OPTIMAL CROP AND DAIRY ENTERPRISE SELECTION FOR CENTRAL OKLAHOMA DAIRY FARMS

By

MIGUEL RIBON

Engenheiro-Agronomo
Universidade Federal de Viçosa
Viçosa, Minas Gerais, Brazil
1962

Magister Scientiae em Economia Rural
Universidade Federal de Viçosa
Viçosa Minas Gerais, Brazil
1966

Submitted to the Faculty of the Graduate College
of the Oklahoma State University
in partial fulfillment of the requirements
for the Degree of
DOCTOR OF PHILOSOPHY
December, 1977

OPTIMAL CROP AND DAIRY ENTERPRISE

SELECTION FOR CENTRAL

OKLAHOMA DIARY FARMS

Thesis Approved:

David D. Klotz
Thesis Adviser

H. Evan Drummond

Ted R. Nelson

Milton Wells

Norman N. Durham
Dean of the Graduate College

PREFACE

This study concerns the determination of the optimum dairy farm conditions of feed and milk production under varying resource situations. A short run linear programming model is constructed to represent a 500-acre dairy farm in Central Oklahoma. Basic optimal solution and variations thereof are obtained.

The author wishes to express his sincere appreciation to Universidade Federal de Viçosa (UFV), Brazil, in supporting him during his graduate studies at Oklahoma State University (OSU). Appreciation is also expressed to U.S. Agency for International Development (USAID) and Ford Foundation for their financial support. Thanks are given to OSU Department of Agricultural Economics for the opportunity to entering the graduate program.

The author wishes to express his gratitude to his major adviser, Dr. Darrel D. Kletke, for his guidance and assistance throughout the study. Appreciation is also expressed to the other committee members, Drs. Evan Drummond, Ted R. Nelson and Milton Wells, for their invaluable suggestions.

Special thanks are given to Professors Antonio Fagundes de Sousa, UFV Rector, for his constant encouragement and friendship, Euter Paniago, Former Head, and Teotonio D. Teixeira, present Head of UFV Agricultural Economics Department.

Appreciation is also expressed to Professors Clifford H. Burton, Jack Stout, and Curtis Ricardson for their suggestions, to Mrs. Kathi Walker

for her excellence in typing earlier and final copies of this thesis, and to Mrs. Ginny Gann and the Statistical Laboratory staff for the tasks performed.

Finally, my profound gratitude is directed to my beloved family: my wife, Didi, our son, Miguel Jr., our daughters, Glaucia Maria and Giovana; and my progenitors, Pedro and Erna Ribon, and my sister, Floripes, for their understanding, endurance and may sacrifices.

TABLE OF CONTENTS

Chapter Page

LIST OF TABLES

Table

Page

LIST OF FIGURES

CHAPTER I

INTRODUCTION

Agriculture is the single most important industry among the economic activities in Oklahoma. Of the agricultural enterprises dairy cattle is an important one based on the volume of resources tied up with the enterprise and returns obtained. In 1975 the Oklahoma gross income from dairy products exceeded $95 million or 5.6 percent of total farm income, after beef, wheat and hays.

Milk is described as the existing most perfect food. Milk is a good source of major nutrients required for human nutrition. It is well known that dairy cattle are an efficient converter of feed protein into food protein. This implies there is a potential for complementarity among farm feed production and dairy enterprises.

Milk production has been stable or experienced a slight decrease in Oklahoma, although price increases have more than compensated, resulting in an increased total revenue. Another relevant aspect justifying further studies aimed at better dairy farm organization is the inelasticity of milk demand. This implies that research efforts leading to higher levels of efficiency in dairy farming may be more productive than those leading to increased milk production.

In a extensive survey of the U.S. dairy industry, Hoglund, (14,p.4) points out that the major trend "has been toward fewer farms and cows but higher-producing and larger herds". In a study predicting

expected changes in production and consumption toward the year 1985 for New York State, Conneman (8,p.1) says that "although the dairy industry is usually considered a relatively stagle industry, rapid changes have been taking place in the structure of dairy farming in recent years". The same pattern can be observed in Oklahoma, where the milk cow population has been decreasing since long ago. During the last ten years ending in 1975, the number of dairy cows decreased 10 percent from 128,000 head in 1966. The number of grade A farms has been decreasing. In 1975, 1450 farms had producing milk cows, whereas in 1966 these were 2000 farms. Consequently, milking cows per farm increased over this period.[1]

The Problem

The dairy enterprise requires a high degree of specialization compared to other farm production enterprises. It requires a continuous flow of labor and management and as a consequence it does not allow a flexible organization nor does it permit easy entrance and exit.

Improperly organized dairy farms may fail to succeed in providing the necessary net income for family living and debt retirement. Farms improperly organized often exist only by the gradual utilization of the farm capital. Rapid inflation of land prices has allowed these producers to continue and very often have an increase in net assets but will land prices continue increasing into the future?

Dairy production has been characterized by continuous transformations. Purchased inputs including concentrated feed and automation in feeding

[1] Cows represent the number used by USDA in providing the percentage of cows on DHIA test in Oklahoma. The number of farms marketing grade A milk is based on State Department of Health inspections (7).

the herd have been substituted for the traditional inputs land and labor. An increasing substitution of capital for labor has occurred with the adoption of herring-bone milk parlors. Also, improved techniques have transformed the dairying from being a primarily supplementary enterprise to one having the characteristics of a primary production activity or even the single enterprise on a farm. Specialization of the sector is evident when one sees that the number of dairy cows and dairy farms has diminished but total production has been stable in the recent years. As pointed out earlier, the statistics show a trend toward fewer commercial dairy farms and increase in the dairy cow herd size, at national as well as at state levels. This has resulted in increasing investment in buildings, equipment and livestock.

In addition, the dairy farm like many other firms must compete for resources produced off-farm particularily labor and capital. Therefore dairymen must plan the allocation of these resources wisely, because with the increase use of off-farm inputs, fixed costs are turned into variable costs.

In general terms, the problem is a search for the best organization of the dairy business operation as related to level of technology, dairy herd size, production level, size of the farm, input prices and output prices.

Objectives

The central objective is to determine the management decisions necessary for Oklahoma milk producers to achieve certain goals. In addition, the study applies the knowledge of agronomy, dairy science, farm management and computer modeling in dairy farm planning.

Specifically, the objective is to determine optimum dairy farm combinations of feed and milk production under varying farm resource situations. Linear programming will be the modeling technique used.

Area of Study

The study area is Central Oklahoma, an important dairy producing region, containing approximately 1/4 of the state production. The rest of the production is scattered throughout other regions. Central Oklahoma region has 13 counties, one of which - Lincoln - has the highest milk production in the state. In January, 1975, there were 38,700 head in Central Oklahoma or more than 30 percent of the state herd (27). In addition, Oklahoma City, located in the area, represents an important delivery point for milk produced. The area is suited for the production of most forages and grains required for milk production.

Previous Studies in Oklahoma

Many aspects of dairying have received significant research efforts. Cost and returns, organization of dairy farms, consumer preferences for dairy products, marketing, and firm growth are some examples.

Hughes was one of the first analyze the factors and economic relationships associated with dairy farming (15). King (17), Underwood (38), and Mangum (21) contributed in the related area of cost and returns of the dairy farming enterprise. Underwood conducted an economic survey of resources used by dairy farmers which guided further studies in the field (38).

Sparks analyzed feeding systems for replacement heifers. Budgeting techniques were used to study some alternatives in raising, buying, or contract raising dairy herd replacements (36).

McMullin (22) and Shafer (34) focused on consumer preferences for dairy products and services, whereas Burnet (6), Rogers (32) and Brooks (5) studied the market for dairy products. More recent studies for the country's milk industry as a whole were made by Kloth (19) and Riley (31).

Linear programming techniques have been largely utilized in least cost rations formulation, optimization of beef-forage models and to a lesse estent to dairy farm planning in Oklahoma. Grubb determined coefficients and used them to organize resource use to maximize profits by the dairy farmer. He utilized linear programming techniques to find the organization most conducive to high returns. Although he considered roughage programs without analyzing their relationship to the least cost system, Grubb concluded that roughages produced on farm contributed most to profits (10).

Smith conducted a study "to define some alternative least cost roughage systems". He considered only TDN as a basis for nutrient requirements. He found that by reorganizing their roughage systems, dairymen could increase their net farm income (35).

Using a linear programming framework, Quance looked at the least cost roughage systems for dairy cattle in the Oklahoma City milkshed, subject to restrictions on nutrient requirements (TND, DP, DM) and the stomach intake of animals (28).

In a more recent study dealing with firm growth of Oklahoma grade A dairy farms Hall sought to "determine the nature of management decisions necessary to attain specific goals subject to various initial organizations, resources and institutional restraints, and technology levels". Utilizing this information, he developed a firm growth simulator. Linear programming was used to obtain the initial resource base organization necessary to maximize net income (11).

CHAPTER II

THE CONCEPTUAL MODEL

In the determination of the optimal organization of the dairy farm the management is faced with problems of choice. Sometimes the problem is simple and can be solved by experience and common sense. But most of the time there are a number of variables that cannot be easily handled. In this instance one may resort to mathematical programming techniques. One of the most widely known and used is linear programming.

The general linear programming model may be expressed as:

Optimize $Z = f(x_1, x_2, \ldots, x_n) = c_1x_1 + c_2x_2 + \ldots + c_nx_n$,

subject to:

$$g_1(x_1, x_2, \ldots, x_n) = a_{11}x_1 + a_{12}x_2 + \ldots + a_{1n}x_n \ (\leq=\geq) \ b_1,$$
$$g_2(x_1, x_2, \ldots, x_n) = a_{21}x_1 + a_{22}x_2 + \ldots + a_{2n}x_n \ (\leq=\geq) \ b_2,$$
$$\vdots \qquad\qquad\qquad\qquad\qquad\qquad \vdots$$
$$g_m(x_1, x_2, \ldots, x_n) = a_{m1}x_1 + a_{m2}x_2 + \ldots + x_{mn}x_n \ (\leq=\geq) \ b_m,$$
$$x_1, x_2, \ldots, x_n \geq 0.$$

The above formulation can be expressed in a compact form by using the summation sign.

Optimize $Z = f(x_1, x_2, \ldots, x_n) = \sum_{j=1}^{n} c_jx_j$,

subject to:

$$g_i(x_1, x_2, \ldots, x_n) = \sum_{j=1}^{n} a_{ij}x_j \ (\leq=\geq) \ b_i, \ i = 1, 2, \ldots, m,$$
$$x_j \geq 0, \ j = 1, 2, \ldots, n.$$

Where c_j, b_i, and a_{ij} are known constants. The variables x_j are the decision variables. The function to be optimized (minimized or maximized) is called the objective function. The maximization or minimization of the objective function with respect to the decision variables x_j is performed in such a manner as to satisfy the g_i constraints. For each constraint only one of the signs ($\underline{<=>}$) holds, i.e., the constraint is either a function or one of the inequalities. In the real world all decision variables must take positive or zero values.

The general linear programming is implicitly accompanied by a set of assumptions. They are: (a) linearity or proportionality of the variables in the constraints and the objective function to be optimized; (b) additivity of the activities, i.e., when two or more are used then the total product must be the sum of their individual products; (c) divisibility with respect to factors used and products obtained; (d) finiteness which means that there is a limit in the number of alternative activities to be considered, and (e) deterministic or that all the parameters of the model (the a_{ij}, b_i, and c_j values) are known constraints (1, 13).

In the linear programming terminology it is conventionally said that any specification of values for the decision variables x_j is called a solution, regardless of whether it is a desirable or a permissible alternative. Other types of solutions are identified, so that any solution for which all constraints and the negative restraints are satisfied is called a feasible solution. The purpose of linear programming is to search for the best solution as determined by the value of the objective function. Any feasible solution that optimizes the objective function is called an optimal feasible solution. The ultimate goals of the linear programming problem is to find an optimal feasible solution. For

additional details concerning theoretical aspects of linear programming see Heady and Candler (12), Hillier and Lieberman (13) or any other text in linear programming.

Economic Relationships

Marginal analysis is concerned with the derivation of optimal relationships for the factor-product, factor-factor and product-product models.

Naylor analyzed in some depth the differences underlying marginal analysis model and linear programming model of the firm following the Hicksian model of the multi-product, multi-factor competitive firm (25). He points out that it is in the production function that originates the principal differences between the definition of the "production function" and the definition of an "activity". Naylor (26), summarizing the salient differents laid down by Dorfman, wrote:

> ...the [activity] of linear programming is a more specifically defined concept than the production function of marginal analysis. Indeed, a production function is a family of [activities] which use the same factors and turn out the same products. If we compare any two points on a production surface, if the internal ratios of the inputs and outputs at the two points are the same they will represent different levels of the same [activity], otherwise they will represent different [activities]. The production function thus is a tool for exhibiting and comparing different but related [activities]. What it fails to present adequately is the consequence of using several [activities] in parallel, and such combinations of [activities] are characteristics of modern industry (p. 268).

Nevertheless, with a sufficient number of activities the optimum allocation of resources derived from linear programming is the same as derived using marginal analysis.

Following is a discussion of the three models embodied in both marginal analysis and linear programming. Only the necessary conditions are presented (16).

Factor-Product Model

The equilibrium of the factor-product model determines the most profitable level of output and the corresponding level of input. Considering the continuous production function $Y = f(X_1/X_2, \ldots, X_n)$ profits are maximum when:

$$\frac{\Delta Y}{\Delta X} = \frac{P_X}{P_Y}$$

In Figure 1 point c is a point of such an equilibrium.

The linear programming production function is "discrete" or "discontinuous". In Figure 1 the function is represented by the dashed line abcd. The activities of the linear programming are represented by the various points a, b, c, and d. Each point represents a particular factor-product ratio, that is, each of the activities use input of factor X to produce the output of product Y but at different levels. Therefore, by increasing the activities of the linear programming to a finite number it is possible to approximate the continuous function by successive additional line segments forming the discontinuous function. The equilibrium optimum amount of factor X is at point c where the condition holds $\Delta Y/\Delta X = P_X/P_Y$. For the discontinuous production function, abcd, profit maximization occurs at point c defined by:

$$\frac{\Delta Y}{\Delta X} \geq \frac{P_X}{P_Y} \geq \frac{\Delta Y'}{\Delta X'}$$

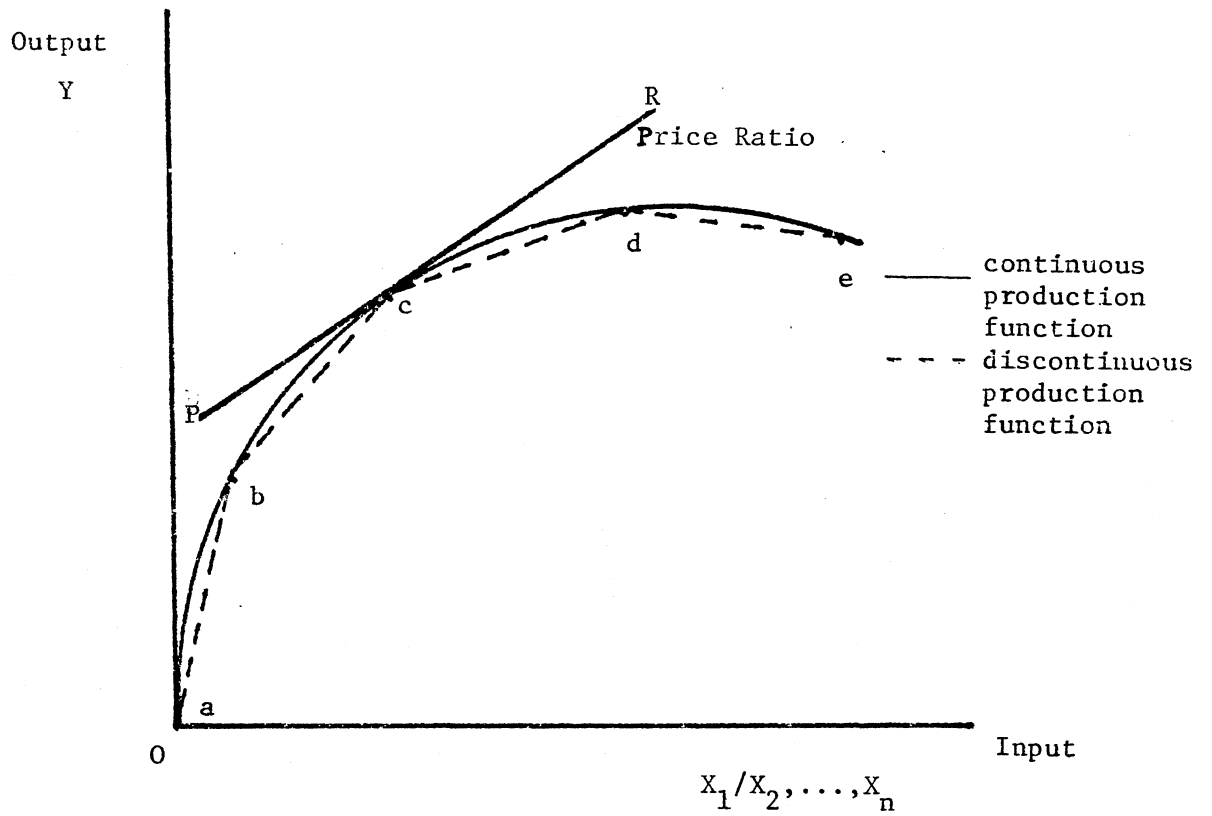

Figure 1. Profit Maximization in the Factor-Product Model.

where:

$\frac{\Delta Y}{\Delta X}$ is the change in product per unit change in the factor (or marginal physical product) for the line segment ab, and,

$\frac{\Delta Y'}{\Delta X'}$ is the change in product per unit change in the factor (or marginal physical product) for the line segment bc.

The maximum profit point is indicated by the point where the factor-product price ratio is equal to the marginal physical product or, graphically, price ratio line, PR, is tangent to the continuous production function, abcd.

Factor-Factor Model

The factor-factor equilibrium model indicates the least cost combination of two factors in the production of a unique quantity of a product or maximize output for a given level of cost. Consider the production function $Y = f(X_1, X_2, /X_3, \ldots, X_n)$. In Figure 2 an isoquant line and an isocost line are depicted from a family of such lines. Every output level may be represented by an isoquant line and outlays for inputs can be represented by an isocost line. For the continuous case the least cost criterion is given by point b where:

$$\frac{\Delta X_1}{\Delta X_2} = -\frac{P_{X_2}}{P_{X_1}}$$

The left side of the equation represents the slope of the isoquant and the right side, the slope of the isocost line. Therefore, the least cost combination is at the point where the isocost line is tangent to the isoquant, given the convexity of the latter.

For the discrete case, the isoquant is not continuous or is formed by broken segments because of the linearity and finiteness assumptions of linear programming.

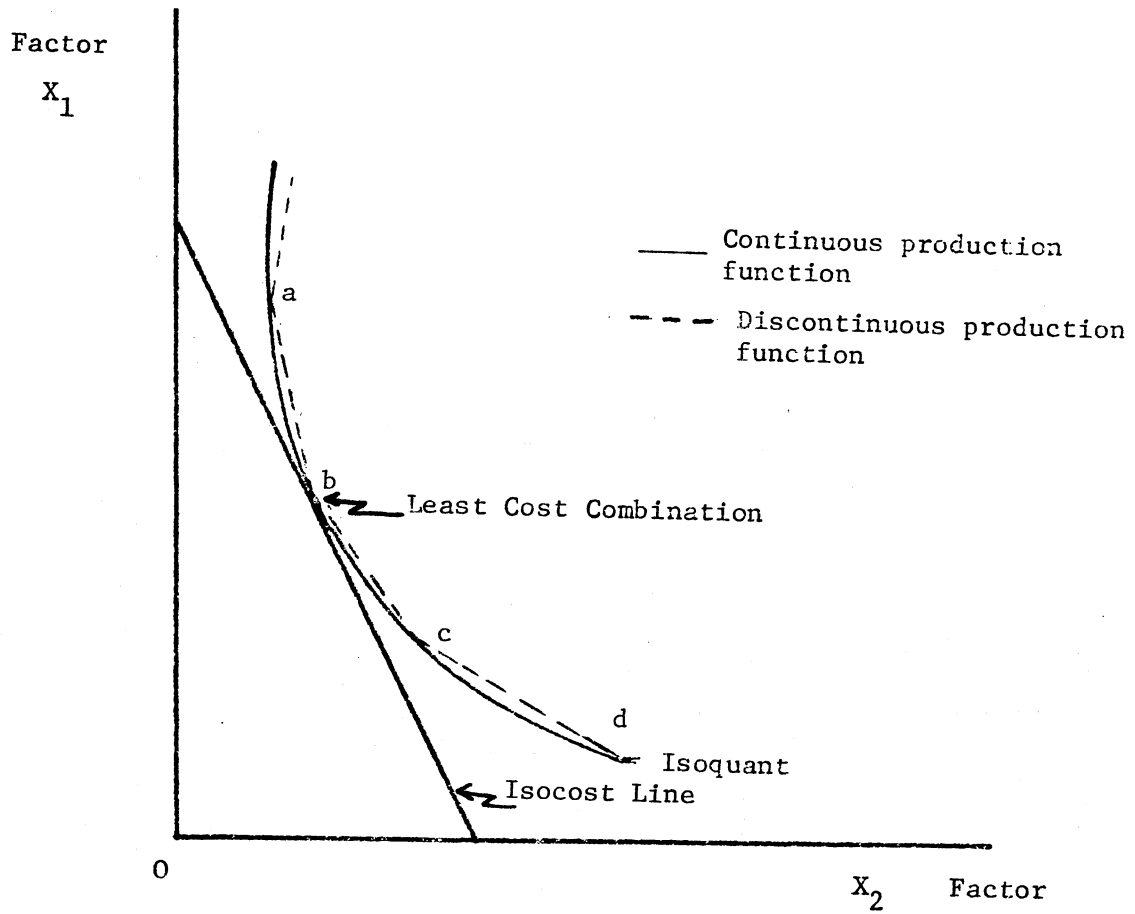

Figure 2. Factor-Factor Equilibrium.

In Figure 2 the discontinuous isoquant is illustrated by line abcd. Equilibrium is given by:

$$\frac{\Delta X_1}{\Delta X_2} \geq -\frac{P_{X_2}}{P_{X_1}} \geq \frac{\Delta X_2'}{\Delta X_2'}$$

where:

$\frac{\Delta X_1}{\Delta X_2}$ is the change in factor X_1 per unit change in the factor X_2 (marginal rate of technical substitution) for the segment bc, and;

$\frac{\Delta X_1'}{\Delta X_2'}$ is the change in factor X_1 per unit change in the factor X_2 (marginal rate of technical substitution) for the segment ab of the isoquant curve.

Linear programming activities are represented by points such as a, b, c, and d. They require different ratios of the factors of production (X_1, X_2) to produce the fixed quantity of product (Y). To find which activity is the least cost combination of the factors of production turns out to be an economic problem in which solution linear programming may be employed.

Product-Product Model

In the product-product model the equilibrium is indicated by the maximum profit combination of outputs made possible by the use of certain amount of the input or set of inputs. In Figure 3 the production possibility curve is depicted as well as the isorevenue line. The point of tangency of the two curves (point c), given that the former is concave down, is defined where:

$$\frac{\Delta Y_2}{\Delta Y_1} = -\frac{P_{Y_1}}{P_{Y_2}}$$

Because of the linearity and finiteness assumptions of linear programming the production possibility curve is formed by broken lines in

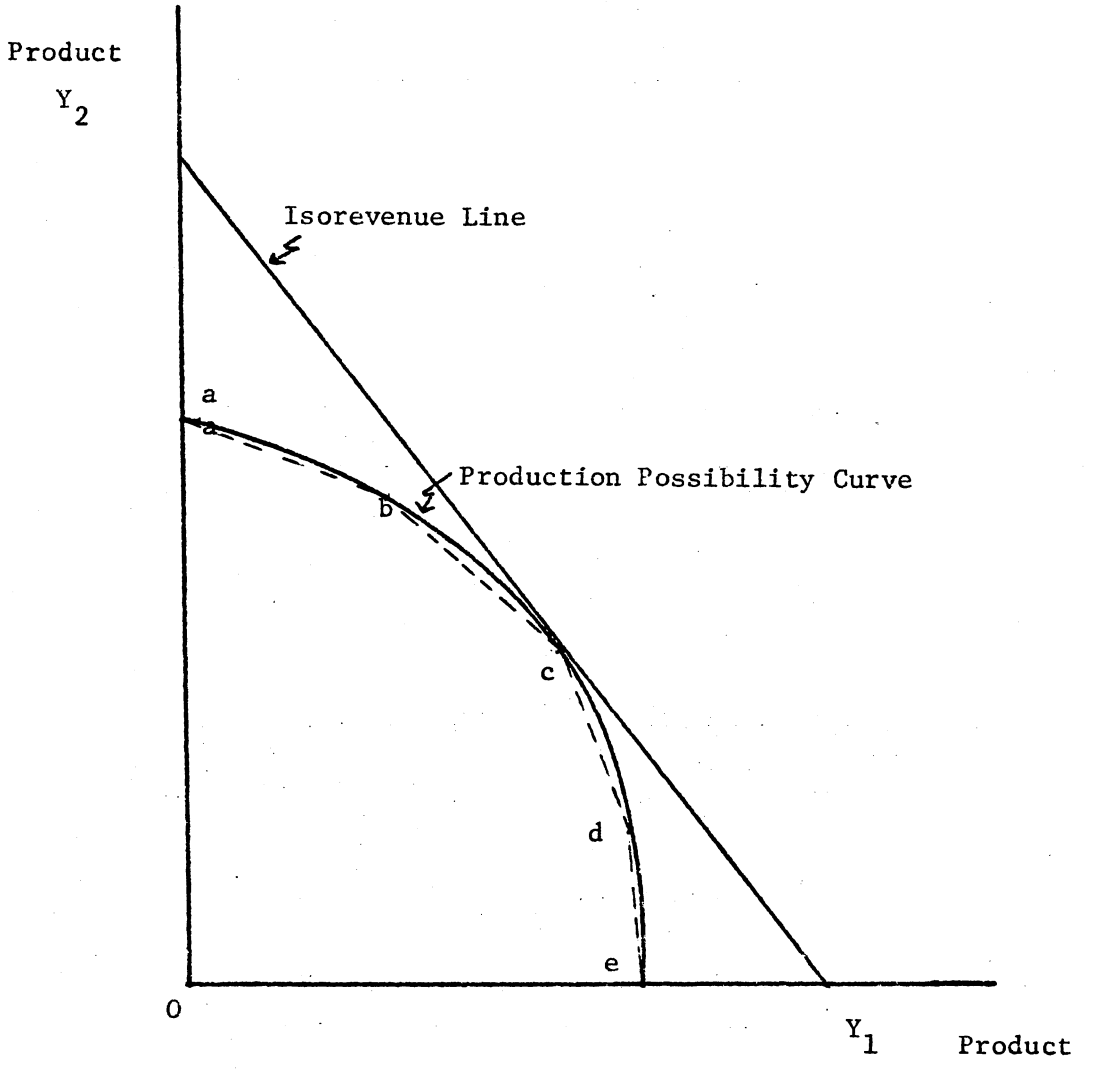

Figure 3. Product-Product Equilibrium.

in the discontinuous case. In this case the profit maximization combination of products is given by:

$$\frac{\Delta Y_2}{\Delta Y_1} \geq -\frac{P_{Y_1}}{P_{Y_2}} \geq \frac{\Delta Y_2'}{\Delta Y_1'}$$

where:

$\frac{Y_2}{Y_1}$ is the marginal rate of substitution of product Y_1 for product Y_2 for segment bc, and;

$\frac{Y_2'}{Y_1'}$ is the marginal rate of substitution of product Y_1 for product Y_2 for segment cd of the production possibility curve.

In the linear programming problem the line segments ab, bc, de represent the constraints on the factor of production and consequently on the production level.

Technical Relationships

Dairy Nutrition

Nutrients are usually classified as energy, protein, minerals, and vitamins. Dairy cattle need nutrients for proper physiological functioning. According to Schmidt and Van Vleck (33) the two most important are energy and protein.

Energy. Energy is the most important nutritive requirement in the dairy ration formulation. An insufficient supply of energy has the effect, in young animals, of retarding both growth and the start of puberty, and in adult animals to depress milk production and cause loss of body weight. Prolonged lack of energy depresses the reproduction function (25). The nutritionists propose many measures of energy. Net

energy is the measure used here. It is more appropriate than others to indicate the energy value of feeds and energy requirements of dairy cattle, because it expresses these values according to the physiological function performed. Thus, there are two general considerations in determining energy needs. First, net energy for maintenance (NE_m) and net energy for body gain (NE_{gain}) are the two values found in tables of requirements and composition of feeds. Net energy for maintenance is the net energy value of feeds used by nonlactating animals for maintenance. Net energy for gain is the net energy value of feeds necessary for deposition of body gain of nonlactating animals. Second, net energy for lactating cows expresses the energy necessary for maintenance, pregnancy, and milk production. All three physiological functions are expressed in just one value as $NE_{lactating\ cows}$. Tables of feed composition and requirements are readily available (25).

Protein. Protein is important in dairy feeding because it supplies amino acids for physiological functions. Protein is needed for growth, maturation, and production of milk by dairy cattle; interruption of gestation may occur due to a protein deficiency. If the deficiency is severe, decline in solids-nonfat occurs. Protein administered in excess increases protein content of milk but does not influence milk yield. Microorganism in the ruminant's rumen can synthesize the needed amino acid from nonprotein nitrogen sources and lower quality protein. Therefore, the composition of the amino acid of the dietary protein is not critical. "If a nonprotein source of nitrogen makes up a large portion of the protein requirements, additional energy is required for the cows to synthesize the necessary amino acids" (33, p. 331). Excess protein is not toxic to the animal.

This study uses digestible protein which is the portion os crude protein assimilated by the organism.

Minerals. The requirements for mineral elements by dairy cattle is well known. Perhaps the most important are calcium, phosphorus and sodium chloride. In general, dairy rations contain sufficient amounts of all mineral elements. Mineral and salt mix are fed free choice in the model and the cost is included in the budgets of all classes of dairy enterprises.

Vitamins. There is a variety of vitamins and the effects of deficiencies are well documents. In general, natural feeds provide most vitamins in adequate amounts. Source vitamins are synthesized in the animal's rumen. Vitamins needed are fed in the model and the cost is included in the enterprise budget.

Although water and antibiotics are not considered nutrients they are essential to the animal's life. Water is not a feed and despite this it is the most critical element. It has important functions in the animal body. The animal can suffer lack of water more easily than a shortage of other nutritive elements. Water is provided free access in the model.

Antibiotics are not nutrients but additives to feeds. They are specially important for young calves. The cost of providing antibiotics is included in the budgets of all dairy enterprises.

Voluntary Dry Matter Intake. The dry matter intake is dependent upon the palatability of the feedstuff. Also, the stomach capacity and class of animal (e.g., lactating cow, calf, dry cow, etc.) influences the intake. As Schmidt and Van Vleck (33, p. 321) point out, there are

two aspects which control the intake of feed: one is "physical limitations (distension of rumen or fill)" and the other is "metabolic results associated with absorption of nutrients from a meal." Feed intake is related to distension of rumen, i.e., the intake of feed is directly associated to digestibility of feed. Nevertheless, further increases of digestibility of the feed through grinding or pelleting of roughages or addition of concentrates, causes dry matter intake to decrease while energy intake remains constant. In this range rumen fill does not limit feed intake. Instead, some chemostatic or thermostatic mechanisms control feed intake (33).

CHAPTER III

THE ANALYTICAL PROCEDURE

The last chapter described briefly the theoretical model including some economic relationships relevant to it. This chapter focuses on the analytic procedure. The model represents a 500-acre dairy farm in Central Oklahoma. The resources available are described and activities are established, i.e., land, labor, management, capital, buildings, machinery and equipment, the alternative crops and dairy production activities. Additionally, the parameters and assumptions underlying those activities are presented.

The optimization of the program is sought through the Mathematical Programming System Extended (MPSX). Given the size and the characteristics of the problem a special algorithm was developed to aid data preparation for the MPSX model.

Farm Resources

Land

The model depicts a 500-acre dairy farm located in Central Oklahoma. The soil is of average quality divided into two broad categories according to its potential ability: 360 acres of cropland and 140 acres of pastureland.

Labor and Management

The owner-operator-manager is assumed to provide 3000 hours of labor per year, or 250 hours per month. His labor will be used to take care of farm activities, supervise hired labor, to perform non-farm activities, and spend time in entrepreneurial activities. Also it is assumed that the manager has the ability necessary to maintain the production levels given in this study.

A strong assumption made is that all labor required beyond the 250 hours per month can be promptly hired on an hourly basis in the labor market. Labor requirements are included in the enterprise budgets shown in the Appendix.

Machinery and Equipment

All machinery and equipment needed by the dairy farm is listed in the livestock and crop budgets. The machinery and equipment set is composed of 19 different pieces. The costs, fixed and variable, are estimated by means of the OSU-Agricultural Economics Department Enterprise Budget Generator (18). All assumptions concerning enterprises are stored in this program as coefficients. For example, years owned, hours used annually, hours of life, salvage values, etc., are supplied for every machine and implement.

Constructions

All housing facilities, including the barn with milking parlor, and silos are considered sufficient in number and capacity to handle the dairy herd and feed, respectively.

Capital

The operating capital necessary for the operation is assumed to be owned by the operator and provided free of interest charge.

Pasture Activities

The study considers three pastures: bermuda, wheat and native grass. It assumes delayed grazing is feasible. This means that pasture may be grazed at a later period but at the expense of dry matter quantity, but more importantly at the expense of pasture quality. Thus a coefficient of loss is assumed for dry matter, digestible protein and net energy (Table I).

Information concerning each pasture activity is shown in the enterprise budgets (Appendix Tables LXII, LXIII, and LXIV).

Crop Activities

Forage sorghum is the only silage activity considered by this study. Two hay activities are included: Sudan hay and alfalfa hay. The grains are sorghum, barley, and wheat. Sorghum stubble, barley pasture and wheat pasture are included as possible pastures. Wheat pasture from small grain grazeout and wheat pasture are combined in only one wheat pasture activity. The same assumptions concerning losses when pastures are grazed in later periods apply. Likewise, for silage and hays storage losses in quantity and quality are assumed in terms of dry matter, digestible protein and net energy (Table II). Other information concerning crops are given in the enterprise budgets, shown in Appendix Tables LXV to LXX.

TABLE I

LOSS COEFFICIENTS FOR PASTURES FROM MONTH IN ROW TO THE FOLLOWING MONTH

Month	Bermuda			Sm. Gr. Grazeout			Native Grass		
	DM	DP	NE	DM	DP	NE	DM	DP	NE
January	.05		.02	.05		.5	.05		.05
February	.05		.02	.05	.3	.5	.05		.05
March	1.00	1.00	1.00	.05		.5	1.00	1.00	1.00
April	.05	.03	.06	1.00	1.00	1.00	.05	.484	.08
May	.05		.06				.05	.091	.08
June	.05	.2	.06				.05	.033	.08
July	.05	.11	.02				.05	.052	.08
August	.05		.02				.05		.08
September	.05		.02				.05		.08
October	.05	.36	.02	.05	.015	.5	.05	.082	.18
November	.05		.02	.05		.5	.05	.082	.18
December	.05		.02	.05		.5	.05		.05

DM is Dry Matter, DP is Digestible Protein, and NE is Net Energy.

Source: Estimated from (2).

TABLE II

LOSS COEFFICIENTS FOR CROPS AND PASTURES FROM MONTH IN ROW TO THE FOLLOWING MONTH

Month	Sorghum Silage			Sudan Hay			Alfalfa Hay			Grain Sorghum Stubble			Barley Pasture			Small Grain Graze in		
	DM	DP	NE	DM	DP	NE	DM	DP	NE	DM	DP	NE	DM	DP	NE	DM	DP	NE
January				.02	.03	.08	.02	.03	.08				.1	.2	.2	.05		.5
February				.02	.03	.08	.02	.03	.08				1.0	1.0	1.0	1.0	1.0	1.0
March																		
April							1.0	1.0	1.0									
May							.02	.03	.08									
June				1.0	1.0	1.0	.02	.03	.08									
July				.02	.03	.08												
August	1.0	1.0	1.0															
September	.03	.05	.04	.02	.03	.08												
October	.03	.05	.04	.02	.03	.08	.02	.03	.08									
November	.03	.05	.04							1.0	1.0	1.0	.1	.2	.2	.05	.015	.5
December	.03	.05	.04	.02	.03	.08	.02	.03	.08				.1	.2	.2	.05		.5

Source: Based partly in (2).

Oats, corn and soybeans are not grown on this farm. They are feeds that with molasses are acquired elsewhere.

The composition of all pasture and crop feed activities used are given in Table III.

The crops potentially grown on this farm may serve as either an intermediate product, in which case they are going to feed the dairy herd, or as final products being disposed directly in the market, or both. It may happen that, depending on prices relationship, it is more advantageous all feeds off the farm and grow crops for market only. Later in this chapter a diagram is given with all possible alternatives.

Prices received and prices paid for feeds used in the study are given in Table IV. They represent as accurately as possible the current prices. But they are not exempt of fluctuations. It was possible to obtain the seasonal variation for some prices. For others it is assumed that an average price will be representative throughout the year.

Livestock Activities

The study considers a large dairy breed, Holstein, for example, in the production of milk. Mature cows are assumed to have a live weight of 1400 lbs. or 650 kg. and are assumed to have the ability to be high producing cows. Three levels of production, 12,000, 15,000, and 18,000 pounds, of 3.5 percent fat corrected milk in a 305-day period of lactation are assumed. These three levels are adapted to a typical milk production curve (Table V). An adjustment factor for milk production is applied to take into account seasonality and month of calving (Table VI).

Given the cow size and the production ability the requirements are readily calculated for each month from freshening. Calculated are the

TABLE III

MONTHLY COMPOSITION OF FEEDS ON A DRY MATTER BASIS

Feed	Month	Dry Matter (%)	Net Energy: Lactating Cows NE_{lact} (Mcal./cwt.)	Net Energy: Growing Dairy Cattle NE_{maint} (Mcal./cwt.)	Net Energy: Growing Dairy Cattle NE_{gain} (Mcal./cwt.)	Digestible Protein (%)	Crude Fiber (%)
Bermuda Pasture	04	25.0	62.6	59.0	31.3	7.69	25.6
	05	30.0	62.6	59.0	31.3	7.45	25.6
	06	35.0	62.6	59.0	31.3	7.45	25.6
	07	40.0	47.5	48.3	12.2	6.00	25.6
	08	45.0	47.5	48.3	12.2	5.33	25.6
	09	50.0	47.5	48.3	12.2	5.33	25.6
	10	55.0	47.5	48.3	12.2	5.00	25.6
Small Grain Graze Out	10	26.0	78.1	72.6	46.4	19.3	22.9
	11	26.0	78.1	72.6	46.4	19.0	22.9
	12	26.0	78.1	72.6	46.4	19.0	22.9
	01	26.0	78.1	72.6	46.4	19.1	22.9
	02	26.0	78.1	72.6	46.4	19.0	22.9
	03	26.0	78.1	72.6	46.4	13.3	22.9
	04	26.0	78.1	72.6	46.4	13.3	22.9
	05	26.0	78.1	72.6	46.4	13.3	22.9
Nature Pastures	04	30.0	62.6	59.0	31.3	12.8	26.1
	05	35.0	62.6	59.05	31.3	6.7	26.1
	06	40.0	62.6	59.0	31.3	5.9	26.1
	07	45.0	62.6	59.0	31.3	5.8	26.1
	08	50.0	62.6	59.0	31.3	5.6	26.1
	09	55.0	62.6	59.0	31.3	5.5	26.1

TABLE III (Continued)

Feed	Month	Dry Matter (%)	Net Energy: Lactating Cows NE_{lact} (Mcal./cwt.)	Net Energy: Growing Dairy Cattle NE_{maint} (Mcal./cwt.)	Net Energy: Growing Dairy Cattle NE_{gain} (Mcal./cwt.)	Digestible Protein (%)	Crude Fiber (%)
Nature Pasture	10	60.0	62.6	59.0	31.3	5.5	26.1
	11	65.0	62.6	59.0	31.3	.9	26.1
Sorghum Silage	09	30.0	62.6	56.7	27.7	1.8	6.6
Sudan Hay	07, 09	89.0	59.0	57.3	28.1	5.5	28.9
Alfalfa Hay	05, 06, 10	90.0	64.4	64.4	40.0	15.5	24.4
Sorghum, Grain	10	89.0	91.3	83.9	55.8	7.0	2.5
Sorghum, Stubble	11	67.0	57.2	55.6	26.3	4.6	30.8
Barley, Grain	06	89.0	104.3	96.6	63.5	9.6	6.0
Barley, Pasture	11, 12, 01, 02	22.0	72.4	66.2	40.1	13.5	23.1
Wheat, Grain	06	89.0	113.0	97.5	64.4	10.0	2.8
Wheat, Pasture	11, 12, 01, 02	26.0	78.1	72.6	46.4	19.0	22.9
Oats		89.0	92.5	78.5	51.7	9.8	11.9
Corn Grain		89.0	117.9	103.4	67.1	6.7	2.0

TABLE III (Continued)

Feed	Month	Dry Matter (%)	Net Energy: Lactating Cows NE_{lact} (Mcal./cwt.)	Net Energy: Growing Dairy Cattle NE_{maint} (Mcal./cwt.)	Net Energy: Growing Dairy Cattle NE_{gain} (Mcal./cwt.)	Digestible Protein (%)	Crude Fiber (%)
Soybean Meal		89.0	101.2	87.5	58.5	47.2	5.9
Molasses		77.0	117.9	103.4	67.1	3.4	0.0

Sources: (2), (24), (25), (29), (30).

TABLE IV

MONTHLY PRICES RECEIVED AND PRICES PAID FOR FEEDS

Item	Month											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Sudan Hay - Prices Rec.	45.26	46.04	45.67	44.28	37.64	36.57	36.49	38.95	38.62	39.11	39.98	43.38
Prices Paid	49.26	50.05	49.67	48.28	41.64	40.57	40.49	42.95	42.62	43.11	43.98	47.38
Alfalfa Hay - Prices Rec.	62.85	63.85	62.40	60.72	50.95	49.77	48.98	52.91	53.31	53.59	54.88	60.05
Prices Paid	67.85	67.85	68.58	65.72	55.95	54.77	53.98	57.91	58.31	58.59	59.88	65.05
Grain Sorghum - Prices Rec.	4.32	4.25	4.14	4.04	3.98	4.08	4.19	4.65	4.31	4.32	4.32	4.38
Prices Paid	4.62	4.55	4.44	4.34	4.28	4.38	4.49	4.95	4.61	4.62	4.62	4.68
Barley - Prices Rec.	2.35	2.34	3.31	2.24	2.18	2.07	2.09	2.20	2.24	2.29	2.33	2.37
Prices Paid	2.65	2.64	2.61	2.54	2.48	2.37	2.39	2.50	2.54	2.59	2.63	2.67
Wheat - Prices Rec.	3.63	3.38	3.19	3.05	2.95	2.89	2.92	3.64	3.50	3.54	3.48	3.69
Prices Paid	3.93	3.68	3.49	3.35	3.15	3.19	3.22	3.94	3.80	3.84	3.78	3.99
Oats - Prices Paid	1.74	1.72	1.68	1.64	1.62	1.51	1.51	1.64	1.65	1.67	1.68	1.74
Corn - Prices Paid	3.05	3.02	2.93	2.83	2.87	2.94	3.00	3.24	3.07	3.01	2.98	3.08
Soybean Meal - Prices Paid	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
Molasses - Prices Paid	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50

Sources: Based partly in (3), (4), (37).

TABLE V

DISTRIBUTION OF TYPICAL MILK PRODUCTION AS A PERCENT OF TOTAL ANNUAL PRODUCTION

Month of Lactation from Freshening											
1	2	3	4	5	6	7	8	9	10	11	12
12.6	15.2	14.5	12.6	10.8	9.0	7.6	6.5	5.8	5.4	0	0

TABLE VI

FACTORS FOR DETERMING TOTAL PRODUCTION OF HOLSTEIN COWS IN OKLAHOMA BASED ON MONTH OF FRESHENING

Age (Months)	Month of the Year											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
52	1.00	1.00	1.00	1.01	1.03	1.06	1.10	1.11	1.02	1.04	1.02	1.01

Source: (40).

basic nutrients (digestible protein and net energy), dry matter, and fiber (Tables VII, VIII, and IX).

Dry cows have their requirements calculated for the two months they are assumed dry and in gestation (Table X).

Replacements can either be purchased or raised. In this last instance it is assumed that replacements take 24 months to be ready to go into the herd from the time they are born. To facilitate handling the replacements in the model, they are divided into three age groups: calves (0-6 months), heifers (7-15 months), and replacements (16-24 months). Calves up to six months old have their nutrient requirement built into the enterprise budget. The calf starter composition is given in Table XI. All three groups of replacements have their requirements calculated monthly (Tables XII and XIII).

Labor requirements for all classes of dairy animals are presented in the budgets (Appendix Tables LXXI to LXXVII). Some data on labor requirements are available in (9), (23), (39). Additional essential assumptions concerning dairy activities are given in Table XIV.

Another point considered in this study relates to constraints limiting dry matter provided dairy cows coming from concentrates. It is assumed that a maximum 60 percent dry matter can come from concentrates, the other 40 percent being from roughages. Also there are constraints on a particular concentrate. For purposes of this study, the imposition of such constraints are as follows: grain sorghum, 50 percent; barley, 60 percent; wheat, 30 percent; oats, 50 percent; corn, 60 percent; soybean meal, 20 percent; and molasses, 3 percent.

TABLE VII

MONTHLY PRODUCTION AND NUTRIENT REQUIREMENTS BY COWS PRODUCING 12,000 POUNDS OF 3.5 PERCENT FAT CORRECTED MILK IN A 305-DAY PERIOD OF LACTATION

Month	Production (lbs.)	Dry Matter* (lbs.)	Digestible Protein (%)	Net Energy (Mcal)
01	1512.0	1112.0	0.114	807.3
02	1824.0	1250.0	0.114	907.8
03	1740.0	1213.0	0.114	880.8
04	1512.0	1112.0	0.114	807.3
05	1296.0	1162.0	0.105	738.1
06	1080.0	1056.0	0.105	670.5
07	912.0	973.0	0.105	617.9
08	780.0	908.0	0.105	576.6
09	696.0	867.0	0.105	550.3
10	648.0	843.0	0.105	535.3

Source: (25).

*Dry matter required = $\frac{\text{Net Energy Required}}{\text{Net Energy (corrected for feeding level)}}$

In calculating Net Energy Required to compensate for reduction in feed value at high levels of feed intake, an allowance of three percent for each 22 lbs. of milk produced above 44 lbs./day was made.

TABLE VIII

MONTHLY PRODUCTION AND NUTRIENT REQUIREMENTS BY COWS PRODUCING 15,000 POUNDS OF 3.5 PERCENT FAT CORRECTED MILK IN A 305-DAY PERIOD OF LACTATION

Month	Production (lbs.)	Dry Matter* (lbs.)	Digestible Protein (%)	Net Energy (Mcal)
01	1890.0	1280.0	0.114	929.1
02	2280.0	1296.0	0.123	1057.4
03	2175.0	1253.0	0.123	1022.5
04	1890.0	1280.0	0.114	929.1
05	1620.0	1160.0	0.114	842.1
06	1350.0	1040.0	0.114	755.1
07	1140.0	1085.0	0.105	689.2
08	975.0	1004.0	0.105	637.6
09	870.0	952.0	0.105	604.7
10	810.0	923.0	0.105	586.0

Source: (25).

*Dry matter required = $\frac{\text{Net Energy Required}}{\text{Net Energy (corrected for feeding level)}}$

In calculating Net Energy Required to compensate for reduction in feed value at high levels of feed intake, an allowance of three percent for each 22 lbs. of milk produced above 44 lbs./day was made.

TABLE IX

MONTHLY PRODUCTION AND NUTRIENT REQUIREMENTS BY COWS PRODUCING 18,000 POUNDS OF 3.5 PERCENT FAT CORRECTED MILK IN A 305-DAY PERIOD OF LACTATION

Month	Production (lbs.)	Dry Matter* (lbs.)	Digestible Protein (%)	Net Energy (Mcal)
01	2268.0	1294.0	0.123	1055.8
02	2736.0	1482.0	0.123	1209.1
03	2610.0	1430.0	0.123	1166.8
04	2268.0	1294.0	0.123	1055.8
05	1944.0	1304.0	0.114	946.5
06	1620.0	1159.0	0.114	841.7
07	1368.0	1048.0	0.114	760.7
08	1170.0	1100.0	0.105	698.6
09	1044.0	1038.0	0.105	659.2
10	972.0	1003.0	0.105	636.7

Source: (25).

*Dry matter required = $\frac{\text{Net Energy Required}}{\text{Net Energy (corrected for feeding level)}}$

In calculating Net Energy Required to compensate for reduction in feed value at high levels of feed intake, an allowance of three percent for each 22 lbs. of milk produced above 44 lbs./day was made.

TABLE X

MONTHLY NUTRIENT REQUIREMENTS OF DRY COWS

Month	Dry Matter (lbs.)	Digestible Protein (%)	Net Energy (Mcal)
01	878.4	5.1	439.2
02	878.4	5.1	439.2

Source: (25).

TABLE XI

COMPOSITION OF ONE TON OF CALF STARTER

Ingredient	Amount/ Ton (lbs.)	Dry Matter (lbs.)	Digestible Protein (lbs.)	Net Energy	
				Maintenance (Mcal)	Gain (Mcal)
Rolled Grain Sorghum	600.0	534.0	30.0	474.0	318.0
Crimped Corn	300.0	267.0	20.1	276.0	180.0
Crimped Oats	300.0	267.0	26.4	210.0	138.0
Wheat Bran	200.0	178.0	25.0	124.0	78.0
Soybean Meal	460.0	409.4	179.4	358.8	239.2
Molasses	100.0	75.0	1.8	77.0	50.0
Dicalcium Phosphate	20.0	19.2			
Trace Mineralized Salt	20.0	20.0			

Source: (29), (30).

TABLE XII

MONTHLY NUTRIENT REQUIREMENTS FOR CALVES AND YOUNG HEIFERS UP TO 15 MONTHS OF AGE

Month	Dry Matter (lbs.)	Digestible Protein (% of DM)	Net Energy	
			Maintenance (Mcal)	Gain (Mcal)
01	53.0	20.0	33.55	15.25
02	74.0	20.0	38.13	17.53
03	93.0	12.0	42.7	22.87
04	112.0	12.0	49.56	28.96
05	146.0	6.2	61.0	33.6
06	146.0	6.2	61.0	33.6
07	214.0	6.2	94.6	45.7
08	214.0	6.2	94.6	45.7
09	243.0	6.2	109.8	50.3
10	272.0	6.2	125.1	54.9
11	285.0	6.2	130.4	57.9
12	324.0	6.2	146.4	67.1
13	324.0	6.2	146.4	67.1
14	362.0	6.2	164.7	74.0
15	374.0	6.2	170.8	76.2

Source: (25).

TABLE XIII

MONTHLY NUTRIENT REQUIREMENTS OF REPLACEMENTS BETWEEN 15 TO 24 MONTHS OF AGE

Month	Dry Matter (lbs.)	Digestible Protein (% of DM)	Net Energy	
			Maintenance (Mcal)	Gain (Mcal)
16	395	6.2	180.0	80.8
17	416	6.2	189.1	85.4
18	416	6.2	189.1	85.4
19	462	6.2	210.4	94.6
20	462	6.2	210.4	94.6
21	474	6.2	219.6	94.6
22	486	6.2	228.8	94.6
23	605	6.2	320.2	94.6
24	614	6.2	334.0	90.0

Source: (25).

TABLE XIV

ADDITIONAL ASSUMPTIONS FOR LIVESTOCK

Item	Unit	Amount
Replacement Heifers/Cow	HD.	.25
Calf Crop	%	90
Cull Cow	%	20

TABLE XV

RELATIVE SHARE OF EXPENSES INCURRED BY THE DIFFERENT CLASSES OF DAIRY ANIMALS (PERCENT)

Item	Calves 0-6 mo.	Heifers 7-15 mo.	Replacements 16-24 mo.	Producing Cows	Dry Cows
Breeding Fees			100	100	
Veterinary Services and Medicines	20	5	5	60	10
Supplies	5	5	5	80	5
Accounting				100	
Utilities	5	5	5	80	5
Custom Hauling				100	

With respect to some expenses incurred by each class of animal, Table XV gives the relative share of each class. These expenditures are presented in the enterprise budgets.

Finally, prices received and prices paid for milk and livestock are shown in Table XVI. The milk prices are seasonally adjusted; for the livestock, the average annual price was used.

Data Source

The coefficients used in this study were selected by consulting the specialized literature in the fields of agronomy, animal science, agricultural economics, dairy science and/or by discussion with specialists in these specific areas.

Nutrient requirements of dairy cattle are based on National Academy of Sciences (NAS) publication, "Nutrient Requirements of Dairy Cattle", which provides data on the composition of commonly used feeds (25). A study done by Anderson (2) and fact sheets authored by Richardson are sources as well. A more complete source of data and composition is the Atlas of Nutritional Data on United States and Canadian Feeds, published by the above metioned NAS (24). Loss coefficients for pastures are estimates from published data (2). Likewise, loss coefficients for crops - silage, hays, grains - are obtained from published studies (20).

Crop production coefficients are taken from the enterprise budgets applicable to the areas of study.

The vector of prices currently used for budget preparation in Oklahoma is used for milk, most crops, and livestock (3), (4), (39). In some instances, data are estimates because needed data was not published.

TABLE XVI

MONTHLY PRICES RECEIVED AND PRICES PAID FOR MILK AND LIVESTOCK

Item	Unit	Price	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Milk	cwt.	Rec.	9.57	9.42	9.14	8.71	8.55	8.50	8.64	8.82	9.27	9.48	9.57	9.50
Baby Calves	Hd.	Rec.	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
Calves	Hd.	Rec.	125.00	125.00	125.00	125.00	125.00	125.00	125.00	125.00	125.00	125.00	125.00	125.00
		Paid	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00
Heifers	Hd.	Rec.	250.00	250.00	250.00	250.00	250.00	250.00	250.00	250.00	250.00	250.00	250.00	250.00
		Paid	275.00	275.00	275.00	275.00	275.00	275.00	275.00	275.00	275.00	275.00	275.00	275.00
Replacements	Hd.	Rec.	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00
		Paid	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00	450.00
Cull Cows	Hd.	Rec.	216.00	216.00	216.00	216.00	216.00	216.00	216.00	216.00	216.00	216.00	216.00	216.00

Source: Based partly in (3), (4).

The Dairy Model

The purpose of this section is to present the linear programming model. Important development of the model are concepts of short run and long run. These economic concepts are part of the everyday economic vocabulary. For example, decisions are short run if the quantities of some factors of productions vary whereas others remain fixed. Typically long run decisions are the ones where it is possible to vary the quantity of all factors of production. In this study the developed model must be characterized as a short run model. This model is static in nature, and is useful for short run adjustments. The a_{ij} coefficients of the linear programming model are fixed. The model implicitly assumes certainty. Although the influence of the past is not denied and the relevance of the future is not ignored, the analysis considers just one period. There is no economic or planning horizon.

The model is designed to determine the optimal organization and help determine proper management decisions for the dairy farm. Given the size of the dairy farm, the herd size, dairy facility capacity, and available labor, the model selects resource and output combinations for the optimal farm organization. Both dairy cow nutrient requirements and nutrients supplied by feedstuffs are specified in detail.

The planning period of one year is equally divided into twelve periods corresponding to 30.5 days each, from 01 through 12 or roughly the twelve months of the year. The feed requirements by the dairy activities are then matched throughout the period.

Objective Function

The value of the objective function represents the net revenue of the dairy model. The net revenue is composed of estimated costs and returns of the factors and products which are included in the model. Here net returns is defined as the residual to land, operator labor, machinery, overhead, risk and management.

Constraints

In addition to the objective function row that expresses the net revenue of the program, there are the restrictions imposed to the bundle of available resources to the firm. Restrictions are placed on land, labor, capital, nutrients, feeds, and capacity, to make the optimal plan feasible and realistic.

Land. There are basically two broad categories of land: cropland and native pasture. No attempt was made to break the soils into more categories. The percentage of each of the category of soils is assumed to represent, on the average, the composition of farmland and pastureland of the region.

Labor. The labor necessary to take care of the crops and livestock is allocated to these activities through the labor rows. Family labor is available for each of the twelve periods in an amount equal to 250 hours. If more labor is required, after family labor is exhausted, the model permits the hiring of additional labor that, again, is allocated through labor purchase activities. These rows are minimum constraints. There is no restriction on the amount of labor to be used or hired.

Capital. The capital row is a neutral restraint. The firm is assumed to have all needed operating funds, so that the needed operating capital to reach the optimal plan is readily available.

Nutrients. The nutrients considered in the model are digestible protein and net energy. The measures of net energy used in the model are: net energy for lactating cows, net energy for maintenance and net energy for growth. The measure used depends on the requirements of the animal being considered. The model has a row for each of the twelve feeding periods in consideration. Digestible protein and net energy rows are a minimum constraint to guarantee that the minimum requirements of protein and energy are fed in each time period.

In addition to the above restrictions on energy and protein, it is usual to include constraints on dry matter and fiber. The dry matter rows are a minimum restraint so that there is a lower limit in the total quantity of dry matter fed for each time period subject to the animal's capacity. Fiber requirement rows are also minimum requirements for producing cows.

The model permits restrictions on groups of feeds as for example the maximum amount of dry matter allowed to come from concentrates or forages, or forage to concentrate ratio. Also, it is possible to restrict the quantity of dry matter coming from particular concentrates or forages.

Maximum Intake. For purposes of this study it is assumed that a cow can consume a maximum of the equivalent to 3.5 percent of her body weight daily in roughage and concentrates.

Transfer and Accounting. The linear program model contains rows for transferring produced feed to the feeding or selling activities, of a particular period or to the corresponding row of the succeeding period. Other rows permit transferring purchased feeds to the nutrient feeding activities. Baby calves, heifers, and replacements can be tranferred to production activities or selling activities. Cull cows can be transferred to the selling enterprises. Replacements, heifers and fresh cows can be purchased and transferred to the production activities. Likewise there are rows that restrain the maximum and minimum number of cows that come fresh each time period. Milk production is transferred to the selling activities through accounting rows.

Columns

The dairy model developed in this study encompasses the following column vector sectors or group of activities:

(1) Pasture production

(2) Crop production

(3) Milk and dairy cattle

(4) Transfer

(5) Buy and sell

(6) Hired labor

These activities have the capability of using the scarce resources, producing resources for other activities, using resources produced by other activities or a combination of them. Following is a description of the activities of the model.

Pasture Production. The model permits the use of a great number of production activities. For the present case, pasture production includes

bermuda, small grain grazeout and native grass pasture. These pastures are commonly grown in Central Oklahoma. In addition to these three pastures the grain crop activities like barley and wheat produces pastures too. Pastureland is restricted so that it must be used as native pasture. As was said earlier the model permits use of up to twelve activities corresponding to twelve months of production. Evidently, none of the pastures has this capability of producing all year round. The pasture dry matter and pasture digestible protein production coefficients for average soil, continuous grazing were taken from Anderson (2). The net energy content of these three grasses and for the remaining feed production activities other sources were used (24). Pasture cannot be sold or rented out, but must be used by the dairy cattle exclusively.

Additional information concerning the pastures are included in the enterprise budgets shown in the Appendix Tables LXII, LXIII, and LXIV. Table XVII gives an overview of the activities related to pastures, crops, and acquired feedstuff.

Crops. Crops included in the model as activities are sorghum for silage, sudan hay, alfalfa hay, sorghum for grain, barley, and wheat.

The production activities, all crops and livestock as well, comprise the biggest portion of the model. The resources made available through the transfer rows are carried to the production activities. It must be emphasized that the product may be used in the production of another product. It is internal sale of a product that serves as an input to a final product, depending on price relationships. That is the case of alfalfa hay, for example. It may be put in the market, used as feed to dairy cattle or both.

TABLE XVII

SUMMARY OF POTENTIAL PRODUCTION, ACQUISITION, AND DISPOSITION OF CROP ACTIVITIES

Feed	Produce and Transfer	Use	Buy	Sell
Bermuda Pasture	√	√		
Small Grain Grazeout	√	√		
Native Pasture	√	√		
Sorghum Silage	√	√		
Sudan Hay	√	√	√	√
Alfalfa Hay	√	√	√	√
Grain Sorghum	√	√	√	√
Sorghum Stubble		√		
Barley	√	√	√	√
Barley Pasture	√	√		
Wheat	√	√	√	√
Wheat Pasture	√	√		
Oats		√	√	
Corn		√	√	
Soybean Meal		√	√	
Molasses		√	√	

The model allows each crop to have as many monthly activities as necessary, up to twelve. The coefficients for each crop activity in terms of digestible protein, net energy, fiber, yields were obtained from sources already referred. The enterprise budgets have other information that are used for each crop (Appendix Tables LXII to LXX).

Milk and Dairy Cattle. Other important portion of the model is the dairy cattle activities. It starts with baby calves, heifers, replacements, cows and dry cows. The main product is milk, supposedly to be the final output of the entire dairy operation, but not the sole source of revenue. Each dairy production level can be represented by up to twelve activites, one for cows coming fresh each month.

The model allows the use of an intermediate product or activity as an input of a subsequent activity or allows it to be sold as a final product. For example, heifers can be either transferred to replacements or sold as extra heifers.

The feed requirement data are specified in the activities. Other coefficients are shown in the enterprise budgets (Appendix Tables LXXI to LXXVII).

When produced items are sold, they are sold through their respective selling activities.

Transfer. Transfer column activities allow the transfer of grain, hay, and pasture from one time period to the next. Products are transferred at a cost, storage, and can be utilized in later periods. All except pasture can be sold in any period. The main feature of this section of the model is the use of a rate of loss in dry matter, digestible protein and net energy to account for losses in quantity and, most important, in quality of pastures and hay.

Likewise, in the dairy portion of the model, transfer activities permit transferring heifers from the production side to the selling activities.

Buy and Sell. The sell activities dispose of the products produced by the dairy firm. The main product - milk - and sudan hay, alfalfa hay, grain sorghum, barley, wheat, calves, heifers, and cull cows are all sold through the sell activities.

On the other side, the dairy firm cannot produce all the resources it needs. Then purchase of resources required by the other activities are effected by means of the buying activities.

The feedstuffs not produced on the farm - oats, corn, soybean meal, molasses - and calves, heifers and fresh cows can be purchased through these column activities.

Varying the selling and buying prices is one way of analyzing how the optimal organization might change under different conditions.

Hired Labor. The firm may hire additional labor if the available labor is entirely used by the various activites. As with the majority of other activities this can be done throughout each of the twelve time periods.

Right Hand Sides (RHS)

The right hand sides are useful for imposing restrictions on the amount of resources. Land, labor, number of cows on hand in each period due to barn capacity are the restrictions in the sense that there is a certain amount of that resource per period of time. The land may be varied so that alternative farm sizes can be studied.

Summary

This chapter dealt with a dairy model in a linear programming context. The available resources were described and the alternative activities for the dairy farm model established. The underlying assumptions of the study were explained and a summary provided a general view of the constraints and activities. The next chapter will present the basic optimal solution and some variations obtained by employing the Mathematical Programming System - Extended aided by an algorithm especially developed for data preparation.

CHAPTER IV

ANALYSIS AND EVALUATION OF THE RESULTS

This chapter deals with the optimum whole dairy farm organization. The data from the linear programming solutions are presented in two broad sections. First, the base model is discussed. Derivations of the base model or specific models follow in the second section.

Optimal Farm Organization - Base Model

In this section the base model is presented. Besides the general characteristics and restrictions presented in the last chapter, the base model contains restrictions on the areas destined to sudan hay and alfalfa hay, which are 50 acres and 80 acres, respectively. These are arbitrary constraints to keep the model as realistic as possible.

Optimum Dairy System

The optimum dairy system in terms of monthly activities is shown in Table XVIII. The solution of the linear programming model has all dairy cows freshening in the odd numbered months: 1,3,5,7,9, and 11. Given the assumptions and the set of prices, eight cows each producing 18,000 pounds of milk calve in each of these months. The calf crop is assumed to be 90 percent, therefore 7.2 calves are obtained. Between 0 and 6 months of age a death loss of 12.7 percent is assumed meaning a loss of .9144 calves. Of the 6.2856 calves six months old, half are heifers of

TABLE XVIII

MONTHLY INVENTORIES OF DAIRY ANIMALS IN THE OPTIMAL SOLUTION FOR 18,000 POUNDS OF PRODUCTION

Activity	Period 1	3	5	7	9	11
	(Head)					
Cows Freshening	8.0	8.0	8.0	8.0	8.0	8.0
Calves	7.2	7.2	7.2	7.2	7.2	7.2
Heifers	1.92	1.92	1.92	1.92	1.92	1.92
Replacements	1.6	1.6	1.6	1.6	1.6	1.6
Dry Cows	8.0	8.0	8.0	8.0	8.0	8.0
Sale of Cows	3.98	3.98	3.98	3.98	3.98	3.98
Sale of Extra Heifers	.3072	.3072	.3072	.3072	.3072	.3072
Sales of Extra Replacements	.32	.32	.32	.32	.32	.32
Sale of Cull Cows	1.6	1.6	1.6	1.6	1.6	1.6
Heifer Transfer	.8388	.8388	.8388	.8388	.8388	.8388

of which .8388 are transfered and sold together with the 3.1428 steers. From six months to fifteen months there is a loss of .0768 head, leaving 2.2272 heifers 15 months old. At this age the heifers are culled and .3072 head are sold. Therefore, 1.92 replacement heifers begin the 16 to 24 month period. At the end of the period .32 head are culled from the replacements, leaving 1.6 replacement cows. Every two months 1.6 replacement heifers ready to go into the herd. Eight cows become dry every other month, after a lactation period of 305 days. They are dry for two months.

When the calculations are carried through, it is found that the composition of the herd during the whole 12-month period would be as displayed in Table XIX. The producing cows, their calves, and the dry cows happen to have the same number throughout the year. Because of the physical capacity of the barn, limited to handle 40 cows, the program chose to work at full capacity with 40 lactating cows. Likewise, the herd has 21.6 calves under six months and eight dry cows each month during the entire year. There are 9.6 heifers on hand in even months and 7.68 head in odd months. There are 8.0 replacements on hand in even months and 7.68 head in odd months. There are 8.0 replacments on hand in even months and 6.4 head in odd months. The existing differences from one month to another are due to the sale of cull heifers and transfer of heifers to the replacement category.

Optimum Feeding System

The feeding system is simultaneously solved for the entire dairy cattle system. Table XX shows the quantities or weight of the feeds fed to the herd each month. The pastures that enter the solution are native

TABLE XIX

MONTHLY COMPOSITION OF DAIRY HERD IN THE OPTIMAL SOLUTION FOR COWS PRODUCING 18,000 POUNDS

Class of Animal	Period											
	1	2	3	4	5	6	7	8	9	10	11	12
	(Head)											
Producing Cows	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
Calves	21.6	21.6	21.5	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6	21.6
Heifers	9.6	7.68	9.6	7.68	9.6	7.68	9.6	7.68	9.6	7.68	9.6	7.68
Replacements	8.0	6.4	8.0	6.4	8.0	6.4	8.0	6.4	8.0	6.4	8.0	6.4
Dry Cows	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0

TABLE XX

SUMMARY OF THE MONTHLY UTILIZATION OF FEED BY ALL LIVESTOCK IN THE OPTIMAL SOLUTION FOR COWS PRODUCING 18,000 POUNDS

Feed Unit		Period											
		1	2	3	4	5	6	7	8	9	10	11	12
Native Pasture	lbs.				28715.08	38468.89	42555.38	36261.00	39252.15	34944.42	39340.77	8923.59	2589.98
Wheat Pasture	lbs.	21057.85	23639.61									20056.69	23291.71
Sudan Hay	ton	10.62	10.53	12.16	10.46							10.41	10.12
Alfalfa Hay	ton			.98		9.26	8.44	8.50	7.29	7.03	4.99		
Grain Sorghum	cwt.	151.87	162.09	192.32	177.62	56.82	57.27	64.96	64.50	63.54	57.66	139.16	145.35
Oats	bu.	376.29	340.12	215.53	278.65	835.45	814.27	788.33	765.28	767.72	753.14	419.76	425.61
Corn	bu.	63.35	58.73	77.39	48.70	2.50							30.91
Soybean Meal	cwt.	57.46	54.72	73.35	58.86	5.58	7.81	13.69	17.37	21.59	28.27	56.26	52.28

pasture and wheat pasture. Native pasture is grazed from April through December and wheat is grazed from November through February. Sudan hay and alfalfa hay typically are used in two distinct periods, the former being from November to April and the latter taking over the remaining period. Grain sorghum, oats and soybean meal are supplied to the herd during the 12-month period. Corn is used six months only, from December to May. The area planted to crops produced on the farm are: Native pasture consumes all the 140 acres of pastureland available; wheat uses 209.42 acres out of the 360 acres cropland. As can be seen, only part of the wheat acreage is grazed in the indicated months. Sudan hay and alfalfa hay take 50 and 80 acres, respectively. The remainder of the 360 cropland acres has 20.58 acres planted to grain sorghum. The remaining feedstuffs which are not grown on the farm include oats, corn and soybean meal. Of the crops which can be grown bermuda pasture, small grain graze out, sorghum for silage and barley do not come in as activities in the optimum whole dairy farm solution.

The Producing Cow Activities - Balanced Ration

Following the presentation of results of the whole farm, where the dairy activities or the dairy system and the feed system are integrated, the details of the lactating cow activites are discussed. Information presented in Table XXI is similar to that presented in Table XX in format, but the data in Table XXI applies to producing dairy cows only. The quantities in terms of area of pasture grazed or the weight of the other feeds supplied appear on a monthly basis. Note that the pattern followed by the cow herd in the utilization of feed resembles that of the whole herd. The differences are that the producing cows do not utilize native

TABLE XXI

FEED SUPPLIED TO COWS PRODUCING 18,000 POUNDS IN THE OPTIMAL SOLUTION OF OF THE BASE MODEL

Feed Unit		Period											
		1	2	3	4	5	6	7	8	9	10	11	12
Native Pasture	lbs.				8305.62	8290.35	10342.69	10134.00	12930.75	13028.68	17240.92		
Wheat Pasture	lbs.	6813.27	7777.65									6802.73	7773.83
Sudan Hay	ton	10.62	10.53	12.16	10.46							10.41	10.12
Alfalfa Hay	ton					9.26	8.44	8.50	7.29	7.03	4.99		
Grain Sorghum	cwt.	151.87	162.09	192.32	177.62	56.82	57.27	64.96	64.50	63.54	57.66	139.16	137.17
Oats	bu.	376.29	340.12	215.53	278.65	835.45	814.27	788.33	765.28	767.72	753.14	419.76	425.61
Soybean Meal	cwt.	57.46	54.72	68.45	58.86	5.58	7.81	12.52	16.28	20.53	26.98	56.26	52.28

pasture beyond October because of its lwoer quality and secondly corn does not enter the feed mix, in any time period, due to its low fiber content relative to other grains.

The results in Table XXI are basic to the calculations carried out to obtain the results in Table XXII, XXIII, and XXIV. The information in Table XXII concerns the nutrients supplied - digestible protein and net energy - and other feed components for each feed in each period. The numbers are obtained by multiplying the quantities in Table XXI by the corresponding yields presented in earlier tables.

The daily consumption in pouhds of feed per cow is extracted from Table XXII and shown by periods in Table XXIII. The procedure for estimating this consumption for each feed is to divide the capacity number by 1220 (30.5 days x 40 cows).

The supply of nutrients to the cow herd is shown in Table XXIV. The results for each period are obtained by adding up the information provided for each feed in Table XXII. The profit maximizing balanced ration thus provides checks against the total requirements for the herd given in Table XXV. The data in Table XXV comes from Tables VII, VIII, and IX, in the last chapter.

The Dry Cow Activities - Balanced Ration

The dry cow feed requirement are included in the total farm requirements presented in Table XX. However, specific information concerning them is shown in the following tables. The monthly balanced ration is composed of native pasture, wheat pastures, corn and soybean meal. Table XXVI depicts the use of pastures and the quantities of concentrates utilized by the dry cows.

TABLE XXII

DIGESTIBLE PROTEIN (DP), NET ENERGY (NE), CAPACITY (CAP), DRY MATTER (DM) AND FIBER (FB) OF EACH FEED SUPPLIED BY PERIOD FOR PRODUCING COWS AT THE 18,000 POUND PRODUCTION LEVEL

Feed		Period 1	2	3	4	5	6	7	8	9	10	11	12
Native Pasture	CAP				8305.6	8290.4	10342.7	10134.0	12930.8	13028.7	17240.9		
	DM				2491.6	2901.6	4137.1	4560.3	6465.4	7165.8	10344.8		
	DP				319.0	194.4	244.1	264.1	362.1	394.3	568.8		
	NE				1559.8	1816.4	2589.9	2854.9	4047.5	4485.6	6475.4		
	FB				650.4	757.3	1079.7	1190.2	1687.6	1870.0	2700.0		
Wheat Pasture	CAP	6813.3	7777.6									6802.7	7773.8
	DM	1771.4	2022.2									1768.7	2021.2
	DP	338.4	384.2									336.0	384.0
	NE	1383.5	1579.3									1381.4	1578.5
	FB	405.6	463.1									405.0	462.8
Sudan Hay	CAP	19990.9	19425.1	21983.3	18910.0							19995.5	19438.5
	DM	17791.9	17288.2	19565.2	16830.0							17796.0	17300.2
	DP	948.9	912.6	1022.3	879.4							958.9	932.2
	NE	8684.8	7922.4	8416.8	7240.1							9553.3	8995.6
	FB	5463.1	5416.8	6255.3	5380.8							5355.1	5205.9
Alfalfa Hay	CAP					18520.0	16880.0	16660.0	14288.4	13778.8	9980.0		
	DM					16668.0	15192.0	14994.0	12859.6	12400.9	8982.0		
	DP					2583.5	2354.8	2300.4	1972.9	1902.5	1392.2		
	NE					10734.2	9783.6	9064.9	7774.5	7497.8	5784.4		
	FB					4067.0	3706.8	3733.2	3201.8	3087.6	2191.6		
Grain Sorghum	CAP	15187.0	16209.0	19232.0	17762.0	5682.0	5727.0	6496.0	6450.0	6354.0	5766.0	13916.0	13717.0
	DM	13516.4	14426.0	17116.5	15808.2	5057.0	5097.0	5781.4	5740.5	5655.1	5131.7	12385.2	12208.1
	DP	946.2	1009.8	1198.2	1106.6	354.0	356.8	404.7	401.8	395.8	359.2	867.0	854.6
	NE	13866.7	14798.8	17564.6	16216.7	5187.7	5228.8	5930.8	5888.8	5801.2	5264.4	12705.3	12523.6
	FB	379.7	405.2	480.8	444.0	142.0	143.2	162.4	161.2	158.8	144.1	347.9	342.9

TABLE XXII (Continued)

Feed		Period 1	2	3	4	5	6	7	8	9	10	11	12
Oats	CAP	12041.3	10883.8	6897.0	8916.8	26734.4	26056.6	25226.6	24489.0	24567.0	24100.5	13432.3	13619.5
	DM	10716.7	9686.6	6138.3	7936.0	23793.6	23190.4	22451.6	21795.2	21864.7	21449.4	11954.8	12121.4
	DP	1049.8	948.9	601.3	777.4	2330.9	2271.8	2199.4	2135.1	2141.9	2101.3	1171.1	1187.4
	NE	11138.2	10067.6	6379.7	8248.0	24729.3	24102.4	23334.6	22652.3	22724.5	22292.9	12424.9	12598.0
	FB	1275.6	1153.0	730.6	944.6	2832.2	2760.4	2672.4	2594.3	2602.6	2553.1	1423.0	1442.8
Soybean Meal	CAP	5746.0	5472.0	6845.0	5886.0	558.0	781.0	1252.0	1626.0	2053.0	2698.0	5626.0	5228.0
	DM	5113.9	4870.1	6092.0	5238.5	496.6	695.1	1114.3	1447.1	1827.2	2401.2	5007.1	4652.9
	DP	2413.9	2298.8	2875.6	2472.7	234.4	328.1	526.0	683.1	862.5	1133.4	2363.6	2196.3
	NE	5815.0	5537.7	6927.1	5956.6	564.7	790.4	1257.0	1645.5	2077.6	2730.4	5693.5	5290.7
	FB	301.7	287.3	359.4	309.0	29.3	41.0	65.7	85.4	107.8	141.6	295.4	274.5

CAP, DM, DP and FB are expressed in pounds; NE is in Mcal.

TABLE XXIII

CONSUMPTION OF FEED AS IS BY THE 18,000 POUNDS PRODUCING COWS IN POUNDS PER HEAD PER DAY

	Period											
Feed	1	2	3	4	5	6	7	8	9	10	11	12
Native Pasture				6.8	6.8	8.5	8.3	10.6	10.7	14.1		
Wheat Pasture	5.6	6.4									5.6	6.4
Sudan Hay	16.4	15.9	18.0	15.6							16.4	15.9
Alfalfa Hay					15.2	13.8	13.6	11.7	11.3	8.2		
Grain Sorghum	12.4	13.3	15.8	14.6	4.6	4.7	5.3	5.3	5.2	4.7	11.4	11.2
Oats	9.9	8.9	5.6	7.3	21.9	21.4	20.7	20.1	20.1	19.8	11.0	11.2
Soybean Meal	4.7	4.5	5.6	4.8	.4	.6	1.0	1.3	1.7	2.2	4.6	4.3

TABLE XXIV

PER PERIOD NUTRIENTS SUPPLIED TO THE COW HERD (40 COWS) PRODUCING 18,000 POUNDS OF MILK PER COW

Period	Capacity (lb.)	Dry Matter (lb.)	Digestible Protein (lb.)	Net Energy (Mcal)	Fiber (lb.)
1	59778.5	48910.3	5697.2	40888.2	7825.7
2	59767.5	48293.1	5554.3	39905.8	7725.4
3	54957.3	48912.0	5697.4	39288.2	7826.1
4	59780.3	48304.3	5555.1	39221.2	7728.8
5	59784.8	48916.8	5697.2	43032.3	7731.1
6	59787.3	48311.6	5555.6	48050.7	7731.1
7	59768.0	48901.6	5694.9	42452.2	7823.9
8	59784.2	48307.8	5555.0	42008.6	7730.9
9	59781.5	48913.7	5697.0	42586.1	7826.8
10	59785.4	48309.1	5554.9	42547.5	7730.4
11	59770.2	48911.8	5696.5	41758.4	7826.4
12	59776.8	48303.8	5554.5	41186.4	7728.9

TABLE XXV

PER PERIOD REQUIREMENTS AND CAPACITY FOR A COW HERD (40 COWS) PRODUCING 18,000 POUNDS OF MILK PER YEAR[1]

Period	Capacity (lb.)	Dry Matter (lb.)	Digestible Protein (lb.)	Net Energy (Mcal)	Fiber (lb.)
1.3.5.7,9,11	59780.0	48912.0	5697.4	36712.0	7825.9
2,4,6,8,10,12	59780.0	48304.0	5555.1	35535.2	7728.6

[1]Capacity is a maximum limit, all others are minimum levels required.

TABLE XXVI

FEED SUPPLIED TO ALL DRY COWS IN THE OPTIMAL SOLUTION OF THE BASE MODEL

Feed Unit		Period											
		1	2	3	4	5	6	7	8	9	10	11	12
Native Pasture	lbs.				9332.66	15284.70	15187.50	13729.50	12798.45	11847.64	10859.14	5329.73	
Wheat Pasture	lbs.	7515.37										6616.64	7252.60
Corn	bu.	31.02	30.90	45.71	26.67	2.50							30.91
Soybean Meal	cwt.			4.90									

Native pasture is used from April to November and small grain grazing is used from November to February. Corn is needed for approximately six months or from December until May, in which month a small quantity is consumed. Soybean Meal is required in only one month - March - to make up requirements of protein. Protein, energy and dry matter supplied to the dry cows in each period are presented in Table XXVII. This information is obtained by multiplying the yield of the crop by the activity of the feed transfered to the dry cows in a particular period. The consumption of feed per capita obtained by dividing the total feed by 244 (30.5 day x 8 cows). For example, in April native pasture enters the solution with 35.53 acres that multiplied by the yield 262.67 lb. per acre and dividing the result by the 244 cow-days gives 38.2 pounds per dry cow per day see Table XXVIII. By totaling the figures in Table XXVII, the information in Table XXIX is obtained for the 12-month supply of nutrients. These quantities closely mathc the nutrient requirements for dry cows which are digestible protein, 385.4 lb., and net energy 3513.6 Mcal per month. The dry matter of the ration is well below the maximum level at times.

Replacements - Balanced Ration

The remaining two groups of animals in the herd are heifers; young heifers (7 to 15 months of age) and replacement heifers (16 to 24 months of age). To ease presentation these combined into one group called replacements. The number of replacements are noted in Tables XVIII and XIX; and Table XX includes feed the replacements aregoing to use along with the other categories of animals. Table XXX presents feed production and purchase requirements needed to supply the replacements with a

TABLE XXVII

DIGESTIBLE PROTEIN (DP), NET ENERGY (NE), AND DRY MATTER (DM) OF EACH FEED SUPPLIED BY PERIOD TO DRY COWS

		Period											
Feed		1	2	3	4	5	6	7	8	9	10	11	12
Native Pasture	DM				2799.8	5349.6	6075.0	6178.3	6399.2	6516.2	6515.6	3464.1	
	DP				358.5	358.4	358.5	358.2	358.4	358.5	358.3	31.4	
	NE				1752.7	3348.8	3803.1	3867.8	4006.1	4079.0	4078.5	2168.3	
Wheat Pasutre	DM	1876.0	1886.9									1720.3	1885.7
	DP	358.3	358.5									326.8	358.2
	NE	1465.1	1473.6									1343.6	1472.7
Corn	DM	1546.0	1540.0	2278.2	1329.2	124.6							1540.6
	DP	103.6	103.2	152.7	89.1	8.4							103.2
	NE	2047.9	2040.0	3017.8	1760.8	165.0							2040.7
Soybean Meal	DM			436.1									
	DP			205.8									
	NE			495.9									

DM and DP are expressed in pounds; NE is in Mcal.

TABLE XXVIII

CONSUMPTION OF FEED AS IS BY DRY COWS IN POUNDS PER HEAD PER DAY

	Period											
Feed	1	2	3	4	5	6	7	8	9	10	11	12
Native Pasture				38.2	62.6	62.2	53.3	52.4	48.6	44.5	21.8	
Wheat Pasture	29.6	29.7									27.1	29.7
Corn	7.1	7.1	10.5	6.1	.6							7.1
Soybean Meal			2.0									

TABLE XXIX

SUPPLY OF NUTRIENTS TO ALL DRY COWS
IN THE OPTIMAL SOLUTION

Period	Dry Matter (lb.)	Digestible Protein (lb.)	Net Energy (NE_m) (Mcal)
1	3422.0	461.9	3513.0
2	3426.9	461.7	3513.6
3	2714.3	358.5	3513.7
4	4129.0	447.6	3513.5
5	5474.2	366.8	3513.8
6	6075.0	358.5	3803.1
7	6178.3	358.2	3867.8
8	6399.2	358.4	4006.1
9	6516.2	358.5	4079.0
10	6515.6	358.3	4078.5
11	5184.4	358.2	3511.9
12	3426.3	461.4	3513.4

TABLE XXX

FEED SUPPLIED TO ALL REPLACEMENTS IN
IN THE OPTIMAL SOLUTION

Feed Unit		Period											
		1	2	3	4	5	6	7	8	9	10	11	12
Native Pasture	lbs.				11076.79	14893.84	17025.19	12397.50	13522.95	10068.10	11240.70	.3650.17	2569.98
Wheat Pasture	lbs.	7029.21	8604.67									6637.32	791.54
Alfalfa Hay	ton			.98									
Grain Sorghum	cwt.												6.18
Corn	bu.	22.89	27.83	31.68	22.03								
Soybean Meal	cwt.							1.17	1.11		1.06	1.29	

balanced ration. Native pasture is present in the ration from April to November, and wheat pasture from November through February. A small portion of alfafla is used in March. Grain sorghum is part of the ration in December. Corn fills the requirements during the first four months of the year, and soybean meal, from July through October.

Given the activity levels information in Table XXXI is prepared. Dry matter, digestibel protein and net energy for maintenance and for gain are shown in Table XXXI, for each feed for each month. A summary of the nutrients supplied each month is presented in Table XXXIII, except for dry matter which is below the required amount most of the time.

Technical Aspects and Economic Considerations

The allocation of resources is summarized in Table XXXIV. All cropland and pastureland is used. There are 3709.2 hours of labor used of which 2839.3 hours are family labor (Table XXIV).

The crop activities cause the seasonal distribution in labor utilization. The peak month of labor use is June where all 250 free hours are used and an additional 279.8 hours are hired. There was no need to hire labor during the winter months.

Operating expenses for the farm total $56022.76 (Table XXXIV), with the monthly distribution on line 10 of Table XXXVI.

An overview of the farm financial picture is displayed using the cash flow in Table XXXVI. Livestock income displays a cyclical behavior, that is, receipts are observed only in odd numbered months. Hay crops are sold in January and grains in August causing these months to be the highest income periods. Milk income is relatively stable throughout the year.

TABLE XXXI

DIGESTIBLE PROTEIN (DP), NET ENERGY (NE), AND DRY MATTER (DM) OF EACH FEED SUPPLIED BY PERIOD TO ALL REPLACEMENTS

Feed		Period 1	2	3	4	5	6	7	8	9	10	11	12
Native Pasture	DM				3323.0	5212.8	6810.1	5578.9	6761.5	5537.4	6744.6	2372.5	1942.4
	DP				425.5	349.2	401.9	323.4	378.6	304.7	370.8	21.5	17.1
	NE_m				1960.5	3075.6	4018.1	3291.7	3989.0	3267.2	3979.5	1399.9	989.4
	NE_g				1039.9	1631.6	2131.5	1746.1	2116.4	1733.2	2111.2	742.5	524.8
Wheat Pasture	DM	1827.6	2237.2									1725.7	2149.0
	DP	349.1	425.0									327.9	408.2
	NE_m	1326.8	1624.2									1525.9	1560.1
	NE_g	848.0	1038.0									800.9	997.1
Alfalfa Hay	DM			1627.0									
	DP			242.1									
	NE_m			813.8									
	NE_g			505.5									
Grain Sorghum	DM												728.0
	DP												51.0
	NE_m												686.3
	NE_g												456.4
Corn	DM	1140.8	1387.0	1587.9	1098.0								
	DP	76.4	93.0	105.8	73.6								
	NE_m	1325.3	1611.4	1834.3	1275.5								
	NE_g	860.2	1045.8	1190.5	827.9								
Soybean Meal	DM							104.1	98.8	94.3	114.8		
	DP							49.1	46.6	44.5	54.2		
	NE_m							102.4	97.1	92.8	112.9		
	NE_g							68.5	64.9	62.0	75.5		

DM and DP are expressed in pounds; Energy is in Mcal.

NE_m is net energy for maintenance and NE_g is net energy for grain.

TABLE XXXII

SUPPLY OF NUTRIENTS TO ALL REPLACEMENTS
IN THE OPTIMAL SOLUTION

Period	Dry Matter (lb.)	Digestible Protein (lb.)	Net Energy	
			Maintenance (Mcal)	Grain (Mcal)
1	2968.4	425.5	2652.1	1708.2
2	3624.2	518.0	3235.8	2083.8
3	3205.9	342.9	2648.1	1696.0
4	4421.0	499.1	3236.0	1867.8
5	5212.8	349.2	3075.6	1631.6
6	6859.9	425.4	4067.1	2164.3
7	5633.2	349.0	4086.1	2181.3
8	6860.3	425.2	4086.1	2181.3
9	5631.7	349.2	3360.0	1795.2
10	6859.4	425.0	4092.4	2186.7
11	4098.2	349.4	2652.8	1543.2
12	4819.4	476.3	3712.1	1978.3

TABLE XXXIII

REQUIREMENTS OF NUTRIENTS BY
REPLACEMENTS BY PERIOD

Period	Dry Matter[1] (lb.)	Digestible Protein (lb.)	Net Energy	
			Maintenance (Mcal)	Gain (Mcal)
1,3,5,7,9,11	5632.6	349.2	2652.7	1041.5
2,4,6,8,10,12	6860.2	425.4	3238.0	1271.1

[1]Dry Matter is an maximum and the other three are minimums.

TABLE XXXIV

ALLOCATION OF RESOURCE IN THE OPTIMAL SOLUTION OF THE BASE MODEL FOR COWS PRODUCING 18,000 POUNDS

Resource	Unit	Amount
Land		
Pasture	Acre	140
Sudan Hay	Acre	50
Alfalfa Hay	Acre	80
Grain Sorghum	Acre	20.6
Wheat	Acre	209.4
Labor	Hour	3709.3
Total Operating Expenses	$	56022.76

TABLE XXXV

MONTHLY DISTRIBUTION OF LABOR REQUIREMENTS
FOR THE OPTIMAL SOLUTION OF THE BASE MODEL

Month	Family Labor	Hired Labor	Total
	(Hours)		
01	210.5		210.5
02	218.8		218.8
03	250.0	41.4	291.4
04	235.5		235.5
05	250.0	112.6	362.6
06	250.0	279.8	529.8
07	250.0	152.7	402.7
08	250.0	60.3	310.3
09	250.0	157.7	407.7
10	250.0	65.4	315.4
11	210.5		210.5
12	214.0		214.0
Total	2839.3	869.9	3709.2

TABLE XXXVI

WHOLE DAIRY FARM CASH FLOW IN THE OPTIMAL SOLUTION FOR COWS PRODUCING 18,000 POUNDS

	Whole Farm Per Month												
	1	2	3	4	5	6	7	8	9	10	11	12	Total
ENTERPRISE RECEIPTS													
1. Livestock													
Calf Sale	497.70		497.70		497.70		497.70		497.70		497.70		2986.20
Cull Cow Sale	345.60		345.60		345.60		345.60		345.60		345.60		2073.60
Extra Repl. Sale	144.00		144.00		144.00		144.00		144.00		144.00		864.00
Extra Heifer Sale	76.80		76.80		76.80		76.80		76.80		76.80		460.80
2. Milk	7069.55	6606.06	6751.90	6047.53	6132.06	5623.60	5802.62	5572.12	6341.42	6393.31	6946.23	6596.04	75882.44
3. Crops													
Sudan Hay	3793.68												3793.68
Alfalfa Hay	15084.00												15084.00
Grain Sorghum								2297.26					2297.26
Wheat								24392.69					24392.67
4. Total Cash Receipts	27011.33	6606.06	7816.00	6047.53	7196.16	5623.60	6866.72	32262.07	7405.52	6393.31	8010.33	6596.04	127834.67
ENTERPRISE EXPENSES													
5. Hired Labor			124.07		337.79	839.48	458.13	180.99	473.19	196.14			2609.79
6. Livestock Expenses													
Milking Cows	710.08	690.16	710.08	690.16	710.08	690.16	710.08	690.16	710.08	690.16	710.08	690.16	8401.44
Dry Cows	34.32	36.88	34.32	36.88	34.32	36.88	34.32	36.88	34.32	36.88	34.32	36.88	427.20
Heifers	24.12	30.45	24.12	30.45	24.12	30.45	24.12	30.45	24.12	30.45	24.12	30.45	327.20
Replacements	8.96	11.20	8.69	11.20	8.96	11.20	8.96	11.20	8.96	11.20	8.96	11.20	120.96
Calves	235.22	252.50	235.22	252.50	235.22	252.50	235.22	252.50	235.22	252.50	235.22	252.50	2926.32
7. Feeds													
Alfalfa Hay							2803.54						2803.54
Grain Sorghum		737.50	853.92	770.87	243.18	2981.70			292.83				5880.10
Oats	654.74	585.01	362.10	456.98	1353.43	1229.55	1190.38	1255.07	1266.74	1257.75	705.20	740.56	11057.51
Corn	164.42	177.36	226.74	137.84	7.18							95.18	808.72
Soybean Meal	517.11	492.46	660.11	529.73	50.24	75.33	118.19	156.33	194.34	254.50	506.37	470.55	4025.26
8. Crop Operating Costs		3212.97	24.08	923.48	1743.16	1033.94	710.66	184.29	4621.39	500.10			12954.07
9. Feed Storage and Processing	66.12	54.40	38.40	28.19	131.75	597.97	727.99	328.82	376.46	474.67	439.18	416.48	3680.43
10. Total Operating Expenses	2415.09	6280.89	3302.12	3868.28	4879.43	7779.16	7021.59	3126.69	8237.75	3704.35	2663.45	2743.96	56022.76
11. Cash Balance-Beginning	0	24596.24	24921.41	29435.29	31614.54	33931.27	31775.71	31620.84	60756.22	59923.99	62612.95	67959.83	
12. Cash Balance-Ending	24596.24	24921.41	29435.29	31614.65	33931.27	31775.71	31620.84	60756.22	59923.99	62612.95	67959.83	71811.91	
	Summary of Whole Dairy Farm Per Cow												
Milk Income-18,000 lbs.	147.28	137.63	140.66	125.99	127.75	117.16	120.89	116.09	132.11	133.19	144.71	137.42	1580.88
Total Farm Receipts-18,000 lbs.	562.74	137.63	162.83	125.99	149.92	117.16	143.06	672.13	154.28	133.19	166.19	137.42	2663.22
Dairy Expenses-18,000 lbs.	21.10	21.27	23.68	21.27	28.14	38.76	30.64	25.04	30.96	25.36	21.10	21.27	308.61
Total Farm Expenses-18,000 lbs.	50.31	130.85	68.79	80.59	101.65	162.06	146.28	65.14	171.62	77.17	55.49	55.16	1167.14
Net Returns-18,000 lbs.	512.43	6.77	94.04	45.40	48.27	-44.90	-3.22	606.99	-17.34	56.02	111.39	80.26	1496.08
Net Returns-15,000 lbs.	500.46	-10.86	75.09	29.97	31.60	-55.00	1.18	591.31	-37.05	37.51	68.58	61.20	1316.13
Net Returns-12,000 lbs.	487.19	-30.37	55.85	12.05	14.48	-67.41	-5.56	574.51	-56.96	19.18	69.35	40.86	1113.16

The total operating expenses are incurred more or less evenly during the year except in February, June, July, and September when the biggest amounts are spent. See line 10 of Table XXXVI. The last two lines of TableXXXVI show the cash balance, in the beginning and at the end of the periods. Finally, this cash flow analysis shows what has occurred during the year, e.g., it gives the value of the plan as $71811.91. This value represents the return to land, operator labor, capital, machinery, overhead, risk, and management. In other words, it is the model's objective function defined as net revenue to compensate the use of these factors.

Base Model - The 12,000 and 15,000 Pounds Production Levels

As part of the base model discussion, the solutions when 12,000 and 15,000 lbs. of milk are produced are presented. These solutions are obtained one at a time by preventing the immediately higher production level or levels from entering the optimal solution.

The results are similar in many respects. The monthly activities of the various classes of dairy cattle enter the optimal solution at the same level in all three production levlels under consideration. This is already shown in Tables XVIII and XIX.

The feed utilization for farms where cows produce for the 12,000 and 15,000 pounds of milk are found in Tables XXXVII and XXXVIII, respectively. The monthly distribution of pastures, hays, and supplements is in general the same. The differences lie firstly in that alfalfa hay enters the solution for four, five and six months starting in May for levels 12, 15, and 18,000 respectively; secondly, molasses enters the optimal solution only for the lowest level of milk production. The digestible protein content should explain these differences: at higher levels of production

TABLE XXXVII

FEED SUPPLIED TO COWS PRODUCING 12,000 POUNDS
IN THE OPTIMAL SOLUTION OF THE BASE MODEL

Feed Unit		Period											
		1	2	3	4	5	6	7	8	9	10	11	12
Native Pasture	lbs.				20089.00	19815.59	24340.50	24219.00	30429.00	30994.32	27566.56		
Wheat Pasture	lbs.	16606.07	18807.62									16810.40	18809.10
Sudan Hay	ton	7.57	7.10	10.59	6.53							7.42	6.81
Alfalfa Hay	ton					5.62	3.48	.75					
Grain Sorghum	cwt.	119.78	120.17	173.65	135.30	57.08	54.80	60.00	55.70	51.72	54.83	110.66	103.39
Oats	bu.	436.76	417.19	197.58	345.37	696.26	644.74	643.61	587.84	598.22	577.10	467.64	474.76
Soybean Meal	cwt.	27.76	25.11	50.42	32.96	7.41	17.66	21.34	34.96	40.51	39.28	27.00	23.47
Molasses	cwt.									4.20			

TABLE XXXVIII

FEED SUPPLIED TO COWS PRODUCING 15,000 POUNDS IN THE OPTIMAL SOLUTION OF THE BASE MODEL

Feed	Unit	Period											
		1	2	3	4	5	6	7	8	9	10	11	12
Native Pasture	lbs.				15016.84	13916.69	18316.12	17005.50	22897.35	21865.20	29562.13		
Wheat Pasture	lbs.	11690.53	14059.25									11682.50	14065.87
Sudan Hay	ton	9.13	8.58	11.40	8.22							8.95	8.24
Alfalfa Hay	ton					7.48	5.78	6.05	3.56	3.58			
Grain Sorghum	cwt.	136.46	137.29	183.46	152.59	57.20	54.94	62.78	58.56	60.41	55.56	125.50	117.00
Oats	cwt.	406.19	382.54	207.17	315.17	767.94	716.22	718.12	662.73	683.53	613.65	443.52	452.12
Soybean Meal	cwt.	42.59	39.25	59.28	45.50	6.10	14.82	16.45	28.31	29.89	47.02	41.61	37.27

greater concentration of protein is needed, and alfalfa can provide it cheaper than molasses does.

Tables XXXIX and XL are derived from data in Tables XXXVII and XXXVIII. They refer to per cow requirement in feeds to satisfy the minimum daily nutrient requirements. It can be seen that the higher the level of production, the lower the use of pastures, oats, and molasses. That is because high production levels demand more protein and energy and at the same time a higher fiber content in the balanced ration. In these circumstances sudan hay, grain sorghum, and soybean meal are demanded in greater quantities as higher levels of production are reached.

Table XLI summarizes the total use of land, labor and capital. There is a slight tendency for more land to be devoted to grain sorghum at the expense of cropland devoted to wheat as higher producing level herd is maintained.

The value of the objective function is $53,431.54 for the 12,000 lbs. producing herd and $63,173.43 for the 15,000 lbs.. The value of the objective function represents the net return to compensate for the use of the production factors used, or the return to land, operator labor, capital, machinery, overhead, risk, and management.

Sensitivity Analysis Base Model

The stability of the optimal dairy farm organization can be considered in terms of cost, returns, and resource changes. This can be accomplished using sensitivity analysis. When analyzing activities the "ceteris paribus" conditions must hold.

TABLE XXXIX

CONSUMPTION OF FEED AS IS BY THE 12,000 POUND PRODUCING COWS, IN POUNDS PER HEAD PER DAY

	Period											
Feed	1	2	3	4	5	6	7	8	9	10	11	12
Native Pasture				16.5	16.2	20.0	19.8	24.9	25.4	22.6		
Wheat Pasture	13.8	15.4									13.8	15.7
Sudan Hay	11.7	10.7	15.7	9.2							12.2	10.9
Alfalfa Hay					9.2	6.2	5.6	1.2				
Grain Sorghum	9.8	9.8	14.2	11.1	4.7	4.5	4.9	4.6	4.2	4.5	9.1	8.5
Oats	11.4	10.9	5.2	9.0	18.3	16.9	16.9	15.4	15.7	15.1	12.3	12.4
Soybean Meal	2.3	2.0	4.1	2.7	.6	1.4	1.7	2.9	3.3	3.2	2.2	2.2
Molasses									.3			

TABLE XL

CONSUMPTION OF FEED AS IS BY THE 15,000 POUND PRODUCING COWS, IN POUNDS PER HEAD PER DAY

Feed	Period											
	1	2	3	4	5	6	7	8	9	10	11	12
Native Pasture				12.3	11.4	15.0	13.9	18.8	17.9	24.2		
Wheat Pasture	9.6	11.5									9.6	11.5
Sudan Hay	14.1	13.0	16.9	12.2							12.5	13.0
Alfalfa Hay					12.3	9.5	9.7	5.7	5.8			
Grain Sorghum	11.2	11.2	15.0	12.5	4.7	4.5	5.1	4.8	5.0	4.6	10.3	9.6
Oats	10.6	10.0	5.4	8.3	20.1	18.8	18.8	17.4	17.9	16.1	11.6	11.8
Soybean Meal	3.5	3.2	4.8	3.7	.5	1.2	1.3	2.3	2.4	3.8	3.4	3.0

TABLE XLI

ALLOCATION OF RESOURCES IN THE OPTIMAL SOLUTION
OF THE BASE MODEL FOR COWS PRODUCING
12,000 AND 15,000 POUNDS

Resource	Unit	Milk Production Level	
		12,000 lbs.	15,000 lbs.
		(Amount)	(Amount)
Land			
Pasture	Acre	140.00	140.00
Sudan Hay	Acre	50.00	50.00
Alfalfa Hay	Acre	80.00	80.00
Grain Sorghum	Acre	16.53	18.45
Wheat	Acre	213.47	211.55
Labor	Hour	3711.7	3710.5
Total Operating Expenses	$	49,953.30	52,466.27

Some selected resources were found to have marginal value products as follows:

Resource	Marginal Value Products
Cropland, acre	$ 70.73
Pastureland, acre	.53
Labor, hour	3.00
Barn size, head	0.00 (September)
	19.28 (July)
	151.11 (April)

The marginal value product or shadow price is the change in the value of the plan (objective function) associated with a one unit change in the amount of resource use. Stated differently it is the maximum price one would desire to pay for an additional unit of the resource. Therefore, the marginal value product of the resources listed indicates that additional units of these resources might be profitable, except barn size in September. The zero shadow price means that if barn size could be increased in September without a corresponding increase in other months it would not be profitable.

If cropland can be increased the first and perhaps some unspecified number of additional acres utilized would increase the net revenue by $70.73 per acre added.

The remaining sensitivity analysis discussion considers two important groups of activities: (a) activities at limit level, and (b) activities in the basis.

Activities at Limit Level. This section deals with activities included in the model but not appearing in the optimal solution. The shadow price is the guide for analyzing the changes that would occur if one item would change and all others were held constant. It indicates the change in price (cost) or return required before an activity would be included

in the plan. Alternatively, it can be interpreted as the amount that the net revenue decreases if one unit of the activity is forced into the solution.

Table XLII presents all such activities and the corresponding lowest and highest shadow prices observed. The month or months to which the price refers is also provided. These particular activities are comprised of purchase and sale exclusively. The computer printout from which Table XLII was taken has all activities listed. One example will suffice for understanding. As an example consider the sale of alfalfa hay. From the range analysis it is noted that February is the month requiring the smallest increase in price for hay to be sold in that month. Note that alfalfa hay is sold in January in the optimal solution so the January activity is not considered as a row at limit level. The February hay price is $63.58 per ton. According to the range analysis, if the hay price increased 27¢ to 63.85 there would be 240 tons of alfalfa hay sold in February. A look at the optimal solution shows 240 tons being sold in January so in effect a 27¢ increase in the February hay price would cause the hay to be sold in February rather than January.

The month requiring the biggest change in alfalfa price is July. The expected hay price in July is $48.98 per ton. If the hay price increases $6.71 to $55.69 per ton there would be some alfalfa hay sold in July. According to the range output, the 181.97 ton of hay produced before July would be sold. In other words, if expected prices prevail, July is the worst month to sell alfalfa hay. Table XLII contains the price changes required for each of the buy and sell activities to enter the solution. For buy activities the quantities are price decreases whereas for sell activities they are price increases required.

TABLE XLII

HIGHEST AND LOWEST PRICE CHANGES REQUIRED FOR ACTIVITIES NOT IN THE OPTIMAL SOLUTION OF THE BASE MODEL TO ENTER THE BASE MODEL

Activity	Activity Type	Unit	Shadow Price ($) Low Value	Low Month	High Value	High Month
Sudan Hay	Purchase	ton	.02	04	4.00	01
	Sale	ton	.22	02	3.98	04
Alfalfa Hay	Purchase	ton	.45	10	6.71	01
	Sale	ton	.27	02	6.71	07
Grain Sorghum	Purchase	cwt	.01	07	.37	08
	Sale	cwt	.01	10	.37	02-06,09
Barley	Purchase	bu	.06	01	.22	04
	Sale	bu	.49	04	.71	02
Wheat	Purchase	bu	.13	03	.92	08
	Sale	bu	.15	12	.80	03
Corn	Purchase	bu	.53	07	.70	10
Molasses	Purchase	cwt	.26	02	.89	10
Calf	Sale	head	5.38	05	24.88	11
Extra Replacement	Sale[1]	head	154.45	02	154.45	02
Young Heifer	Purchase[2]	head	25.00	01-12	25.00	01-12
Heifer	Purchase	head	74.30	04	94.31	01
Fresh Heifer	Purchase	head	245.57	04	305.93	02
Labor	Hire[3]	hour	3.00		3.00	

[1]Only one month.

[2]Same price in all months.

[3]Same price in periods 01, 02, 04, 11, and 12.

Activities in the Basis. The range analysis or sensitivity analysis also included examination of activities included in the optimal solution of the model. See Tables XLIII, XLIV, and XLV. The ranges are interpreted much as the ranges for the activities at limit level. Many activities are included in the optimal solution at a zero level, but their interpretation does not differ from other activities.

If the price are cost cost range is relatively narrow, the price or cost movement required for activity level to change would be relatively small. Between the two range values presented in Tables XLIII, XLIV, and XLV, the price or cost can vary without changing the mix of enterprise in the optimal solution. For example, in Table XLIII, native pasture has a current cost of 81¢ per acre and a cost range negative infinity to $1.36. If the cost of production varies from $1.36 to, in effect, zero the use of native pasture will remain 140 acres. If the cost of production rises slightly above $1.36 per acre a lesser number of acres will be used. In this case the range output indicates 113.74 acres.

Tables XLIV and XLV show the optimal range for purchase prices and sale prices, respectively. Sales of alfalfa hay amount to 240 a ton at $62.85 per ton, and an optimal range for the sale price of $62.58 to infinity. The range is narrow in downward direction. Note that 27¢ is the difference between the actual price and the bottom end of the range. This is the same amount the hay price in February must increase, presented earlier. Below the lower limit less alfalfa is sold. The positive infinity in the upper limit means that no matter how much the sale price increase, only 240 ton of alfalfa is sold. Because of the fixed area allocated to alfalfa and the assumed yield, production of alfalfa cannot be increased. Other activities present in the optimal plan may be interpreted similarly.

TABLE XLIII

OPTIMAL COST RANGE OF ACTIVITIES
IN THE BASE MODEL SOLUTION

Activity	Acres	Cost $	Optimal Cost Range[1] Low	High
Bermuda Pasture		36.42	-10.26	Infinity
Small Grain		30.23	19.65	Infinity
Native Pasture	140.0	.81	-Infinity	1.36
Silage Sorghum		118.99	114.71	154.71
Sudan Hay	50.0	30.31	-Infinity	38.15
Alfalfa Hay	80.0	47.50	-Infinity	84.22
Grain Sorghum	20.6	26.39	26.26	27.10
Barley		32.04	15.48	Infinity
Wheat	209.4	33.34	32.62	33.47

TABLE XLIV

OPTIMAL RANGE OF PURCHASE ACTIVITIES
IN THE OPTIMAL BASE MODEL SOLUTION

Activity	Unit	Month	Units Purchased	Price ($)	Optimal Price Range	
					Low	High
Sudan Hay	ton	06		40.57	38.64	42.64
Grain Sorghum	cwt	02	162.09	4.55	4.40	4.66
		03	192.32	4.44	4.41	4.58
		04	177.62	4.34	4.18	4.42
		05	56.82	4.28	4.28	4.44
		06	680.75	4.38	4.32	4.38
		09	63.54	4.61	4.24	4.68
Barley	bu	02		2.64	2.48	2.68
Oats	bu	01	376.29	1.74	1.69	1.98
		02	340.12	1.72	1.68	2.07
		03	215.53	1.68	1.64	1.86
		04	278.65	1.64	1.62	1.75
		05	835.45	1.62	1.53	1.74
		06	814.27	1.51	1.47	1.56
		07	788.33	1.51	1.50	1.60
		08	765.28	1.64	1.58	1.72
		09	767.72	1.65	1.54	1.71
		10	753.14	1.67	1.43	1.68
		11	419.76	1.68	1.66	1.97
		12	425.61	1.74	1.69	2.01
Corn	bu	01	53.91	3.05	2.67	3.13
		02	58.73	3.02	2.48	3.12
		03	77.39	2.93	2.81	2.95
		04	48.70	2.83	2.82	2.90
		05	2.50	2.87	2.74	2.88
		06		2.94	2.40	Infinity
		08		3.24	2.51	Infinity
		11		2.98	2.88	Infinity
		12	30.90	3.08	3.10	3.17
Soybean Meal	cwt	01	57.47	9.00	5.90	9.35
		02	54.72	9.00	5.94	9.32
		03	73.34	9.00	8.24	9.14
		04	58.86	9.00	8.16	9.11
		05	5.58	9.00	7.87	10.17
		06	8.37	9.00	6.79	10.77
		07	13.13	9.00	7.90	9.43
		08	17.37	9.00	8.49	10.94
		09	21.59	9.00	8.42	11.11

TABLE XLIV (Continued)

Activity	Unit	Month	Units Purchased	Price ($)	Optimal Price Range	
					Low	High
Soybean Meal	cwt	10	28.28	9.00	8.92	11.94
		11	56.26	9.00	8.75	9.07
		12	52.28	9.00	4.82	9.37
Molasses	cwt	03		3.50	3.33	Infinity
		05		3.50	3.05	Infinity
		06		3.50	3.22	Infinity
		07		3.50	3.28	Infinity
		08		3.50	3.22	Infinity
		09		3.50	3.16	Infinity
Labor	hour	03	41.36	3.00	2.00	8.15
		05	112.60	3.00	2.35	5.15
		06	279.83	3.00	2.12	3.16
		07	152.71	3.00	.40	5.75
		08	60.33	3.00	1.44	3.28
		09	157.73	3.00	1.81	3.21
		10	65.38	3.00	2.80	4.10

TABLE XLV

OPTIMAL RANGE OF SALE ACTIVITIES IN THE OPTIMAL BASE MODEL SOLUTION

Activity	Unit	Month	Unit Sold	Price $	Optimal Price Range Low	High
Sudan Hay	ton	01	83.82	45.26	45.04	45.28
Alfalfa Hay	ton	01	240.00	62.85	62.58	Infinity
Grain Sorghum	cwt	08	494.03	4.65	4.62	4.71
Wheat	bu	08	6701.29	3.64	3.64	3.66
Milk	cwt	01	738.72	9.57	8.25	15.73
		02	701.28	9.42	10.68	3.85
		03	738.72	9.14	7.82	15.30
		04	694.32	8.71	2.50	10.04
		05	717.20	8.55	7.19	14.35
		06	661.60	8.50	1.98	9.90
		07	671.60	8.64	7.19	12.53
		08	631.76	8.82	3.30	10.29
		09	684.08	9.27	7.85	10.19
		10	674.40	9.48	3.97	10.85
		11	724.32	9.59	8.25	15.85
		12	694.32	9.50	3.80	10.83
Calf	Head	01,03,09,11	3.98	125.00	112.59	150.00
		05	3.98	125.00	118.83	150.00
		07	3.98	125.00	115.40	150.00
		02		125.00	108.52	137.41
		04		125.00	110.24	137.41
		06		125.00	117.11	137.41
		08		125.00	113.68	137.41
		10		125.00	105.08	137.41
		12		125.00	98.21	137.41
Cull, Cow	Head	01,03,05,07,11	1.6	216.00	185.11	360.07
		09	1.6	216.00	185.11	312.38
		02,04,06,08,12		216.00	71.93	246.89
		10		216.00	119.62	246.89
Extra Replacement	Head	01,03,05,07,11	.32	450.00	295.55	1170.34
		09	.32	450.00	295.55	931.92
		04,06,08,10,12		450.00		604.45
Extra Heifer	Head	01,03,05,07,11	.31	250.00	89.11	1000.35
		09	.31	250.00	89.11	752.00
		02,04,06,08,10,12		250.00		410.89

Model Changes - Applications

The optimal organization obtained with the base model under the underlying assumptions was described in some detail in the last section. This section contains the solutions based on changes of particular constraints, prices and assumptions used in the base model. Departure from the base model enables one to better evaluate possible alternative organizations. The changes are not intended to be promptly adopted. Some will be feasible; others, affected by expogenous factors, simply force the dairymen to adjust in the long run to seek other alternatives.

Given the dimensions of the model it should be recognized that it is almost impossible to look at all possible changes in organization. Changes analyzed in this section allow adjustment in all activity levels as opposed to the previous section when only one variable was allowed to change. Therefore, modifications judged relevant are introduced so that resulting solution changes can be evaluated. As seen in the previous section, range or sensitivity analysis give an indication of the magnitude of changes in the objective function and in the availability of resources.

The base model modifications are the following:

--Price changes: Alfalfa;
--Deleting activities: All pastures;
--No restriction on planted area: Sudan hay and alfalfa hay,
--Ration specification changes: Decrease in fiber content, decrease in feed intake requirement; and,
--No transfer of pasture from one time period to another allowed.

Changes in Alfalfa Hay Prices

Any hay silage or grain could have been selected to experience price variation. Alfalfa hay was selected because it is the most commonly used hay. Thus the sale price of alfalfa was lowered 20 percent. The results

are in Tables XLVI and XLVIII. Recalling from previous discussion, sale of alfalfa occurred just one time, i.e., in January.

When compared with the base model, the level of the feed activities are the same from May to October. Differences in feeding exist from November to April. As a relatively cheaper feedstuff, alfalfa hay is a substitute for other feeds now relatively more expensive.

The first thing to notice is that alfalfa is now used in all months previously utilizing no alfalfa. Sudan hay is heavily replaced. Grain sorghum is reduced by 50 percent approximately. On the other hand the quantity of oats is increased in some cases by more than 100 percent, and soybean meal is either drastically reduced or not provided in the ration as from November to February.

It seems that given the lower price of alfalfay hay, oats come in because it contains more net energy, digestible protein and fiber than grain sorghum. Alfalfa hay and oats together can provide more protein than sudan and grain sorghum and as a result less soybean meal is used. The amounts per day per cow to satisfy the minimum requirements are shown in Table XLVII.

The herd's composition has the same characteristics as that of the base model. All sales of dairy animals and transfers of dairy animals are similar to those of the base model. Total labor requirements amount to 3715 hours, with 877 hours of hired labor. The remaining is family labor. The peak demand for labor occurs in June.

Ttoal operating expenses are $51,448.46, and the value of the objective function is $71,390.58.

TABLE XLVI

FEED SUPPLIED TO COWS PRODUCING 18,000 POUNDS IN AN OPTIMAL SOLUTION WITH A 20 PERCENT REDUCTION IN THE ALFALFA PRICE

Feed	Unit	Period											
		1	2	3	4	5	6	7	8	9	10	11	12
Native Pasture	lbs.				8620.83	8290.35	10342.69	10134.00	12930.75	13028.68	17240.92		
Wheat Pasture	lbs.	7118.57	8075.01									7112.89	8056.79
Sudan Hay	ton	.21	.36									.47	.89
Alfalfa Hay	ton	10.04	9.82	11.78	10.08	9.26	8.44	8.50	7.29	7.03	4.99	9.58	8.90
Grain Sorghum	cwt.	75.29	86.24	100.85	98.86	56.82	57.27	64.96	64.50	63.54	57.66	67.08	70.19
Oats	bu.	795.17	748.14	700.08	695.53	835.45	814.27	788.33	765.28	767.72	753.14	820.81	798.28
Soybean Meal	cwt.			4.87	4.22	5.58	7.81	12.52	16.26	20.53	26.98		

TABLE XLVII

FEED IN POUND PER HEAD PER DAY SUPPLIED TO COWS PRODUCING 18,000 POUNDS OF MILK IN THE OPTIMAL SOLUTION WITH A 20 PERCENT REDUCTION IN THE ALFALFA PRICE

Feed	Period											
	1	2	3	4	5	6	7	8	9	10	11	12
Native Pasture				7.1	6.8	8.5	8.3	10.6	10.7	14.1		
Wheat Pasture	5.8	6.6									5.8	6.6
Sudan Hay	.3	.5									.7	1.4
Alfalfa Hay	15.8	15.2	17.8	15.2	15.2	13.8	13.6	11.7	11.3	8.2	13.4	14.3
Grain Sorghum	6.2	7.1	8.3	8.1	4.6	4.7	5.3	5.3	5.2	4.7	5.5	5.8
Oats	20.8	19.6	18.4	18.2	21.9	21.4	20.7	20.1	20.1	19.8	21.5	20.9
Soybean Meal			.4	.3	.4	.6	1.0	1.3	1.7	2.2		

Deleting Pasture Activities

The main objective of deleting all pastures was to simulate a dry lot operation. The results show that between June and September except for grain sorghum the quantities of other feedstuffs used are increased. (See Tables XLVIII through LIII). In this period, requirements of grain sorghum decrease with increasing elvels of production because of low fiber content of this grain. Soybean meal is exclusively required during the period from October through April for all three levels of milk production. The exception is for July and September for the high production level group when a small quantity is necessary to make up for deficiencies in protein. Molasses now enters from June through September because of its energy content.

The composition of the herd in all three technology levels is the same and follows the organization of the base model. Likewise sales of dairy animals and transfers are similar to the base model.

Labor and capital requirements and the returns of the three technology levels are as follows:

		Amount		
	Unit	12,000 Lbs.	15,000 Lbs.	18,000 Lbs.
Labor (Total)	Hour	3691	3690	3689
Own	Hour	2823	2823	2823
Hired	Hour	868	867	866
Operating Expenses	$	48585.87	54600.98	57615.07
Returns	$	55190.40	58687.32	68129.45

Unrestricted Crop Area

The restriction on area planted to alfalfa and sudan hay is dropped in this model. The native pasture remains restricted to its orignal area of 140 acres. The new optimal solution contains 354.17 acres of alfalfa and 5.83 acres of wheat. The feeding activities are shown in

TABLE XLVIII

FEED SUPPLIED TO COWS PRODUCING 12,000 POUNDS OF MILK IN THE OPTIMAL SOLUTION OF A DRYLOT SYSTEM (NO PASTURE ALLOWED).

		Period											
Feed	Unit	1	2	3	4	5	6	7	8	9	10	11	12
Sudan Hay	ton	10.18	10.07	10.59	10.28	1.91	1.65	1.52	1.43	1.52	9.48	9.97	9.68
Alfalfa Hay	ton					7.76	7.71	8.13	7.96	8.13			
Grain Sorghum	cwt.	148.58	156.07	173.65	168.37	76.19	52.60	52.48	52.14	52.48	120.69	136.43	132.24
Oats	bu.	283.52	233.60	197.58	191.49	659.72	663.26	688.93	664.69	688.93	355.00	325.22	315.34
Soybean Meal	cwt.	47.99	47.96	50.42	49.14						44.49	46.80	45.63
Molasses	cwt.						16.11	16.60	16.11	16.60			

TABLE XLIX

FEED SUPPLIED TO COWS PRODUCING 15,000 POUNDS OF MILK
IN THE OPTIMAL SOLUTION OF A DRYLOT SYSTEM
(NO PASTURE ALLOWED)

Feed	Unit	Period											
		1	2	3	4	5	6	7	8	9	10	11	12
Sudan Hay	ton	10.94	10.80	11.40	11.02	1.19	.92	.74	.67	.74	10.17	10.72	10.38
Alfalfa Hay	ton					9.12	9.03	9.64	9.39	9.64			
Grain Sorghum	cwt.	156.50	164.12	183.46	177.30	68.88	43.69	48.58	47.32	48.58	126.18	143.42	138.57
Oats	bu.	229.62	245.29	207.17	200.13	750.47	750.98	765.62	739.64	765.62	375.48	344.47	332.95
Soybean Meal	cwt.	56.66	56.33	59.28	57.60						52.61	55.38	53.83
Molasses	cwt.						17.28	17.86	17.28	17.86			

TABLE L

FEED SUPPLIED TO COWS PRODUCING 18,000 POUNDS OF MILK IN THE OPTIMAL SOLUTION OF A DRYLOT SYSTEM (NO PASTURE ALLOWED).

Feed	Unit	Period											
		1	2	3	4	5	6	7	8	9	10	11	12
Sudan Hay	ton	11.68	11.77	12.16	12.01	.37	.52		.23		11.08	11.44	11.30
Alfalfa Hay	ton					10.54	10.26	11.09	10.72	11.09			
Grain Sorghum	cwt.	163.55	176.93	192.32	191.28	60.02	40.32	44.38	46.38	44.38	135.60	149.60	148.09
Oats	bu.	314.17	264.22	215.53	215.03	842.90	840.77	837.95	821.05	837.95	406.03	362.03	359.70
Soybean Meal	cwt.	65.66	64.16	68.45	65.55			.73		.73	60.11	64.29	61.44
Molasses	cwt.						18.82	19.06	18.82	19.06			

TABLE LI

PER HEAD PER DAY FEED AS IS SUPPLIED TO COWS PRODUCING
12,000 POUNDS OF MILK IN THE OPTIMAL SOLUTION
OF A DRYLOT SYSTEM (NO PASTURE ALLOWED)

Feed	Period											
	1	2	3	4	5	6	7	8	9	10	11	12
Sudan Hay	15.7	15.2	15.7	15.2	2.8	2.4	2.5	2.3	2.5	15.2	15.7	15.2
Alfalfa Hay					12.7	12.6	13.1	12.8	13.1			
Grain Sorghum	12.2	12.8	14.2	13.8	6.2	4.3	4.3	4.3	4.3	9.9	11.2	10.8
Oats	7.4	6.1	5.2	5.0	17.3	17.4	18.1	17.4	18.1	9.3	8.5	8.3
Soybean Meal	3.9	3.9	4.1	4.0						3.6	3.8	3.7
Molasses						1.3	1.4	1.3	1.4			

TABLE LII

PER HEAD PER DAY FEED AS IS SUPPLIED TO
COWS PRODUCING 15,000 POUNDS OF
MILK IN THE OPTIMAL SOLUTION
OF A DRYLOT SYSTEM
(NO PASTURE ALLOWED)

	Period											
Feed	1	2	3	4	5	6	7	8	9	10	11	12
Sudan Hay	16.9	16.3	16.9	16.3	1.8	1.4	1.2	1.1	1.2	16.3	16.9	16.3
Alfalfa Hay					15.0	14.8	15.5	15.1	15.5			
Grain Sorghum	12.8	13.4	15.0	14.5	5.6	3.6	4.0	3.9	4.0	10.3	11.9	11.4
Oats	7.8	6.4	5.4	5.2	19.7	19.7	20.1	19.4	20.1	9.8	9.0	8.7
Soybean Meal	4.6	4.6	4.8	4.7						4.3	4.5	4.4
Molasses						1.4	1.5	1.4	.15			

TABLE LIII

PER HEAD PER DAY FEED AS IS SUPPLIED TO COWS PRODUCING
18,000 POUNDS OF MILK IN THE OPTIMAL SOLUTION
OF A DRYLOT SYSTEM (NO PASTURE ALLOWED)

Feed	Period											
	1	2	3	4	5	6	7	8	9	10	11	12
Sudan Hay	18.0	17.8	18.0	17.8	.5	.8		.4		17.8	18.0	17.8
Alfalfa Hay					17.3	16.8	17.8	17.2	17.8			
Grain Sorghum	13.4	14.5	15.8	15.7	4.9	3.3	3.6	3.8	3.6	11.1	12.3	12.1
Oats	8.2	6.9	5.6	5.6	22.1	22.0	22.0	21.5	22.0	10.6	9.5	9.4
Soybean Meal	5.3	5.3	5.6	5.4			.1		.1	4.9	5.3	5.0
Molasses						1.5	1.6	1.5	1.6			

Tables LIV and LV. Sudan hay and alfalfa hay maintain a substitute relationship as in the base plan. Grain sorghum is used in all twelve periods. A greater quantity is utilized by the cows from December through April, the reverse being true for oats and soybean meal. Molasses is used in only two periods.

The composition of the dairy herd is the same as that obtained with the base model. The activities call for 3874 hours of total labor in the twelve periods. Of that amount 1116 hours must be hired. This plan demands larger quantities of labor in May, June, and October than the base model: 350, 353, and 354, respectively. This results because alfalfa harvesting is labor intensive. Operating expenses amount to $69374.18, and the return is $80350.96.

Changes of Ration Specification

This part concerns with modifications in ration specification. Two modifications are introduced in the base model, one each time. The first involves a reduction in the fiber requirement and the second a reduction in feed intake.

Reduction in Fiber. The base model for a minimum of 16 percent of fiber in the balanced ration in order to ensure adequate milk fat content. This plan reduces the fiber requirement to 12 percent (Table LVI).

The new optimal organization shows that native pasture and small grain activities have approximately the same magnitude as in the base model. Alfalfa hay is provided in each month. Grain sorghum and oats quantities supplied to the cows are increased and molasses now enters the optimal plan. The reorganization results because the lower fiber requirements allows less fibrous feeds to enter the plan.

TABLE LIV

FEED SUPPLIED TO COWS PRODUCING 18,000 POUNDS OF MILK IN THE OPTIMAL SOLUTION WITH NO RESTRICTION ON ALFALFA AND SUDAN HAY ACREAGES

Feed	Unit	Period											
		1	2	3	4	5	6	7	8	9	10	11	12
Native Pasture	lbs.				8305.62	8290.35	10342.69	10093.50	12930.75	13028.68	17240.92		
Sudan Hay	ton	11.68	11.77	12.16	10.46								11.30
Alfalfa Hay	ton					9.26	8.44	8.50	7.29	7.03	4.99	11.09	
Grain Sorghum	cwt.	163.55	176.93	192.32	177.62	56.82	57.27	64.96	64.50	63.54	57.66	44.38	127.03
Oats	bu.	314.17	264.22	215.53	278.65	835.45	814.27	788.33	765.28	767.72	53.14	837.95	374.22
Soybean Meal	cwt.	65.66	64.16	68.45	58.86	5.58	7.81	12.52	16.26	20.53	26.98	.73	62.58
Molasses												19.06	18.82

TABLE LV
PER HEAD PER DAY FEED AS IS SUPPLIED TO COWS PRODUCING 18,000 POUNDS OF MILK IN THE OPTIMAL SOLUTION WITH NO RESTRICTION ON ALFALFA AND SUDAN HAY ACREAGES

	Period											
Feed	1	2	3	4	5	6	7	8	9	10	11	12
Native Pasture				6.8	6.8	8.5	8.3	10.6	10.6	14.1		
Sudan Hay	18.0	17.8	18.0	15.5								17.8
Alfalfa Hay					15.2	13.8	13.6	11.7	11.3	8.2	17.8	
Grain Sorghym	13.4	14.5	15.8	14.6	4.6	4.7	5.3	5.3	5.2	4.7	3.6	10.4
Oats	8.2	6.9	5.6	7.3	21.9	21.4	20.7	20.1	20.1	19.8	22.0	9.8
Soybean Meal	5.4	5.2	5.6	4.8	.5	.6	1.0	1.3	1.7	2.2	.1	5.1
Molasses											1.6	1.5

TABLE LVI

FEED SUPPLIED TO COWS PRODUCING 18,000 POUNDS OF MILK IN THE OPTIMAL SOLUTION WITH THE FIBER MINIMUM REDUCED TO TWELVE PERCENT

Feed	Unit	Period											
		1	2	3	4	5	6	7	8	9	10	11	12
Native Pasture	lbs.				8239.96	8058.92	10342.69	10134.00	12530.70	12456.78	16764.82		
Wheat Pasture	lbs.	6761.15	7721.90									6802.73	7758.94
Alfalfa Hay	ton	10.30	10.22	11.78	10.15	9.30	8.44	8.51	7.40	7.21	5.14	10.09	9.81
Grain Sorghum	cwt.	274.79	271.37	274.79	271.37	274.79	271.37	274.79	271.37	274.79	271.37	274.79	271.37
Oats	bu.	67.62	71.78	55.50	56.69	70.41	95.11	83.52		8.88	.68	78.01	82.25
Soybean Meal	cwt.	16.83	15.02	20.71	19.85	23.25	23.84	28.23	33.17	27.86	43.87	15.66	13.14
Molasses	cwt.	19.06	18.82	19.06	18.82	10.60			13.23	16.48	11.78	16.56	17.12

TABLE LVII

PER HEAD PER DAY FEED AS IS SUPPLIED TO COWS PRODUCING 18,000 POUNDS OF MILK IN THE OPTIMAL SOLUTION WITH THE FIBER MINIMUM REDUCED TO TWELVE PERCENT

Feed	Period											
	1	2	3	4	5	6	7	8	9	10	11	12
Native Pasture				6.8	6.6	8.5	8.3	10.3	10.2	13.7		
Wheat Pasture	5.5	6.3									5.6	6.4
Alfalfa Hay	16.2	15.8	17.8	15.3	15.2	13.8	13.7	11.9	11.6	8.4	16.2	15.8
Grain Sorghum	22.5	22.2	22.5	22.2	22.5	22.2	22.5	22.2	22.5	22.2	22.5	22.5
Oats	1.8	1.9	1.4	1.5	1.8	2.5	2.2		.2		2.0	2.2
Soybean Meal	1.4	1.2	1.7	1.6	1.9	2.0	2.3	2.7	3.1	3.6	1.3	1.1
Molasses	1.6	1.5	1.6	1.5	.9			1.1	1.4	1.0	1.4	1.4

The herd's composition is the same as the base model. Also, dairy animal sale and transfer activities behave similarly.

Labor amounts to 3444 hours of which 849 hours must be hired. Optimal expenses amount to $57534.12. The return is $73087.69. Table LVII shows the feed per head per day necessary to fulfill the cow's requirement.

Reduction in Feed Intake. Feed intake allowed is 3.5 percent of body weight per day. As a departure from the base model 3.0 percent of body weight is used in this model. The revised optimal organization includes native pasture in only one month (Table LVIII). Wheat pasture is no longer included because of the relatively low level of nutrients per pound of intake. Sudan hay has its quantities greatly diminished and appears in different periods than in the base model. Unlike sudan hay, alfalfa hay quantities are increased to a great extent and appearing in all months of the year. Alfalfa hay provides the protein that is lost when wheat pasture leaves the solution. In the period from November to April, grain sorghum is reduced to approximately one half of the quantity in the base model. The quantity of oats doubled during these periods. Soybean meal is used two months and with insignificant amounts.

Table LIX gives the daily amount of feed necessary for each cow to satisfy nutrient requirements.

This model does not follow the pattern encountered in the base model and many others concerning herd composition and sales and transfer activities. Cows of all three levels of production come fresh with no definite pattern. Some months have no cows coming fresh and some do. The maximum coming fresh in any month is 4.6 cows. Demand for labor by the activities entering this plan is 3714 hours, of which 878 hours must be hired.

TABLE LVIII

FEED SUPPLIED TO COWS IN THE OPTIMAL SOLUTION
WITH THE MAXIMUM FEED INTAKE REDUCED FROM
3.5 PERCENT TO 3.0 PERCENT OF
BODY WEIGHT PER DAY.

Feed	Unit	Period											
		1	2	3	4	5	6	7	8	9	10	11	12
Native Pasture	lbs.		277.92										
Sudan Hay	ton					1.07	1.07	.76	.90	.62	.85	.94	.66
Alfalfa Hay	ton	10.22	10.67	11.04	11.04	9.22	9.22	9.61	9.50	9.75	9.35	9.73	9.75
Grain Sorghum	cwt.	78.00	86.90	96.88	97.35	67.08	67.05	68.90	71.07	67.71	60.26	74.15	69.42
Oats	bu.	721.13	693.55	659.55	660.31	755.00	755.10	749.40	742.57	753.18	776.39	757.63	747.83
Soybean Meal	cwt.			.87	.16								

TABLE LIX

PER HEAD PER DAY FEED AS IS SUPPLIED TO COWS IN THE OPTIMAL SOLUTION WITH THE MAXIMUM FEED INTAKE REDUCED FROM 3.5 PERCENT TO 3.0 PERCENT OF BODY WEIGHT PER DAY

Feed	Period											
	1	2	3	4	5	6	7	8	9	10	11	12
Native Pasture		.2										
Sudan Hay	.6				1.6	1.6	1.2	1.4	1.0	1.4	1.5	1.0
Alfalfa Hay	16.1	16.5	16.7	16.7	15.1	15.1	15.4	15.3	15.7	15.3	15.6	15.7
Grain Sorghum	6.4	7.1	7.9	8.0	5.5	5.5	5.6	5.8	5.6	4.9	6.1	5.7
Oats	18.9	18.2	17.3	17.3	19.8	19.8	19.6	19.5	19.8	20.4	19.9	19.6
Soybean Meal			.07	.01								

Operating expenses, amount to $57493.49 for the period, and the optimal plan returns an amount equal to $63236.88.

No Transfer Allowed

It was implicitly assumed for all the preceding models that it was possible to transfer pastures, hays, silages, and grains from one period to another. This assumption is now dropped. This means that feeds available in a certain period must be consumed in that same period. The results indicate the monthly production of native pasture is utilized through the month of November (Table LX). Wheat pasture enters with the same values, approximately. Either sudan hay is used in much the same manner as the base model. Alfalfa hay is used in five months only. Grain Sorghum, oats and soybean meal enter the solution with the approximately same amounts as in the base model, except for October when the grain sorghum and oats amount nearly double and soybean meal more than doubles. The daily consumption per cow is shown in Table LXI.

The herd's composition differs from the base model in that in odd numbered months there are 3.4 cows freshening whereas in the even numbered months 4.6 cows freshen. Consequently, the sale of dairy animals as well as transfer follow a different pattern as that observed in the base model. The total labor requirement is 3708 hours of which 870 hours are hired. Operating expenses amount to $55866.66, and the return above variable cost is $71629.20.

TABLE LX

FEED SUPPLIED TO COWS PRODUCING 18,000 POUNDS IN THE OPTIMAL SOLUTION WITH NO PASTURE TRANSFERS ALLOWED FROM THE MONTH THE GRAZING IS PRODUCED

Feed	Unit	Period											
		1	2	3	4	5	6	7	8	9	10	11	12
Native Pasture	lbs.				7706.74	8938.36	9633.94	10926.00	12039.30	14047.46	9089.81	2674.82	
Wheat Pasture	lbs.	7371.74	7220.11									6368.52	7215.37
Sudan Hay	ton	10.45	10.71	12.07	10.66						8.03	9.38	10.29
Alfalfa Hay	ton					9.05	8.67	8.22	7.62	6.63			
Grain Sorghum	cwt.	150.51	163.66	191.72	179.21	57.28	56.83	65.12	64.38	63.60	114.08	129.91	138.32
Oats	bu.	380.40	355.30	215.24	274.35	828.34	821.99	780.91	773.41	758.80	480.96	439.61	422.21
Soybean Meal	cwt.	55.12	57.07	66.76	61.03	5.01	8.15	12.34	16.18	20.98	60.04	56.77	54.60

TABLE LXI

PER HEAD PER DAY FEED AS IS SUPPLIED TO COWS PRODUCING 18,000 POUNDS IN THE OPTIMAL SOLUTION WITH NO PASTURE TRANSFERS ALLOWED FROM THE MONTH THE GRAZING IS PRODUCED

	Period											
Feed	1	2	3	4	5	6	7	8	9	10	11	12
Native Pasture				6.3	7.3	7.9	9.0	9.9	11.5	7.4	2.2	
Wheat Pasture	6.0	5.9									5.2	5.9
Sudan Hay	16.1	16.2	17.9	15.8						12.9	14.8	16.2
Alfalfa Hay					14.8	14.2	13.2	12.2	10.6			
Grain Sorghum	12.3	13.4	15.7	14.7	4.7	4.6	5.3	5.3	.5.2	9.4	10.6	11.3
Oats	10.0	8.8	5.6	7.2	21.7	21.6	20.5	20.3	19.9	12.6	11.5	11.1
Soybean Meal	4.5	4.7	5.5	5.0	.4	.7	1.0	1.3	1.7	4.9	4.6	4.5

CHAPTER V

SUMMARY AND CONCLUSIONS

Milk is described as the most complete food because of its essential nutritive contents for human nutrition. Unlike other products, milk is produced everywhere, with more or less intensity and efficiency. As a farm product it is price inelastic and any attempt to increase production drives down prices and decreases net farm income. The reverse has occurred. Production and number of dairy farms have been decreasing, while the sector's total revenue, herd size and average farm size have been increasing (7) (27).

Because of economic conditions surrounding milk production, dairy farmers and thus researchers are concerned with ways to maintain or increase efficiency of production with better selection of crop and livestock production enterprises. To adequately adapt to economic conditions, the dairyman needs assistance to determine the most profitable combination of dairy activities and feed activities. It is apparent that the success of a manager resides in his ability to determine whether crops grown should be sold for cash or should be grown to be used as feed for the dairy herd. These decisions must examined periodically to re-evaluate prior decisions. Successful dairy farm management concerns the whole farm and not just how to provide feed to the dairy operation at least cost. The underlying objective of this study was to determine the nature of management decisions Oklahoma milk producers must make to achieve certain goals.

A linear programming model was constructed and an algorithm written to organize activites and restrictions into a matrix such that the Mathematical Programming System - Extended (MPSX) could be used to select the most profitable combination of activites. The model was constructed to represent a 500-acre farm in Central Oklahoma. Three levels of productivity for cows weighing 14 cwt. were considered. The levels of production were 12,000 15,000 and 18,000 pounds of 3.5 percent fat corrected milk produced in a 305-day lactation period. The short run model planning period was divided into twelve one-month time periods. Pasture and crop activities were included as well as their use, transfer, and disposition through sales. The purchase of feedstuffs and the sale and purchase of replacement cows were also considered in the model.

Farm resources were land, labor and management, capital, equipment machinery, and buildings. Land was divided into cropland and pasture-land. The operator and his family provided most of the labor with hourly hired labor used on a supplementary basis. Capital necessary to cover operating expensies was assumed to be owned by the operator and readily avialable. The fixed costs were not taken in consideration. Machinery, equipment and buildings were assumed to be sufficient.

The ration was balanced considering the dairy cattle minimum requirements in dry matter, fiber, and the nutrients digestible protein and net energy. Other constraints were also imposed to aid in the formulation of the ration. Both the requirements and the composition of feeds in terms of nutirents were expressed in common units.

The objective function of the model was the residual return to land, operator labor, machinery and equipment, overhead, risk and management. The cost and returns budgets for both crops and livestock were prepared

using the OSU Department of Agricultural Economics Budget Generator.

Implications for Dairy Farmers

Results suggest that dairying is a stable activity, since it entered in all models, at a maximum level, utilizing the highest producing cows. Livestock investment was not considered; thus, it may happen that, in some instances, herds with lower producing cows would maximize profits for the farm.

Alfalfa is the principal hay that most dairymen use. This study indicated that at assumed prices, alfalfa is too valuable as a cash crop to be used for feeding the cows. Decreasing the price of alfalfa results in more alfalfa being utilized in the dairy operation as opposed to being sold on the market. Sudan hay and more protein supplement, rather than alfalfa is prescribed by the model.

The sensitivity analysis indicated that milk production is stable over a prelatively wide range of milk prices. This suggests that the total farm organization is not subject to modifications of the optimal enterprise mix because of small changes in milk prices. The model was allowed to select whether replacements would br purchased or replaced. Under the price assumptions used, the model opted for raising the replacements.

The base model assumed that native and small grain pasture could be utilized and could, in addition, be utilized in months after the actual grwoth occurred. Thus, native pasture could be used in winter, and small grain pasture utilized more heavily in some months than others. The tranfers from one period to another occured with some expected loss in quantity and quality of forage. In the base model, these options were

exercised with native pasture being used through December. When the results of the base model were compared with a dry lot model, a lower net return was obtained for the dry lot model. It is apparent that managers with the skill to balance rations and reduce or eliminate milk quality problems can profitiably utilize both native pasture and small gain grazing in their rations.

Potential of Model for Use in Future Research

The model was developed with flexibility in mind. It is relatively easy to modify prices received or paid yields, and resources available. After making such changes reoptimization of the model is relatively inexpensive. From this standpoint the potential for additional research at little cost is good. However, for many modifications of the data, regeneration of the matrix would be required. This is relatively expensive, but has the advantage that all data can be modified and updated. Additional land classes can be included, more crop enterprizes, more feed purchase activities, and more dairy production alternatives could be considered. Regeneration of the matirx allows a complete re-definition of the problem.

Furthermore, this model was constructed under the assumption of perfect knowledge, so that the dairy operation is free of inefficiencies. Nevertheless, this is not always true. Thus, constraints may be incorporated into the model to account for such inefficiencies.

Much be done with the model to determine optimum herd size under various capital and labor constraints. In addition, the model could be modified to allow selection of the most profitable farm size. This could be accomplished using the mixed integer capability of the

MPSX program. Expansion of the model in this direction would require more complete specification of the capital required and the cost of acquiring that capital. Such a model might be used to more accurately compare the capital and labor intensive dairy farm iwth other less intensive forms of farm organizations.

Suggestions for Future Inquiry

Many parameters included in the model were not based on research study. They were estimated as the result of personal interviews with knowledgeable professionals and manipulations of some of the sketchy data available. In this category are hay and pasture, quantity and quality losses through time. Some monthly price data was impossible to locate, particularly where both prices received and prices paid were required. In addition dairy calf and replacement heifer prices are not available as there is no definite market for them.

A SELECTED BIBLIOGRAPHY

(1) Agrawal, R. C. and E. O. Heady. Operations Research Methods for Agricultural Decisions. Ames: Iowa State Univ. Pres, 1972.

(2) Anderson, Kim B. "A Quality Calibrated Pasture-Forage Linear Programming Model for Organizing Livestock farms." (Unpub. M.S. thesis, Oklahoma State University, 1976.)

(3) Blakley, Leo V. "Seasonal Price Indexes." Oklahoma Current Farm Economics, Vol. 48, No. 3 (October, 1975), pp. 10-19.

(4) Blakley, Leo V. "Ten-Year and Last Five-Year Seasonal Indexes of Prices of Oklahoma Crops, 1965-66 through 1974-75." Oklahoma Current Farm Economics, Vol. 49, (March, 1976), pp. 7-13.

(5) Brooks, Elton O. "An Economic Analysis of Seasonal Pricing Plans for Class I Milk in the Oklahoma Market." (M.S. thesis, Oklahoma State University, 1962.)

(6) Burnet, Claron. "Farmer Evaluation of Procurement Policies and Practices of a Selected Group of Dairy Processing Firms." (Ph.D. thesis, Oklahoma State University, 1959.)

(7) Burton, Clifford H. Personal Interivew. Stillwater, Oklahoma, July 29, 1977.

(8) Conneman, George J. Toward the Year 1985: Milk Production and Comsumption. Ithaca: Cornell University, Special Cornell Series Number 1, 1970.

(9) Cuykendall, Charles H. and George L. Casler. Forage and Grain Programs for Dairy Farms with Varying Cow-Land Ratios. Ithaca: Cornell University, No. 27, 1973.

(10) Grubb, Herbert W. "A Linear Program Analysis of Grade A Dairy Farm Organizations in the Oklahoma Metropolitan Milk Marketing Area." (M.S. thesis, Oklahoma State University, 1960.)

(11) Hall, Hollis D. " An Economic Analysis of the Growth of the Oklahoma Grade A Dairy Farms Using the Growth Simulation Technique." (Ph.D. thesis, Oklahoma State University, 1969.)

(12) Heady, Earl O. and WilfredCandler. Linear Programming Methods. Ames: The Iowa State University Press, 1969.

(13) Hillier, F. S. and G. J. Lieberman. Operations Research. 2nd Ed. San Francisco: Holden-Day, Inc., 1974.

(14) Hoglund, C. R. The U.S. Dairy Industry Today and Tommorow. East Lansing: Michigan State university, Research Report 275, 1975

(15) Hughes, Rufus B., Jr. "A tentative Analysis of Dairy Farming in the Arkansas River Valley (Type of Farming Area Nine) of Eastern Oklahoma." (M.S. thesis, Oklahoma State University, 1950.)

(16) Jones, J. H., Jr. "A Linear Programming Derivation of Optimum Range Rations from Alternative Nutritive Specifications in a Whole Beef Farm Framework." (Ph.D. disseration, Oklahoma State University, 1974.)

(17) King, John R. "Some of the Causes of Differences in Income Among Farms Producing Milk for Manufacture in Northeastern Oklahoma, 1950." (M.S. thesis, Oklahoma State University, 1955.)

(18) Kletke, Darrel D. Operations Manual for the Oklahoma State University Enterprise Budget Generator. Stillwater: Oklahoma Agricultural Experimentation Research Report, 1975, pp. 719.

(19) Kloth, Donald W. "Optimum Market Organizations of the Fluid Milk Industry in the United States Under Alternative Marketing Strategies." (Ph.D. thesis, Oklahoma State University, 1970.)

(20) Logan, Timothy R. and Donald Hillman. Storage Management to Preserve the Energy and Protein of Forages. East Lansing: Michigan State University Extension Bulletin E-803, 1975.

(21) Mangum, Fred A., Jr. "Cost and Returns of Bulk Milk Tanks on Dairy Farms in the Oklahoma City Milkshed." (M.S. thesis, Oklahoma State University, 1959.)

(22) McMullin, Leslie D. "A Study of Consumer Preferences for Dairy Products and Services in Oklahoma City, Oklahoma." (M.S. thesis, Oklahoma State University, 1955.)

(23) Morosov, N. M., W. Saupe, P. Seaberg and D. Acker. Labor Requirements of Seven Wisconsin Dairy Herds. Madison: University of Wisconsin, No. 16, 1970.

(24) National Academy of Sciences. Atlas of Nutritional Data on United States and Canadian Feeds. Wasington, D.C.: U.S. Printing and Publishing Office, 1971

(25) National Academy of Sciences. Nutrient Requirements of Dairy Cattle. 4th Ed. Washington, D.C.: U.S. Printinag and Publishing Office, 1971.

(26) Naylor, Thomas H. "The Theory of the Firm: A Comparison of Marginal Analysis and Linear Programming." The Southern Economic Journal, Vol. XXXII No. 3 (January, 1966), pp. 263-274.

(27) Oklahoma Crop and Livestock Reporting Service. Oklahoma Agricultural Statistics 1975. Oklahoma City: Central Printing, State Board of Affairs, 1976.

(28) Quance, C. L. "An Analysis of Least Cost Roughage Systems for Dairy Cattle in the Oklahoma City Milkshed." (Unpub. M.S. thesis, Oklahoma State University, 1963.)

(29) Richardson, Curtis W. "Feeding Dairy Replacement Heifers." OSU Extension Facts, No. 4004. Stillwater: Oklahoma State University, 1966.

(30) Richardson, Curtis W. and L. J. Bush. "Dairy Nutrient Requirements and Feed Composition Data." OSU Extension Facts, No. 4002. Stillwater: Oklahoma State University, 1974.

(31) Riley, John B. "Equilibrium in the Fluid Milk Industry Under Alternative pricing Policies and Structural Changes, 1972-1976." (Ph.D. thesis, Oklahoma State Univeristy, 1974.)

(32) Rogers, Walter B. "Costs and Charges for Fulk Milk Assembly in the Oklahoma City Milkshed." (Ph.D. thesis, Oklahoma State University, 1959.)

(33) Schmidt, G. H. and L. D. Van Vleck. Principles of Dairy Science. San Francisco: W. H. Freeman and Co., 1974.

(34) Shafer, Carl E. "A Study of Consumer Preferences for Dairy Products and Services in Perry and Bristow, Oklahoma." (M.S. thesis, Oklahoma State University, 1957.)

(35) Smith, F. J. "A Linear Program Analysis of Roughage Systems for Grad A Dairy Farms in Grady and Lincoln Counties." (M.S. thesis, Oklahoma State University, 1962.)

(36) Sparks, Donald E. "An Analysis of Dairy Herd Replacements in Grady and Lincoln Counties." (M.S. reprot, Oklahoma State University, 1962.)

(37) "Tables of Prices and Indexes." Oklahoma Current Farm Economics, Vol. 49, No. 2 (June 1976), pp. 30-33.

(38) Underwood, F. L. Economic Survey of Resources Used Dairy Farmers in Oklahoma. Stillwater: Oklahoma State University Bulletin, No. b-482, 1956.)

(39) University of Wisconsin. Wisconsin Farm Enterprise Budgets Dairy Cows and Replacements. Madison: University of Wisconsin, 1975.

(40) U.S. Department of Agriculture - DHIA. Factors for Standardizing 305-Day Lactation Records for Age and Month of Calving. Washington, D.C.: Agriculture Research Service, ARS-NE-40, 1974.

APPENDIXES

BERMUDA PASTURE
CENTRAL OKLAHOMA

CATEGORY	UNITS	PRICE	QUANTITY	VALUE
PRODUCTION:				
DRY MATTER	LBS.	0.0	3171.900	0.0
DIGESTIBLE PROT.	LBS.	0.0	241.420	0.0
NET ENERGY-LACT.	MCAL	0.0	1789.740	0.0
NET ENERGY-MAIN.	MCAL	0.0	1733.260	0.0
NET ENERGY-GRTH.	MCAL	0.0	744.409	0.0
FIBER	LBS.	0.0	811.999	0.0
TOTAL RECEIPTS				0.0
OPERATING INPUTS:				
I/IC EST. CHARGE	ACRE	5.000	1.000	5.00
NITROGEN (N)	LBS.	0.180	100.000	18.00
PHOSPH (P2O5)	LBS.	0.160	40.000	6.40
POTASH (K2O)	LBS.	0.075	40.000	3.00
FERT. SPREADER	ACRE	1.450	2.000	2.90
TRACTOR FUEL & LUBE	ACRE			0.69
TRACTOR REPAIR COST	ACRE			0.39
EQUIP. REPAIR COST	ACRE			0.04
TOTAL OPERATING COST				36.41
RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT				-36.41
CAPITAL COST:				
ANNUAL OPERATING CAPITAL		0.100	23.691	2.37
TRACTOR INVESTMENT		0.100	6.412	0.64
EQUIPMENT INVESTMENT		0.100	1.145	0.11
TOTAL INTEREST CHARGE				3.12
RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT				-39.54
OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE)				
TRACTOR	HR.			1.25
EQUIPMENT	HR.			0.26
TOTAL OWNERSHIP COST				1.51
RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT				-41.04
LABOR COST:				
MACHINERY LABOR	HR.	3.000	0.390	1.17
TOTAL LABOR COST			0.390	1.17
RETURNS TO LAND, OVERHEAD, RISK AND MANAGEMENT				-42.21

$50.00 ESTABLISHMENT COST PRORATED OVER 10 YEAR LIFE

ENTERPRISE 32 AREA AND COUNTY 20 DETAIL 83 IRIG. LEVEL 0 LAND CLASS 1
GRAZING 5 MACH. COMP. 12 IRIG. SYSTEM 0 PRICE VECT 2 INDIV. NUMBER 12
ANNUAL CAPITAL MONTHS 12

BERMUDA PASTURE
CENTRAL OKLAHOMA

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 DRY MATTER	0.0	0.0	0.0	364.50	888.00	618.80	475.50	396.80	348.80	79.50	0.0	0.0	0.0	0.0	12.	281.	2.	0.
2 DIGESTIBLE PROT.	0.0	0.0	0.0	28.03	94.19	46.10	28.53	21.15	19.18	4.24	0.0	0.0	0.0	0.0	12.	282.	2.	0.
3 NET ENERGY-LACT.	0.0	0.0	0.0	228.70	555.89	387.37	225.86	180.48	165.68	37.76	0.0	0.0	0.0	0.0	20.	283.	2.	0.
4 NET ENERGY-MAIN.	0.0	0.0	0.0	216.06	523.92	365.09	229.67	191.65	168.47	38.40	0.0	0.0	0.0	0.0	20.	284.	2.	0.
5 NET ENERGY-GRTH.	0.0	0.0	0.0	114.09	277.94	193.68	58.01	48.44	42.55	9.70	0.0	0.0	0.0	0.0	20.	285.	2.	0.
6 FIBER	0.0	0.0	0.0	93.31	227.33	158.41	121.73	101.58	89.29	20.35	0.0	0.0	0.0	0.0	12.	286.	2.	0.
OPERATING INPUTS						RATE/UNIT							PRICE	NUMBER UNITS	UNIT CODE	ITEM CODE	TYPE	CONT
11 1/10 EST. CHARGE	1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.000	0.0	7.	417.	3.	0.
12 NITROGEN (N)	0.0	0.0	0.0	50.00	0.0	50.00	0.0	0.0	0.0	0.0	0.0	0.0	0.180	0.0	12.	211.	3.	0.
13 PHOSPH (P205)	0.0	0.0	0.0	40.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.160	0.0	12.	214.	3.	0.
14 POTASH (K20)	0.0	0.0	0.0	40.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.075	0.0	12.	216.	3.	0.
16 FERT. SPREADER	0.0	0.0	0.0	1.00	0.0	1.00	0.0	0.0	0.0	0.0	0.0	0.0	1.450	0.0	7.	361.	3.	0.
MACHINERY REQUIREMENTS						TIMES OVER							XXXXX	XXXXX	POWER UNIT	MACH CODE	TYPE	CONT
38 TRACTOR(3)	0.0	0.0	0.0	0.05	0.0	0.05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.	3.	4.	0.
39 SPIKE HARROW	0.0	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	3.	56.	4.	0.

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	0.0	0.0	0.0	0.0
TOTAL EXPENSES	ACRE	5.00	0.0	0.0	20.41	0.0	11.01	0.0	0.0	0.0	0.0	0.0	0.0	36.41
RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT														-36.41

ANNUAL CAPITAL	DOL.	4.58	0.0	0.0	13.40	0.0	5.50	0.0	0.0	0.0	0.0	0.0	0.0		23.49

LABOR REQUIREMENTS BY MONTH

MACHINERY LABOR	HR.	0.0	0.0	0.0	0.20	0.0	0.20	0.0	0.0	0.0	0.0	0.0	0.0		0.39

MACHINERY FIXED AND VARIABLE COSTS PER HOUR

MACHINE	CODE	DEPR	INSUR.	TAX	TOTAL FIXED	REPAIR	FUEL	LUB.	TOTAL VARIABLE	INT.	HR/TIME
TRACTOR(3)	3	1.97	1.27	0.28	3.51	1.11	1.68	0.25	3.04	1.81	1.03
SPIKE HARROW	56	0.72	0.36	0.09	1.17	0.16	0.0	0.0	0.16	0.51	0.11

OPERATION	ITEM NO.	DATE	TIMES OVER	LABOR HOURS	MACHINE HOURS	FUEL,OIL,LUB., REPAIR PER ACRE	FIXED COSTS PER ACRE
TRACTOR(3)	3	APR	0.05	0.060	0.050	0.15	0.27
SPIKE HARROW	3.56	APR	1.00	0.135	0.111	0.39	0.84
TRACTOR(3)	3	JUN	0.05	0.060	0.050	0.15	0.27
SPIKE HARROW	3.56	JUN	1.00	0.135	0.111	0.39	0.84
TOTAL				0.389	0.322	1.08	2.21

COLUMN NAME OF MACHINE	1 CODE	2 WIDTH (FEET)	3 INITIAL LIST PRICE	4 SPEED (MPH)	5 FIELD EFFIC-ENCY	6 RC1	7 RC2	8 RC3	9 HOURS USED ANNUALLY	10 YEARS OWNED	11 RFV1	12 RFV2	13 PURCHASE PRICE	14 FUEL TYPE	15 HOURS OF LIFE	16 HP
TRACTOR(3)	3.	100.0	16750.	4.5	0.88	1.20	0.000631	1.60	600.	10.0	0.580	0.920	16750.	3.	12000.	100.
SPIKE HARROW	56.	20.0	875.	5.3	0.70	0.65	0.000251	1.80	100.	10.0	0.600	0.885	875.	0.	2000.	0.

$50.00 ESTABLISHMENT COST PRORATED OVER 10 YEAR LIFE

MACHINERY COMPLEMENT 14
EQUIPMENT COMPLEMENT 1

SMALL GRAIN GRAZEOUT - CENTRAL OKLAHOMA

CATEGORY	UNITS	PRICE	QUANTITY	VALUE
PRODUCTION:				
DRY MATTER	LBS.	0.0	3495.200	0.0
DIGESTIBLE PROT.	LBS.	0.0	539.669	0.0
NET ENERGY-LACT.	LBS.	0.0	2729.750	0.0
NET ENERGY-MAIN.	LBS.	0.0	2537.510	0.0
NET ENERGY-GRTH.	LBS.	0.0	1621.770	0.0
FIBER	LBS.	0.0	800.389	0.0
TOTAL RECEIPTS				0.0
OPERATING INPUTS:				
GRAIN SEED	BU.	5.000	1.000	5.00
18-46-0 FERT	CWT.	10.550	1.000	10.55
NITROGEN (N)	LBS.	0.180	40.000	7.20
FERT. SPREADER	ACRE	1.450	2.000	2.90
TRACTOR FUEL & LUBE	ACRE			2.87
TRACTOR REPAIR COST	ACRE			1.45
EQUIP. FUEL & LUBE	ACRE			1.10
EQUIP. REPAIR COST	ACRE			0.67
TOTAL OPERATING COST				31.74
RETURNS TO LAND,LABOR,CAPITAL,MACHINERY, OVERHEAD,RISK, AND MANAGEMENT				-31.74
CAPITAL COST:				
ANNUAL OPERATING CAPITAL		0.100	15.218	1.52
TRACTOR INVESTMENT		0.100	23.753	2.38
EQUIPMENT INVESTMENT		0.100	15.474	1.55
TOTAL INTEREST CHARGE				5.44
RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT				-37.18
OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE)				
TRACTOR	HR.			4.61
EQUIPMENT	HR.			3.54
TOTAL OWNERSHIP COST				8.15
RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT				-45.34
LABOR COST:				
MACHINERY LABOR	HR.	3.000	2.165	6.50
OTHER LABOR	HR.	3.000	0.400	1.20
TOTAL LABOR COST			2.565	7.70
RETURNS TO LAND, OVERHEAD, RISK AND MANAGEMENT				-53.03

100# 18-46-0 IN FALL, 40# N IN SPRING

ENTERPRISE 89 AREA AND COUNTY 20 DETAIL 08 IRIG. LEVEL 0 LAND CLASS 1
GRAZING 6 MACH. COMP. 12 IRIG. SYSTEM 0 PRICE VECT 2 INDIV. NUMBER 12
ANNUAL CAPITAL MONTH: 4
DATE PRINTED:11/03/77

SMALL GRAIN GRAZEOUT - CENTRAL OKLAHOMA

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 DRY MATTER	193.60	241.60	966.40	980.80	241.60	0.0	0.0	0.0	0.0	140.00	537.60	193.60	0.0	0.0	12.	281.	2.	0.
2 DIGESTIBLE PROT.	36.92	45.93	128.43	130.35	32.11	0.0	0.0	0.0	0.0	27.01	102.14	36.78	0.0	0.0	12.	282.	2.	0.
3 NET ENERGY-LACT.	151.20	188.69	754.76	766.00	188.69	0.0	0.0	0.0	0.0	109.34	419.87	151.20	0.0	0.0	12.	283.	2.	0.
4 NET ENERGY-MAIN.	140.55	175.40	701.61	712.06	175.40	0.0	0.0	0.0	0.0	101.64	390.30	140.55	0.0	0.0	12.	284.	2.	0.
5 NET ENERGY-GRTH.	89.83	112.10	448.41	455.09	112.10	0.0	0.0	0.0	0.0	64.96	249.45	89.83	0.0	0.0	12.	285.	2.	0.
6 FIBER	44.33	55.33	221.30	224.60	55.33	0.0	0.0	0.0	0.0	32.06	123.11	44.33	0.0	0.0	12.	286.	2.	0.
OPERATING INPUTS					RATE/UNIT								PRICE	NUMBER UNITS	UNIT CODE	ITEM CODE	TYPE	CONT
11 GRAIN 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.	170.	3.	0.
12 18-46-0 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	10.550	0.0	16.	217.	3.	0.
13 NITROGEN (N)	0.0	40.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.180	0.0	12.	211.	3.	0.
17 FERT. SPREADER	0.0	1.00	0.0	0.0	0.0	0.0	0.0	0.0	1.00	0.0	0.0	0.0	1.450	0.0	7.	361.	3.	0.
MACHINERY REQUIREMENTS						TIMES OVER							XXXXX	XXXXX	POWER UNIT	MACH CODE	TYPE	CONT
38 TANDEM 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	3.	35.	4.	0.
39 M.B. PLOW 5	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	3.	32.	4.	0.
40 FIELD CULTIVATOR	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	3.	46.	4.	0.
41 SPRINGTOOTH	0.0	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	3.	54.	4.	0.
42 DRILL WC/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	3.	61.	4.	0.
43 PICKUP	0.0	0.0	0.10	0.0	0.0	0.20	0.10	0.10	0.10	0.0	0.0	0.0	0.0	0.0	0.	11.	4.	0.
44 TRACTOR(3)	0.0	0.0	0.10	0.0	0.0	0.0	0.0	0.0	0.10	0.0	0.0	0.0	0.0	0.0	0.	3.	4.	0.
50 OTHER LABOR	0.0	0.0	0.10	0.0	0.0	0.10	0.10	0.10	0.0	0.0	0.0	0.0						

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	0.0	0.0	0.0	0.0
TOTAL EXPENSES	ACRE	0.0	8.65	0.57	0.0	0.0	0.99	1.56	1.04	18.92	0.0	0.0	0.0	31.74
RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT														-31.74
ANNUAL CAPITAL	DOL.	0.0	1.44	0.05	0.0	0.0	0.83	1.17	0.69	11.04	0.0	0.0	0.0	15.22
LABOR REQUIREMENTS BY MONTH														
MACHINERY LABOR	HR.	0.0	0.0	0.24	0.0	0.0	0.42	0.54	0.36	0.60	0.0	0.0	0.0	2.17
OTHER LABOR	HR.	0.0	0.0	0.10	0.0	0.0	0.10	0.10	0.10	0.0	0.0	0.0	0.0	0.40
TOTAL LABOR	HR.	0.0	0.0	0.34	0.0	0.0	0.52	0.64	0.46	0.60	0.0	0.0	0.0	2.57

MACHINERY FIXED AND VARIABLE COSTS PER HOUR

MACHINE	CODE	DEPR	INSUR.	TAX	TOTAL FIXED	REPAIR	FUEL	LUB.	TOTAL VARIABLE	INT.	HR/TIME
TRACTOR(3)	3	1.97	1.27	0.28	3.51	1.11	1.90	0.28	3.29	1.81	1.00
PICKUP	11	0.83	0.38	0.09	1.30	0.29	1.59	0.24	2.12	0.55	1.00
TANDEM DISK	35	0.97	0.50	0.12	1.59	0.24	0.0	0.0	0.24	0.71	0.15
M.B. PLOW 5	32	0.84	0.42	0.10	1.36	0.27	0.0	0.0	0.27	0.60	0.35
FIELD CULTIVATOR	46	1.15	0.58	0.14	1.87	0.40	0.0	0.0	0.40	0.82	0.12
SPRINGTOOTH	54	1.03	0.52	0.13	1.68	0.64	0.0	0.0	0.64	0.74	0.03
DRILL WO/FERT	61	4.45	2.22	0.54	7.21	1.01	0.0	0.0	1.01	3.18	0.22

OPERATION	ITEM NO.	DATE	TIMES OVER	LABOR HOURS	MACHINE HOURS	FUEL,OIL,LUB., REPAIR PER ACRE	FIXED COSTS PER ACRE
TANDEM DISK	3,35	JUN	1.00	0.179	0.148	0.57	1.21
PICKUP	11	JUN	0.20	0.240	0.200	0.42	0.37
M.B. PLOW 5	3,32	JUL	1.00	0.420	0.347	1.35	2.71
PICKUP	11	JUL	0.10	0.120	0.100	0.21	0.18
FIELD CULTIVATOR	3,46	AUG	1.00	0.144	0.119	0.48	1.02
SPRINGTOOTH	3,54	AUG	1.00	0.100	0.082	0.35	0.68
PICKUP	11	AUG	0.10	0.120	0.100	0.21	0.18
SPRINGTOOTH	3,54	SEP	1.00	0.100	0.082	0.35	0.68
DRILL WO/FERT	3,61	SEP	1.00	0.261	0.215	1.00	3.50
PICKUP	11	SEP	0.10	0.120	0.100	0.21	0.18
TRACTOR(3)	3	SEP	0.10	0.120	0.100	0.33	0.53
PICKUP	11	MAR	0.10	0.120	0.100	0.21	0.18
TRACTOR(3)	3	MAR	0.10	0.120	0.100	0.33	0.53
TOTAL				2.163	1.794	6.02	11.97

COLUMN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
NAME OF MACHINE	CODE	WIDTH (FEET)	INITIAL LIST PRICE	SPEED (MPH)	FIELD EFFIC-ENCY	RC1	RC2	RC3	HOURS USED ANNUALLY	YEARS OWNED	RFV1	RFV2	PURCHASE PRICE	FUEL TYPE	HOURS OF LIFE	HP
TRACTOR(3)	3.	100.0	16750.	4.5	0.88	1.20	0.000631	1.60	600.	10.0	0.580	0.920	16750.	3.	12000.	113.
PICKUP	11.	0.5	4800.	20.0	0.88	0.60	0.000631	1.40	500.	8.0	0.600	0.835	4400.	1.	4000.	1.
M.B. PLOW 5	32.	6.6	2550.	4.5	0.80	2.00	0.000251	1.30	250.	10.0	0.600	0.885	2550.	0.	2000.	0.
TANDEM DISK	35.	14.0	1300.	4.8	0.83	0.65	0.000251	1.80	100.	10.0	0.500	0.895	1200.	0.	2000.	0.
FIELD CULTIVATOR	46.	24.0	1400.	3.8	0.76	1.00	0.000251	1.80	100.	10.0	0.500	0.835	1400.	0.	2000.	0.
SPRINGTOOTH	54.	27.0	2200.	5.3	0.70	0.65	0.000251	1.80	175.	10.0	0.600	0.885	2200.	0.	2000.	0.
DRILL WO/FERT	61.	13.3	2700.	4.0	0.72	0.65	0.000251	1.80	50.	10.0	0.500	0.895	2700.	0.	1000.	0.

100# 18-46-0 IN FALL, 40# N IN SPRING

MACHINERY COMPLEMENT 14
EQUIPMENT COMPLEMENT 1

NO NAME CHANGES HAVE BEEN STORED WITH THIS BUDGET

NO COMPLEMENT CHANGES HAVE BEEN STORED WITH THIS BUDGET

NATIVE GRASS PASTURE
CENTRAL OKLAHOMA
GOOD TO EXCELLENT RANGE CONDITIONS

CATEGORY	UNITS	PRICE	QUANTITY	VALUE
PRODUCTION:				
DRY MATTER	LBS.	0.0	1125.199	0.0
DIGESTIBLE PROT.	LBS.	0.0	68.780	0.0
NET ENERGY-LACT.	LBS.	0.0	704.359	0.0
NET ENERGY-MAIN.	LBS.	0.0	663.879	0.0
NET ENERGY-GRTH.	LBS.	0.0	351.780	0.0
FIBER	LBS.	0.0	293.670	0.0
TOTAL RECEIPTS				0.0
OPERATING INPUTS:				
2-4-D	LBS.	1.870	0.250	0.47
TRACTOR FUEL & LUBE	ACRE			0.21
TRACTOR REPAIR COST	ACRE			0.12
EQUIP. REPAIR COST	ACRE			0.01
TOTAL OPERATING COST				0.81
RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT				-0.81
CAPITAL COST:				
ANNUAL OPERATING CAPITAL		0.100	0.134	0.01
TRACTOR INVESTMENT		0.100	1.979	0.20
EQUIPMENT INVESTMENT		0.100	0.307	0.03
TOTAL INTEREST CHARGE				0.24
RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT				-1.05
OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE)				
TRACTOR	HR.			0.38
EQUIPMENT	HR.			0.07
TOTAL OWNERSHIP COST				0.45
RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT				-1.50
LABOR COST:				
MACHINERY LABOR	HR.	3.000	0.120	0.36
TOTAL LABOR COST			0.120	0.36
RETURNS TO LAND, OVERHEAD, RISK AND MANAGEMENT				-1.86

3/4 LB. 2,4-D APPLIED ONCE EVERY 3 YEARS

ENTERPRISE 85 AREA AND COUNTY 50 DETAIL 11 IRIG. LEVEL 0 LAND CLASS 5
GRAZING 0 MACH. COMP. 15 IRIG. SYSTEM 0 PRICE VECT 7 INDIV. NUMBER 15
ANNUAL CAPITAL MONTH: 6
DATE PRINTED:11/03/77

NATIVE GRASS PASTURE
CENTRAL OKLAHOMA
GOOD TO EXCELLENT RANGE CONDITIONS

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 DRY MATTER	0.0	0.0	0.0	78.80	180.00	202.50	202.50	157.50	146.30	101.30	56.30	0.0	0.0	0.0	12.	281.	2.	0.
2 DIGESTIBLE PROT.	0.0	0.0	0.0	10.08	12.06	11.95	11.74	8.82	8.05	5.57	0.51	0.0	0.0	0.0	12.	282.	2.	0.
3 NET ENERGY-LACT.	0.0	0.0	0.0	49.33	112.68	126.76	126.76	98.60	91.58	63.41	35.24	0.0	0.0	0.0	12.	283.	2.	0.
4 NET ENERGY-MAIN.	0.0	0.0	0.0	46.49	106.20	119.48	119.48	92.92	86.32	59.77	33.22	0.0	0.0	0.0	12.	284.	2.	0.
5 NET ENERGY-GRTH.	0.0	0.0	0.0	24.66	56.34	63.38	63.38	49.30	45.79	31.71	17.22	0.0	0.0	0.0	12.	285.	2.	0.
6 FIBER	0.0	0.0	0.0	20.57	46.98	52.85	52.85	41.11	38.18	26.44	14.69	0.0	0.0	0.0	12.	286.	2.	0.
OPERATING INPUTS						RATE/UNIT							PRICE	NUMBER UNITS	UNIT CODE	ITEM CODE	TYPE	CONT
11 2-4-D	0.0	0.0	0.0	0.25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.870	0.0	12.	251.	3.	0.
MACHINERY REQUIREMENTS						TIMES OVER							XXXXX	XXXXX	POWER UNIT	MACH CODE	TYPE	CONT
38 SPRAYER	0.0	0.0	0.0	0.33	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.	74.	4.	0.

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	0.0	0.0	0.0	0.0
TOTAL EXPENSES	ACRE	0.0	0.0	0.0	0.81	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.81
RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT														-0.81
ANNUAL CAPITAL	DOL.	0.0	0.0	0.0	0.13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.13

LABOR REQUIREMENTS BY MONTH

MACHINERY LABOR	HR.	0.0	0.0	0.0	0.12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.12

MACHINERY FIXED AND VARIABLE COSTS PER HOUR

MACHINE	CODE	DEPR	INSUR.	TAX	TOTAL FIXED	REPAIR	FUEL	LUB.	TOTAL VARIABLE	INT.	HR/TIME
TRACTOR(3)	3	1.97	1.27	0.28	3.51	1.11	1.63	0.24	2.98	1.81	1.00
SPRAYER	74	0.40	0.22	0.05	0.67	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
SPRAYER	3,74	APR	0.33	0.120	0.100	0.34	0.68
TOTAL				0.120	0.100	0.34	0.68

COLUMN NAME OF MACHINE	1 CODE	2 WIDTH (FEET)	3 INITIAL LIST PRICE	4 SPEED (MPH)	5 FIELD EFFIC-ENCY	6 RC1	7 RC2	8 RC3	9 HOURS USED ANNUALLY	10 YEARS OWNED	11 RFV1	12 RFV2	13 PURCHASE PRICE	14 FUEL TYPE	15 HOURS OF LIFE	16 HP
TRACTOR(3)	3.	100.0	16750.	4.5	0.88	1.20	0.000631	1.60	600.	10.0	0.680	0.920	16750.	3.	12000.	100.
SPRAYER	74.	12.0	300.	3.8	0.60	0.65	0.000251	1.80	50.	10.0	0.600	0.885	255.	0.	1000.	0.

3/4 LB. 2,4-D APPLIED ONCE EVERY 3 YEARS

MACHINERY COMPLEMENT 14
EQUIPMENT COMPLEMENT 1

FORAGE SORGHUM FOR SILAGE
CENTRAL, OKLAHOMA

CATEGORY	UNITS	PRICE	QUANTITY	VALUE
PRODUCTION:				
SILAGE	TONS	0.0	10.000	0.0
DRY MATTER	LBS.	0.0	6000.000	0.0
DIGESTIBLE PROT.	LBS.	0.0	1080.000	0.0
NET ENERGY-LACT.	MCAL	0.0	3756.000	0.0
NET ENERGY-MAIN.	MCAL	0.0	3402.000	0.0
NET ENERGY-GRTH.	MCAL	0.0	1662.000	0.0
FIBER	LBS.	0.0	396.000	0.0
TOTAL RECEIPTS				0.0
OPERATING INPUTS:				
SORGHUM SEED	LBS.	0.300	8.000	2.40
PHOSPH (P2O5)	LBS.	0.160	36.000	5.76
NITROGEN (N)	LBS.	0.180	98.000	17.64
ANTRAZINE	ACRE	7.500	1.000	7.50
SILAGE CUTTER	TONS	8.000	10.000	80.00
POTASH (K2O)	LBS.	0.075	18.000	1.35
TRACTOR FUEL & LUBE	ACRE			2.18
TRACTOR REPAIR COST	ACRE			1.28
EQUIP. FUEL & LUBE	ACRE			0.29
EQUIP. REPAIR COST	ACRE			0.61
TOTAL OPERATING COST				119.01
RETURNS TO LAND,LABOR,CAPITAL,MACHINERY, OVERHEAD,RISK, AND MANAGEMENT				-119.01
CAPITAL COST:				
ANNUAL OPERATING CAPITAL		0.100	11.843	1.18
TRACTOR INVESTMENT		0.100	20.948	2.09
EQUIPMENT INVESTMENT		0.100	13.767	1.38
TOTAL INTEREST CHARGE				4.66
RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT				-123.66
OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE)				
TRACTOR	HR.			4.07
EQUIPMENT	HR.			3.13
TOTAL OWNERSHIP COST				7.20
RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT				-130.86
LABOR COST:				
MACHINERY LABOR	HR.	3.000	2.001	6.00
TOTAL LABOR COST			2.001	6.00
RETURNS TO LAND, OVERHEAD, RISK AND MANAGEMENT				-136.86

150# 12-24-12 AT PLANTING
80# N IN JUNE
ANTRAZIN FOR WEED CONTROL CUSTOM HARVEST
ENTERPRISE 26 AREA AND COUNTY 80 DETAIL 10 IRIG. LEVEL 0 LAND CLASS 1
GRAZING 0 MACH. COMP. _5 IRIG. SYSTEM 0 PRICE VECT 5 INDIV. NUMBER _5
ANNUAL CAPITAL MONTH: 9
DATE PRINTED:11/03/77

FORAGE SORGHUM FOR SILAGE
CENTRAL, OKLAHOMA

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 SILAGE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.00	0.0	0.0	0.0	0.0	0.0	3.	160.	2.	0.
2 DRY MATTER	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6000.00	0.0	0.0	0.0	0.0	0.0	12.	261.	2.	0.
3 DIGESTIBLE PROT.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1080.0	0.0	0.0	0.0	0.0	0.0	12.	282.	2.	0.
4 NET ENERGY-LACT.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3756.0	0.0	0.0	0.0	0.0	0.0	20.	283.	2.	0.
5 NET ENERGY-MAIN.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3402.0	0.0	0.0	0.0	0.0	0.0	20.	284.	2.	0.
6 NET ENERGY-GRTH.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1662.0	0.0	0.0	0.0	0.0	0.0	20.	285.	2.	0.
7 FIBER	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	396.00	0.0	0.0	0.0	0.0	0.0	12.	286.	2.	0.
OPERATING INPUTS					RATE/UNIT								PRICE	NUMBER UNITS	UNIT CODE	ITEM CODE	TYPE	CONT
11 SORGHUM SEED	0.0	0.0	0.0	0.0	8.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.300	0.0	12.	198.	3.	0.
12 PHOSPH (P205)	0.0	0.0	0.0	0.0	36.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.160	0.0	12.	214.	3.	0.
13 NITROGEN (N)	0.0	0.0	0.0	0.0	18.00	80.00	0.0	0.0	0.0	0.0	0.0	0.0	0.180	0.0	12.	211.	3.	0.
14 ANTRAZINE	0.0	0.0	0.0	0.0	1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.500	0.0	7.	360.	3.	0.
15 SILAGE CUTTER	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.00	0.0	0.0	0.0	8.000	0.0	3.	372.	3.	0.
16 POTASH (K20)	0.0	0.0	0.0	0.0	18.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.075	0.0	12.	216.	3.	0.
MACHINERY REQUIREMENTS						TIMES OVER							XXXXX	XXXXX	POWER UNIT	MACH CODE	TYPE	CONT
38 M.B. PLOW 5	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	1.	32.	4.	0.
39 TANDEM 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	1.	35.	4.	0.
40 SPIKE HARROW	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	3.	56.	4.	0.
41 PLANTER	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	1.	65.	4.	0.
42 ROW 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	3.	45.	4.	0.
43 PICKUP	0.0	0.05	0.0	0.0	0.05	0.10	0.0	0.0	0.0	0.02	0.0	0.0	0.0	0.0	0.	11.	4.	0.

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	0.0	0.0	0.0	0.0
TOTAL EXPENSES	ACRE	0.0	0.80	0.30	0.0	21.58	-15.42	0.85	0.0	80.00	0.03	0.0	0.0	119.01
RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT														-119.01

ANNUAL CAPITAL	DOL.	0.0	0.47	0.15	0.0	7.19	3.86	0.14	0.0	0.0	0.03	0.0	0.0		11.84

LABOR REQUIREMENTS BY MONTH

MACHINERY LABOR	HR.	0.0	0.48	0.18	0.0	0.62	0.41	0.29	0.0	0.0	0.02	0.0	0.0		2.00

MACHINERY FIXED AND VARIABLE COSTS PER HOUR

MACHINE	CODE	DEPR	INSUR.	TAX	TOTAL FIXED	REPAIR	FUEL	LUB.	TOTAL VARIABLE	INT.	HR/TIME
TRACTOR(1)	1	1.08	0.70	0.15	1.93	0.61	0.90	0.13	1.64	0.99	1.00
TRACTOR(3)	3	1.97	1.27	0.28	3.51	1.11	1.63	0.24	2.93	1.81	1.00
PICKUP	11	0.83	0.38	0.09	1.30	0.29	1.15	0.17	1.61	0.55	1.00
M.B. PLOW 5	32	0.84	0.42	0.10	1.36	0.27	0.0	0.0	0.27	0.60	0.35
TANDEM DISK	35	0.97	0.50	0.12	1.59	0.24	0.0	0.0	0.24	0.71	0.15
SPIKE HARROW	56	0.72	0.36	0.09	1.17	0.16	0.0	0.0	0.16	0.51	0.11
PLANTER	65	3.02	1.51	0.37	4.90	0.97	0.0	0.0	0.97	2.16	0.21
ROW CULTIVATOR	45	0.99	0.49	0.12	1.60	0.34	0.0	0.0	0.34	0.71	0.24

OPERATION	ITEM NO.	DATE	TIMES OVER	LABOR HOURS	MACHINE HOURS	FUEL,OIL,LUB., REPAIR PER ACRE	FIXED COSTS PER ACRE
PICKUP	11	OCT	0.02	0.024	0.020	0.03	0.04
M.B. PLOW 5	1,32	FEB	1.00	0.420	0.347	0.72	1.80
PICKUP	11	FEB	0.05	0.060	0.050	0.08	0.09
TANDEM DISK	1,35	MAR	1.00	0.179	0.148	0.30	0.82
TANDEM DISK	1,35	MAY	1.00	0.179	0.148	0.30	0.82
SPIKE HARROW	3,56	MAY	1.00	0.135	0.111	0.38	0.84
PLANTER	1,65	MAY	1.00	0.248	0.205	0.57	2.11
PICKUP	11	MAY	0.05	0.060	0.050	0.08	0.09
ROW CULTIVATOR	3,45	JUN	1.00	0.288	0.238	0.86	1.94
PICKUP	11	JUN	0.10	0.120	0.100	0.16	0.18
ROW CULTIVATOR	3,45	JUL	1.00	0.288	0.238	0.86	1.94
TOTAL				2.001	1.656	4.36	10.67

COLUMN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
NAME OF MACHINE	CODE	WIDTH (FEET)	INITIAL LIST PRICE	SPEED (MPH)	FIELD EFFIC-ENCY	RC1	RC2	RC3	HOURS USED ANNUALLY	YEARS OWNED	RFV1	RFV2	PURCHASE PRICE	FUEL TYPE	HOURS OF LIFE	HP
TRACTOR(1)	1.	55.0	9200.	4.5	0.83	1.20	0.000631	1.60	600.	10.0	0.680	0.920	9200.	3.	12000.	55.
TRACTOR(3)	3.	100.0	16750.	4.5	0.88	1.20	0.000631	1.60	600.	10.0	0.580	0.920	16750.	3.	12000.	100.
PICKUP	11.	0.5	4300.	20.0	0.88	0.60	0.000631	1.40	500.	8.0	0.500	0.885	4400.	1.	4000.	1.
M.B. PLOW 5	32.	6.6	2550.	4.5	0.80	2.00	0.000251	1.30	250.	10.0	0.600	0.885	2550.	0.	2000.	0.
TANDEM DISK	35.	14.0	1300.	4.8	0.83	0.65	0.000251	1.80	100.	10.0	0.500	0.885	1200.	0.	2000.	0.
ROW CULTIVATOR	45.	12.0	1200.	3.8	0.76	1.00	0.000251	1.80	100.	10.0	0.600	0.985	1200.	0.	2000.	0.
SPIKE HARROW	56.	20.0	875.	5.3	0.70	0.65	0.000251	1.80	100.	10.0	0.600	0.885	875.	0.	2000.	0.
PLANTER	65.	12.0	2200.	5.0	0.67	0.80	0.000631	1.60	60.	10.0	0.500	0.835	2200.	0.	1200.	0.

150# 12-24-12 AT PLANTING
80# N IN JUNE
ANTRAZIN FOR WEED CONTROL CUSTOM HARVEST

MACHINERY COMPLEMENT 14
EQUIPMENT COMPLEMENT 1

SUDAN CENTRAL OKLAHOMA
HAY

CATEGORY	UNITS	PRICE	QUANTITY	VALUE
PRODUCTION:				
SUDAN HAY	TONS	35.000	3.000	105.00
DRY MATTER	LBS.	0.0	7120.000	0.0
DIGESTIBLE PROT.	LBS.	0.0	299.040	0.0
NET ENERGY-LACT.	MCAL	0.0	4670.719	0.0
NET ENERGY-MAIN.	MCAL	0.0	4072.640	0.0
NET ENERGY-GRTH.	MCAL	0.0	2036.320	0.0
FIBER	LBS.	0.0	2185.840	0.0
TOTAL RECEIPTS				105.00
OPERATING INPUTS:				
SUDAN SEED	LBS.	0.130	20.000	2.60
NITROGEN (N)	LBS.	0.180	50.000	9.00
FERT. SPREADER	ACRE	1.450	1.000	1.45
MISCL EXPENSE	BL.	0.070	90.000	6.30
TRACTOR FUEL & LUBE	ACRE			4.13
TRACTOR REPAIR COST	ACRE			2.67
EQUIP. FUEL & LUBE	ACRE			0.19
EQUIP. REPAIR COST	ACRE			3.98
TOTAL OPERATING COST				30.32
RETURNS TO LAND,LABOR,CAPITAL,MACHINERY, OVERHEAD,RISK, AND MANAGEMENT				74.68
CAPITAL COST:				
ANNUAL OPERATING CAPITAL		0.100	10.277	1.03
TRACTOR INVESTMENT		0.100	43.667	4.37
EQUIPMENT INVESTMENT		0.100	59.518	5.95
TOTAL INTEREST CHARGE				11.35
RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT				63.33
OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE)				
TRACTOR	HR.			8.48
EQUIPMENT	HR.			15.56
TOTAL OWNERSHIP COST				24.04
RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT				39.29
LABOR COST:				
MACHINERY LABOR	HR.	3.000	2.997	8.99
OTHER LABOR	HR.	3.000	0.200	0.60
TOTAL LABOR COST			3.197	9.59
RETURNS TO LAND, OVERHEAD, RISK AND MANAGEMENT				29.70

ENTERPRISE 37 AREA AND COUNTY 20 DETAIL 15 IRIG. LEVEL 0 LAND CLASS 1
GRAZING 0 MACH. COPP. 12 IRIG. SYSTEM 0 PRICE VECT 2 INDIV. NUMBER 12
ANNUAL CAPITAL MONTH: 8
DATE PRINTED:11/03/77

SUDAN CENTRAL OKLAHOMA
HAY

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
PROCUCTION					NUMBER OF UNITS													
1 SUDAN HAY	0.0	0.0	0.0	0.0	0.0	0.0	1.50	0.0	1.50	0.0	0.0	0.0	35.000	0.0	3.	87.	2.	0.
2 DRY MATTER	0.0	0.0	0.0	0.0	0.0	0.0	3560.0	0.0	3560.0	0.0	0.0	0.0	0.0	0.0	12.	281.	2.	0.
3 DIGESTIBLE PROT.	0.0	0.0	0.0	0.0	0.0	0.0	186.90	0.0	112.14	0.0	0.0	0.0	0.0	0.0	12.	282.	2.	0.
4 NET ENERGY-LACT.	0.0	0.0	0.0	0.0	0.0	0.0	2335.4	0.0	2335.4	0.0	0.0	0.0	0.0	0.0	20.	283.	2.	0.
5 NET ENERGY-MAIN.	0.0	0.0	0.0	0.0	0.0	0.0	2036.3	0.0	2046.3	0.0	0.0	0.0	0.0	0.0	20.	284.	2.	0.
6 NET ENERGY-GRTH.	0.0	0.0	0.0	0.0	0.0	0.0	1273.0	0.0	763.62	0.0	0.0	0.0	0.0	0.0	20.	285.	2.	0.
7 FIBER	0.0	0.0	0.0	0.0	0.0	0.0	1366.2	0.0	819.69	0.0	0.0	0.0	0.0	0.0	12.	286.	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	20.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.130	0.0	12.	187.	3.	0.
12 NITROGEN (N)	0.0	0.0	0.0	0.0	50.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.180	0.0	12.	211.	3.	0.
13 FERT. SPREADER	0.0	0.0	0.0	0.0	1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.450	0.0	7.	361.	3.	0.
14 MISCL EXPENSE	0.0	0.0	0.0	0.0	0.0	0.0	60.00	0.0	30.00	0.0	0.0	0.0	0.070	0.0	6.	400.	3.	0.
MACHINERY REQUIREMENTS					TIMES OVER								XXXXX	XXXXX	POWER UNIT	MACH CODE	TYPE	CONT
38 M.B. PLOW 5	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	3.	32.	4.	0.
39 SPRINGTOOTH	0.0	0.0	0.0	0.0	2.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.	54.	4.	0.
40 DRILL WC/FERT	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	3.	61.	4.	0.
41 TRACTOR(3)	0.0	0.0	0.0	0.0	0.10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.	3.	4.	0.
42 S.P. SWATHER	0.0	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.	18.	4.	0.
43 PTO BALER	0.0	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	3.	96.	4.	0.
50 OTHER LABOR	0.0	0.0	0.0	0.0	0.20	0.0	0.0	0.0	0.0	0.0	0.0	0.0						

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	52.50	0.0	52.50	0.0	0.0	0.0	105.00
TOTAL EXPENSES	ACRE	0.0	0.0	0.0	0.0	16.03	0.0	8.19	0.0	6.09	0.0	0.0	0.0	30.32
RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT														74.68

ANNUAL CAPITAL	DOL.	0.0	0.0	0.0	0.0	4.01	0.0	0.68	0.0	5.59	0.0	0.0	0.0		10.28

LABOR REQUIREMENTS BY MONTH

MACHINERY LABOR	HR.	0.0	0.0	0.0	0.0	1.00	0.0	1.00	0.0	1.00	0.0	0.0	0.0		3.00
OTHER LABOR	HR.	0.0	0.0	0.0	0.0	0.20	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.20
TOTAL LABOR	HR.	0.0	0.0	0.0	0.0	1.20	0.0	1.00	0.0	1.00	0.0	0.0	0.0		3.20

MACHINERY FIXED AND VARIABLE COSTS PER HOUR

MACHINE	CODE	DEPR.	INSUR.	TAX	TOTAL FIXED	REPAIR	FUEL	LUB.	TOTAL VARIABLE	INT.	HR/TIME
TRACTOR(3)	3	1.97	1.27	0.28	3.51	1.11	1.49	0.22	2.82	1.81	1.00
S.P. SWATHER	18	6.55	2.97	0.69	10.21	6.42	0.59	0.09	7.09	4.25	0.14
M.B. PLOW 5	32	0.84	0.42	0.10	1.36	0.27	0.0	0.0	0.27	0.60	0.35
SPRINGTOOTH	54	1.03	0.52	0.13	1.68	0.64	0.0	0.0	0.64	0.74	0.08
DRILL W0/FERT	61	4.45	2.22	0.54	7.21	1.01	0.0	0.0	1.01	3.18	0.22
PTO BALER	96	5.24	1.91	0.43	7.58	1.27	0.0	0.0	1.27	2.73	0.68

OPERATION	ITEM NO.	CATE	TIMES OVER	LABOR HOURS	MACHINE HOURS	FUEL,OIL,LUB., REPAIR PER ACRE	FIXED COSTS PER ACRE
S.P. SWATHER	18	SEP	1.00	0.170	0.142	1.00	2.05
PTO BALER	3,96	SEP	1.00	0.828	0.684	2.99	11.05
M.B. PLOW 5	3,32	MAY	1.00	0.420	0.347	1.17	2.71
SPRINGTOOTH	3,54	MAY	2.00	0.199	0.165	0.62	1.36
DRILL W0/FERT	3,61	MAY	1.00	0.261	0.215	0.88	3.50
TRACTOR(3)	3	MAY	0.10	0.120	0.100	0.28	0.53
S.P. SWATHER	18	JUL	1.00	0.170	0.142	1.00	2.05
PTO BALER	3,96	JUL	1.00	0.828	0.684	2.99	11.05
TOTAL				2.996	2.479	10.94	34.31

COLUMN / NAME OF MACHINE	1 CODE	2 WIDTH (FEET)	3 INITIAL LIST PRICE	4 SPEED (MPH)	5 FIELD EFFIC-ENCY	6 RC1	7 RC2	8 RC3	9 HOURS USED ANNUALLY	10 YEARS OWNED	11 RFV1	12 RFV2	13 PURCHASE PRICE	14 FUEL TYPE	15 HOURS OF LIFE	16 HP
TRACTOR(3)	3.	100.0	16750.	4.5	0.88	1.20	0.000631	1.60	600.	10.0	0.680	0.920	16750.	3.	12000.	100.
S.P. SWATHER	18.	14.0	10300.	5.4	0.77	1.00	0.002510	1.30	150.	8.0	0.560	0.850	10300.	3.	1500.	1.
M.B. PLOW 5	32.	6.6	2550.	4.5	0.80	2.00	0.000251	1.30	250.	10.0	0.500	0.885	2550.	0.	2000.	0.
SPRINGTOOTH	54.	27.0	2200.	5.3	0.70	0.65	0.000251	1.80	175.	10.0	0.600	0.885	2200.	0.	2000.	0.
DRILL W0/FERT	61.	13.3	2700.	4.0	0.72	0.65	0.000251	1.80	50.	10.0	0.500	0.885	2700.	0.	1000.	0.
PTO BALER	96.	6.0	4300.	3.0	0.67	0.85	0.002510	1.30	100.	6.0	0.560	0.885	4300.	0.	2000.	0.

MACHINERY COMPLEMENT 14
EQUIPMENT COMPLEMENT 1

DRYLAND ALFALFA HAY PRODUCTION
LOAM
SOIL

CATEGORY	UNITS	PRICE	QUANTITY	VALUE
PRODUCTION:				
ALFALFA HAY	TONS	50.000	3.000	150.00
DRY MATTER	LBS.	0.0	5340.000	0.0
DIGESTIBLE PROT.	LBS.	0.0	587.400	0.0
NET ENERGY-LACT.	MCAL	0.0	2616.600	0.0
NET ENERGY-MAIN.	MCAL	0.0	2616.600	0.0
NET ENERGY-GRTH.	MCAL	0.0	1121.400	0.0
FIBER	LBS.	0.0	1634.040	0.0
TOTAL RECEIPTS				150.00
OPERATING INPUTS:				
ALFALFA SEED	LBS.	1.000	8.000	8.00
PHOSPH (P2O5)	LBS.	0.160	60.000	9.60
INSECTICIDE	ACRE	10.000	1.000	10.00
MISCL EXPENSE	BL.	0.070	90.000	6.30
TRACTOR FUEL & LUBE	ACRE			4.97
TRACTOR REPAIR COST	ACRE			2.84
EQUIP. FUEL & LUBE	ACRE			0.32
EQUIP. REPAIR COST	ACRE			5.46
TOTAL OPERATING COST				47.49
RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT				102.51
CAPITAL COST:				
ANNUAL OPERATING CAPITAL		0.100	15.894	1.59
TRACTOR INVESTMENT		0.100	46.538	4.65
EQUIPMENT INVESTMENT		0.100	76.753	7.68
TOTAL INTEREST CHARGE				13.92
RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT				88.59
OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE)				
TRACTOR	HR.			9.04
EQUIPMENT	HR.			20.50
TOTAL OWNERSHIP COST				29.54
RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT				59.05
LABOR COST:				
MACHINERY LABOR	HR.	3.000	3.341	10.02
OTHER LABOR	HR.	3.000	0.300	0.90
TOTAL LABOR COST			3.641	10.92
RETURNS TO LAND, OVERHEAD, RISK AND MANAGEMENT				48.13

OWN MACHINERY

ENTERPRISE 81 AREA AND COUNTY 60 DETAIL 20 IRIG. LEVEL 0 LAND CLASS 4
GRAZING 0 MACH. COMP. _6 IRIG. SYSTEM 0 PRICE VECT 3 INDIV. NUMBER _6
ANNLAL CAPITAL MONTH: 6
CATE PRINTED:11/03/77

DRYLAND ALFALFA HAY PRODUCTION
LOAM
SOIL

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 ALFALFA HAY	0.0	0.0	0.0	0.0	1.20	1.00	0.0	0.80	0.0	0.0	0.0	0.0	50.000	0.0	3.	81.	2.	0.
2 DRY MATTER	0.0	0.0	0.0	0.0	2136.0	1780.0	0.0	1424.0	0.0	0.0	0.0	0.0	0.0	0.0	12.	281.	2.	0.
3 DIGESTIBLE PROT.	0.0	0.0	0.0	0.0	234.96	195.80	0.0	156.64	0.0	0.0	0.0	0.0	0.0	0.0	12.	282.	2.	0.
4 NET ENERGY-LACT.	0.0	0.0	0.0	0.0	1046.6	872.20	0.0	697.76	0.0	0.0	0.0	0.0	0.0	0.0	20.	283.	2.	0.
5 NET ENERGY-MAIN.	0.0	0.0	0.0	0.0	1046.6	872.20	0.0	697.76	0.0	0.0	0.0	0.0	0.0	0.0	20.	284.	2.	0.
6 NET ENERGY-GRTH.	0.0	0.0	0.0	0.0	448.56	373.80	0.0	299.04	0.0	0.0	0.0	0.0	0.0	0.0	20.	285.	2.	0.
7 FIBER	0.0	0.0	0.0	0.0	653.62	544.68	0.0	435.74	0.0	0.0	0.0	0.0	0.0	0.0	12.	286.	2.	0.
OPERATING INPUTS					RATE/UNIT								PRICE	NUMBER UNITS	UNIT CODE	ITEM CODE	TYPE	CONT
11 ALFALFA SEED	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.00	0.0	0.0	0.0	1.000	0.0	12.	181.	3.	0.
13 PHOSPH (P2O5)	0.0	60.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.160	0.0	12.	214.	3.	0.
14 INSECTICIDE	0.0	0.0	0.0	1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.000	0.0	7.	240.	3.	0.
15 MISCL EXPENSE	0.0	0.0	0.0	0.0	36.00	30.00	0.0	0.0	0.0	24.00	0.0	0.0	0.070	0.0	6.	400.	3.	0.
MACHINERY REQUIREMENTS					TIMES OVER								XXXXX	XXXXX	POWER UNIT	MACH CODE	TYPE	CONT
38 M. B. PLOW 5	0.0	0.0	0.0	0.0	0.0	0.20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.	32.	4.	0.
39 TANDEM DISK	0.0	0.0	0.0	0.0	0.0	0.0	0.20	0.0	0.20	0.0	0.0	0.0	0.0	0.0	3.	35.	4.	0.
40 SPRINGTOOTH	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.40	0.0	0.0	0.0	0.0	0.0	3.	54.	4.	0.
41 SPRINGTOOTH	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.40	0.0	0.0	0.0	0.0	0.0	3.	54.	4.	0.
42 DRILL W/FERT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.20	0.0	0.0	0.0	0.0	0.0	3.	61.	4.	0.
43 S. P. SWATHER	0.0	0.0	0.0	0.0	1.00	1.00	0.0	0.0	0.0	1.00	0.0	0.0	0.0	0.0	0.	18.	4.	0.
44 PTO BALER	0.0	0.0	0.0	0.0	1.00	1.00	0.0	0.0	0.0	1.00	0.0	0.0	0.0	0.0	3.	96.	4.	0.
45 TRACTOR(3)	0.0	0.05	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.	3.	4.	0.
50 OTHER LABOR	0.0	0.0	0.0	0.0	0.10	0.0	0.0	0.0	0.10	0.10	0.0	0.0						

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	60.00	50.00	0.0	40.00	0.0	0.0	0.0	0.0	150.00
TOTAL EXPENSES	ACRE	0.0	9.77	0.0	10.00	6.69	6.52	0.11	0.0	8.56	5.85	0.0	0.0	47.49
RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT														102.51

ANNUAL CAPITAL	DOL.	0.0	3.26	0.0	1.67	0.56	0.0	0.10	0.0	6.42	3.90	0.0	0.0	15.89

LABOR REQUIREMENTS BY MONTH

MACHINERY LABOR	HR.	0.0	0.06	0.0	0.0	1.00	1.08	0.04	0.0	0.17	1.00	0.0	0.0	3.34
OTHER LABOR	HR.	0.0	0.0	0.0	0.0	0.10	0.0	0.0	0.0	0.10	0.10	0.0	0.0	0.30
TOTAL LABOR	HR.	0.0	0.06	0.0	0.0	1.10	1.08	0.04	0.0	0.27	1.10	0.0	0.0	3.64

MACHINERY FIXED AND VARIABLE COSTS PER HOUR

MACHINE	CODE	DEPR	INSUR.	TAX	TOTAL FIXED	REPAIR	FUEL	LUB.	TOTAL VARIABLE	INT.	HR/TIME
TRACTOR(3)	3	1.97	1.27	0.28	3.51	1.11	1.68	0.25	3.04	1.81	1.00
S. P. SWATHER	18	6.55	2.97	0.69	10.21	6.42	0.64	0.10	7.16	4.25	0.14
M. B. PLOW 5	32	0.84	0.42	0.10	1.36	0.27	0.0	0.0	0.27	0.60	0.35
TANDEM DISK	35	0.97	0.50	0.12	1.59	0.24	0.0	0.0	0.24	0.71	0.15
SPRINGTOOTH	54	1.03	0.52	0.13	1.68	0.64	0.0	0.0	0.64	0.74	0.08
SPRINGTOOTH	54	1.03	0.52	0.13	1.68	0.64	0.0	0.0	0.64	0.74	0.08
DRILL W0/FERT	61	4.45	2.22	0.54	7.21	1.01	0.0	0.0	1.01	3.18	0.22
PTO BALER	96	5.24	1.91	0.43	7.58	1.27	0.0	0.0	1.27	2.73	0.68

OPERATION	ITEM NO.	DATE	TIMES OVER	LABOR HOURS	MACHINE HOURS	FUEL,OIL,LUB., REPAIR PER ACRE	FIXED COSTS PER ACRE
TANDEM DISK	3,35	JUL	0.20	0.036	0.030	0.11	0.24
TANDEM DISK	3,35	SEP	0.20	0.036	0.030	0.11	0.24
SPRINGTOOTH	3,54	SEP	0.40	0.040	0.033	0.13	0.27
SPRINGTOOTH	3,54	SEP	0.40	0.040	0.033	0.13	0.27
DRILL W0/FERT	3,61	SEP	0.20	0.052	0.043	0.19	0.70
S. P. SWATHER	18	OCT	1.00	0.170	0.142	1.01	2.05
PTO BALER	3,96	OCT	1.00	0.828	0.684	3.16	11.05
TRACTOR(3)	3	FEB	0.05	0.060	0.050	0.15	0.27
S. P. SWATHER	18	MAY	1.00	0.170	0.142	1.01	2.05
PTO BALER	3,96	MAY	1.00	0.828	0.684	3.16	11.05
M. B. PLOW 5	3,32	JUN	0.20	0.084	0.069	0.25	0.54
S. P. SWATHER	18	JUN	1.00	0.170	0.142	1.01	2.05
PTO BALER	3,96	JUN	1.00	0.828	0.684	3.16	11.05
TOTAL				3.341	2.765	13.58	41.84

COLUMN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
NAME OF MACHINE	CODE	WIDTH (FEET)	INITIAL LIST PRICE	SPEED (MPH)	FIELD EFFIC-ENCY	RC1	RC2	RC3	HOURS USED ANNUALLY	YEARS OWNED	RFV1	RFV2	PURCHASE PRICE	FUEL TYPE	HOURS OF LIFE	HP
TRACTOR(3)	3.	100.0	16750.	4.5	0.88	1.20	0.000631	1.60	600.	10.0	0.580	0.920	16750.	3.	12000.	113.
S. P. SWATHER	18.	14.0	10300.	5.4	0.77	1.00	0.002510	1.30	150.	8.0	0.560	0.830	10300.	3.	1500.	1.
M. B. PLOW 5	32.	6.6	2550.	4.5	0.80	2.00	0.000251	1.30	250.	10.0	0.600	0.885	2550.	0.	2000.	0.
TANDEM DISK	35.	14.0	1300.	4.8	0.83	0.65	0.000251	1.80	100.	10.0	0.500	0.835	1200.	0.	2000.	0.
SPRINGTOOTH	54.	27.0	2200.	5.3	0.70	0.65	0.000251	1.80	175.	10.0	0.500	0.835	2200.	0.	2000.	0.
DRILL W0/FERT	61.	13.3	2700.	4.0	0.72	0.65	0.000251	1.80	50.	10.0	0.600	0.865	2700.	0.	1000.	0.
PTO BALER	96.	6.0	4300.	3.0	0.67	0.85	0.002510	1.30	100.	6.0	0.560	0.895	4300.	0.	2000.	0.

CHN MACHINERY

MACHINERY COMPLEMENT 14
EQUIPMENT COMPLEMENT 1

GRAIN SORGHUM
CENTRAL OKLAHOMA

CATEGORY	UNITS	PRICE	QUANTITY	VALUE
PRODUCTION:				
MILO	CWT.	3.950	24.000	94.80
DRY MATTER	LBS.	0.0	2136.000	0.0
DIGESTIBLE PROT.	LBS.	0.0	149.520	0.0
NET ENERGY-LACT.	MCAL	0.0	1950.170	0.0
NET ENERGY-MAIN.	MCAL	0.0	1792.100	0.0
NET ENERGY-GRTH.	MCAL	0.0	1191.890	0.0
FIBER	LBS.	0.0	53.400	0.0
GRAZING	AUMS	0.0	0.200	0.0
DRY MATTER	LBS.	0.0	150.000	0.0
DIGESTIBLE PROT.	LBS.	0.0	6.900	0.0
NET ENERGY-LACT.	MCAL	0.0	85.800	0.0
NET ENERGY-MAIN.	MCAL	0.0	83.400	0.0
NET ENERGY-GRTH.	MCAL	0.0	39.450	0.0
FIBER	LBS.	0.0	46.200	0.0
TOTAL RECEIPTS				94.80
OPERATING INPUTS:				
GRAIN SORG SEED	LBS.	0.330	5.000	1.65
18-46-0 FERT	CWT.	10.550	1.000	10.55
NITROGEN (N)	LBS.	0.180	33.500	6.03
FERT. SPREADER	ACRE	1.450	1.000	1.45
2-4-D	LBS.	1.500	0.500	0.75
TRACTOR FUEL & LUBE	ACRE			2.66
TRACTOR REPAIR COST	ACRE			1.72
EQUIP. FUEL & LUBE	ACRE			0.87
EQUIP. REPAIR COST	ACRE			1.26
TOTAL OPERATING COST				26.94
RETURNS TO LAND,LABOR,CAPITAL,MACHINERY, OVERHEAD,RISK, AND MANAGEMENT				67.86
CAPITAL COST:				
ANNUAL OPERATING CAPITAL		0.100	10.315	1.03
TRACTOR INVESTMENT		0.100	28.140	2.81
EQUIPMENT INVESTMENT		0.100	49.371	4.94
TOTAL INTEREST CHARGE				8.78
RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT				59.08
OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE)				
TRACTOR	HR.			5.47
EQUIPMENT	HR.			10.94
TOTAL OWNERSHIP COST				16.41
RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT				42.67
LABOR COST:				
MACHINERY LABOR	HR.	3.000	2.260	6.78
OTHER LABOR	HR.	3.000	0.200	0.60
TOTAL LABOR COST			2.460	7.38
RETURNS TO LAND, OVERHEAD, RISK AND MANAGEMENT				35.29

100# 18-46-0 PLUS 100#33.5-0-0

ENTERPRISE 73 AREA AND COUNTY 20 DETAIL 19 IRIG. LEVEL 0 LAND CLASS 4
GRAZING 3 MACH. COMP. 12 IRIG. SYSTEM 0 PRICE VECT 2 INDIV. NUMBER 12
ANNUAL CAPITAL MONTH:10
DATE PRINTED:11/03/77

GRAIN SORGHUM
CENTRAL OKLAHOMA

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	24.00	0.0	0.0	3.950	0.0	16.	73.	2.	0.
2 DRY MATTER	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2136.0	0.0	0.0	0.0	0.0	12.	281.	2.	0.
3 DIGESTIBLE PROT.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	149.52	0.0	0.0	0.0	0.0	12.	282.	2.	0.
4 NET ENERGY-LACT.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1950.2	0.0	0.0	0.0	0.0	20.	283.	2.	0.
5 NET ENERGY-MAIN.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1792.1	0.0	0.0	0.0	0.0	20.	284.	2.	0.
6 NET ENERGY-GRTH.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1191.9	0.0	0.0	0.0	0.0	20.	285.	2.	0.
7 FIBER	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	53.40	0.0	0.0	0.0	0.0	12.	286.	2.	0.
8 GRAZING	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.20	0.0	0.0	0.0	10.	89.	2.	0.
9 DRY MATTER	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	150.00	0.0	0.0	0.0	12.	281.	2.	0.
10 DIGESTIBLE PROT.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.90	0.0	0.0	0.0	12.	282.	2.	0.
28 NET ENERGY-LACT.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	85.80	0.0	0.0	0.0	20.	283.	2.	0.
29 NET ENERGY-MAIN.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	83.40	0.0	0.0	0.0	20.	284.	2.	0.
30 NET ENERGY-GRTH.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	39.45	0.0	0.0	0.0	20.	285.	2.	0.
31 FIBER	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	46.20	0.0	0.0	0.0	12.	286.	2.	0.
OPERATING INPUTS					RATE/UNIT								PRICE	NUMBER UNITS	UNIT CODE	ITEM CODE	TYPE	CONT
11 GRAIN SORG SEED	0.0	0.0	0.0	0.0	5.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.330	0.0	12.	173.	3.	0.
12 16-46-0 FERT	0.0	0.0	0.0	0.0	1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.550	0.0	16.	217.	3.	0.
13 NITROGEN (N)	0.0	0.0	0.0	0.0	33.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.180	0.0	12.	211.	3.	0.
14 FERT. SPREADER	0.0	0.0	0.0	0.0	1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.450	0.0	7.	361.	3.	0.
15 2-4-D	0.0	0.0	0.0	0.0	0.0	0.0	0.50	0.0	0.0	0.0	0.0	0.0	1.500	0.0	12.	251.	3.	0.
MACHINERY REQUIREMENTS						TIMES OVER							XXXXX	XXXXX	POWER UNIT	MACH CODE	TYPE	CONT
38 M.B. PLOW 5	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	3.	32.	4.	0.
39 TANDEM DISK	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	3.	35.	4.	0.
40 SPRINGTOOTH	0.0	0.0	0.0	0.0	2.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.	54.	4.	0.
41 DRILL WC/FERT	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	3.	61.	4.	0.
42 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	3.	74.	4.	0.
43 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	3.	45.	4.	0.
44 SP COMBINE-GRAIN	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	0.	13.	4.	0.
45 TRUCK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.20	0.0	0.0	0.0	0.0	0.	10.	4.	0.
50 OTHER LABOR	0.0	0.0	0.05	0.05	0.0	0.0	0.0	0.0	0.0	0.10	0.0	0.0						

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	94.80	0.0	0.0	94.80
TOTAL EXPENSES	ACRE	0.0	0.0	1.17	0.49	20.30	0.88	2.54	0.0	0.0	1.56	0.0	0.0	26.94
RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT														67.86

ANNUAL CAPITAL	DOL.	0.0	0.0	0.68	0.25	8.46	0.29	0.63	0.0	0.0	0.0	0.0	0.0	10.32

LABOR REQUIREMENTS BY MONTH

MACHINERY LABOR	HR.	0.0	0.0	0.42	0.18	0.20	0.26	0.65	0.0	0.0	0.55	0.0	0.0	2.26
OTHER LABOR	HR.	0.0	0.0	0.05	0.05	0.0	0.0	0.0	0.0	0.0	0.10	0.0	0.0	0.20
TOTAL LABOR	HR.	0.0	0.0	0.47	0.23	0.20	0.26	0.65	0.0	0.0	0.65	0.0	0.0	2.46

MACHINERY FIXED AND VARIABLE COSTS PER HOUR

MACHINE	CODE	DEPR	INSUR.	TAX	TOTAL FIXED	REPAIR	FUEL	LUB.	TOTAL VARIABLE	INT.	HR/TIME
TRACTOR(3)	3	1.77	1.27	0.28	3.51	1.11	1.49	0.22	2.82	1.81	1.00
TRUCK	10	2.16	0.91	0.22	3.28	0.86	1.76	0.26	2.88	1.30	1.00
SP COMBINE-GRAIN	13	16.80	9.00	2.13	27.92	2.01	1.58	0.24	3.83	12.85	0.26
M.B. PLOW 5	32	0.84	0.42	0.10	1.36	0.27	0.0	0.0	0.27	0.60	0.35
TANDEM DISK	35	0.97	0.50	0.12	1.59	0.24	0.0	0.0	0.24	0.71	0.15
SPRINGTOOTH	54	1.03	0.52	0.13	1.68	0.64	0.0	0.0	0.64	0.74	0.08
DRILL WO/FERT	61	4.45	2.22	0.54	7.21	1.01	0.0	0.0	1.01	3.18	0.22
SPRAYER	74	0.40	0.22	0.05	0.67	0.11	0.0	0.0	0.11	0.31	0.30
ROW CULTIVATOR	45	0.99	0.49	0.12	1.60	0.34	0.0	0.0	0.34	0.71	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 5	3.32	MAR	1.00	0.420	0.347	1.17	2.71
TANDEM DISK	3.35	APR	1.00	0.179	0.148	0.49	1.21
SPRINGTOOTH	3.54	MAY	2.00	0.199	0.165	0.62	1.36
DRILL WO/FERT	3.61	JUN	1.00	0.261	0.215	0.88	3.50
SPRAYER	3.74	JUL	1.00	0.365	0.302	0.97	2.06
ROW CULTIVATOR	3.45	JUL	1.00	0.288	0.238	0.82	1.94
SP COMBINE-GRAIN	13	OCT	1.00	0.308	0.257	0.98	10.46
TRUCK	10	OCT	0.20	0.240	0.200	0.58	0.92
TOTAL				2.260	1.871	6.51	24.16

COLUMN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
NAME OF MACHINE	CODE	WIDTH (FEET)	INITIAL LIST PRICE	SPEED (MPH)	FIELD EFFIC-ENCY	RC1	RC2	RC3	HOURS USED ANNUALLY	YEARS OWNED	RFV1	RFV2	PURCHASE PRICE	FUEL TYPE	HOURS OF LIFE	HP
TRACTOR(3)	3.	100.0	16750.	4.5	0.88	1.20	0.000631	1.60	600.	10.0	0.680	0.920	16750.	3.	12000.	100.
TRUCK	10.	2.0	10800.	20.0	0.88	0.80	0.000631	1.40	500.	8.0	0.670	0.860	10800.	1.	4000.	1.
SP COMBINE-GRAIN	13.	16.0	21250.	3.0	0.67	0.33	0.000251	1.80	100.	10.0	0.535	0.895	21250.	3.	2000.	1.
M.B. PLOW 5	32.	6.6	2550.	4.5	0.80	2.00	0.000251	1.30	250.	10.0	0.600	0.885	2550.	0.	2000.	0.
TANDEM DISK	35.	14.0	1300.	4.8	0.83	0.65	0.000251	1.80	100.	10.0	0.600	0.885	1200.	0.	2000.	0.
ROW CULTIVATOR	45.	12.0	1200.	3.8	0.76	1.00	0.000251	1.80	100.	10.0	0.600	0.835	1200.	0.	2000.	0.
SPRINGTOOTH	54.	27.0	2200.	5.3	0.70	0.65	0.000251	1.80	175.	10.0	0.600	0.885	2200.	0.	2000.	0.
DRILL WO/FERT	61.	13.3	2700.	4.0	0.72	0.65	0.000251	1.80	50.	10.0	0.500	0.835	2700.	0.	1000.	0.
SPRAYER	74.	12.0	300.	3.8	0.60	0.65	0.000251	1.80	50.	10.0	0.500	0.835	255.	0.	1000.	0.

100# 18-46-0 PLUS 100#33.5-0-0

MACHINERY COMPLEMENT 14
EQUIPMENT COMPLEMENT 1

BARLEY FOR GRAIN, CUSTOM HARVEST
CENTRAL OKLAHOMA

CATEGORY	UNITS	PRICE	QUANTITY	VALUE
PRODUCTION:				
BARLEY	BU.	1.900	40.000	76.00
DRY MATTER	LBS.	0.0	1637.600	0.0
DIGESTIBLE PROT.	LBS.	0.0	157.210	0.0
NET ENERGY-LACT.	MCAL	0.0	1708.020	0.0
NET ENERGY-MAIN.	MCAL	0.0	1581.920	0.0
NET ENERGY-GRTH.	MCAL	0.0	1039.880	0.0
FIBER	LBS.	0.0	98.260	0.0
GRAZING	AUMS	0.0	0.750	0.0
DRY MATTER	LBS.	0.0	562.500	0.0
DIGESTIBLE PROT.	LBS.	0.0	76.560	0.0
NET ENERGY-LACT.	MCAL	0.0	407.250	0.0
NET ENERGY-MAIN.	MCAL	0.0	372.375	0.0
NET ENERGY-GRTH.	MCAL	0.0	225.568	0.0
FIBER	LBS.	0.0	129.937	0.0
TOTAL RECEIPTS				76.00
OPERATING INPUTS:				
BARLEY SEED	BU.	3.500	1.500	5.25
18-46-0 FERT	CWT.	10.550	1.000	10.55
NITROGEN (N)	LBS.	0.180	40.000	7.20
FERT. SPREADER	ACRE	1.450	2.000	2.90
TRACTOR FUEL & LUBE	ACRE			2.25
TRACTOR REPAIR COST	ACRE			1.45
EQUIP. FUEL & LUBE	ACRE			1.63
EQUIP. REPAIR COST	ACRE			1.36
TOTAL OPERATING COST				32.59
RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT				43.41
CAPITAL COST:				
ANNUAL OPERATING CAPITAL		0.100	19.128	1.91
TRACTOR INVESTMENT		0.100	23.753	2.38
EQUIPMENT INVESTMENT		0.100	51.032	5.10
TOTAL INTEREST CHARGE				9.39
RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT				34.02
OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE)				
TRACTOR	HR.			4.61
EQUIPMENT	HR.			11.36
TOTAL OWNERSHIP COST				15.97
RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT				18.05
LABOR COST:				
MACHINERY LABOR	HR.	3.000	2.713	8.14
OTHER LABOR	HR.	3.000	0.400	1.20
TOTAL LABOR COST			3.113	9.34
RETURNS TO LAND, OVERHEAD, RISK AND MANAGEMENT				8.71

100# 18-46-0 IN FALL AND 40# N IN SPRING
CUSTOM COMBINE AND TRUCKING
ENTERPRISE 71 AREA AND COUNTY 20 DETAIL 05 IRIG. LEVEL 0 LAND CLASS 1
GRAZING 6 MACH. COMP. 12 IRIG. SYSTEM 0 PRICE VECT 2 INDIV. NUMBER 12
ANNUAL CAPITAL MONTH: 6
DATE PRINTED:11/03/77

BARLEY FOR GRAIN, CUSTOM HARVEST
CENTRAL OKLAHOMA

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	BARLEY	0.0	0.0	0.0	0.0	0.0	40.00	0.0	0.0	0.0	0.0	0.0	0.0	1.900	0.0	2.	71.	2.	0.
2	DRY MATTER	0.0	0.0	0.0	0.0	0.0	1637.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.	281.	2.	0.
3	DIGESTIBLE PROT.	0.0	0.0	0.0	0.0	0.0	157.21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.	282.	2.	0.
4	NET ENERGY-LACT.	0.0	0.0	0.0	0.0	0.0	1708.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.	283.	2.	0.
5	NET ENERGY-MAIN.	0.0	0.0	0.0	0.0	0.0	1581.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.	284.	2.	0.
6	NET ENERGY-GRTH.	0.0	0.0	0.0	0.0	0.0	1039.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.	285.	2.	0.
7	FIBER	0.0	0.0	0.0	0.0	0.0	98.26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.	286.	2.	0.
8	GRAZING	0.15	0.10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.20	0.30	0.0	0.0	10.	89.	2.	0.
9	DRY MATTER	112.50	75.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	150.00	225.00	0.0	0.0	12.	281.	2.	0.
10	DIGESTIBLE PROT.	15.81	10.13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.25	30.38	0.0	0.0	12.	282.	2.	0.
28	NET ENERGY-LACT.	81.45	54.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	108.60	162.90	0.0	0.0	20.	283.	2.	0.
29	NET ENERGY-MAIN.	74.48	49.65	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	99.30	148.95	0.0	0.0	20.	284.	2.	0.
30	NET ENERGY-GRTH.	45.11	30.08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	60.15	90.23	0.0	0.0	20.	285.	2.	0.
31	FIBER	25.99	17.32	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34.65	51.98	0.0	0.0	12.	286.	2.	0.
OPERATING INPUTS						RATE/UNIT								PRICE	NUMBER UNITS	UNIT CODE	ITEM CODE	TYPE	CONT
11	BARLEY SEED	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.50	0.0	0.0	0.0	3.500	0.0	2.	171.	3.	0.
12	13-46-0 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	10.550	0.0	16.	217.	3.	0.
13	NITROGEN (N)	0.0	40.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.180	0.0	12.	211.	3.	0.
17	FERT. SPREADER	0.0	1.00	0.0	0.0	0.0	0.0	0.0	0.0	1.00	0.0	0.0	0.0	1.450	0.0	7.	361.	3.	0.
MACHINERY REQUIREMENTS						TIMES OVER								XXXXX	XXXXX	POWER UNIT	MACH CODE	TYPE	CONT
38	TANDEM 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	3.	35.	4.	0.
39	M.B. PLOW 5	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	3.	32.	4.	0.
40	FIELD CULTIVATOR	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	3.	46.	4.	0.
41	SPRINGTOOTH	0.0	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	3.	54.	4.	0.
42	DRILL WC/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	3.	61.	4.	0.
43	PICKUP	0.0	0.0	0.10	0.0	0.0	0.20	0.10	0.10	0.10	0.0	0.0	0.0	0.0	0.0	0.	11.	4.	0.
44	TRACTOR(3)	0.0	0.0	0.10	0.0	0.0	0.0	0.0	0.0	0.10	0.0	0.0	0.0	0.0	0.0	0.	3.	4.	0.
45	SP COMBINE-GRAIN	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	0.	13.	4.	0.
46	TRUCK	0.0	0.0	0.0	0.0	0.0	0.20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.	10.	4.	0.
50	OTHER LABOR	0.0	0.0	0.10	0.0	0.0	0.10	0.10	0.10	0.0	0.0	0.0	0.0						

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	76.00	0.0	0.0	0.0	0.0	0.0	0.0	76.00
TOTAL EXPENSES	ACRE	0.0	8.65	0.46	0.0	0.0	2.36	1.33	0.88	18.91	0.0	0.0	0.0	32.59
RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT														43.41

ANNUAL CAPITAL	DOL.	0.0	2.88	0.12	0.0	0.0	0.0	1.22	0.73	14.18	0.0	0.0	0.0		19.13
LABOR REQUIREMENTS BY MONTH															
MACHINERY LABOR	HR.	0.0	0.0	0.24	0.0	0.0	0.97	0.54	0.36	0.60	0.0	0.0	0.0		2.71
OTHER LABOR	HR.	0.0	0.0	0.10	0.0	0.0	0.10	0.10	0.10	0.0	0.0	0.0	0.0		0.40
TOTAL LABOR	HR.	0.0	0.0	0.34	0.0	0.0	1.07	0.64	0.46	0.60	0.0	0.0	0.0		3.11

MACHINERY FIXED AND VARIABLE COSTS PER HOUR

MACHINE	CODE	DEPR	INSUR.	TAX	TOTAL FIXED	REPAIR	FUEL	LUB.	TOTAL VARIABLE	INT.	HR/TIME
TRACTOR(3)	3	1.97	1.27	0.28	3.51	1.11	1.49	0.22	2.82	1.81	1.00
TRUCK	10	2.16	0.91	0.22	3.28	0.86	1.76	0.26	2.88	1.30	1.00
PICKUP	11	0.83	0.38	0.09	1.30	0.29	1.10	0.16	1.55	0.55	1.00
SP COMBINE-GRAIN	13	16.80	9.00	2.13	27.92	2.01	1.58	0.24	3.83	12.85	0.25
TANDEM DISK	35	0.97	0.50	0.12	1.59	0.24	0.0	0.0	0.24	0.71	0.15
M.B. PLOW 5	32	0.84	0.42	0.10	1.36	0.27	0.0	0.0	0.27	0.60	0.35
FIELD CULTIVATOR	46	1.15	0.58	0.14	1.87	0.40	0.0	0.0	0.40	0.82	0.12
SPRINGTOOTH	54	1.03	0.52	0.13	1.68	0.64	0.0	0.0	0.64	0.74	0.08
DRILL WO/FERT	61	4.45	2.22	0.54	7.21	1.01	0.0	0.0	1.01	3.18	0.22

OPERATION	ITEM NO.	DATE	TIMES OVER	LABOR HOURS	MACHINE HOURS	FUEL,OIL,LUB., REPAIR PER ACRE	FIXED COSTS PER ACRE
M.B. PLOW 5	3,32	JUL	1.00	0.420	0.347	1.17	2.71
PICKUP	11	JUL	0.10	0.120	0.100	0.16	0.18
FIELD CULTIVATOR	3,46	AUG	1.00	0.144	0.119	0.42	1.02
SPRINGTOOTH	3,54	AUG	1.00	0.100	0.082	0.31	0.68
PICKUP	11	AUG	0.10	0.120	0.100	0.16	0.18
SPRINGTOOTH	3,54	SEP	1.00	0.100	0.082	0.31	0.68
DRILL WO/FERT	3,61	SEP	1.00	0.261	0.215	0.88	3.50
PICKUP	11	SEP	0.10	0.120	0.100	0.16	0.18
TRACTOR(3)	3	SEP	0.10	0.120	0.100	0.28	0.53
PICKUP	11	MAR	0.10	0.120	0.100	0.16	0.18
TRACTOR(3)	3	MAR	0.10	0.120	0.100	0.28	0.53
TANDEM DISK	3,35	JUN	1.00	0.179	0.148	0.49	1.21
PICKUP	11	JUN	0.20	0.240	0.200	0.31	0.37
SP COMBINE-GRAIN	13	JUN	1.00	0.308	0.257	0.98	10.46
TRUCK	10	JUN	0.20	0.240	0.200	0.58	0.92
TOTAL				2.711	2.251	6.63	23.34

COLUMN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
NAME OF MACHINE	CODE	WIDTH (FEET)	INITIAL LIST PRICE	SPEED (MPH)	FIELD EFFIC-ENCY	RC1	RC2	RC3	HOURS USED ANNUALLY	YEARS OWNED	RFV1	RFV2	PURCHASE PRICE	FUEL TYPE	HOURS OF LIFE	HP
TRACTOR(3)	3.	100.0	16750.	4.5	0.88	1.20	0.000631	1.60	600.	10.0	0.580	0.920	16750.	3.	12000.	100.
TRUCK	10.	2.0	10800.	20.0	0.83	0.80	0.000631	1.40	500.	8.0	0.670	0.850	10800.	1.	4000.	1.
PICKUP	11.	0.5	4800.	20.0	0.88	0.60	0.000631	1.40	500.	8.0	0.600	0.885	4400.	1.	4000.	1.
SP COMBINE-GRAIN	13.	16.0	21250.	3.0	0.67	0.33	0.000251	1.80	100.	10.0	0.635	0.895	21250.	3.	2000.	1.
M.B. PLOW 5	32.	6.6	2550.	4.5	0.80	2.00	0.000251	1.30	250.	10.0	0.500	0.835	2550.	0.	2000.	0.
TANDEM DISK	35.	14.0	1300.	4.8	0.83	0.65	0.000251	1.80	100.	10.0	0.600	0.885	1200.	0.	2000.	0.
FIELD CULTIVATOR	46.	24.0	1400.	3.8	0.76	1.30	0.000251	1.80	100.	10.0	0.500	0.885	1400.	0.	2000.	0.
SPRINGTOOTH	54.	27.0	2200.	5.3	0.70	0.65	0.000251	1.80	175.	10.0	0.500	0.885	2200.	0.	2000.	0.
DRILL WO/FERT	61.	13.3	2700.	4.0	0.72	0.65	0.000251	1.80	50.	10.0	0.600	0.885	2700.	0.	1000.	0.

100# 18-46-0 IN FALL AND 40# N IN SPRING
CUSTOM COMBINE AND TRUCKING

MACHINERY COMPLEMENT 14
EQUIPMENT COMPLEMENT 1

WHEAT FOR GRAIN
CENTRAL OKLAHOMA

CATEGORY	UNITS	PRICE	QUANTITY	VALUE
PRODUCTION:				
WHEAT	BU.	2.900	32.000	92.80
DRY MATTER	LBS.	0.0	1708.800	0.0
DIGESTIBLE PROT.	LBS.	0.0	170.880	0.0
NET ENERGY-LACT.	MCAL	0.0	1930.940	0.0
NET ENERGY-MAIN.	MCAL	0.0	1666.080	0.0
NET ENERGY-GRTH.	MCAL	0.0	1100.470	0.0
FIBER	LBS.	0.0	47.850	0.0
GRAZING	AUMS	0.0	0.750	0.0
DRY MATTER	LBS.	0.0	497.500	0.0
DIGESTIBLE PROT.	LBS.	0.0	58.220	0.0
NET ENERGY-LACT.	MCAL	0.0	455.230	0.0
NET ENERGY-MAIN.	MCAL	0.0	418.930	0.0
NET ENERGY-GRTH.	MCAL	0.0	276.130	0.0
FIBER	LBS.	0.0	113.940	0.0
TOTAL RECEIPTS				92.80
OPERATING INPUTS:				
WHEAT SEED	BU.	4.150	1.000	4.15
18-46-0 FERT	CWT.	10.550	1.000	10.55
NITROGEN (N)	LBS.	0.180	40.000	7.20
INSECTICIDE	ACRE	2.500	1.000	2.50
FERT. SPREADER	ACRE	1.450	2.000	2.90
TRACTOR FUEL & LUBE	ACRE			2.19
TRACTOR REPAIR COST	ACRE			1.41
EQUIP. FUEL & LUBE	ACRE			1.63
EQUIP. REPAIR COST	ACRE			1.37
TOTAL OPERATING COST				33.89
RETURNS TO LAND,LABOR,CAPITAL,MACHINERY, OVERHEAD,RISK, AND MANAGEMENT				58.91
CAPITAL COST:				
ANNUAL OPERATING CAPITAL		0.100	19.088	1.91
TRACTOR INVESTMENT		0.100	23.101	2.31
EQUIPMENT INVESTMENT		0.100	52.043	5.20
TOTAL INTEREST CHARGE				9.42
RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT				49.48
OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE)				
TRACTOR	HR.			4.49
EQUIPMENT	HR.			11.50
TOTAL OWNERSHIP COST				15.99
RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT				33.50
LABOR COST:				
MACHINERY LABOR	HR.	3.000	2.673	8.02
OTHER LABOR	HR.	3.000	0.400	1.20
TOTAL LABOR COST			3.073	9.22
RETURNS TO LAND, OVERHEAD, RISK AND MANAGEMENT				24.28

100# 18-46-0 IN FALL AND 40# N IN SPRING
CUSTOM COMBINE AND TRUCKING
ENTERPRISE Z6 AREA AND COUNTY 20 DETAIL 01 IRIG. LEVEL 0 LAND CLASS 1
GRAZING 6 MACH. COMP. 12 IRIG. SYSTEM 0 PRICE VECT 2 INDIV. NUMBER 12
ANALAL CAPITAL MONTH: 6
DATE PRINTED:11/03/77

WHEAT FOR GRAIN
CENTRAL OKLAHOMA

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	32.00	0.0	0.0	0.0	0.0	0.0	0.0	2.900	0.0	2.	76.	2.	0.
2 DRY MATTER	0.0	0.0	0.0	0.0	0.0	1708.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.	281.	2.	0.
3 DIGESTIBLE PROT.	0.0	0.0	0.0	0.0	0.0	170.88	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.	282.	2.	0.
4 NET ENERGY-LACT.	0.0	0.0	0.0	0.0	0.0	1930.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.	283.	2.	0.
5 NET ENERGY-MAIN.	0.0	0.0	0.0	0.0	0.0	1666.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.	284.	2.	0.
6 NET ENERGY-GRTH.	0.0	0.0	0.0	0.0	0.0	1100.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.	285.	2.	0.
7 FIBER	0.0	0.0	0.0	0.0	0.0	47.85	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.	286.	2.	0.
8 GRAZING	0.20	0.15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.10	0.30	0.0	0.0	10.	89.	2.	0.
9 DRY MATTER	75.00	122.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	75.00	225.00	0.0	0.0	12.	281.	2.	0.
10 DIGESTIBLE PROT.	8.78	14.33	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.78	26.33	0.0	0.0	12.	282.	2.	0.
28 NET ENERGY-LACT.	68.63	112.09	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	68.63	205.88	0.0	0.0	20.	283.	2.	0.
29 NET ENERGY-MAIN.	64.73	102.04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	64.73	187.43	0.0	0.0	20.	284.	2.	0.
30 NET ENERGY-GRTH.	41.63	67.99	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	41.63	124.88	0.0	0.0	20.	285.	2.	0.
31 FIBER	17.18	28.05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.18	51.53	0.0	0.0	12.	286.	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	4.150	0.0	2.	176.	3.	0.
12 18-46-0 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	10.550	0.0	16.	217.	3.	0.
13 NITROGEN (N)	0.0	40.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.180	0.0	12.	211.	3.	0.
14 INSECTICIDE	0.0	1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.500	0.0	7.	240.	3.	0.
17 FERT. SPREADER	0.0	1.00	0.0	0.0	0.0	0.0	0.0	0.0	1.00	0.0	0.0	0.0	1.450	0.0	7.	361.	3.	0.
MACHINERY REQUIREMENTS						TIMES OVER							XXXXX	XXXXX	POWER UNIT	MACH CODE	TYPE	CONT
38 TANDEM 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	3.	35.	4.	0.
39 M.B. PLOW 6	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	3.	31.	4.	0.
40 FIELD CULTIVATOR	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	3.	46.	4.	0.
41 SPRINGTOOTH	0.0	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	3.	54.	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	3.	61.	4.	0.
43 PICKUP	0.0	0.10	0.0	0.0	0.0	0.20	0.10	0.10	0.10	0.0	0.0	0.0	0.0	0.0	0.	11.	4.	0.
44 TRACTOR(3)	0.0	0.10	0.0	0.0	0.0	0.0	0.0	0.0	0.10	0.0	0.0	0.0	0.0	0.0	0.	3.	4.	0.
45 SP COMBINE-GRAIN	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	0.	13.	4.	0.
46 TRUCK	0.0	0.0	0.0	0.0	0.0	0.20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.	10.	4.	0.
50 OTHER LABOR	0.0	0.10	0.0	0.0	0.0	0.10	0.10	0.10	0.0	0.0	0.0	0.0						

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	92.80	0.0	0.0	0.0	0.0	0.0	0.0	92.80
TOTAL EXPENSES	ACRE	0.0	11.61	0.0	0.0	0.0	2.36	1.23	0.88	17.81	0.0	0.0	0.0	33.89
RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT														58.91

ANNUAL CAPITAL	DOL.	0.0	3.87	0.0	0.0	0.0	0.0	1.13	0.73	13.36	0.0	0.0	0.0	19.09

LABOR REQUIREMENTS BY MONTH

MACHINERY LABOR	HR.	0.0	0.24	0.0	0.0	0.0	0.97	0.50	0.36	0.60	0.0	0.0	0.0	2.67
OTHER LABOR	HR.	0.0	0.10	0.0	0.0	0.0	0.10	0.10	0.10	0.0	0.0	0.0	0.0	0.40
TOTAL LABOR	HR.	0.0	0.34	0.0	0.0	0.0	1.07	0.60	0.46	0.60	0.0	0.0	0.0	3.07

MACHINERY FIXED AND VARIABLE COSTS PER HOUR

MACHINE	CODE	DEPR	INSUR.	TAX	TOTAL FIXED	REPAIR	FUEL	LUB.	TOTAL VARIABLE	INT.	HR/TIME
TRACTOR(3)	3	1.97	1.27	0.28	3.51	1.11	1.49	0.22	2.82	1.81	1.00
TRUCK	10	2.16	0.91	0.22	3.28	0.86	1.76	0.26	2.88	1.30	1.00
PICKUP	11	0.83	0.38	0.09	1.30	0.29	1.10	0.16	1.55	0.55	1.00
SP COMBINE-GRAIN	13	16.80	9.00	2.13	27.92	2.01	1.58	0.24	3.83	12.85	0.26
TANDEM DISK	35	0.97	0.50	0.12	1.59	0.24	0.0	0.0	0.24	0.71	0.15
M.B. PLOW 6	31	1.08	0.69	0.18	1.95	0.32	0.0	0.0	0.32	0.98	0.31
FIELD CULTIVATOR	46	1.15	0.58	0.14	1.87	0.40	0.0	0.0	0.40	0.82	0.12
SPRINGTOOTH	54	1.03	0.52	0.13	1.68	0.64	0.0	0.0	0.64	0.74	0.08
DRILL WO/FERT	61	4.45	2.22	0.54	7.21	1.01	0.0	0.0	1.01	3.18	0.22

OPERATION	ITEM NO.	DATE	TIMES OVER	LABOR HOURS	MACHINE HOURS	FUEL,OIL,LUB., REPAIR PER ACRE	FIXED COSTS PER ACRE
M.B. PLOW 6	3,31	JUL	1.00	0.380	0.314	1.07	2.76
PICKUP	11	JUL	0.10	0.120	0.100	0.16	0.18
FIELD CULTIVATOR	3,46	AUG	1.00	0.144	0.119	0.42	1.02
SPRINGTOOTH	3,54	AUG	1.00	0.100	0.082	0.31	0.68
PICKUP	11	AUG	0.10	0.120	0.100	0.16	0.18
SPRINGTOOTH	3,54	SEP	1.00	0.100	0.082	0.31	0.68
DRILL WO/FERT	3,61	SEP	1.00	0.261	0.215	0.88	3.50
PICKUP	11	SEP	0.10	0.120	0.100	0.16	0.18
TRACTOR(3)	3	SEP	0.10	0.120	0.100	0.28	0.53
PICKUP	11	FEB	0.10	0.120	0.100	0.16	0.18
TRACTOR(3)	3	FEB	0.10	0.120	0.100	0.28	0.53
TANDEM DISK	3,35	JUN	1.00	0.179	0.148	0.49	1.21
PICKUP	11	JUN	0.20	0.240	0.200	0.31	0.37
SP COMBINE-GRAIN	13	JUN	1.00	0.308	0.257	0.98	10.46
TRUCK	10	JUN	0.20	0.240	0.200	0.28	0.92
TOTAL				2.671	2.218	6.54	23.39

COLUMN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
NAME OF MACHINE	CODE	WIDTH (FEET)	INITIAL LIST PRICE	SPEED (MPH)	FIELD EFFIC-ENCY	RC1	RC2	RC3	HOURS USED ANNUALLY	YEARS OWNED	RFV1	RFV2	PURCHASE PRICE	FUEL TYPE	HOURS OF LIFE	HP
TRACTOR(3)	3.	100.0	16750.	4.5	0.88	1.20	0.000631	1.60	600.	10.0	0.680	0.920	16750.	3.	12000.	100.
TRUCK	10.	2.0	10300.	20.0	0.88	0.80	0.000631	1.40	500.	8.0	0.570	0.850	10800.	1.	4000.	1.
PICKUP	11.	0.5	4800.	20.0	0.88	0.60	0.000631	1.40	500.	8.0	0.600	0.885	4400.	1.	4000.	1.
SP COMBINE-GRAIN	13.	16.0	21250.	3.0	0.67	0.33	0.000251	1.80	100.	10.0	0.535	0.895	21250.	3.	2000.	1.
M.B. PLOW 6	31.	8.0	3000.	4.1	0.80	2.00	0.000251	1.30	167.	15.0	0.500	0.835	3000.	0.	2000.	0.
TANDEM DISK	35.	14.0	1300.	4.8	0.83	0.65	0.000251	1.80	100.	10.0	0.500	0.885	1200.	0.	2000.	0.
FIELD CULTIVATOR	46.	24.0	1400.	3.8	0.76	1.10	0.000251	1.80	100.	10.0	0.500	0.835	1400.	0.	2000.	0.
SPRINGTOOTH	54.	27.0	2200.	5.3	0.70	0.65	0.000251	1.80	175.	10.0	0.500	0.835	2200.	0.	2000.	0.
DRILL WO/FERT	61.	13.3	2700.	4.0	0.72	0.65	0.000251	1.80	50.	10.0	0.600	0.885	2700.	0.	1000.	0.

100# 18-46-0 IN FALL AND 40# N IN SPRING
CUSTOM COMBINE AND TRUCKING

MACHINERY COMPLEMENT 14
EQUIPMENT COMPLEMENT 1

DAIRY COW PRODUCTION
12.000 POUNDS PER YEAR
MIGUEL RIBON

PRODUCTION	UNITS	QUANITY	WEIGHT	PRICE	VALUE/UNIT	VALUE
MILK	CWT.	120.02	1.00	9.000	9.00	1080.18
CULL COWS	HD.	1.00	0.20	216.000	43.20	43.20
CALF	HD.	1.00	0.85	15.000	12.75	12.75
TOTAL RECEIPTS						1136.13

OPERATING INPUTS	UNITS	RATE PER UNIT	NUMBER OF UNITS	TOTAL UNITS	PRICE	VALUE
SALT & MIN.	LBS.	65.00	1.00	65.000	0.05	3.25
BREEDING FEES	DOL.	1.00	1.00	1.000	13.25	13.25
VET MEDICINE	DOL.	1.00	1.00	1.000	9.00	9.00
SUPPLIES	DOL.	1.00	1.00	1.000	15.44	15.44
ACCOUNTING	HD.	1.00	1.00	1.000	8.50	8.50
UTILITIES	DOL.	1.00	1.00	1.000	20.00	20.00
CUSTOM HAULING	CWT.	120.02	1.00	120.020	0.40	48.01
TRACTOR FUEL & LUBE						5.23
TRACTOR REPAIR COST						2.16
MACH. FUEL & LUBE						7.81
MACHINERY REPAIR COST						9.20
TOTAL OPERATING COST						141.85

RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT				994.28
CAPITAL COST		PRICE	AMOUNT	VALUE
ANNUAL OPERATING CAPITAL		0.100	56.943	5.69
TRACTOR INVESTMENT		0.100	35.345	3.53
MACHINERY INVESTMENT		0.100	42.810	4.28
TOTAL INTEREST CHARGE				13.51
RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT				980.77
OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE)				
TRACTOR	DOL.			4.60
MACHINERY	DOL.			7.22
TOTAL OWNERSHIP COST				11.82
RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT				968.95
LABOR COSTS		PRICE	HOURS	
MACHINERY LABOR		3.000	10.236	30.71
TOTAL LABOR COST			10.236	30.71
RETURNS TO LAND, OVERHEAD RISK AND MANAGEMENT				938.24

DAIRY COW PRODUCTION
12,000 POUNDS PER YEAR
MIGUEL RIBON

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 MILK	15.12	18.26	17.40	15.12	12.96	10.80	9.12	7.80	6.96	6.48	0.0	0.0	9.000	1.000	16.	1.	2.	0.
2 CULL COWS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	0.0	0.0	216.000	0.200	1.	29.	2.	0.
3 CALF	1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.000	0.850	1.	22.	2.	0.
OPERATING INPUTS					RATE/UNIT								PRICE	NUMBER UNITS	UNIT CODE	ITEM CODE	TYPE	CONT
11 SALT & MIN.	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	0.0	0.0	0.050	1.000	12.	103.	3.	0.
12 BREEDING FEES	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.0	0.0	13.250	1.000	15.	417.	3.	0.
13 VET MEDICINE	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.0	0.0	9.000	1.000	15.	410.	3.	0.
14 SUPPLIES	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.0	0.0	15.440	1.000	15.	418.	3.	0.
15 ACCOUNTING	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.0	0.0	8.500	1.000	1.	401.	3.	0.
16 UTILITIES	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.0	0.0	20.000	1.000	15.	450.	3.	0.
17 CUSTOM HAULING	15.12	18.26	17.40	15.12	12.96	10.80	9.12	7.80	6.96	6.48	0.0	0.0	0.400	1.000	16.	306.	3.	0.
MACHINERY REQUIREMENTS					HOURS								XXXXX	XXXXX	POWER UNIT	MACH CODE	TYPE	CONT
26 WINDROWER	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.0	0.0	0.0	0.0	2.	95.	4.	0.
27 PTO BALER	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.0	0.0	0.0	0.0	2.	96.	4.	0.
28 TRAILER	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.0	0.0	0.0	0.0	1.	99.	4.	0.
29 PICKUP	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.0	0.0	0.0	0.0	0.	11.	4.	0.
30 TRUCK	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.0	0.0	0.0	0.0	0.	10.	4.	0.

MONTHLY SUMMARY OF RECEIPTS AND EXPENDITURES

CATEGORY	YEAR	UNIT	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
TOTAL RECEIPTS	1	DOL.	148.83	164.34	156.60	136.08	116.64	97.20	82.08	70.20	62.64	101.52	0.0	0.0	1136.13
TOTAL VARIABLE COST	1	DOL.	15.43	16.69	16.34	15.43	14.57	13.70	13.03	12.50	12.17	11.98	0.0	0.0	141.85

ANNUAL CAPITAL	1 DOL.	11.57	11.13	9.53	7.72	6.07	4.57	3.26	2.08	1.01	0.0	0.0	0.0		56.94

LABOR REQUIREMENTS

MACHINERY LABOR	1 HOUR	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	0.0	0.0		10.24
TOTAL LABOR	1 HOUR	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	0.0	0.0		10.24

MACHINERY REQUIREMENTS BY MONTH

TRACTOR(1)	HOUR	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.0	0.0		1.32
TRACTOR(2)	HOUR	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.0	0.0		2.64
TRUCK	HOUR	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.0	0.0		1.90
PICKUP	HOUR	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.0	0.0		3.00
WINDROWER	(1.2) HOUR	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.0	0.0		1.20
PTO BALER	(1.2) HOUR	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.0	0.0		1.20
TRAILER	(1.2) HOUR	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.0	0.0		1.20

NO. MONTHLY EQUIPMENT REQUIREMENTS AS A PROPORTION OF THE ITEMS WHOLE FARM USE
THE FINAL ENTRY IN EACH ROW REPRESENTS THE PROPORTION OF THE ITEMS TIME ALLOCATED TO THE BUDGET UNIT

MACHINERY FIXED AND VARIABLE COST PER HOUR

MACHINE	CODE	DEPR	INSUR.	TAX	TOTAL FIXED	REPAIR	FUEL	LUB.	TOTAL VARIABLE	INT.	HR/TIME
TRACTOR(1)	1	0.78	0.04	0.11	0.94	0.44	0.92	0.14	1.50	0.72	1.00
TRACTOR(2)	2	1.07	0.06	0.15	1.28	0.60	1.26	0.19	2.05	0.98	1.00
TRUCK	10	0.80	0.03	0.08	0.91	0.80	1.80	0.27	2.87	0.48	1.00
PICKUP	11	0.64	0.02	0.07	0.73	0.50	1.12	0.17	1.79	0.40	1.00
WINDPOWER	95	0.43	0.02	0.06	0.51	0.55	0.0	0.0	0.55	0.33	1.00
PTO BALER	96	1.04	0.05	0.13	1.22	1.04	0.0	0.0	1.04	0.80	1.00
TRAILER	99	0.87	0.04	0.11	1.02	3.57	0.0	0.0	3.57	0.67	1.00

ANNUAL COST SUMMARY FOR EQUIPMENT AND LIVESTOCK

COLUMN NAME OF MACHINE	1 CODE	2 WIDTH (FEET)	3 INITIAL LIST PRICE	4 SPEED (MPH)	5 FIELD EFFIC-ENCY	6 RC1	7 RC2	8 RC3	9 HOURS USED ANNUALLY	10 YEARS OWNED	11 RFV1	12 RFV2	13 PURCHASE PRICE	14 FUEL TYPE	15 HOURS OF LIFE	16 HP
TRACTOR(1)	1.	55.0	6655.	4.5	0.88	1.20	0.000631	1.60	600.	10.0	0.680	0.920	6655.	3.	12000.	55.
TRACTOR(2)	2.	75.0	9075.	4.5	0.88	1.20	0.000631	1.60	600.	10.0	0.680	0.920	9075.	3.	12000.	75.
TRUCK	10.	2.0	4000.	20.0	0.88	0.80	0.000631	1.60	500.	8.0	0.670	0.850	4000.	1.	4000.	1.
PICKUP	11.	0.5	3300.	20.0	0.88	0.60	0.000631	1.60	500.	8.0	0.600	0.835	3300.	1.	4000.	1.
WINDPOWER	95.	8.0	1100.	3.0	1.00	1.00	0.000251	1.80	200.	10.0	0.635	0.895	1100.	0.	2000.	0.
PTO BALER	96.	4.0	1320.	2.0	1.00	1.30	0.002510	1.30	100.	10.0	0.635	0.895	1320.	0.	1200.	0.
TRAILER	99.	5.0	1650.	4.0	0.50	0.85	0.002510	1.40	150.	10.0	0.635	0.835	1650.	0.	800.	0.

COLUMN---	1	2	3	4	5	6	7	8	9	10	11
ITEM NAME	CODE	SIZE	UNIT TYPE		LIST PRICE	PURCHASE PRICE	YEARS LIFE	SALVAGE PROP OF LIST	REPAIR PROP OF LIST	FUEL & LUB AS PROP	ANNUAL HOURS LABOR

MACHINERY COMPLEMENT 2
EQUIPMENT COMPLEMENT 2

DAIRY COW PRODUCTION
15,000 POUNDS PER YEAR
MIGUEL RIBON

PRODUCTION	UNITS	QUANITY	WEIGHT	PRICE	VALUE/UNIT	VALUE
MILK	CWT.	150.00	1.00	9.000	9.00	1350.00
CULL COWS	HD.	1.00	0.20	216.000	43.20	43.20
CALF	HD.	1.00	0.85	15.000	12.75	12.75
TOTAL RECEIPTS						1405.95

OPERATING INPUTS	UNITS	RATE PER UNIT	NUMBER OF UNITS	TOTAL UNITS	PRICE	VALUE
SALT & MIN.	LBS.	70.00	1.00	70.000	0.05	3.50
BREEDING FEES	DOL.	1.00	1.00	1.000	15.25	15.25
VET MEDICINE	DOL.	1.00	1.00	1.000	9.60	9.60
SUPPLIES	DOL.	1.00	1.00	1.000	15.44	15.44
ACCOUNTING	HD.	1.00	1.00	1.000	9.50	9.50
UTILITIES	DOL.	1.00	1.00	1.000	20.00	20.00
CUSTOM HAULING	CWT.	140.00	1.00	140.000	0.40	56.00
TRACTOR FUEL & LUBE						5.23
TRACTOR REPAIR COST						2.16
MACH. FUEL & LUBE						7.81
MACHINERY REPAIR COST						9.20
TOTAL OPERATING COST						153.69

RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT				1252.26
CAPITAL COST		PRICE	AMOUNT	VALUE
ANNUAL OPERATING CAPITAL		0.100	61.819	6.18
TRACTOR INVESTMENT		0.100	35.345	3.53
MACHINERY INVESTMENT		0.100	42.810	4.28
TOTAL INTEREST CHARGE				14.00
RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT				1238.26
OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE)				
TRACTOR	DOL.			4.60
MACHINERY	DOL.			7.22
TOTAL OWNERSHIP COST				11.82
RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT				1226.44
LABOR COSTS		PRICE	HOURS	
MACHINERY LABOR		3.000	10.236	30.71
TOTAL LABOR COST			10.236	30.71
RETURNS TO LAND, OVERHEAD RISK AND MANAGEMENT				1195.73

DAIRY COW PRODUCTION
15,000 POUNDS PER YEAR
MIGUEL RIBON

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 MILK	18.90	22.80	21.75	18.90	16.20	13.50	11.40	9.75	8.70	8.10	0.0	0.0	9.000	1.000	16.	1.	2.	0.
2 CULL COWS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	0.0	0.0	216.000	0.200	1.	29.	2.	0.
3 CALF	1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.000	0.850	1.	22.	2.	0.
OPERATING INPUTS					RATE/UNIT								PRICE	NUMBER UNITS	UNIT CODE	ITEM CODE	TYPE	CONT
11 SALT & MIN.	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	0.0	0.0	0.050	1.000	12.	103.	3.	0.
12 BREEDING FEES	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.0	0.0	15.250	1.000	15.	417.	3.	0.
13 VET MEDICINE	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.0	0.0	9.600	1.000	15.	410.	3.	0.
14 SUPPLIES	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.0	0.0	15.440	1.000	15.	418.	3.	0.
15 ACCOUNTING	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.0	0.0	9.500	1.000	1.	401.	3.	0.
16 UTILITIES	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.0	0.0	20.000	1.000	15.	460.	3.	0.
17 CUSTOM HAULING	18.90	22.80	21.75	8.90	16.20	13.50	11.40	9.75	8.70	8.10	0.0	0.0	0.400	1.000	16.	306.	3.	0.
MACHINERY REQUIREMENTS					HOURS								XXXXX	XXXXX	POWER UNIT	MACH CODE	TYPE	CONT
26 WINDROWER	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.0	0.0	0.0	0.0	2.	95.	4.	0.
27 PTO BALER	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.0	0.0	0.0	0.0	2.	96.	4.	0.
28 TRAILER	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.0	0.0	0.0	0.0	1.	99.	4.	0.
29 PICKUP	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.0	0.0	0.0	0.0	0.	11.	4.	0.
30 TRUCK	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.0	0.0	0.0	0.0	0.	10.	4.	0.

MONTHLY SUMMARY OF RECEIPTS AND EXPENDITURES

CATEGORY	YEAR	UNIT	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
TOTAL RECEIPTS	1	DOL.	182.85	205.20	195.75	170.10	145.80	121.50	102.60	87.75	78.30	116.10	0.0	0.0	1405.95
TOTAL VARIABLE COST	1	DOL.	17.33	18.09	18.47	13.33	16.25	15.17	14.33	13.67	13.25	13.01	0.0	0.0	153.69
ANNUAL CAPITAL	1	DOL.	13.00	12.59	10.77	6.66	6.77	5.06	3.58	2.28	1.10	0.0	0.0	0.0	61.82

LABOR REQUIREMENTS

MACHINERY LABOR	1	HOUR	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	0.0	0.0	10.24
TOTAL LABOR	1	HOUR	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	0.0	0.0	10.24

MACHINERY REQUIREMENTS BY MONTH

TRACTOR(1)		HOUR	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.0	0.0	1.32
TRACTOR(2)		HOUR	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.0	0.0	2.64
TRUCK		HOUR	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.0	0.0	1.90
PICKUP		HOUR	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.0	0.0	3.00
WINDROWER	(1.2)	HOUR	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.0	0.0	1.20
PTO BALER	(1.2)	HOUR	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.0	0.0	1.20
TRAILER	(1.2)	HOUR	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.0	0.0	1.20

NO. MONTHLY EQUIPMENT REQUIREMENTS AS A PROPORTION OF THE ITEMS WHOLE FARM USE
THE FINAL ENTRY IN EACH ROW REPRESENTS THE PROPORTION OF THE ITEMS TIME ALLOCATED TO THE BUDGET UNIT

MACHINERY FIXED AND VARIABLE COST PER HOUR

MACHINE	CODE	DEPR	INSUR.	TAX	TOTAL FIXED	REPAIR	FUEL	LUB.	TOTAL VARIABLE	INT.	HR/TIME
TRACTOR(1)	1	0.78	0.04	0.11	0.94	0.44	0.92	0.14	1.50	0.72	1.00
TRACTOR(2)	2	1.07	0.06	0.15	1.28	0.60	1.26	0.19	2.05	0.98	1.00
TRUCK	10	0.80	0.03	0.08	0.91	0.80	1.80	0.27	2.87	0.48	1.00
PICKUP	11	0.64	0.02	0.07	0.73	0.50	1.12	0.17	1.79	0.40	1.00
WINDROWER	55	0.43	0.02	0.06	0.51	0.55	0.0	0.0	0.55	0.33	1.00
PTO BALER	96	1.04	0.05	0.13	1.22	1.04	0.0	0.0	1.04	0.80	1.00
TRAILER	99	0.87	0.04	0.11	1.02	3.57	0.0	0.0	3.57	0.67	1.00

ANNUAL COST SUMMARY FOR EQUIPMENT AND LIVESTOCK

COLUMN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
NAME OF MACHINE	CODE	WIDTH (FEET)	INITIAL LIST PRICE	SPEED (MPH)	FIELD EFFIC-ENCY	RC1	RC2	RC3	HOURS USED ANNUALLY	YEARS OWNED	RFV1	RFV2	PURCHASE PRICE	FUEL TYPE	HOURS OF LIFE	HP
TRACTOR(1)	1.	55.0	6655.	4.5	0.88	1.20	0.000631	1.60	600.	10.0	0.580	0.920	6655.	3.	12000.	55.
TRACTOR(2)	2.	75.0	9075.	4.5	0.88	1.20	0.000631	1.60	600.	10.0	0.580	0.920	9075.	3.	12000.	75.
TRUCK	10.	2.0	4000.	20.0	0.88	0.80	0.000631	1.60	500.	8.0	0.670	0.860	4000.	1.	4000.	1.
PICKUP	11.	0.5	3300.	20.0	0.88	0.60	0.000631	1.60	500.	8.0	0.600	0.885	3300.	1.	4000.	1.
WINDROWER	55.	8.0	1100.	3.0	1.00	1.00	0.000251	1.80	200.	10.0	0.635	0.895	1100.	0.	2000.	0.
PTO BALER	56.	4.0	1320.	2.0	1.00	1.00	0.002510	1.30	100.	10.0	0.635	0.895	1320.	0.	1200.	0.
TRAILER	99.	5.0	1650.	4.0	0.50	0.85	0.002510	1.40	150.	10.0	0.635	0.895	1650.	0.	800.	0.

COLUMN---	1	2	3	4	5	6	7	8	9	10	11
ITEM NAME	CODE	SIZE	UNIT	TYPE	LIST PRICE	PURCHASE PRICE	YEARS LIFE	SALVAGE PROP OF LIST	REPAIR PROP OF LIST	FUEL & LUB AS PROP	ANNUAL HOURS LABOR

MACHINERY COMPLEMENT 2
EQUIPMENT COMPLEMENT 2

DAIRY COW PRODUCTION
18.000 POUNDS PER YEAR
MIGUEL RIBON

PRODUCTION	UNITS	QUANITY	WEIGHT	PRICE	VALUE/UNIT	VALUE
MILK	CWT.	180.00	1.00	9.000	9.00	1620.00
CULL COWS	HD.	1.00	0.20	216.000	43.20	43.20
CALF	HD.	1.00	0.85	15.000	12.75	12.75
TOTAL RECEIPTS						1675.95

OPERATING INPUTS	UNITS	RATE PER UNIT	NUMBER OF UNITS	TOTAL UNITS	PRICE	VALUE
SALT & MIN.	LBS.	67.50	1.00	67.500	0.05	3.38
BREEDING FEES	DOL.	1.00	1.00	1.000	18.25	18.25
VET MEDICINE	DOL.	1.00	1.00	1.000	10.20	10.20
SUPPLIES	DOL.	1.00	1.00	1.000	15.44	15.44
ACCOUNTING	HD.	1.00	1.00	1.000	12.00	12.00
UTILITIES	DOL.	1.00	1.00	1.000	20.00	20.00
CUSTOM HAULING	CWT.	179.82	1.00	179.820	0.40	71.93
TRACTOR FUEL & LUBE						5.23
TRACTOR REPAIR COST						2.16
MACH. FUEL & LUBE						7.81
MACHINERY REPAIR COST						8.61
TOTAL OPERATING COST						175.00

DAIRY COW PRODUCTION
18,000 POUNDS PER YEAR
MIGUEL RIBON

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 MILK	22.68	27.36	26.10	22.68	19.44	16.20	13.68	11.70	10.44	9.72	0.0	0.0	9.000	1.000	16.	1.	2.	0.
2 CULL COWS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00	0.0	0.0	216.000	0.200	1.	29.	2.	0.
3 CALF	1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.000	0.850	1.	22.	2.	0.
OPERATING INPUTS					RATE/UNIT								PRICE	NUMBER UNITS	UNIT CODE	ITEM CODE	TYPE	CONT
11 SALT & MIN.	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	0.0	0.0	0.0	0.050	1.000	12.	103.	3.	0.
12 BREEDING FEES	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.0	0.0	18.250	1.000	15.	417.	3.	0.
13 VET MEDICINE	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.0	0.0	10.200	1.000	15.	410.	3.	0.
14 SUPPLIES	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.0	0.0	15.440	1.000	15.	418.	3.	0.
15 ACCOUNTING	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.0	0.0	12.000	1.000	1.	401.	3.	0.
16 UTILITIES	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.0	0.0	20.000	1.000	15.	460.	3.	0.
17 CUSTOM HAULING	22.68	27.36	26.10	22.68	19.44	16.20	13.68	11.30	10.66	9.72	0.0	0.0	0.400	1.000	16.	306.	3.	0.
MACHINERY REQUIREMENTS					HOURS								XXXXX	XXXXX	POWER UNIT	MACH CODE	TYPE	CONT
26 WINDROWER	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.0	0.0	0.0	0.0	2.	95.	4.	0.
27 WINDROWER	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.0	0.0	0.0	0.0	2.	95.	4.	0.
28 TRAILER	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.0	0.0	0.0	0.0	1.	99.	4.	0.
29 PICKUP	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.0	0.0	0.0	0.0	0.	11.	4.	0.
30 TRUCK	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.0	0.0	0.0	0.0	0.	10.	4.	0.

MONTHLY SUMMARY OF RECEIPTS AND EXPENDITURES

CATEGORY	YEAR	UNIT	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
TOTAL RECEIPTS	1	DOL.	216.87	246.24	234.90	204.12	174.96	145.80	123.12	105.30	93.96	130.68	0.0	0.0	1675.95
TOTAL VARIABLE COST	1	DOL.	19.42	21.29	20.79	19.42	18.12	16.83	15.82	14.87	14.61	13.86	0.0	0.0	175.60

ANNUAL CAPITAL	1 DOL.	14.56	14.19	12.12	9.71	7.55	5.61	3.95	2.48	1.22	0.0	0.0	0.0	71.40

LABOR REQUIREMENTS

MACHINERY LABOR	1 HOUR	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	0.0	0.0	10.24
TOTAL LABOR	1 HOUR	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	0.0	0.0	10.24

MACHINERY REQUIREMENTS BY MONTH

TRACTOR(1)	HOUR	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.0	0.0	1.32
TRACTOR(2)	HOUR	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.0	0.0	2.64
TRUCK	HOUR	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.0	0.0	1.90
PICKUP	HOUR	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.0	0.0	3.00
WINDROWER	(1.2)HOUR	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.0	0.0	1.20
WINDROWER	(1.2)HOUR	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.0	0.0	1.20
TRAILER	(1.2)HOUR	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.0	0.0	1.20

NO. MONTHLY EQUIPMENT REQUIREMENTS AS A PROPORTION OF THE ITEMS WHOLE FARM USE
THE FINAL ENTRY IN EACH ROW REPRESENTS THE PROPORTION OF THE ITEMS TIME ALLOCATED TO THE BUDGET UNIT

MACHINERY FIXED AND VARIABLE COST PER HOUR

MACHINE	CODE	DEPR	INSUR.	TAX	TOTAL FIXED	REPAIR	FUEL	LUB.	TOTAL VARIABLE	INT.	HR/TIME
TRACTOR(1)	1	0.78	0.04	0.11	0.94	0.44	0.92	0.14	1.50	0.72	1.00
TRACTOR(2)	2	1.07	0.06	0.15	1.28	0.60	1.26	0.19	2.05	0.98	1.00
TRUCK	10	0.80	0.03	0.08	0.91	0.80	1.80	0.27	2.87	0.48	1.00
PICKUP	11	0.64	0.02	0.07	0.73	0.50	1.12	0.17	1.79	0.40	1.00
WINDROWER	95	0.43	0.02	0.06	0.51	0.55	0.0	0.0	0.55	0.33	1.00
WINDROWER	95	0.43	0.02	0.06	0.51	0.55	0.0	0.0	0.55	0.33	1.00
TRAILER	99	0.87	0.04	0.11	1.02	3.57	0.0	0.0	3.57	0.67	1.00

ANNUAL COST SUMMARY FOR EQUIPMENT AND LIVESTOCK

COLUMN NAME OF MACHINE	1 CODE	2 WIDTH (FEET)	3 INITIAL LIST PRICE	4 SPEED (MPH)	5 FIELD EFFIC-ENCY	6 RC1	7 RC2	8 RC3	9 HOURS USED ANNUALLY	10 YEARS OWNED	11 RFV1	12 RFV2	13 PURCHASE PRICE	14 FUEL TYPE	15 HOURS OF LIFE	16 HP
TRACTOR(1)	1.	55.0	6655.	4.5	0.88	1.20	0.000631	1.60	600.	10.0	0.680	0.920	6655.	3.	12000.	55.
TRACTOR(2)	2.	75.0	9075.	4.5	0.88	1.20	0.000631	1.60	600.	10.0	0.680	0.920	9075.	3.	12000.	75.
TRUCK	10.	2.0	4000.	20.0	0.88	0.80	0.000631	1.60	500.	8.0	0.670	0.860	4000.	1.	4000.	1.
PICKUP	11.	0.5	3300.	20.0	0.88	0.60	0.000631	1.60	500.	8.0	0.600	0.885	3300.	1.	4000.	1.
WINDROWER	95.	8.0	1100.	3.0	1.00	1.00	0.000251	1.80	200.	10.0	0.635	0.895	1100.	0.	2000.	0.
TRAILER	99.	5.0	1650.	4.0	0.50	0.85	0.002510	1.40	150.	10.0	0.635	0.895	1650.	0.	800.	0.

COLUMN---	1	2	3	4	5	6	7	8	9	10	11
ITEM NAME	CODE	SIZE	UNIT	TYPE	LIST PRICE	PURCHASE PRICE	YEARS LIFE	SALVAGE PROP OF LIST	REPAIR PROP OF LIST	FUEL & LUB AS PROP	ANNUAL HOURS LABOR

MACHINERY COMPLEMENT 2
EQUIPMENT COMPLEMENT 2

DRY COW MAINTENANCE
ALL COWS
MIGUEL RIBON

PRODUCTION	UNITS	QUANITY	WEIGHT	PRICE VALUE/UNIT	VALUE
TOTAL RECEIPTS					0.0

OPERATING INPUTS	UNITS	RATE PER UNIT	NUMBER OF UNITS	TOTAL UNITS	PRICE	VALUE
SALT & MIN.	LBS.	4.00	1.00	4.000	0.05	0.20
VET MEDICINE	DOL.	1.00	1.00	1.000	1.60	1.60
SUPPLIES	DOL.	1.00	1.00	1.000	0.97	0.97
UTILITIES	DOL.	1.00	1.00	1.000	1.25	1.25
TRACTOR FUEL & LUBE						1.05
TRACTOR REPAIR COST						0.43
MACH. FUEL & LUBE						1.56
MACHINERY REPAIR COST						1.84
TOTAL OPERATING COST						8.90

RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT	-8.90

CAPITAL COST	PRICE	AMOUNT	VALUE
ANNUAL OPERATING CAPITAL	0.100	0.358	0.04
TRACTOR INVESTMENT	0.100	7.069	0.71
MACHINERY INVESTMENT	0.100	8.562	0.86
TOTAL INTEREST CHARGE			1.60

RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT	-10.50

OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE)			
TRACTOR	DOL.		0.92
MACHINERY	DOL.		1.44
TOTAL OWNERSHIP COST			2.36

RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT	-12.86

LABOR COSTS	PRICE	HOURS	
MACHINERY LABOR	3.000	2.047	6.14
TOTAL LABOR COST		2.047	6.14

RETURNS TO LAND, OVERHEAD RISK AND MANAGEMENT	-19.00

DRY COW MAINTENANCE
ALL COWS
MIGUEL RIBON

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													
OPERATING INPUTS					RATE/UNIT								PRICE	NUMBER UNITS	UNIT CODE	ITEM CODE	TYPE	CONT
11 SALT & MIN.	2.00	2.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.050	1.000	12.	103.	3.	0.
13 VET MEDICINE	0.40	0.60	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.600	1.000	15.	410.	3.	0.
14 SUPPLIES	0.50	0.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.970	1.000	15.	418.	3.	0.
16 UTILITIES	0.50	0.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.250	1.000	15.	460.	3.	0.
MACHINERY REQUIREMENTS						HOURS							XXXXX	XXXXX	POWER UNIT	MACH CODE	TYPE	CONT
26 WINDROWER	0.12	0.12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.	95.	4.	0.
27 PTO BALER	0.12	0.12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.	96.	4.	0.
28 TRAILER	0.12	0.12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.	99.	4.	0.
29 PICKUP	0.30	0.30	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.	11.	4.	0.
30 TRUCK	0.19	0.19	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.	10.	4.	0.

MONTHLY SUMMARY OF RECEIPTS AND EXPENDITURES

CATEGORY	YEAR	UNIT	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
TOTAL VARIABLE COST	1	DOL.	4.29	4.61	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.90
ANNUAL CAPITAL	1	DOL.	0.36	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.36

LABOR REQUIREMENTS

MACHINERY LABOR	1	HOUR	1.02	1.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.05
TOTAL LABOR	1	HOUR	1.02	1.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.05

MACHINERY REQUIREMENTS BY MONTH

TRACTOR(1)		HOUR	0.13	0.13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.26
TRACTOR(2)		HOUR	0.26	0.26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.53
TRUCK		HOUR	0.19	0.19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.38
PICKUP		HOUR	0.30	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.60
WINDROWER	(0.2)	HOUR	0.12	0.12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.24
PTO BALER	(0.2)	HOUR	0.12	0.12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.24
TRAILER	(0.2)	HOUR	0.12	0.12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.24

NO. MONTHLY EQUIPMENT REQUIREMENTS AS A PROPORTION OF THE ITEMS WHOLE FARM USE
THE FINAL ENTRY IN EACH ROW REPRESENTS THE PROPORTION OF THE ITEMS TIME ALLOCATED TO THE BUDGET UNIT

MACHINERY FIXED AND VARIABLE COST PER HOUR

MACHINE	CODE	DEPR	INSUR.	TAX	TOTAL FIXED	REPAIR	FUEL	LUB.	TOTAL VARIABLE	INT.	HR/TIME
TRACTOR(1)	1	0.76	0.04	0.11	0.94	0.44	0.92	0.14	1.50	0.72	1.00
TRACTOR(2)	2	1.07	0.06	0.15	1.28	0.60	1.26	0.19	2.05	0.98	1.00
TRUCK	10	0.80	0.03	0.08	0.91	0.80	1.80	0.27	2.87	0.49	1.00
PICKUP	11	0.64	0.02	0.07	0.73	0.50	1.12	0.17	1.79	0.40	1.00
WINDROWER	55	0.43	0.02	0.06	0.51	0.55	0.0	0.0	0.55	0.33	1.00
PTO BALER	96	1.04	0.05	0.13	1.22	1.04	0.0	0.0	1.04	0.80	1.00
TRAILER	99	0.87	0.04	0.11	1.02	3.57	0.0	0.0	3.57	0.67	1.00

ANNUAL COST SUMMARY FOR EQUIPMENT AND LIVESTOCK

COLUMN NAME OF MACHINE	1 CODE	2 WIDTH (FEET)	3 INITIAL LIST PRICE	4 SPEED (MPH)	5 FIELD EFFIC-ENCY	6 RC1	7 RC2	8 RC3	9 HOURS USED ANNUALLY	10 YEARS OWNED	11 RFV1	12 RFV2	13 PURCHASE PRICE	14 FUEL TYPE	15 HOURS OF LIFE	16 HP
TRACTOR(1)	1.	55.0	6655.	4.5	0.88	1.20	0.000631	1.60	600.	10.0	0.680	0.920	6655.	3.	12000.	55.
TRACTOR(2)	2.	75.0	9075.	4.5	0.88	1.20	0.000631	1.60	600.	10.0	0.680	0.920	9075.	3.	12000.	75.
TRUCK	10.	2.0	4000.	20.0	0.88	0.80	0.000631	1.60	500.	8.0	0.570	0.860	4000.	1.	4000.	1.
PICKUP	11.	0.5	3300.	20.0	0.98	0.60	0.000631	1.60	500.	8.0	0.600	0.865	3300.	1.	4000.	1.
WINDROWER	55.	8.0	1100.	3.0	1.00	1.00	0.000251	1.80	200.	10.0	0.635	0.895	1100.	0.	2000.	0.
PTO BALER	96.	4.0	1320.	2.0	1.00	1.00	0.002510	1.30	100.	10.0	0.635	0.895	1320.	0.	1200.	0.
TRAILER	99.	5.0	1650.	4.0	0.50	0.85	0.002510	1.40	150.	10.0	0.635	0.895	1650.	0.	800.	0.

COLUMN--	1	2	3	4	5	6	7	8	9	10	11
ITEM NAME	CODE	SIZE	UNIT	TYPE	LIST PRICE	PURCHASE PRICE	YEARS LIFE	SALVAGE PROP OF LIST	REPAIR PROP OF LIST	FUEL & LUB AS PROP	ANNUAL HOURS LABOR

MACHINERY COMPLEMENT 2
EQUIPMENT COMPLEMENT 2

DAIRY CALF BUDGET
ALL CALVES 0-6 MONTHS
MIGUEL RIBON

PRODUCTION	UNITS	QUANITY	WEIGHT	PRICE	VALUE/UNIT	VALUE
TOTAL RECEIPTS						0.0

OPERATING INPUTS	UNITS	RATE PER UNIT	NUMBER OF UNITS	TOTAL UNITS	PRICE	VALUE
MILK REPLACER	LBS.	22.00	1.00	22.000	0.30	6.60
CALF STARTER	LBS.	620.60	1.00	620.600	0.09	55.85
VET MEDICINE	DOL.	1.00	1.00	1.002	3.20	3.21
SUPPLIES	DOL.	1.00	1.00	1.002	0.84	0.84
UTILITIES	DOL.	1.00	1.00	1.002	1.25	1.25
TOTAL OPERATING COST						67.75

RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT	-67.75

CAPITAL COST	PRICE	AMOUNT	VALUE
ANNUAL OPERATING CAPITAL	0.100	12.169	1.22
TOTAL INTEREST CHARGE			1.22

RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT	-68.97
OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE)	
TOTAL OWNERSHIP COST	0.0
RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT	-68.97

LABOR COSTS	PRICE	HOURS	
TOTAL LABOR COST		0.0	0.0
RETURNS TO LAND, OVERHEAD RISK AND MANAGEMENT			-68.97

RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT				1500.95
CAPITAL COST		PRICE	AMOUNT	VALUE
ANNUAL OPERATING CAPITAL		0.100	71.397	7.14
TRACTOR INVESTMENT		0.100	35.345	3.53
MACHINERY INVESTMENT		0.100	37.223	3.72
TOTAL INTEREST CHARGE				14.40
RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT				1486.55
OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE)				
TRACTOR	DOL.			4.60
MACHINERY	DOL.			6.36
TOTAL OWNERSHIP COST				10.96
RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT				1475.59
LABOR COSTS		PRICE	HOURS	
MACHINERY LABOR		3.000	10.236	30.71
TOTAL LABOR COST			10.236	30.71
RETURNS TO LAND, OVERHEAD RISK AND MANAGEMENT				1444.88

DAIRY CALF BUDGET
ALL CALVES 0-6 MONTHS
MIGUEL RIBON

LINE .	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
PRODUCTION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	PRICE	WEIGHT	UNIT CODE	ITEM CODE	TYPE	CONT
					NUMBER OF UNITS													
OPERATING INPUTS					RATE/UNIT								PRICE	NUMBER UNITS	UNIT CODE	ITEM CODE	TYPE	CONT
12 MILK REPLACER	15.00	7.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.300	1.000	12.	108.	3.	0.
13 CALF STARTER	33.60	66.00	102.00	123.00	148.00	148.00	0.0	0.0	0.0	0.0	0.0	0.0	0.090	1.000	12.	107.	3.	0.
14 VET MEDICINE	0.17	0.17	0.17	0.17	0.17	0.17	0.0	0.0	0.0	0.0	0.0	0.0	3.200	1.000	15.	410.	3.	0.
15 SUPPLIES	0.17	0.17	0.17	0.17	0.17	0.17	0.0	0.0	0.0	0.0	0.0	0.0	0.840	1.000	15.	418.	3.	0.
17 UTILITIES	0.17	0.17	0.17	0.17	0.17	0.17	0.0	0.0	0.0	0.0	0.0	0.0	1.250	1.000	15.	460.	3.	0.
MACHINERY REQUIREMENTS						HOURS							XXXXX	XXXXX	POWER UNIT	MACH CODE	TYPE	CONT

MONTHLY SUMMARY OF RECEIPTS AND EXPENDITURES

CATEGORY	YEAR	UNIT	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
TOTAL VARIABLE COST	1	DOL.	8.41	8.92	10.06	11.95	14.20	14.20	0.0	0.0	0.0	0.0	0.0	0.0	67.75
ANNUAL CAPITAL	1	DOL.	3.50	2.97	2.52	1.99	1.18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.17

LABOR REQUIREMENTS

MACHINERY REQUIREMENTS BY MONTH

NO.

MONTHLY EQUIPMENT REQUIREMENTS AS A PROPORTION OF THE ITEMS WHOLE FARM USE
THE FINAL ENTRY IN EACH ROW REPRESENTS THE PROPORTION OF THE ITEMS TIME ALLOCATED TO THE BUDGET UNIT

MACHINERY FIXED AND VARIABLE COST PER HOUR

MACHINE	CODE	DEPR	INSUR.	TAX	TOTAL FIXED	REPAIR	FUEL	LUB.	TOTAL VARIABLE	INT.	HR/TIME

ANNUAL COST SUMMARY FOR EQUIPMENT AND LIVESTOCK

COLUMN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
NAME OF MACHINE	CODE	WIDTH (FEET)	INITIAL LIST PRICE	SPEED (MPH)	FIELD EFFIC-ENCY	RC1	RC2	RC3	HOURS USED ANNUALLY	YEARS OWNED	RFV1	RFV2	PURCHASE PRICE	FUEL TYPE	HOURS OF LIFE	HP

COLUMN——	1	2	3	4	5	6	7	8	9	10	11
ITEM NAME	CODE	SIZE	UNIT	TYPE	LIST PRICE	PURCHASE PRICE	YEARS LIFE	SALVAGE PROP OF LIST	REPAIR PROP OF LIST	FUEL & LUB AS PROP	ANNUAL HOURS LABOR

YOUNG HEIFER BUDGET
ALL HEIFERS 7-15 MONTHS
MIGUEL RIBON

PRODUCTION	UNITS	QUANITY	WEIGHT	PRICE	VALUE/UNIT	VALUE
TOTAL RECEIPTS						0.0

OPERATING INPUTS	UNITS	RATE PER UNIT	NUMBER OF UNITS	TOTAL UNITS	PRICE	VALUE
SALT & MIN.	LBS.	13.50	1.00	13.500	0.05	0.67
VET MEDICINE	DOL.	1.00	1.00	1.000	3.20	3.20
SUPPLIES	DOL.	1.00	1.00	1.000	3.73	3.73
UTILITIES	DOL.	1.00	1.00	1.000	5.00	5.00
TOTAL OPERATING COST						12.60
RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT						-12.60

CAPITAL COST	PRICE	AMOUNT	VALUE
ANNUAL OPERATING CAPITAL	0.100	4.162	0.42
TOTAL INTEREST CHARGE			0.42
RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT			-13.02
OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE)			
TOTAL OWNERSHIP COST			0.0
RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT			-13.02

LABOR COSTS	PRICE	HOURS	
TOTAL LABOR COST		0.0	0.0
RETURNS TO LAND, OVERHEAD RISK AND MANAGEMENT			-13.02

YOUNG HEIFER BUDGET
ALL HEIFERS 7-15 MONTHS
MIGUEL RIBON

	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
LINE PRODUCTION					NUMBER OF UNITS													
OPERATING INPUTS					RATE/UNIT								PRICE	NUMBER UNITS	UNIT CODE	ITEM CODE	TYPE	CONT
11 SALT & MIN.	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	0.0	0.0	0.0	0.050	1.000	12.	103.	3.	0.
12 VET MEDICINE	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.12	0.0	0.0	0.0	3.200	1.000	15.	410.	3.	0.
13 SUPPLIES	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.12	0.0	0.0	0.0	3.730	1.000	15.	418.	3.	0.
15 UTILITIES	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.12	0.0	0.0	0.0	5.000	1.000	15.	460.	3.	0.
MACHINERY REQUIREMENTS					HOURS								XXXXX	XXXXX	POWER UNIT	MACH CODE	TYPE	CONT

MONTHLY SUMMARY OF RECEIPTS AND EXPENDITURES

CATEGORY	YEAR	UNIT	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
TOTAL VARIABLE COST	1	DOL.	1.39	1.39	1.39	1.39	1.39	1.39	1.39	1.39	1.51	0.0	0.0	0.0	12.60
ANNUAL CAPITAL	1	DOL.	0.92	0.81	0.69	0.58	0.46	0.35	0.23	0.12	0.0	0.0	0.0	0.0	4.16

LABOR REQUIREMENTS

MACHINERY REQUIREMENTS BY MONTH

NO. MONTHLY EQUIPMENT REQUIREMENTS AS A PROPORTION OF THE ITEMS WHOLE FARM USE
THE FINAL ENTRY IN EACH ROW REPRESENTS THE PROPORTION OF THE ITEMS TIME ALLOCATED TO THE BUDGET UNIT

MACHINERY FIXED AND VARIABLE COST PER HOUR

MACHINE	CODE	DEPR	INSUR.	TAX	TOTAL FIXED	REPAIR	FUEL	LUB.	TOTAL VARIABLE	INT.	HR/TIME

ANNUAL COST SUMMARY FOR EQUIPMENT AND LIVESTOCK

COLUMN NAME OF MACHINE	1 CODE	2 WIDTH (FEET)	3 INITIAL LIST PRICE	4 SPEED (MPH)	5 FIELD EFFIC-ENCY	6 RC1	7 RC2	8 RC3	9 HOURS USED ANNUALLY	10 YEARS OWNED	11 RFV1	12 RFV2	13 PURCHASE PRICE	14 FUEL TYPE	15 HOURS OF LIFE	16 HP

COLUMN---	1	2	3	4	5	6	7	8	9	10	11
ITEM NAME	CODE	SIZE	UNIT	TYPE	LIST PRICE	PURCHASE PRICE	YEARS LIFE	SALVAGE PROP OF LIST	REPAIR PROP OF LIST	FUEL & LUB AS PROP	ANNUAL HOURS LABOR

MACHINERY COMPLEMENT 2
EQUIPMENT COMPLEMENT 2

REPLACEMENT HEIFERS
ALL HEIFERS 16-24 MONTHS
MIGUEL RIBON

PRODUCTION	UNITS	QUANITY	WEIGHT	PRICE	VALUE/UNIT	VALUE
TOTAL RECEIPTS						0.0

OPERATING INPUTS	UNITS	RATE PER UNIT	NUMBER OF UNITS	TOTAL UNITS	PRICE	VALUE
SALT & MIN.	LBS.	18.00	1.00	18.000	0.05	0.90
BREEDING FEES	DOL.	1.00	1.00	1.000	15.46	15.46
VET MEDICINE	DOL.	1.00	1.00	1.000	3.20	3.20
SUPPLIES	DOL.	1.00	1.00	1.000	3.86	3.86
UTILITIES	DOL.	1.00	1.00	1.000	5.00	5.00
TOTAL OPERATING COST						28.42
RETURNS TO LAND, LABOR, CAPITAL, MACHINERY, OVERHEAD, RISK, AND MANAGEMENT						-28.42
CAPITAL COST			PRICE	AMOUNT		VALUE
ANNUAL OPERATING CAPITAL			0.100	9.485		0.95
TOTAL INTEREST CHARGE						0.95
RETURNS TO LAND, LABOR, MACHINERY, OVERHEAD, RISK AND MANAGEMENT						-29.37
OWNERSHIP COST: (DEPRECIATION, TAXES, INSURANCE)						
TOTAL OWNERSHIP COST						0.0
RETURNS TO LAND, LABOR, OVERHEAD, RISK AND MANAGEMENT						-29.37
LABOR COSTS			PRICE	HOURS		
TOTAL LABOR COST				0.0		0.0
RETURNS TO LAND, OVERHEAD RISK AND MANAGEMENT						-29.37

REPLACEMENT HEIFERS
ALL HEIFERS 16-24 MONTHS
MIGUEL RIBON

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													
OPERATING INPUTS					RATE/UNIT								PRICE	NUMBER UNITS	UNIT CODE	ITEM CODE	TYPE	CONT
11 SALT & MIN.	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	0.0	0.0	0.0	0.050	1.000	12.	103.	3.	0.
12 BREEDING FEES	0.12	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.0	0.0	0.0	15.460	1.000	15.	417.	3.	0.
13 VET MEDICINE	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.12	0.0	0.0	0.0	3.200	1.000	15.	410.	3.	0.
14 SUPPLIES	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.12	0.0	0.0	0.0	3.860	1.000	15.	418.	3.	0.
16 UTILITIES	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.12	0.0	0.0	0.0	5.000	1.000	15.	460.	3.	0.
MACHINERY REQUIREMENTS						HOURS							XXXXX	XXXXX	POWER UNIT	MACH CODE	TYPE	CONT

MONTHLY SUMMARY OF RECEIPTS AND EXPENDITURES

CATEGORY	YEAR	UNIT	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
TOTAL VARIABLE COST	1	DOL.	3.28	3.13	3.13	3.13	3.13	3.13	3.13	3.13	3.25	0.0	0.0	0.0	28.42
ANNUAL CAPITAL	1	DOL.	2.19	1.82	1.56	1.30	1.04	0.78	0.52	0.26	0.0	0.0	0.0	0.0	9.48

LABOR REQUIREMENTS

MACHINERY REQUIREMENTS BY MONTH

NO. MONTHLY EQUIPMENT REQUIREMENTS AS A PROPORTION OF THE ITEMS WHOLE FARM USE
THE FINAL ENTRY IN EACH ROW REPRESENTS THE PROPORTION OF THE ITEMS TIME ALLOCATED TO THE BUDGET UNIT

MACHINERY FIXED AND VARIABLE COST PER HOUR

MACHINE	CODE	DEPR	INSUR.	TAX	TOTAL FIXED	REPAIR	FUEL	LUB.	TOTAL VARIABLE	INT.	HR/TIME

ANNUAL COST SUMMARY FOR EQUIPMENT AND LIVESTOCK

COLUMN NAME OF MACHINE	1 CODE	2 WIDTH (FEET)	3 INITIAL LIST PRICE	4 SPEED (MPH)	5 FIELD EFFIC-ENCY	6 RC1	7 RC2	8 RC3	9 HOURS USED ANNUALLY	10 YEARS OWNED	11 RFV1	12 RFV2	13 PURCHASE PRICE	14 FUEL TYPE	15 HOURS OF LIFE	16 HP

COLUMN---	1	2	3	4	5	6	7	8	9	10	11
ITEM NAME	CODE	SIZE	UNIT	TYPE	LIST PRICE	PURCHASE PRICE	YEARS LIFE	SALVAGE PROP OF LIST	REPAIR PROP OF LIST	FUEL & LUB AS PROP	ANNUAL HOURS LABOR

MACHINERY COMPLEMENT 2
EQUIPMENT COMPLEMENT 2

VITA

Miguel Ribon

Candidate for the Degree of

Doctor of Philosophy

Thesis: OPTIMAL CROP AND DAIRY ENTERPRISE SELECTION FOR CENTRAL OKLAHOMA DAIRY FARMS

Major Field: Agricultural Economics

Biographical:

Personal Data: Born in Colatina, Espirito Santo, Brazil, February 6, 1938, the son of Mr. and Mrs. Pedro Ribon.

Education: Graduated from Colegio Agricola de Santa Teresa, Espirito Santo, Brazil, in December, 1958; received the Engenheiro Agronomo degree from Universidade Federal de Viçosa, Minas Gerais, Brazil, in 1962; received Magister Scientiae: em Economia Rura from Universidade Federal de Viçosa in 1966; completed requrements for the Doctor of Philosophy degree at Oklahoma State University in December, 1977.

Professional Experience: Teaching assistant, 1963-64; instructor 1964-67; assistant professor, 1967-1975; adjunct, 1975-76; professor, 1976-present, Universidade Federal de Viçosa (UFV), Brazil; farm management instructor, UFV, since 1963; Assistant researcher National Research Council-Brazil, 1968-1970; departmental committees member and/or coordinator, UFV, various years; Acting Head, Department of Agricultural Economics, UFV, 1970-1971; member Graduate Council, UFV, 1970-72.