.

# TABLE LXVIII

## OPTIMAL SOLUTIONS FOR OBJECTIVE FUNCTION FOUR FOR THE 560 ACRE CLAY LOAM FARMS

| Farm Size | | 560 Acres | | |
|---|---|---|---|---|
| Number of Wells | | Two | Two | One |
| Total GPM | | 800 | 1500 | 1000 |
| Solution Number: | | IA | IB | IC |
| Identification | Units | | | |
| Net Returns | DOL. | -27,030.08 | -43,208.98 | -31,976.82 |
| Net Kilocalories | MILLION | 1,930.90759 | 2,731.55734 | 2,159.78712 |
| Irrigated Crops[A/] | | | | |
| CSMI | AC | 88.8 | 166.7 | 111.1 |
| RSRSCL | AC | 133.3 | 250.0 | 166.6 |
| Dryland Crops[A/] | | | | |
| DLGSC | AC | 337.9 | 143.3 | 282.3 |
| Crop Products[B/] | | | | |
| SGGOOM | AUM | 546 | 1,025 | 683 |
| GSNJ | AUM | 342 | 274 | 323 |
| Corn Silage | TON | 2,665 | 5,000 | 3,333 |
| Grain Sorghum | CWT | 7,448 | 8,577 | 7,771 |
| Cropping System[C/] | | | | |
| Con Tillage | AC | 88.8 | 166.7 | 111.1 |
| Red Tillage | AC | 133.3 | 250.0 | 166.6 |
| Monthly Labor Requirements | | | | |
| March | HR. | 165 | 165 | 165 |
| April | HR. | 150 | 187 | 166 |
| May | HR. | 162 | 187 | 187 |
| June | HR. | 209 | 209 | 209 |
| July | HR. | 153 | 146 | 151 |
| August | HR. | 55 | 105 | 69 |
| September | HR. | 82 | 105 | 103 |
| October | HR. | -- | -- | -- |
| November | HR. | 27 | 52 | 34 |
| Monthly Hired Labor | | | | |
| March | HR. | 39 | 17 | 33 |
| April | HR. | -- | 17 | -- |
| May | HR. | -- | 117 | 15 |
| June | HR. | 150 | 289 | 190 |
| July | HR. | -- | -- | -- |
| August | HR. | -- | -- | -- |
| September | HR. | -- | -- | -- |
| October | HR. | -- | -- | -- |
| November | HR. | -- | -- | -- |

TABLE LXVIII (Continued)

| Solution Number: | | IA | IB | IC |
|---|---|---|---|---|
| Identification | Units | | | |
| Limited Labor Months | | | | |
| June 8-22 | HR. | -- | -- | -- |
| September 15-29 | HR. | -- | -- | -- |
| October 1-15 | HR. | -- | -- | -- |
| Monthly Irrigation Requirements | | | | |
| March | ACIN | 533 | 1,000 | 666 |
| April | ACIN | 1,066 | 2,000 | 1,333 |
| May | ACIN | 1,066 | 2,000 | 1,333 |
| June | ACIN | 444 | 833 | 555 |
| July | ACIN | 1,066 | 2,000 | 1,333 |
| August | ACIN | 1,066 | 2,000 | 1,333 |
| September | ACIN | 533 | 1,000 | 666 |
| October | ACIN | -- | -- | -- |
| November | ACIN | 533 | 1,000 | 666 |
| Total Water Used | ACIN | 6,307 | 11,833 | 7,886 |
| SIS[D/] | AC | 222.1 | 416.7 | 277.7 |
| Capital | | | | |
| Operating | DOL. | 6,778.07 | 8,614.93 | 7,303.17 |
| Investment | DOL. | 26,882.95 | 44,689.01 | 29,904.46 |
| Energy Inputs | | | | |
| Nitrogen | CWT | 461.9 | 866.0 | 577.6 |
| Phosphate | CWT | -- | -- | -- |
| Herbicide | LB. | 166.3 | 312.5 | 208.1 |
| Insecticide | LB. | 222.1 | 416.7 | 277.7 |
| Diesel | GALS. | 3,756.4 | 4,399.0 | 3,940.4 |
| Oil | QTS. | 880.3 | 1,386.6 | 1,024.9 |
| Natural Gas | 1000 CUFT. | 4,451.660 | 8,352.083 | 5,566.663 |
| Machinery | DOL. | 7,296.95 | 12,694.30 | 8,839.87 |

[A/]CSMI, Conventional tillage grain sorghum moderate irrigation; RSRSCL, Reduced tillage silage and rye double crop; DLGSC, Dryland grain sorghum.

[B/]SGGOOM, Small grain graze out October-May; GSNJ, Grain sorghum stubble graze November-January.

[C/]For irrigated acreage only, Con refers to conventional and Red means reduced tillage.

[D/]SIS, Surface irrigation system used.

# TABLE LXIX

## OPTIMAL SOLUTIONS FOR OBJECTIVE FUNCTION FOUR FOR THE 1440 ACRE CLAY LOAM FARMS

| Farm Size | | 1440 Acres | | |
|---|---|---|---|---|
| Number of Wells | | Three | Three | Two |
| Total GPM | | 1200 | 2250 | 2000 |
| Solution Number: | | IIA | IIB | IIC |
| Identification | Units | | | |
| Net Returns | DOL. | -56,109.05 | -80,742.44 | -73,390.44 |
| Net Kilocalories | MILLION | 3,986.97281 | 5,187.09020 | 4,901.63371 |
| Irrigated Crops[A/] | | | | |
| CSMI | AC | 133.3 | 250.0 | 222.3 |
| RSRSCL | AC | 200.0 | 375.0 | 333.4 |
| Dryland Crops[A/] | | | | |
| DLGSC | AC | 1,106.7 | 815.0 | 884.4 |
| Crop Products[B/] | | | | |
| SGGOOM | AUM | 820 | 1,538 | 1,367 |
| GSNJ | AUM | 963 | 861 | 886 |
| Corn Silage | TON | 4,000 | 7.500 | 6,668 |
| Grain Sorghum | CWT | 17,773 | 19,465 | 19,063 |
| Croping System[C/] | | | | |
| Con Tillage | AC | 133.3 | 250.0 | 222.3 |
| Red Tillage | AC | 200.0 | 375.0 | 333.4 |
| Monthly Labor Requirements | | | | |
| March | HR. | 143 | 143 | 143 |
| April | HR. | 165 | 165 | 165 |
| May | HR. | 165 | 165 | 165 |
| June | HR. | 187 | 187 | 187 |
| July | HR. | 187 | 187 | 187 |
| August | HR. | 84 | 157 | 140 |
| September | HR. | 124 | 187 | 187 |
| October | HR. | -- | -- | -- |
| November | HR. | 42 | 78 | 70 |
| Monthly Hired Labor | | | | |
| March | HR. | 410 | 377 | 385 |
| April | HR. | 157 | 237 | 218 |
| May | HR. | 78 | 291 | 240 |
| June | HR. | 568 | 776 | 727 |
| July | HR. | 217 | 206 | 209 |
| August | HR. | -- | -- | -- |
| September | HR. | -- | 45 | 19 |
| October | HR. | -- | -- | -- |
| November | HR. | -- | -- | -- |

TABLE LXIX (Continued)

| Solution Number: | | IIA | IIB | IIC |
|---|---|---|---|---|
| Identification | Units | | | |
| Limited Labor Months | | | | |
| June 8-22 | HR. | -- | -- | -- |
| September 15-29 | HR. | -- | -- | -- |
| October 1-15 | HR. | -- | -- | -- |
| Monthly Irrigation Requirements | | | | |
| March | ACIN | 800 | 1,500 | 1,333 |
| April | ACIN | 1,600 | 3,000 | 2,667 |
| May | ACIN | 1,600 | 3,000 | 2,667 |
| June | ACIN | 666 | 1,250 | 1,111 |
| July | ACIN | 1,600 | 3,000 | 2,667 |
| August | ACIN | 1,600 | 3,000 | 2,667 |
| September | ACIN | 800 | 1,500 | 1,333 |
| October | ACIN | -- | -- | -- |
| November | ACIN | 800 | 1,500 | 1,333 |
| Total Water Used | ACIN | 9,466 | 17,750 | 15,779 |
| SIS[D/] | AC | 333.3 | 625.0 | 555.7 |
| Capital | | | | |
| Operating | DOL. | 15,185.07 | 17,938.40 | 17,283.50 |
| Investment | DOL. | 51,810.49 | 78,517.52 | 65,935.78 |
| Energy Inputs | | | | |
| Nitrogen | CWT | 693.3 | 1,300.0 | 1,155.7 |
| Phosphate | CWT | -- | -- | -- |
| Herbicide | LB. | 250.0 | 468.8 | 416.7 |
| Insecticide | LB. | 333.3 | 625.0 | 555.6 |
| Diesel | GALS. | 8,876.0 | 9,838.5 | 9,609.6 |
| Oil | QTS. | 1,644.9 | 2,403.9 | 2,223.3 |
| Natural Gas | 1000 CUFT. | 6,681.666 | 12,528.125 | 11,137.503 |
| Machinery | DOL. | 12,169.20 | 20,259.45 | 18,335.13 |

A/ CSMI, Conventional tillage grain sorghum moderate irrigation; RSRSCL, Reduced tillage silage and rye double crop; DLGSC, Dryland grain sorghum.

B/ SGGOOM, Small grain graze out October-May; GSNJ, Grain sorghum stubble graze November-January.

C/ For irrigated acreage only, Con refers to conventional and Red means reduced tillage.

D/ SIS, Surface irrigation system used.

# TABLE LXX

## OPTIMAL SOLUTIONS FOR OBJECTIVE FUNCTION FOUR FOR THE 2680 ACRE CLAY LOAM FARMS

| Farm Size | | 2680 Acres | | |
|---|---|---|---|---|
| Number of Wells | | Six | Six | Four |
| Total GPM | | 2400 | 4500 | 4000 |
| Solution Number: | | IIIA | IIIB | IIIC |
| Identification | Units | | | |
| Net Returns | DOL. | -110,577.66 | -160,707.74 | -147,841.10 |
| Net Kilocalories | MILLION | 7,610.69423 | 10,010.92901 | 9,439.15880 |
| Irrigated Crops[A/] | | | | |
| CSMI | AC | 266.7 | 500.0 | 444.4 |
| RSRSCL | AC | 400.0 | 750.0 | 666.6 |
| Dryland Crops[A/] | | | | |
| DLGSC | AC | 2,013.3 | 1,430.0 | 1,568.9 |
| Crop Products[B/] | | | | |
| SGGOOM | AUM | 1,640 | 3,075 | 2,733 |
| GSNJ | AUM | 1,777 | 1,572 | 1,621 |
| Corn Silage | TON | 8,000 | 15,000 | 13,333 |
| Grain Sorghum | CWT | 33,347 | 36,730 | 35,924 |
| Cropping System[C/] | | | | |
| Con Tillage | AC | 266.7 | 500.0 | 444.4 |
| Red Tillage | AC | 400.0 | 750.0 | 666.6 |
| Monthly Labor Requirements | | | | |
| March | HR. | 121 | 121 | 121 |
| April | HR. | 143 | 143 | 143 |
| May | HR. | 143 | 143 | 143 |
| June | HR. | 165 | 165 | 165 |
| July | HR. | 165 | 165 | 165 |
| August | HR. | 165 | 165 | 165 |
| September | HR. | 165 | 165 | 165 |
| October | HR. | -- | -- | -- |
| November | HR. | 84 | 143 | 139 |
| Monthly Hired Labor | | | | |
| March | HR. | 903 | 837 | 853 |
| April | HR. | 469 | 630 | 592 |
| May | HR. | 343 | 769 | 668 |
| June | HR. | 1,274 | 1,689 | 1,590 |
| July | HR. | 586 | 564 | 569 |
| August | HR. | 3 | 150 | 114 |
| September | HR. | -- | 300 | 248 |
| October | HR. | -- | -- | -- |
| November | HR. | 83 | 14 | -- |

TABLE LXX (Continued)

| Solution Number: | | IIIA | IIIB | IIIC |
|---|---|---|---|---|
| Identification | Units | | | |
| Limited Labor Months | | | | |
| June 8-22 | HR. | -- | -- | -- |
| September 15-29 | HR. | -- | -- | -- |
| October 1-15 | HR. | -- | -- | -- |
| Monthly Irrigation Requirements | | | | |
| March | ACIN | 1,600 | 3,000 | 2,666 |
| April | ACIN | 3,200 | 6,000 | 5,333 |
| May | ACIN | 3,200 | 6,000 | 5,333 |
| June | ACIN | 1,333 | 2,500 | 2,222 |
| July | ACIN | 3,200 | 6,000 | 5,333 |
| August | ACIN | 3,200 | 6,000 | 5,333 |
| September | ACIN | 1,600 | 3,000 | 2,666 |
| October | ACIN | -- | -- | -- |
| November | ACIN | 1,600 | 3,000 | 2,666 |
| Total Water Used | ACIN | 18,933 | 35,500 | 31,553 |
| SIS[D/] | AC | 666.7 | 1,250.0 | 1,111.0 |
| Capital | | | | |
| Operating | DOL. | 28,698.13 | 34,204.80 | 32,893.00 |
| Investment | DOL. | 99,792.97 | 153,207.04 | 128,041.50 |
| Energy Inputs | | | | |
| Nitrogen | CWT | 1,386.7 | 2,600.0 | 2,310.9 |
| Phosphate | CWT | -- | -- | -- |
| Herbicide | LB. | 500.0 | 937.5 | 883.8 |
| Insecticide | LB. | 666.7 | 1,250.0 | 1,111.0 |
| Diesel | GALS. | 16,672.0 | 18,597.0 | 18,138.4 |
| Oil | QTS. | 3,181.9 | 4,699.7 | 4,338.1 |
| Natural Gas | 1000 CUFT. | 1,336.333 | 25,056.250 | 22,270.830 |
| Machinery | DOL. | 23,932.40 | 40,112.90 | 36,258.47 |

[A/] CSMI, Conventional tillage grain sorghum moderate irrigation; RSRSCL, Reduced tillage silage and rye double crop; DLGSC, Dryland grain sorghum.

[B/] SGGOOM, Small grain graze out October-May; GSNJ, Grain sorghum stubble graze November-January.

[C/] For irrigated acreage only, Con refers to conventional and Red means reduced tillage.

[D/] SIS, Surface irrigation system used.

# TABLE LXXI

## OPTIMAL SOLUTIONS FOR OBJECTIVE FUNCTION FOUR FOR THE 560 ACRE SANDY LOAM FARMS

| Farm Size | | 560 Acres | | |
|---|---|---|---|---|
| Number of Wells | | Two | Two | One |
| Total GPM | | 800 | 1500 | 1000 |
| Solution Number: | | IA | IB | IC |
| Identification | Units | | | |
| Net Returns | DOL. | -39,078.83 | -62,135.54 | -44,110.57 |
| Net Kilocalories | MILLION | 2,064.06951 | 2,490.30119 | 2,185.91518 |
| Irrigated Crops[A/] | | | | |
| RSRCSL | AC | 148.1 | 277.8 | 185.1 |
| Dryland Crops[A/] | | | | |
| DLGSS | AC | 411.9 | 282.2 | 375.9 |
| Crop Products[B/] | | | | |
| SGGOOM | AUM | 607 | 1,139 | 759 |
| GSNJ | AUM | 309 | 212 | 281 |
| Corn Silage | TON | 2,961 | 5,556 | 3,703 |
| Grain Sorghum | CWT | 8,651 | 5,927 | 7,872 |
| Cropping System[C/] | | | | |
| Con Tillage | AC | -- | -- | -- |
| Red Tillage | AC | 148.1 | 277.8 | 185.1 |
| Monthly Labor Requirements | | | | |
| March | HR. | 165 | 160 | 165 |
| April | HR. | 89 | 89 | 89 |
| May | HR. | 121 | 187 | 151 |
| June | HR. | 168 | 148 | 162 |
| July | HR. | 209 | 209 | 209 |
| August | HR. | 54 | 102 | 68 |
| September | HR. | 84 | 158 | 105 |
| October | HR. | -- | -- | -- |
| November | HR. | 31 | 58 | 38 |
| Monthly Hired Labor | | | | |
| March | HR. | 27 | -- | 18 |
| April | HR. | -- | -- | -- |
| May | HR. | -- | 40 | -- |
| June | HR. | -- | -- | -- |
| July | HR. | 11 | 61 | 25 |
| August | HR. | -- | -- | -- |
| September | HR. | -- | -- | -- |
| October | HR. | -- | -- | -- |
| November | HR. | -- | -- | -- |

TABLE LXXI (Continued)

| Solution Number: | | IA | IB | IC |
|---|---|---|---|---|
| Identification | Units | | | |
| Limited Labor Months | | | | |
| June 8-22 | HR. | -- | -- | -- |
| September 15-29 | HR. | -- | -- | -- |
| October 1-15 | HR. | -- | -- | -- |
| Monthly Irrigation Requirements | | | | |
| March | ACIN | 444 | 833 | 555 |
| April | ACIN | 444 | 833 | 555 |
| May | ACIN | 444 | 833 | 555 |
| June | ACIN | 533 | 1,000 | 666 |
| July | ACIN | 1,066 | 2,000 | 1,333 |
| August | ACIN | 1,066 | 2,000 | 1,333 |
| September | ACIN | 444 | 833 | 555 |
| October | ACIN | -- | -- | -- |
| November | ACIN | 592 | 1,111 | 740 |
| Total Water Used | ACIN | 5,033 | 9,444 | 6,294 |
| CSIS[D/] | AC | 148 | 277.8 | 185.1 |
| Capital | | | | |
| Operating | DOL. | 9,278.80 | 11,707.20 | 9,973.00 |
| Investment | DOL. | 40,626.61 | 72,647.26 | 43,086.40 |
| Energy Inputs | | | | |
| Nitrogen | CWT | 620.5 | 918.9 | 705.8 |
| Phosphate | CWT | 74.0 | 138.9 | 92.6 |
| Herbicide | LB. | 222.1 | 416.4 | 277.7 |
| Insecticide | LB. | 560.0 | 560.0 | 560.0 |
| Diesel | GALS. | 2,971.2 | 3,023.1 | 2,986.1 |
| Oil | QTS. | 791.3 | 1,230.4 | 916.9 |
| Natural Gas | 1000 CUFT. | 4,164.062 | 7,812.500 | 5,207.031 |
| Machinery | DOL. | 4,431.23 | 7,298.09 | 5,250.77 |

[A/] RSRCSL, Reduced tillage silage and rye double crop; DLGSS, Dryland grain sorghum.

[B/] SGGOOM, Small grain graze out October-May; GSNJ, Grain sorghum stubble graze November-January.

[C/] For irrigated acreage only, Con refers to conventional and Red means reduced tillage.

[D/] CSIS, Circular sprinkler irrigation system.

TABLE LXXII

OPTIMAL SOLUTIONS FOR OBJECTIVE FUNCTION FOUR FOR THE 1440 ACRE SANDY LOAM FARMS

| Farm Size | | | 1440 Acres | |
|---|---|---|---|---|
| Number of Wells | | Three | Three | Two |
| Total GPM | | 1200 | 2250 | 2000 |
| Solution Number: | | IIA | IIB | IIC |
| Identification | Units | | | |
| Net Returns | DOL. | -86,695.79 | -115,019.17 | -101,437.46 |
| Net Kilocalories | MILLION | 4,786.84581 | 5,425.73698 | 5,273.77215 |
| Irrigated Crops[A/] | | | | |
| RSRCSL | AC | 222.2 | 416.7 | 370.4 |
| Dryland Crops[A/] | | | | |
| DLGSS | AC | 1,217.8 | 1,023.3 | 1,069.6 |
| Crop Products[B/] | | | | |
| SGGOOM | AUM | 911 | 1,708 | 1,519 |
| GSNJ | AUM | 913 | 768 | 802 |
| Corn Silage | TON | 4,444 | 8,333 | 7,408 |
| Grain Sorghum | CWT | 25,573 | 21,490 | 22,461 |
| Cropping System[C/] | | | | |
| Con Tillage | AC | -- | -- | -- |
| Red Tillage | AC | 222.2 | 416.7 | 370.4 |
| Monthly Labor Requirements | | | | |
| March | HR. | 143 | 143 | 143 |
| April | HR. | 165 | 165 | 165 |
| May | HR. | 165 | 165 | 165 |
| June | HR. | 187 | 187 | 187 |
| July | HR. | 187 | 187 | 187 |
| August | HR. | 82 | 154 | 137 |
| September | HR. | 126 | 187 | 187 |
| October | HR. | -- | -- | -- |
| November | HR. | 46 | 87 | 77 |
| Monthly Hired Labor | | | | |
| March | HR. | 391 | 343 | 354 |
| April | HR. | 65 | 65 | 65 |
| May | HR. | 17 | 176 | 138 |
| June | HR. | 269 | 240 | 247 |
| July | HR. | 317 | 393 | 375 |
| August | HR. | -- | -- | -- |
| September | HR. | -- | 50 | 24 |
| October | HR. | -- | -- | -- |
| November | HR. | -- | -- | -- |

TABLE LXXII (Continued)

| Solution Number: | | IIA | IIB | IIC |
|---|---|---|---|---|
| Identification | Units | | | |
| Limited Labor Months | | | | |
| June 8-22 | HR. | -- | -- | -- |
| September 15-29 | HR. | -- | -- | -- |
| October 1-15 | HR. | -- | -- | -- |
| Monthly Irrigation Requirements | | | | |
| March | ACIN | 666 | 1,250 | 1,111 |
| April | ACIN | 666 | 1,250 | 1,111 |
| May | ACIN | 666 | 1,250 | 1,111 |
| June | ACIN | 800 | 1,500 | 1,333 |
| July | ACIN | 1,600 | 3,000 | 2,667 |
| August | ACIN | 1,600 | 3,000 | 2,667 |
| September | ACIN | 666 | 1,250 | 1,111 |
| October | ACIN | -- | -- | -- |
| November | ACIN | 888 | 1,666 | 1,481 |
| Total Water Used | ACIN | 7,555 | 14,166 | 12,594 |
| CSIS[D/] | AC | 222.2 | 416.7 | 370.4 |
| Capital | | | | |
| Operating | DOL. | 20,892.80 | 24,532.80 | 23,667.00 |
| Investment | DOL. | 95,526.91 | 120,682.90 | 92,419.19 |
| Energy Inputs | | | | |
| Nitrogen | CWT | 1,231.1 | 1,678.3 | 1,571.9 |
| Phosphate | CWT | 111.1 | 208.3 | 185.2 |
| Herbicide | LB. | 333.3 | 625.0 | 555.6 |
| Insecticide | LB. | 1,440.0 | 1,440.0 | 1,440.0 |
| Diesel | GALS. | 7,576.9 | 7,654.7 | 7,636.2 |
| Oil | QTS. | 1,499.4 | 2,157.1 | 2,000.8 |
| Natural Gas | 1000 CUFT. | 6,250.000 | 11,718.750 | 10,417.968 |
| Machinery | DOL. | 7,891.91 | 12,189.13 | 11,167.01 |

[A/]RSRCSL, Reduced tillage silage and rye double crop; DLGSS, Dryland grain sorghum.

[B/]SGGOOM, Small grain graze out October-May; GSNJ, Grain sorghum stubble graze November-January.

[C/]For irrigated acreage only, Con refers to conventional and Red means reduced tillage.

[D/]CSIS, Cricular sprinkler irrigation system.

# TABLE LXXIII

## OPTIMAL SOLUTIONS FOR OBJECTIVE FUNCTION FOUR FOR THE 2680 ACRE SANDY LOAM FARMS

| Farm Size | | 2680 Acres | | |
|---|---|---|---|---|
| Number of Wells | | Six | Six | Four |
| Total GPM | | 2400 | 4500 | 4000 |
| Solution Number: | | IIIA | IIIB | IIIC |
| Identification | Units | | | |
| Net Returns | DOL. | -169,650.86 | -227,185.62 | -199,846.87 |
| Net Kilocalories | MILLION | 9,010.26323 | 10,288.04556 | 9,983.65955 |
| Irrigated Crops[A/] | | | | |
| RSRCSL | AC | 444.4 | 833.3 | 740.7 |
| Dryland Crops[A/] | | | | |
| DLGSS | AC | 2,235.6 | 1,846.7 | 1,939.3 |
| Crop Products[B/] | | | | |
| SGGOOM | AUM | 1,822 | 3,417 | 3,037 |
| GSNJ | AUM | 1,676 | 1,385 | 1,454 |
| Corn Silage | TON | 8,889 | 16,667 | 14,813 |
| Grain Sorghum | CWT | 46,947 | 38,780 | 40,725 |
| Cropping System[C/] | | | | |
| Con Tillage | AC | -- | -- | -- |
| Red Tillage | AC | 444.4 | 833.3 | 740.7 |
| Monthly Labor Requirements | | | | |
| March | HR. | 121 | 121 | 121 |
| April | HR. | 143 | 143 | 143 |
| May | HR. | 143 | 143 | 143 |
| June | HR. | 165 | 165 | 165 |
| July | HR. | 165 | 165 | 165 |
| August | HR. | 164 | 165 | 165 |
| September | HR. | 165 | 166 | 165 |
| October | HR. | -- | -- | -- |
| November | HR. | 93 | 143 | 143 |
| Monthly Hired Labor | | | | |
| March | HR. | 866 | 769 | 792 |
| April | HR. | 285 | 285 | 285 |
| May | HR. | 221 | 540 | 464 |
| June | HR. | 679 | 621 | 635 |
| July | HR. | 785 | 937 | 901 |
| August | HR. | -- | 143 | 109 |
| September | HR. | 88 | 310 | 257 |
| October | HR. | -- | -- | -- |
| November | HR. | -- | 32 | 12 |

TABLE LXXIII (Continued)

| Solution Number: | | IIIA | IIIB | IIIC |
|---|---|---|---|---|
| Identification | Units | | | |
| Limited Labor Months | | | | |
| June 8-22 | HR. | -- | -- | -- |
| September 15-29 | HR. | -- | -- | -- |
| October 1-15 | HR. | -- | -- | -- |
| Monthly Irrigation Requirements | | | | |
| March | ACIN | 1,333 | 2,500 | 2,222 |
| April | ACIN | 1,333 | 2,500 | 2,222 |
| May | ACIN | 1,333 | 2,500 | 2,222 |
| June | ACIN | 1,600 | 3,000 | 2,666 |
| July | ACIN | 3,200 | 6,000 | 5,333 |
| August | ACIN | 3,200 | 6,000 | 5,333 |
| September | ACIN | 1,333 | 2,500 | 2,222 |
| October | ACIN | -- | -- | -- |
| November | ACIN | 1,777 | 3,333 | 2,962 |
| Total Water Used | ACIN | 15,111 | 28,333 | 25,183 |
| CSIS[D/] | AC | 444.4 | 833.3 | 740.7 |
| Capital | | | | |
| Operating | DOL. | 39,461.60 | 46,741.60 | 45,007.40 |
| Investment | DOL. | 187,149.81 | 237,461.79 | 180,934.40 |
| Energy Inputs | | | | |
| Nitrogen | CWT | 2,362.2 | 3,256.7 | 3,043.6 |
| Phosphate | CWT | 222.2 | 416.7 | 370.3 |
| Herbicide | LB. | 666.7 | 1,250.0 | 1,111.0 |
| Insecticide | LB. | 2,680.0 | 2,680.0 | 2,680.0 |
| Diesel | GALS. | 14,113.8 | 14,269.3 | 14,232.3 |
| Oil | QTS. | 2,895.8 | 4,210.3 | 3,897.1 |
| Natural Gas | 1000 CUFT. | 12,500.000 | 23,437.500 | 20,832.031 |
| Machinery | DOL. | 15,369.80 | 23,964.30 | 21,916.95 |

[A/]RSRCSL, Reduced tillage silage and rye double crop; DLGSS, Dryland grain sorghum.

[B/]SGGOOM, Small grain graze out October-May; GSNJ, Grain sorghum stubble graze November-January.

[C/]For irrigated acreage only, Con refers to conventional and Red means reduced tillage.

[D/]CSIS, Circular sprinkler irrigation system.

# APPENDIX D

# SHADOW PRICES FOR SPECIFIED CROPS AND
AND CROPPING METHODS

# TABLE LXXIV

## SHADOW PRICES FOR SPECIFIED CROPS AND CROPPING METHODS FOR OBJECTIVE FUNCTIONS ONE AND FOUR, THREE FARM SIZES AND IRRIGATION SITUATIONS, CONVENTIONAL, REDUCED AND DRYLAND TILLAGE CLAY AND SANDY LOAM SOILS[A/]

| OBJECTIVE FUNCTION | I[B/] | | | | | | | | | IV[C/] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FARM SIZE | 560 Acres | | | 1440 Acres | | | 2680 Acres | | | 560 Acres | | | 1440 Acres | | | 2680 Acres | | |
| SOLUTION NUMBER | IA | IB | IC | IIA | IIB | IIC | IIIA | IIIB | IIIC | IA | IB | IC | IIA | IIB | IIC | IIIA | IIIB | IIIC |
| ACTIVITIES | | | | | | | | | | | | | | | | | | |
| CLAY LOAM SOILS | | | | | | | | | | | | | | | | | | |
| Irrigated Crops | | | | | | | | | | | | | | | | | | |
| Conventional Tillage | | | | | | | | | | | | | | | | | | |
| Wheat Grain | 1.20 | 1.04 | 1.34 | 1.71 | 2.15 | 1.85 | 2.67 | 2.78 | 2.81 | 1.60303 | .43006 | 3.20340 | .32858 | .47124 | .43006 | 1.98103 | 1.98103 | 1.98103 |
| Wheat Graze-Out | 30.81 | 44.19 | 32.16 | 32.04 | 33.71 | 33.39 | 32.82 | BSO | 35.14 | 3.61594 | 2.8821 | 3.3785 | 3.06488 | 2.03703 | 2.88221 | 2.88221 | 2.07303 | 3.25940 |
| Sorghum Moderate Irrigation | 24.64 | 26.87 | 23.78 | 26.02 | 24.79 | 25.16 | 25.21 | 25.19 | 25.10 | BS | BS | BS | BS | BS | BS | BS | BS | BS |
| Sorghum Heavy Irrigation | 63.35 | 26.36 | 62.49 | 65.30 | 65.41 | 64.44 | 66.99 | 68.77 | 68.60 | BSO | 3.78939 | .85570 | 3.05870 | 3.78939 | 3.78939 | 3.78939 | 3.78939 | .85570 |
| Sudan Hay | 115.70 | 75.77 | 114.84 | 114.71 | 113.89 | 113.85 | 116.34 | 115.33 | 115.16 | .15293 | 3.94231 | BSO | 3.21163 | .37899 | 1.98886 | 3.94231 | 3.94231 | 1.00863 |
| Soybeans | BSO | BS | BSO | BSO | BSO | BSO | 40.47 | BSO | BSO | 6.07576 | 9.86515 | 6.93146 | 9.13446 | 9.86515 | 9.86515 | 9.86515 | 9.86515 | 6.93146 |
| Reduced Tillage | | | | | | | | | | | | | | | | | | |
| Silage and Rye Graze Double Crop | BSO | BSO | BSO | BSO | BSO | BSO | BSO | BSO | BSO | BS | BS | BS | BS | BS | BS | BS | BS | BS |
| Two Year Wheat Rotation | BS | BS | BS | BS | BS | BS | BS | BS | BS | 1.69928 | BSO | 3.18080 | BSO | BSO | BSO | 1.55097 | 1.55097 | 3.18080 |
| Wheat and Sorghum Double Crop | BS | BS | BS | BS | BS | BS | BS | BS | BS | .35603 | BSO | .39564 | BSO | .03609 | BSO | BSO | 1.4086 | .59372 |
| Wheat Graze and Sudan Hay Double Crop | 117.37 | 93.78 | 117.48 | 116.68 | 116.86 | 116.78 | 118.00 | 87.13 | 117.67 | .38911 | 1.36742 | BSO | 1.12386 | BSO | BSO | 1.36842 | 2.49433 | .86450 |
| Wheat-Fallow-Sorghum Heavy Irrigation | BS | BS | BS | BS | BS | BS | BS | BS | BS | .20854 | 1.07932 | 1.02071 | .80329 | 1.08879 | 1.07932 | 1.59114 | 1.59114 | 1.02071 |
| Wheat-Fallow-Sorghum Moderate Irrigation | 1.31 | 7.08 | 1.11 | 1.18 | .98 | .98 | .81 | .33 | .29 | .33779 | .61964 | 1.00922 | 45523 | .62911 | .69164 | 1.13146 | 1.13146 | 1.00922 |
| Dryland Tillage | | | | | | | | | | | | | | | | | | |
| Wheat | BS | 23.19 | BS | BS | BS | BS | BS | BS | BS | BSO | .14208 | .68492 | BSO | .23198 | .14208 | .68492 | .68492 | .68492 |
| Grain Sorghum | 1.58 | 25.50 | 1.59 | 1.95 | 2.82 | 1.94 | 2.49 | 3.72 | 3.72 | BS | BS | BS | BS | BS | BS | BS | BS | BS |
| Small Grain Graze-Out | 14.70 | 38.28 | 14.70 | 15.09 | 15.63 | 15.09 | 16.29 | 5.25 | 16.29 | .51496 | .51496 | .51496 | .54496 | .51496 | .51496 | .51496 | .51496 | .51496 |
| SANDY LOAM SOILS | | | | | | | | | | | | | | | | | | |
| Irrigated Crops | | | | | | | | | | | | | | | | | | |
| Conventional Tillage | | | | | | | | | | | | | | | | | | |
| Corn Grain | 2.86 | 11.43 | 10.60 | 6.55 | 12.11 | 10.57 | 8.86 | 14.24 | 13.26 | 1.94899 | .30613 | 1.94899 | 1.94899 | 1.94899 | 1.94899 | .30613 | 1.94899 | .30613 |
| Corn Silage | 25.29 | 23.84 | 23.45 | 26.01 | 23.69 | 24.62 | 26.94 | 24.62 | 24.82 | .63902 | .63902 | .63902 | .63902 | .63902 | .63902 | .63092 | .63902 | .63902 |
| Rye Graze-Out | 22.11 | 22.06 | 20.12 | 40.48 | 22.06 | 20.39 | 41.53 | 24.49 | 23.04 | 6.33588 | 4.91838 | 3.54933 | 3.54933 | 3.54933 | 3.54933 | 4.91838 | 3.54933 | 4.91883 |
| Reduced Tillage | | | | | | | | | | | | | | | | | | |
| Corn Grain | BSO | BS | BS | 37.46 | .86 | BS | 35.75 | 1.72 | BS | 2.85619 | 2.85619 | 2.26504 | 2.26504 | 2.26504 | 2.26504 | 1.53487 | 2.26504 | 1.53487 |
| Silage and Rye Graze Double Crop | BSO | BSO | BSO | BSO | BSO | BSO | BSO | BSO | BSO | BS | BS | BS | BS | BS | BS | BS | BS | BS |
| Wheat and Soybean Double Crop | BS | BS | BS | BS | BS | BS | BS | BS | BS | 7.33490 | 7.79125 | 7.33490 | 5.6004 | 5.6004 | 5.6004 | 7.79125 | 7.33588 | 7.79125 |
| Dryland Tillage | | | | | | | | | | | | | | | | | | |
| Wheat | BSO | BSO | BSO | BSO | BSO | BSO | BSO | BSO | BSO | BSO | BSO | BSO | 1.11330 | 1.11330 | 1.11330 | BSO | BSO | BSO |
| Grain Sorghum | BS | BS | BS | BS | BS | BS | BS | BS | BS | BS | BS | BS | BS | BS | BS | BS | BS | BS |
| Small Grain Graze-Out | 24.69 | 24.09 | 24.36 | 23.61 | 23.61 | 23.61 | 23.97 | 23.97 | 23.97 | 1.51584 | 1.51584 | 1.51584 | 1.51584 | 1.51584 | 1.51584 | 1.51584 | 1.51584 | 1.51584 |

[A/] BS refers to those crops in the Solution at specified levels, while BSO refers to those crops in the solution at a zero level.

[B/] Figures for objective function one measured in dollars.

[C/] Figures for objective function four measured in Million of kilocalories of energy.

VITA

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