EFFECTS OF SOIL CONSERVING ENTERPRISES ON PART-TIME OPERATOR'S INCOME IN SOUTHEASTERN OKLAHOMA

By

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IN SOUTHEASTERN OKLAHOMA

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INTRODUCTION

General Problem

American farm families are relying more and more on income earned from working off the farm. Off-farm income exceeded $39 billion in 1982, representing 62 percent of the total $63 billion income of the farm population (48). Added to this is the fact that net farm income as a percentage of gross farm income has dropped from 41 percent in 1950 to 14 percent in 1982. For every dollar the farmer earned in 1982, there was only 14 cents left after paying expenses (48). These figures do not include expenses to pay family labor and to cover returns to equity capital and management.

Much of the off-farm income is earned by smaller farm and ranch operators. Farm operators selling less than $20,000 worth of farm commodities in 1982 represented 60 percent of the nation's 2.4 million farmers, but received only 6 percent of total farm cash receipts (48). Farmers who work off the farm generally control smaller quantities of land, capital, and to some extent, labor resources compared to the full time farmer.

The figures at the state level are similar. In Oklahoma, farms with sales of $20,000 or less comprised 73 percent of the farm population, yet received only 11 percent of Oklahoma's $2.53 billion in sales for the year 1982.

The characteristics of Oklahoma's farmers are also worth noting. Over 54 percent of the 72,523 farmers in the state spend more than half of their time at jobs off the farm. While the average size of a "full-time" farmer's operation is 711 acres, "part-time" farmers work only 225 acres. Those listing farming as their principal occupation had 79 percent of the total sales in Oklahoma in 1982; the part-time farmer had 21 percent. Finally, of the farmers with sales of $20,000 or less, 67 percent listed themselves as part-time operators (47).

In an effort to increase farm income, operators have been demanding more from their land. This has brought some less stable land into production and increased the potential for soil erosion. By intensifying cropping patterns and plowing up marginal land, the loss of topsoil becomes more likely if recommended soil management practices are not followed. However, the uncertainty in demand for agricultural products coupled with lower economic returns to farm enterprises makes long-term conservation investment decisions difficult (11).

The Oklahoma Conservation Commission estimates that over 150 million tons of Oklahoma soil are lost annually as a result of soil erosion. In the 1982 National Resource Inventory (NRI) for Oklahoma, estimates of average annual erosion rates are listed by soil types, Major Land Resource Areas (MLRA), and land use (i.e., cropland, pasture-land, rangeland, and forestland). The average erosion rates for the four land uses in Oklahoma are: cropland 5.5 tons/acre/year; pastureland 1.0 tons/acre/year; rangeland 2.0 tons/acre/year; and forestland 1.1 tons/acre/year (51).

The Soil Conservation Service (SCS) has estimated a soil loss tolerance based upon: depth of the soil, type of parent material, relative productivity of topsoil and subsoil, and amount of previous erosion (44). The SCS has represented this amount as a T-value and defines it as "the maximum average annual soil loss expressed in tons per acre per year that will permit high levels of production economically and indefinitely" (51, p. 82). In Oklahoma, 65 percent of the cropland has average erosion rates that are less than the T-value. The same is true for 93 percent of the pastureland, 83 percent of the rangeland and 89 percent of the forestland (51). Although the economic validity of T-values are constantly questioned, they remain the operational standard for measuring the maximum soil erosion rate to maintain sustained productivity (18).

Though the nation has made a large investment in soil conservation programs over the past five decades and a significant number of farmers have adopted erosion control practices, soil erosion remains a problem in agriculture today. The Oklahoma NRI report lists estimated conservation needs on cropland, pastureland, rangeland, and forestland. The percent of acres in each land use class needing conservation practices are 44 percent, 52 percent, 61 percent, and 62 percent, respectively.

General changes in farm structure and agricultural technology have obscured some of the effects of continued soil erosion. Crop yields have been increasing in spite of continued erosion. Our improved agricultural technology, including use of better crop varieties and increasing amounts of fertilizers and pesticides, masks much of the effect of the loss of the natural soil productivity (23).

The effects of soil erosion are two-fold. The first, and the one that concerns the farm operator most, are the on-site impacts. Erosion lowers soil productivity through loss of storage capacity for plant-available water, loss of plant nutrients (both naturally occurring and applied), degradation of soil structure, and decreased uniformity of soil conditions (15, 45).

Off-site damages however, have a more indirect effect on the farmer, and a more direct effect on society. The major off-site impact of soil erosion is on water quality and on the condition of the nation's waterways. Erosion runoff decreases storage capacity in lakes and reservoirs, increases flooding, and increases water treatment costs (23). By weight and volume, sediment is the greatest pollutant of surface waters in the U.S. (43).

Objectives

The primary objective of this study is to determine if the adoption of some recommended low risk management practices can increase the part-time farmer's income over a period of time. A concurrent objective is to select those best management practices for soil conservation, and/or those enterprises that will reduce current levels of soil erosion on these part-time farms. Certainly, the farm operator must take into consideration that he has a full-time off-farm job, and may have limited labor availability during peak periods of labor needs on the farm (for example, calving, vaccination, dipping, and castration). Also, most part-time operators have limited capital to invest in the farming/ranching operation, and/or may have better investment opportunities for their capital resources. Stated in economic terms, the part-time operator must consider the opportunity cost of both his capital and labor resources.

Area of Study

Part-time farmers and ranchers make up the majority of farmers in Southeastern Oklahoma. Some contributing factors for this include: smaller average farm size, general economic conditions of the area, and climatic and soil characteristics. Also, there is a long-standing tradition and desire of the people in Southeastern Oklahoma to be involved in agriculture, even though they work in an off-farm job to support their family. Based on 1982 Census data, in the 11 counties in the study area, 61 percent of the farmers spend more than half of their labor hours at an outside job off of the farm. The counties in the Southeastern Oklahoma study area are identified in Figure 1.

While the land areas being farmed by part-time farmers in Southeastern Oklahoma generally are not experiencing high rates of soil erosion, and are below the estimated acceptable levels as set by the SCS, even low levels of soil erosion can decrease the productivity and carrying capacity of the land (7). This is particularly true where the fertile topsoil layer is only a few inches thick as is the case in much of Southeastern Oklahoma.

Organization of Remainder of Thesis

The remainder of the thesis is organized into six chapters. A review of literature is presented in Chapter II. Methodology, including the survey, development of the representative farm, budget

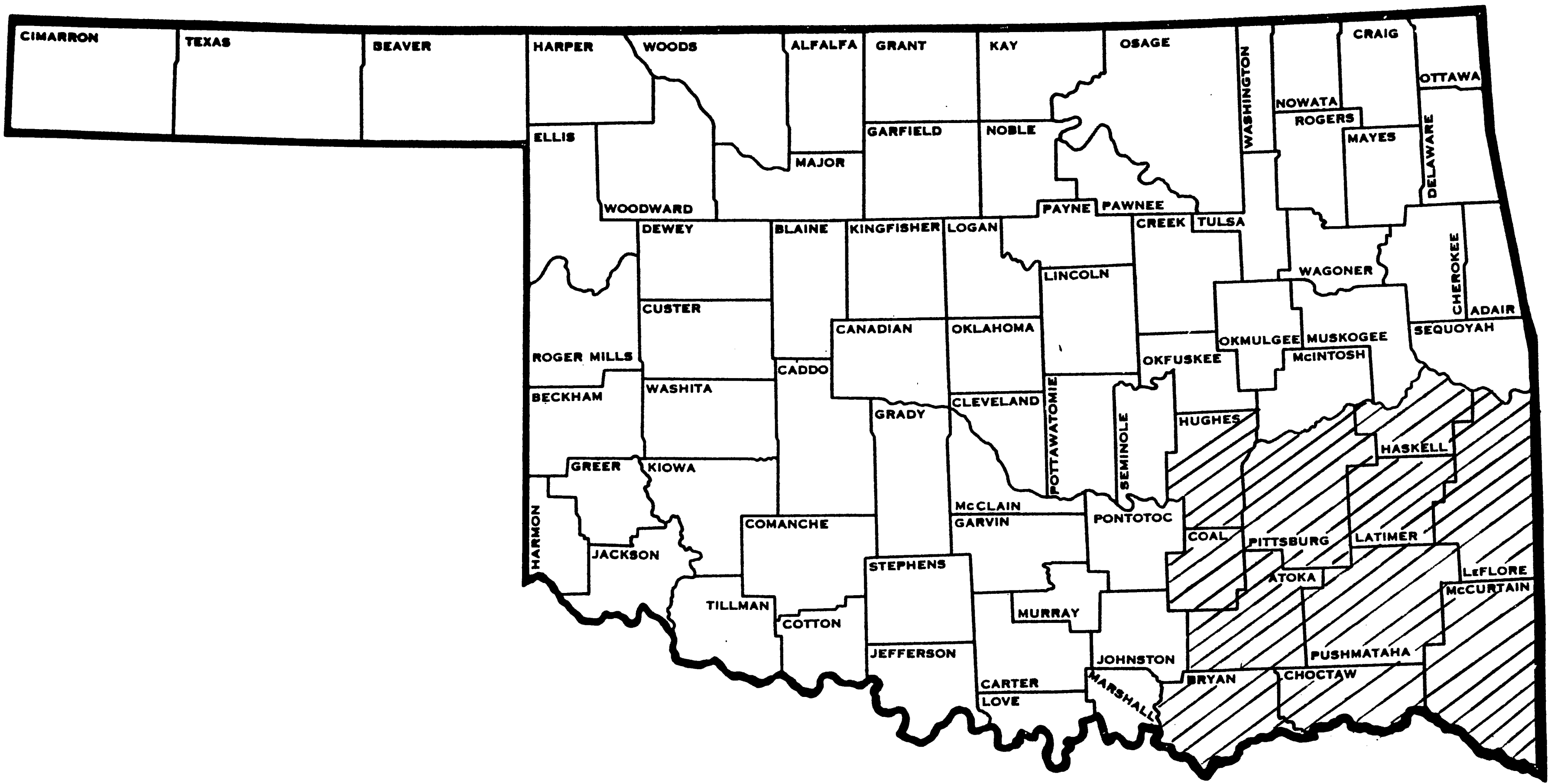

Figure 1. Oklahoma Counties Included in the Study Area

theory, the Universal Soil Loss Equation (USLE), and a discussion of linear programming are presented in Chapter III. The characteristics of the study region and results of the survey are presented in Chapter IV. Secondary data from the budgets, USLE estimates and other model inputs are presented in Chapter V. Result of the study are presented in Chapter VI. The summary and conclusions, limitations and other considerations are presented in Chapter VII.

CHAPTER II

REVIEW OF LITERATURE

Frederick Troeh stated that

> the objective of soil conservation is the use of each acre of agricultural land within its capabilities and the treatment of each acre of agricultural land in accordance with its need for protection and improvement (44, p. 5).

Immediately though, questions arise such as "what is the acceptable erosion rate for my land, what will be the benefits of controlling erosion, and at what cost to me."

While it is generally accepted that it is not possible to prevent soil erosion, many feel that it is both possible and necessary to reduce erosion losses to tolerable rates (12, 22, 44). Previous research on soil conservation has covered many categories and researchers have reached various, often contradictory, conclusions. Four areas of interest in soil conservation will be examined in this chapter.

Attitudes Toward Adoption Of Conservation Practices

Farmers' response to the soil erosion problem has not been as fast as some policy makers would like (9). Which categories of farmers are adopting conservation practices and their reasons for doing so have been the topics of earlier research.

In 1977, a survey was conducted by Monsanto Chemical Company to determine why 150 farmers in the Corn Belt had recently used reduced tillage on some of their acreage. Sixty percent claimed that they used reduced tillage to lower operating expenses, eighteen percent listed soil conservation as their main incentive, and the remainder cited moisture conservation and reduced compaction as motivation factors. The conclusion of the study was that farmers reduced their tillage in the past, or expected to reduce tillage in the future, based upon economic reasons (9).

Reductions in time and labor by up to sixty percent was found to be the incentive for farmers switching to no-till in a study conducted by Chevron Chemical Company. This was especially true if the farmer held an off-farm job and placed an emphasis on time allocation (9). It should be noted that costs and returns were not included when looking at the benefits of no-till.

Income, it was concluded by Lee, is the basis of all farm management decisions. Farmers are thought to make soil management decisions by calculating the income effect of a proposed conservation program over time, then comparing it to expected income over time without conservation measures. Different decisions on farms with similar land may be reached depending on the length of planning horizon and the choice of discount rate (30). A lower discount rate and a longer planning horizon tend to encourage conservation decisions by increasing the present value of expected net revenues and by allowing sufficient time to recover conservation investment costs (9, 22, 29).

When looking at those who adopted approved agricultural technological practices in 1949, Neal Gross concluded: "The adoption of new or approved practices is an especially crucial problem facing agricultural extension workers" (21, p. 23). His findings were: accepters were better educated, had higher social participation, read more experiment station bulletins, subscribed to more magazines and newspapers, and had larger farms and higher incomes than the non-accepters. Evidence did not support the hypothesis that accepters would be younger; and tenure, interfarm mobility, extent of neighboring and nationality were found to be insignificant (21).

Tenure has also been the focus of research trying to characterize the adopters of soil conservation technologies. The results have been mixed. Tenure arrangements that separate land ownership from farm operations are thought to hinder soil conservation decisions (8).

It has been suggested that landlords, particularly absentee landlords, may have a short-term planning horizon and strong preference for income now that will lead them to maximize current income at the expense of future soil quality and perhaps future income (42). In terms of attitudes, absentee landlords in the Corn Belt were found to be unaware that conservation measures would improve farm income over time (31).

In a 1982 Nebraska study, landlords generally perceived erosion to be less severe than their tenants believed (2). However, data from Monroe County, Missouri, indicates that there is less erosion control on rented cropland than on cropland operated by the owner (17).

One theory for this is that landlords as a group may be older, implying that they have shorter planning periods and higher discount rates than owner-operators. Because shorter planning horizons and higher discount rates make long-run investments less attractive, lower conservation expenditures would be expected (5, 18, 29).

Due to the short-term leases and lack of security for some tenants, investments such as terraces tend to be uneconomical for many tenants if only direct benefits are considered. Studies on conservation and tenure by Lee, however, have not supported these claims. Hypothesized soil management differences among full owner-operator, landlords, nonfamily corporations, and family ownerships were not found to be reflected in average soil loss rates among the varying groups at the national level (29). As for motives for conservation tillage adoption, separation of farm ownership from farm operation does not significantly inhibit adoption (30). The theory that landlords refuse to carry out erosion control and would abandon any erosion control implemented by previous tenants was not supported in an Iowa study (6).

Effects of Erosion on Productivity

It is generally accepted, or at least theorized, that high erosion rates over a long term will decrease the inherent productivity of the soil. Many people are surprised that more farmers have not adopted available conservation technologies. Farmers often do not perceive soil erosion as a problem because fertilizers and other production inputs have boosted crop yields and masked the effects of high rates of soil loss (9, 28, 31).

A definition of productivity seems appropriate at this time. Stallings, in 1950, defined soil productivity as "the capacity of a soil, in its natural environment, to produce a particular plant or sequence of plants under a specified management system" (41, p. 2).

One of the most dangerous characteristics of the erosion productivity problem is its difficulty of detection. Generally, erosion reduces productivity so slowly that the reduction may not be recognized until land is no longer economically suitable for growing crops; and improved technology can hide this effect (28).

A study by the National Soil Erosion Council in 1978 expounded on this idea and concluded that the difficulty of detecting productivity losses is compounded by the nonlinear nature of the erosion process. Erosion generally increases future runoff because of reduced infiltration. Increased runoff reduces available soil water, thus reducing plant growth. Less plant growth results in less residue. Less vegetation and residue provide less cover to slow down runoff. Therefore, the process advances exponentially (31).

Another report by the Council examined the nature of productivity loss caused by erosion. Their findings were 1) erosion reduces productivity first and foremost through the loss of plant-available soil water capacity, 2) eroded soil particles carry attached nutrients from fields into streams and lakes, and 3) the nonuniformity of eroded land reduces effective, uniform applications of fertilizers and herbicides (31).

K. L. Wells performed a study to better understand the problem of nutrient loss. His conclusion was that the nutrient content of sediments which wash from a field is often greater than that of the surface soil which remains behind. At an erosion rate of 3-5 tons/acre/year, the soil can loose 15-30 pounds of nitrogen, 6-10 pounds of phosphate, 5-8 pounds of potash and 90-150 pounds of calcium and magnesium. Wells also determined that at this level of erosion, annual fertilizer applications of 50-100 pounds of phosphate and 30-70 pounds of potash would be required to sustain current productivity levels in the short run (55). Restoration of productivity of eroded soils, it was concluded by Phillips and Kamprath, is generally difficult and costly because subsoil conditions often inhibit crop growth.

Rosenberry did a study in the Southern Iowa Conservation District in 1980. The objective was to predict the effects of current levels of soil erosion, if continued, on a soil's productivity and also production costs in the year 2020. His analysis included the use of the Universal Soil Loss Equation (USLE) to compute soil loss, and simulation of six erosion control alternative practices. Rosenberry concluded that the costs incurred in reducing soil erosion to tolerable levels were three times as expensive as the benefits received from no decline in productivity (37).

An evaluation in Arkansas by Osborn et al., concluded that a reduction in soil loss by 25 percent from 4.2 to 3.2 tons/acre/year, would result in productivity gains and an increase in net returns to farmers from $83.94/acre to $107.28/acre (after three years, with constant prices) (35).

One of the earliest studies on the productivity-erosion dilemma was done in 1949 by Adams. He found yield reductions of 34-40 percent for nonleguminous crops (cotton, corn, oats) and 23 percent for a legume crop (vetch) on Southern Piedmont soils where water had eroded the top six inches (1).

Scrivner and Gantzer used a productivity index to examine decreases in corn yields on three soil types in Missouri. They concluded that at a rate of 10 tons/acre/year, it would take 56 years to erode four inches of soil. At this level, the most sensitive soil, in those 56 years, should be expected to decrease only 12 bushels in annual acre yields (40). Triplett et al., in a ten year study that ended in 1973, found that continuous cropping on poorly drained soil due to erosion had resulted in corn and wheat yield reduction of 10-20 percent over the time period (44).

Olson, in 1977, tried to determine the effects of topsoil loss on crop yields in the Western Corn Belt. He applied three soil removal treatments and six fertility treatments on Beadle sility clay loam. Olson concluded that removal of 12-18 inches of topsoil reduced corn yields significantly. However, the supply of high rates of nitrogen fertilizer and zinc decreased the yield losses somewhat (34).

Short-Term Impacts of Conservation Practices

Much research lately has focused on the economics of soil conservation practices and also their short-term effects on productivity. Research studies completed in the Great Plains by Christensen indicated that yields will often be higher under conservation tillage than conventional tillage. This was primarily due to the increased moisture associated with conservation tillage.

A six year study in Missouri by Wendt and Burwell looked at conventional tillage versus no-till on grain and silage yields. In all but two years, grain yields among treatments within years were not significantly different ($P<.05$) (56). Tucker et al., determined that conservation or reduced tillage resulted in consistently lower wheat yields. A 6 percent lower yield was realized with conservation tillage, and 20 percent lower yields with zero-tillage compared to conventional tillage (46).

A 1981 study conducted by Burt applied control theory to study the economics of soil conservation in the Palouse Area of the Northwest. The study used a dynamic programming model to maximize the present value of net returns from the land resource over an infinite planning horizon. The results indicated that intensive wheat production with appropriate cultural and fertilization practices was economically justified in the long run, as well as for immediate net returns (4).

Epplin et al., looked at the returns to conventional, conservation, and zero tillage as applied to wheat and grain sorghum in Oklahoma. They concluded that "if the long run economic impact of soil loss is ignored, our research suggests an economic advantage for conservation tillage in Oklahoma in only a limited number of acres" (16, p. 45). However, linear programming model results from Kraft and Toohill on conservation tillage in Illinois indicated conservation practices can increase returns to management and real property while meeting erosion control standards in the long run (27).

In 1983, an Oklahoma study performed by Salem analyzed the short term and long term impacts of restricting soil erosion on income at the farm level. Minimum tillage and no tillage were used to control erosion, and production cost estimates for various crop enterprises using reduced tillage technology were calculated from survey information obtained in Eastern Oklahoma. A linear programming model to maximize net returns was applied to three scenarios. Scenario 1 assumed that yields were the same for all tillage systems, Scenario 2 assumed a decrease in yield with conservation tillage, and Scenario 3 assumed increasing yields when conservation tillage was practiced. Results showed that in the long run, for all three representative farms, it was profitable to adopt reduced tillage technology to control soil erosion (38).

Eddings did a study in Southwestern Oklahoma to analyze the economic impact of restricting soil erosion on the farm firm. A linear programming model with a planning horizon of 40 years was used. The analysis indicated that adopting soil conservation practices would increase annual production costs. The practices considered were pasture management, minimum tillage, terraces, terraces and minimum tillage combined, and conventional tillage. The use of terraces caused the greatest increase in production costs. For two of the three farms in the model, restricting soil erosion had adverse affects on their net present value (14).

Research has seemed to conclude that the short-term view, which most farm operators must take, will probably be that the decrease in yield associated with the loss of surface soil is not great enough to justify the costs of erosion control methods (31, 40).

Policy Implications

Halcrow and Seitz concluded that since off-farm benefits greatly exceed on farm benefits, the nation has a great deal more to gain by investing in soil erosion control than does the individual farmer (22). There are many proposals for reducing soil erosion, and most are political.

Alternatives for encouraging the adoption of practices for reducing soil loss include regulations requiring the adoption of conservation practices, zoning to reduce erosion, paying farmers to abandon highly erodible land, investment tax credits for conservation practices, conservation incentive payments for soil loss reduction, requirements that farmers use erosion control measures to be eligible for government benefits, and taxation of excessive soil loss (9).

Forester and Becker in 1979 analyzed the net economic impacts of restrictions of soil loss, taxes on soil loss, and subsidies for reducing soil loss. Results of the LP model indicated that total net revenues of farmers in the Honey Creek Watershed could be increased if soil loss reducing practices were adopted (20).

A similar study was conducted by Daines and Heady in 1980. The objective was to analyze and compare three soil conservation policies: 1) a tax on soil loss, 2) reductions in soil loss to T=5, and 3) a tax to encourage soil conservation practices. An LP model was used to minimize the cost of production, and results indicated significant reduction in soil losses could be obtained through applying each of the three practices (13).

Tice and Epplin analyzed incentives for Oklahoma winter wheat producers to invest in conservation. They determined that with the lower yields associated with conservation tillage, it would take a subsidy of $20/acre for the farmer to practice conservation tillage (41). A similar study in Missouri shows an inverse relationship between farm size and short-run cash cost to meet soil loss tolerances set by the SCS. If these tolerances were enforced, such impacts would place small farmers and probably young farmers at a relative disadvantage (18).

Badger et al., presented and evaluated farmers' attitudes on participation in water quality improving conservation practices and their impacts on net farm incomes in the Little Washita River Watershed in Oklahoma. An LP model was developed to maximize total return subject to resource and erosion control policy constraints. The results of the study indicated that farm income decreased as erosion control policies became restrictive (3).

Saygidegar et al., analyzed the trade-off's between efficiency and soil loss control in U.S. agriculture. They found that at a very high level of soil loss, a reduction in soil erosion can be obtained without a substantial cost to society. But when soil losses are at relatively low levels, further reductions are very expensive (39). As the total amount of soil loss is reduced on U.S. cropland, the costs rise sharply to achieve further reduction (10, 39).

The Agricultural Conservation Program (ACP) which is administered by the Agricultural Stabilization and Conservation Service (ASCS) has come under criticism. Emphasis of the ACP is to be placed on "enduring soil and water conservation and pollution abatement measures on farmland" (52, p. 4). A U.S. Government Accounting office report revealed in 1975, however, that some 55 percent of cost-sharing funds distributed under the ACP actually went to increase production rather than conserve soil or water (52).

In general, farmers tend to place most of the ACP erosion controls on their less erosive land (10). A 1980 study by the ASCS found that more than half of all ACP cost-sharing funds were being applied on land with an annual soil loss from erosion of less than five tons per acre (50).

Summary

New directions for conservation policy are needed. Farmers cannot be expected to remedy the most important soil erosion problems on their own initiatives. Incentives do not exist for them to farm and conserve soil in a way that is consistent with the public interest (22). Studies suggest that if a policy to conserve soil is to be successful with existing technology at present relative prices, producers must be confronted with some non-market incentives (16, 41). If a farmer fails to act in the face of evident damage, it is more realistic to assume that the cost of control exceeds the cost of damage than to assume that farmers are ignorant of the damage or indifferent to it (12).

Soil erosion does deplete soil productivity, but the relationship between erosion and productivity is not well defined. Empirical relationships are difficult to develop because improved technology has masked the effects of erosion (10, 31).

Implication Of Previous Studies

The past studies reviewed here offered many varying and seemingly contradictory conclusions. This is mainly due to the fact that assumptions vary from study to study and also consideration must be given to the differences in physical characteristics of the many regions studied.

While results of research concerned with adoption of soil conserving techniques have been mixed, it is thought that due to capital and time constraints, the farmer who spends more than fifty percent of his time off the farm is less likely to adopt soil conservation techniques. Research needs to be conducted that will address the soil loss issue, yet work within the bounds of these two constraints.

CHAPTER III

METHODOLOGY

The Sample Survey

Personal surveys were conducted in five counties of the eleven county region in Southeastern Oklahoma in the summer and fall of 1984. The sample of those part-time farmers to be interviewed was selected with the assistance of the OSU County Extension Directors, ASCS County Executive Directors, and SCS District Conservationists. The population included farmers and ranchers who receive over one-half of their annual income from nonfarm sources, and also who work over one-half of their available time off the farm.

The purpose of this survey was to familiarize the researcher with the study area and to obtain a better understanding of agriculture in Southeastern Oklahoma. Any parameters derived are not statistically significant, and conclusions drawn may not be representative of the region as a whole.

The survey included questions on property description, soil characteristics, farm enterprises, agricultural management practices, and soil conservation practices. Information on their use of technical assistance from government agencies, and cost-sharing assistance also were obtained.

The four corner counties of the region (Hughes, LeFlore, Bryan, and McCurtain) and a middle county, Pittsburg, were chosen as the counties to conduct the personal surveys. Based upon production data and characteristics compiled in the 1982 Census of Agriculture, it was felt that these counties were diverse enough to represent the entire region yet were still homogenous. A total of 23 farmers were interviewed in the five counties. The number of farmers interviewed and the average size of farm in each county are presented in Table I.

Development of a Representative Farm

Based on results of the surveys and Census data, it was felt that an in depth case analysis of one representative farm for the region could adequately reflect the study area as a whole. Livestock enterprises are predominant in the region. Only a few of the part-time farmers had hay and/or crop enterprises. One had a few acres of peanuts and one produced alfalfa seed for sale. None of the operators interviewed had any vegetable and/or fruit crops. Therefore, crops were not included in the representative farm. The information obtained indicated that the farms were similar in size and type of operation.

This case study consisted of three phases or steps. First, using costs and returns developed by the OSU Budget Generator, a linear programming model was used to maximize returns. The solution represented the highest net returns available from the given enterprises without regard to soil loss.

Soil loss estimates were obtained from the Universal Soil Loss Equation. Using the soil loss and enterprise return estimates, the objective function was changed to limit soil loss to T-values. Total soil loss and farm income from the two objectives were then compared.

TABLE I

NUMBER OF OKLAHOMA FARMERS INTERVIEWED AND
SIZE OF FARMS BY COUNTY, 1984

County	Farmers Interviewed	Smallest	Largest	Average
Bryan	5	150	440	336
Hughes	5	55	520	229
LeFlore	5	50	560	324
McCurtain	5	240	320	278
Pittsburg	3	220	360	275
Region	23	55	560	290 [a]

a) This figure is an average for all 23 farms.

The final step incorporated cost-sharing funds received from ASCS to determine the optimum enterprise combination and resulting income and soil loss.

Due to the long term nature of forestry, this enterprise was not included in the linear programming analysis. Instead, net returns and soil loss were estimated at various years of the investment, with the income ultimately being discounted back to a present value. This was done so that a comparison could be made between the investment and expected returns.

Budgets

There are three basic types of budgets used as tools in the farm business management process: 1) whole farm, 2) enterprise, and 3) partial. Each type of budget has been designed to provide different information to the farmer for use in the decision making process.

The whole-farm budget is a classified and detailed summary of the major physical and financial features of the entire farm business. Whole-farm budget analysis is the process of identifying the component parts of the total farm business and determining the relationships among the different parts.

The whole-farm budget is set up to help plan the organization of the entire farm business while the partial budget is used for estimating the effects of a change in only a part of the farm organization. Partial budgets are designed to analyze the profitability of proposed changes in the operation of a farm where the change is relatively small. Only the changes in costs and income are included in a partial budget (25).

An enterprise budget is a statement of what generally is expected from particular production practices when producing a specified amount of a commodity. It includes a statement of expected revenues and expenses in producing a particular product. The budget is useful in estimating variable and fixed costs, expected profitability, and also breakeven market prices (26). Enterprise budgets are generally based on a small unit such as one acre for a crop or one head for livestock enterprises.

Three general types of costs are associated with producing any farm commodity: variable costs, fixed costs, and overhead costs. Variable costs are the costs of such items as seed, feed, fertilizer, normal repairs, custom or hourly labor, and tractor operating expenses. They are items that will be used during one year's operation or during one production period and would not be purchased if the enterprise was not produced.

Fixed costs are the costs associated with buildings, machinery, and equipment which are pro-rated over a period of years. Included in this category are depreciation, interest, insurance, and taxes on individual buildings, and pieces of machinery and equipment that can be allocated to an individual enterprise.

Overhead costs are costs associated with buildings, utilities and other miscellaneous items that cannot be allocated to an individual enterprise. Since these items are involved in the production of many enterprises on an individual farm, it is difficult to include them in an individual enterprise budget (26).

The enterprise budget is an effective tool for planning, but it is only as good as the estimates put into it. Risks both on the production and marketing sides can limit the effectiveness of budget reliability. This element of risk should be considered and evaluated by the farm operator when determining the farm organization that best meets the goals and objectives of the farmer and the farm family.

Universal Soil Loss Equation

Wischmeier and Smith in 1965 proposed an equation for estimating sheet and rill erosion due to water (57). This has come to be known as the Universal Soil Loss Equation (USLE). The equation originally was proposed for use on cropland in the area of the United States east of the Rocky Mountains. It has, however, been tested and used in other sections of the United States, in Europe, and in the tropics (44). It has also been tested for use on rangeland and in forest areas with effective results. The equation is:

$$A = R * K * LS * C * P$$

where

A = estimated average annual soil loss, expressed in tons per acre

R = rainfall site index

K = soil erodibility factor

LS = slope length and steepness factor

C = cropping-management factor

P = erosion-control-support-practice factor

The values for these coefficients were obtained from an in-house publication of the SCS, Estimating Soil Loss From Water and Wind

Erosion, Oklahoma (49). Given the soil associations on the representative farms, the estimated soil loss was computed for the various enterprises. The pastureland was evaluated as improved or native stand. The forestland was judged as either poor, medium or a good stand.

Linear Programming Model

Linear programming (LP) is a planning method that is helpful in decisions requiring a choice among alternatives. Three components of a linear programming model are: 1) an objective function, 2) the restrictions which typically take the form of limited amounts of resources, and 3) alternative combinations of these resources in the production process. A linear programming model maximizes or minimizes an objective function subject to certain constraints. A linear programming model for a maximization may be written as:

$$\text{maximize } Z = C_1X_1 + C_2X_2 + \ldots C_nX_n \tag{1}$$

subject to the input output relationships and the resource levels:

$$\begin{aligned} a_{11}x_1 + a_{12}x_2 + \ldots a_{1n}x_n &\leq b_1 \\ a_{21}x_1 + a_{22}x_2 + \ldots a_{2n}x_n &\leq b_2 \\ \vdots \qquad\quad \vdots \qquad\quad &\vdots \\ a_{m1}x_1 + a_{m2}x_2 + \ldots a_{mn}x_n &\leq b_m \end{aligned} \tag{2}$$

$$x_1 \geq 0,\ x_2 \geq 0,\ \ldots\ x_n \geq 0 \tag{2.1}$$

In a compact form the problem can be rewritten as:

$$\text{maximize} \quad Z = \sum_{j=1}^{n} C_j X_j \tag{1a}$$

$$\sum_{j=1}^{n} a_{ij} X_j \leq b_i \tag{2a}$$

$$X_j \geq 0 \text{ for all } j \tag{2.1a}$$

where

i = 1,2,. . . ,m and j = 1,2, . . . , n,

Z = the objective function,

C_j = per unit prices, net incomes, or costs of associated activities (the objective function values for each of the activities or the net income and/or costs of the associated activities),

X_j = the possible alternative activities or the level of activities,

a_{ij} = the requirements of resource i per unit of activity j,

and

b_i = the resource availabilities of the m resources (activity restrictions)

When dealing with restrictive resources and alternative enterprises, linear programming provides a more precise and more efficient solution than budgeting techniques. In this analysis, the IBM MPSX linear programming package has been used to solve the LP model.

Data needed to solve the linear programming model are discussed in Chapter V. Those include the alternative enterprises, the net returns or costs associated with each enterprise, the input-output coefficients for each enterprise considered, and the amount or level of each resource restriction. Resource restrictions include the land availability by soil series, and labor. Soil erosion coefficients were calculated using the Universal Soil Loss Equation and are also discussed in Chapter V.

Cost-Sharing

There are two government cost-sharing programs that have a direct impact on soil loss and the implementation of soil conserving practices in Southeastern Oklahoma. They are the Agricultural Conservation Program (ACP) and the Forestry Incentives Program (FIP) (51).

ACP is the largest USDA cost-sharing conservation program. The program is managed by the ASCS and provides financial assistance to agricultural producers in carrying out approved soil and water conservation practices. The ACP is designed to reduce soil erosion and water pollution, protect and improve productive farmland and rangeland, conserve water used in agriculture, preserve and develop wildlife habitat and encourage energy conservation (51).

The most popular practices are those involving establishment or improvement of vegetative cover (commonly bermuda grass), and the installation of water impoundment reservoirs. In 1983, the Southeastern region accounted for 39 percent of the acres involved in cost-sharing for cover improvement. For the state, the construction of impoundment reservoirs had the largest amount of acres served, and was also the cheapest per unit practice.

Cost-share levels and 1983 participation figures for the eleven county region are shown in Tables II and III. Note that not all practices are offered in each county, and the cost-share rates may vary by county. The ASCS committee determines the practices and cost-share rates for each county.

Authorized initially in 1974 and reauthorized in 1978, the FIP operates under the Cooperative Forestry Assistance Act. The FIP is designed to increase the supply of timber products from private, non-industrial forest land. Another goal is to improve and preserve the environment by decreasing soil loss in forested areas. The program encourages landowners to plant trees on suitable open lands or cut-over areas, and to improve present timber stands.

The ASCS administers the program and provides cost-sharing for tree planting, site preparation, stand improvement and other forestry practices that increase the supply of timber. Cost-sharing assistance cannot exceed 65 percent of the cost of the practice, and the maximum annual contribution to any one landowner for forestry practices under the program is $10,000. The counties that offer FIP cost-sharing are listed in Table IV.

TABLE II

ACP COST-SHARE LEVELS FOR ALTERNATIVE SOIL CONSERVATION PRACTICES BY COUNTIES IN STUDY REGION, 1984[a]

County	SL1	SL2	SL4	SL5	SL11	WC1	WP1	WP3
Atoka	60	--[b]	65	65	75	50	65	65
Bryan	65	--	65	65	75	50	65	65
Choctaw	60	50	--	65	75	50	--	--
Coal	65	50	--	65	75	50	--	65
Haskell	65	50	65	65	75	50	65	--
Hughes	50	50	65	50	75	50	50	65
Latimer	65	50	--	60	70	50	--	--
LeFlore	65	--	--	--	--	50	--	--
McCurtain	65	50	--	--	75	50	--	--
Pittsburg	60	--	65	65	75	50	65	65
Pushmataha	65	50	--	--	50	50	--	--

Source: ASCS, USDA: Oklahoma State Office, Stillwater, Oklahoma.

a) SL1 Permanent Vegetative Cover Establishment
SL2 Permanent Vegetative Cover Improvement
SL4 Terraces
SL5 Diversions
SL11 Treatment of Critical Area Erosion
WC1 Water Impoundment Reservoirs
WP1 Sediment Retention-Water Retention
WP3 Sod Waterways

b) ACP Cost-sharing for this practice is not offered in these counties.

TABLE III

ACP PARTICIPATION FIGURES FOR ALTERNATIVE SOIL CONSERVATION PRACTICES,[a] IN STUDY REGION AND STATE TOTALS, 1983

	SL1		SL2		SL4		SL11		WC1		WP1	
	Acres	Avg. Amt. Paid by ASCS Per Acre	Acres	Avg. Amt. Paid by ASCS Per Acre	Acres	Avg. Amt. Paid by ASCS Per Acre	Acres	Avg. Amt. Paid by ASCS Per Acre	Acres	Avg. Amt. Paid by ASCS Per Acre	Acres	Avg. Amt. Paid by ASCS Per Acre
Atoka	1061	$32.83	--[b]	--	20	$15.20	40	$12.18	--	--	--	--
Bryan	575	28.82	--	--	145	13.44	105	68.64	1329	$27.43	325	$37.95
Choctaw	1421	30.67	336	13.83	--	--	--	--	4905	4.32	--	--
Coal	393	35.92	2114	10.94	--	--	--	--	945	12.43	--	--
Haskell	683	39.35	438	17.80	--	--	--	--	2325	10.63	--	--
Hughes	771	28.08	100	12.24	80	18.59	109	40.26	1046	27.44	170	24.14
Latimer	518	42.93	45	15.60	--	--	--	--	1875	10.42	--	--
LeFlore	1186	38.24	20	13.35	--	--	--	--	1967	10.44	--	--
McCurtain	1865	24.96	1096	10.42	--	--	--	--	1157	10.09	--	--
Pittsburg	1676	34.89	--	--	--	--	--	--	2310	15.78	--	--
Pushmataha	1164	32.01	189	8.54	--	--	--	--	1543	11.38	--	--
State Totals	64399	$26.55	11107	$14.56	46,265	$14.94	6737	$16.33	80138	$12.18	19205	$26.24

a)
SL1 Permanent Vegetative Cover Establishment
SL2 Permanent Vegetative Cover Improvement
SL4 Terraces
SL11 Treatment of Critical Erosion Area
WC1 Water Impoundment Reservoir
WP1 Sediment Retention, Water Retention

b) - indicates that cost-sharing was not available for this practice in this county.

Source: ASCS, USDA, Oklahoma State Office, Stillwater, Oklahoma

TABLE IV

COST-SHARE RATES BY ASCS FOR FORESTRY INCENTIVES PROGRAM PRACTICES BY COUNTIES IN STUDY REGION, 1984[a]

County	FR1	FR3
Atoka	65	65
Bryan	--[b]	--
Choctaw	65	65
Coal	--	--
Haskell	65	65
Hughes	65	--
Latimer	65	65
LeFlore	65	65
McCurtain	65	65
Pittsburg	50	--
Pushmataha	--	--

Source: ASCS, USDA: Oklahoma State Office, Stillwater, Oklahoma.

a) FR1 Planting (includes cost of trees, labor, equipment).
FR3 Site preparation: Complete preparation limited to $39.00 per acre.
Chemical preparation: Limited to $26.65 per acre.
Limited brush hogging or disking limited to $7.00 per acre.
Prescribed burning: limited to $1.95 per acre.

b) Cost-sharing for this practice is not offered in these counties.

CHAPTER IV

CHARACTERISTICS OF THE STUDY REGION AND RESULTS OF THE SURVEY

Statistical data from the U.S. Census of Agriculture for Oklahoma supports the hypothesis that Southeastern Oklahoma is composed mainly of smaller operations, managed by persons with their main source of income from off the farm. The average size operation in the study area is 343 acres, compared to a state average of 446 acres. Farms with less than 219 acres make up 62 percent of the farm population in the eleven county region; the state percentage is 56. Conversely, 23 percent of the farms in Oklahoma are greater than 500 acres, but only 15 percent are that large in the area studied (47).

At the state level, 55 percent of the farm operators work more than one-half of their time off the farm; 62 percent of the farm operators work off the farm more than 50 percent of their time in the southeastern corner. These off-farm statistics could be even higher when the unemployment rate is considered. For the calender year 1984 Oklahoma averaged an unemployment rate of 6.7 percent; for the southeastern region, the average unemployment rate was 11.5 percent (Table V).

The results of the 23 part-time farmer surveys indicate the group is relatively homogeneous. The average size operation was 278 acres with a standard deviation of 60 acres when the two farms at either end of the scale were excluded. The typical farm had 227 acres of

TABLE V

SELECTED FARM AND RELATED CHARACTERISTICS FOR THE 11 COUNTY STUDY REGION AND FOR THE STATE OF OKLAHOMA, 1982

Component	State Average	Region Average
Farm size (acres)	446	343
Farms less than 219 acres (%)	56	62
Farms greater than 500 acres (%)	23	15
Operators working more than 50% off the farm (%)	55	62
Farms with sales less than $10,000 (%)	60	75
Average 1984 Unemplopment Rate[a]	6.7	11.5

Source: Bureau of Census, U.S. Department of Commerce, Washington, D.C. Unemployment figures are from the Oklahoma Employment Security Commission, Oklahoma City.

a) The unemployment data are for 1984.

pastureland and 51 acres of woodland. The pastureland included 132 acres of improved pasture (bermuda and fescue) and 95 acres of native pasture.

Farm operators in the survey worked off the farm an average of 47 hours per week; and 87 percent of the respondents claimed that farm income accounted for less than 19 percent of family income.

One section of the survey dealt specifically with pasture management. Only 50 percent used a "bush or brush hog" at least once a year as a means of controlling weeds. Application of herbicides was even lower, with only 33 percent of the respondents using a field sprayer. This is an area that this author feels needs more emphasis. Like soil loss control, weed control is necessary to maintain agricultural production over the long term. Weeds reduce yields, lower crop quality, and harbor insects and disease pests.

The farmers interviewed were more concerned with fertilization rates and fertility of the soil than with weed control. Eighty-five percent of the operators had analyzed their soils in the last five years and several expressed that they had increased livestock carrying capacity by increasing pasture fertilization.

Rotational grazing is becoming more popular in Southeastern Oklahoma, but most operators are still experimenting with finding the optimal size of the divisions. Rotational grazing means placing cross fences in the pasture so the livestock can only graze part of the pasture at a time. This system has the potential of producing more total pasture per unit of land by permitting the seeding of each subdivision to grasses or grass mixtures with different seasons to grow. The main objective of rotational grazing however is to guard against overgrazing of any one pasture division.

With continuous grazing there is a tendency to graze the pasture with the same stocking rate throughout the grazing season with the result that it is underused during maximum growth periods and overgrazed during dry weather and dormant periods. Overgrazing inhibits plant production in two ways: (a) by reducing the amount of leaf area available for photosynthesis and (b) by inhibiting root growth. Consequently, pasture productivity will decrease and soil erosion may take place if the land is sloping.

Operators were asked what incentives would they need to improve the quality of their pasture. Only 42 percent were interested in more cost-sharing by the ASCS. Most of the farmers wanted higher and more stable cattle prices.

The survey also consisted of questions on cattle management. During the time span of the surveying period (June - September 1984) the average operator had 37 cows, 34 calves, and 1 bull. Production records were not kept on any farm, and only 15 percent tried to follow a specific calving season. The Kerr Foundation is urging ranchers in the southeastern region to breed for a spring (February-April) calving season. Unless at least one-half of the pasture is established with cool season forages, there is little reason to have a fall calving season. Fall calving cows will have much higher nutritional requirements going through the winter than cows that calve in the spring.

The use of growth implants and ear tags is still not widespread with the ranchers interviewed. Actually, ear tags are being used less now due to a natural resistance by the ticks and flies. Therefore, other methods such as dusting, spraying, and bags are being used more frequently.

Only two farmers used either OSU Extension or SCS services "frequently". The other 21 were about equally divided between the choices of "sometimes" and "seldom." A major reason given for not attending field demonstrations or meetings was that they were held during working hours in the middle of the week; a time that this population was not free. A majority (90 percent) reported that they had received cost-sharing assistance from ASCS at some time, but only 22 percent had received assistance in the last five years. Cost-sharing had been for water-retention structures, improvement of vegetative cover, and two operators had established terraces. Generally, the operators had received the maximum cost-share rate as discussed in the previous chapter.

Although woodland comprises about 20 to 30 percent of each farmstead, none of the part-time farmers in the survey had sold any timber commercially. Twenty of the respondents were not aware of the Forestry Incentives Program offered by the ASCS and did not know that cost-sharing was available in their counties. However, when the program was explained they did seem to be interested in knowing more about it.

None of the farmers surveyed seemed to believe that they had any problem with soil erosion. Eighteen of the twenty-three operators (78 percent) stated that they did have one or more gullies on their land that were still actively eroding. Sprigging the gully was the most popular action taken to remedy the problem, although several stated that they were simply anchoring the soil with "junk" at the present time.

While many larger producers have capitalized on new, cost-effective technologies and will continue to do so, most of the small, part-time producers have not. For example, part-time operators frequently cannot justify the additional handling of cattle to utilize improved management practices such as implants. In many cases, sufficient time may simply not be available for these part-time producers to adequately consider and adopt improved technology.

CHAPTER V

MODEL INPUTS

McCurtain County was chosen as the representative farm site for several reasons. First, of the regional statistics reported in Table II (farm size, unemployment rate), McCurtain County generally was close to the average. The soil types found in this county are predominant in the southeastern region. Also, McCurtain County has much potential for growth in the forest industry.

The representative farm had 235 acres of pastureland and 50 acres of woodland. In the linear programming model it was assumed that one third of the pasture acreage could already have been converted from native to improved pasture. Therefore, 78 acres in the model have no establishment charge since it would not have been correct, from the data gathered, to assume that all pasture in the base was in a native state.

Four soil series which comprise about 35 percent of the land in McCurtain County were included in the representative farm. The distribution of the soils on the farm was proportional to their county-wide distribution. The composition of the farm is presented in Table VI.

The capability class for each soil series also is shown in Table VI. Capability groupings show the suitability of soils for various uses. In the capability system, all kinds of soil are grouped at three levels: the capability class, subclass and unit.

TABLE VI

SOIL TYPE COMPOSITION OF THE REPRESENTATIVE FARM
FOR SOUTHEASTERN OKLAHOMA, 1985

Soil Type	Acres	Capability Class[a]
Goldston-Carnasaw-Sacul (G-C-S)	100	VIIs-1
Carnasaw-Goldston (C-G)	69	VIe-2
Felker Loam (FL)	66	IIw-1
Pickens Silt Loam (PSL)	50	VIIs-2
Total	285	

a) Source: Soil Survey McCurtain County, Oklahoma. USDA, SCS, 1974.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The higher numerals indicate progressively greater limitations and narrower choices for practical use. Class I soils have few limitations, the widest range of use, and the least risk of soil erosion damage when they are used. The soils in the other classes have progressively greater natural limitations.

Capability subclasses are soil groups within one class; they are designated by adding a small letter (e, w, s, or c) to the class numeral. The letter "e" shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; "w" shows that water in or on the soil interferes with plant growth or cultivation; "s" shows that the soil is limited mainly because it is shallow, droughty, or stony; and "c" shows that the chief limitation is climate that is too cold or too dry.

Capability units are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Capability units are generally designated by adding an Arabic numeral to the subclass symbol.

The Four Soil Associations

Goldston - Carnasaw - Sacul

The Goldston series consists of moderately deep, moderately steep and steep, well-drained to excessively drained soils on uplands. Most of the area of these soils are either wooded or have been cleared for use as tame pasture. These soils are not suited to crops, but they are suited to trees, grasses, and food and cover for wildlife.

Wooded areas can be maintained or improved by protecting them from fire, removing or controlling inferior species, planting suitable species, and selectively harvesting trees on a planned schedule. The quality of grasses can be maintained or improved by controlling brush, applying lime and fertilizer according to soil tests, and using suitable grazing practices.

Carnasaw - Goldston

The Carnasaw series consists of deep, very gently sloping to steep, well-drained soils on uplands. These soils are not suited to crops, but they are well suited to trees and tame pasture. Most of the areas are wooded. A large acreage, however, has been cleared of trees and is used for tame pasture. By employing suitable grazing practices, and using lime and fertilizer, the quality of the pasture can be maintained or improved. Selective harvesting and control of inferior species can improve the wooded areas.

Felker Loam

The Felker series consists of deep, nearly level and very gently sloping, somewhat poorly drained soil on uplands. This soil is used mostly for trees and tame pasture. It is suitable to cultivation, but a seasonal high water table and ponded water during wet periods late in the spring are concerns in management. Management practices are needed to help maintain or to improve soil fertility and structure and to remove excess surface water.

Pickens Silt Loam

The Pickens series consists of shallow, moderately steep, excessively drained soils on uplands. These soils are best suited to tame pasture. In places are areas of trees for commercial timber. The quality of grasses can be maintained or improved by controlling brush, using suitable grazing practices, and protecting the grasses from fire. The commercial wooded areas require selective planting and harvesting as well as control of inferior species (53).

Estimates of Soil Loss Coefficients

The predicted average annual soil loss (A) expressed in tons per acre per year were calculated using the USLE for the different soil series under varying conditions (Table VII). The T-values or soil loss tolerances are also presented in this table.

The rainfall factor (R) for McCurtain County is 340 and is constant in all examples. The length factor (L) was assumed to be 200 feet for all series, and the slope factor (S) was 2 percent for Felker Loam, 8 percent for Pickens, and 5 percent for the two other series. The crop-management factor (CP) was obtained for native and improved pasture, as well as poor, medium and good timber stands (49).

Available Labor

The quantity of labor available was estimated assuming the farm operator supplies most of the labor. During the months of December, January and February, he could supply three hours a day during

TABLE VII

AVERAGE ANNUAL SOIL LOSS COEFFICIENTS FOR THE REPRESENTATIVE FARM IN SOUTHEASTERN OKLAHOMA, 1985

Soil Series and Enterprise	R	K	LS	CP	A	T
Goldston-Carnasaw-Sacul						
Native Pasture	340	.28	.76	.038	2.75	2
Improved Pasture	340	.28	.76	.003	.22	2
Carnasaw-Goldston						
Native Pasture	340	.43	.76	.038	4.22	3
Improved Pasture	340	.43	.76	.003	.33	3
Felker Loam						
Native Pasture	340	.37	.25	.038	1.20	5
Improved Pasture	340	.37	.25	.003	.09	5
Pickens Silt Loam						
Poor Timber Stand	340	.28	1.40	.009	1.19	1
Medium Timber Stand	340	.28	1.40	.004	.53	1
Good Timber Stand	340	.28	1.40	.001	.13	1

Source: Estimating Soil Loss From Water and Wind Erosion, An In-House SCS Publication, SCS/USDA.

weekdays and six hours a day on weekends. During the remaining months he could supply four hours a day during the week and seven hours a day for weekends during March, April, October and November. Eight hours a day on the weekend were allowed during May, June, July, August, and September. The number of weekdays and weekends was based on the 1985 calendar year (Table VIII).

Budgets

Budgets were developed using the OSU Budget Generator for yearly maintenance of native pasture, bermuda and fescue. Establishment charges were also estimated for the bermuda and fescue pastures under conditions of the farmer paying all costs or receiving cost-sharing assistance. Two cow-calf budgets were also developed with one relying more on pasture production and the other having higher quantities of supplements required.

Selected values from the budgets (presented in Appendix B) are presented in Tables IX and X. The coefficients for annual operating capital, labor requirements, operating (variable) costs and production were used in the linear programming model. For a yearly pasture charge, the establishment cost was discounted at a 4 percent rate over ten years and then added to the annual maintenance charge.

ASCS cost-sharing reduced the establishment charges for bermuda grass by 53 percent and fescue by 49 percent. Though the cost-share rate for both practices was 65 percent, it was not applicable to all input charges. Only the charges for seed, sprigging, fertilizer and lime are cost-shared.

TABLE VIII

HOURS OF OPERATOR LABOR AVAILABLE BY MONTH, SOUTHEASTERN OKLAHOMA REPRESENTATIVE FARM, 1985

Month	Weekday	Weekend Hours	Total
January	69	48	117
February	60	48	108
March	84	70	154
April	88	56	144
May	88	72	160
June	80	80	160
July	80	88	168
August	88	72	160
September	84	72	156
October	92	56	148
November	84	63	147
December	63	60	123
Total	960	785	1745

TABLE IX

PER ACRE PRODUCTION AND INPUT REQUIREMENTS FOR THREE PASTURES ON THE SOUTHEASTERN OKLAHOMA REPRESENTATIVE FARM, 1985

	Labor Requirements (Hours)	Annual Operating Capital (Dollars)	Operating Cost (Dollars)	Production
Native Pasture Maintenance	.3	2.16	48.17	4.0 AUM's[b]
Bermuda Grass Establishment	1.4	7.79	136.12	7.1 AUM's
with ASCS Cost-Share	1.4	2.65	60.31	7.1 AUM's
Bermuda Grass Maintenance	.6	4.15	87.24	7.1 AUM's
Fescue Establishment	1.4	4.71	96.71	8.3 AUM's
with ASCS Cost-Share	1.4	2.03	44.95	8.3 AUM's
Fescue Maintenance	.2	4.13	59.06	8.3 AUM's

Source: Budgets presented in Appendix D.

a) Annual operating capital at 14 percent interest rate.

b) An Animal Unit Month (AUM) is the grazing (forage) requirement to support one cow unit for one month.

TABLE X

COW-CALF COST PER HEAD UNDER TWO PASTURE SITUATIONS FOR SOUTHEASTERN OKLAHOMA REPRESENTATIVE FARM, 1985

	Hay (Tons)	Protein Supplement (Pounds)	Operating Capital (Dollars)	Operating Cost (Dollars)	Labor (Hours)
Situation 1[a]	1.10	252.0	11.40	219.55	9.2
Situation 2	.50	67.2	5.65	146.25	9.2

a) Situation 1 receives less pasture grazing and must have more protein and hay than Situation 2.

The cow-calf budgets were based on two scenarios. One situation assumed less pasture production (AUM's) and the deficiency had to be corrected with higher supplements of crude protein and hay.

In establishing a pine plantation the major costs are preparing the site and buying and planting the seedlings. These costs usually range between $50 and $200 per acre depending on the method chosen and the present condition of the area. Another way to establish a pine stand is from seed, either through natural regeneration or mechanical seeding. Costs for establishing a seeded stand range upward from $15 per acre, again depending on the present condition (50). Cost-sharing is available under the FIP program for site preparation, seedlings, labor and equipment.

Annual management costs are not included in this analysis. During a pine stand's first 15 or 20 years they are minimal, consisting mainly of firebreak maintenance. Rarely will these costs exceed $1 per acre per year.

Since this analysis is based upon part-time operators, chemical injection was chosen as the method of site preparation. This method requires no labor from the landowner. Total per acre establishment costs are $105.40 before cost-sharing and $34.35 with FIP (Table XI). The maximum annual payment is $10,000 per individual.

TABLE XI

ESTABLISHMENT COSTS PER ACRE FOR LOBOLLY PINE ON SOUTHEASTERN OKLAHOMA REPRESENTATIVE FARM, 1985

Item	No FIP Assistance	With FIP Assistance
Site preparation (Injection)	$ 43.00	$16.35[a]
Seedlings (800 seedlings)	22.40	18.00[b]
Labor	40.00	--[b]
Total Cost Per Acre	$105.40	$34.35

a) ASCS will pay up to $26.65 per acre for chemical site preparation.

b) ASCS will pay up to $5.55 per 100 trees for the cost of trees, labor and equipment.

CHAPTER VI

REPRESENTATIVE FARM RESULTS FOR ALTERNATIVE FARMING SITUATIONS

Linear Programming Model Solutions

One objective function (maximize returns) was used with the linear programming model, with two scenarios, to observe the effect that limiting soil loss had on net farm income in the short-run. The enterprise combinations and resulting income were determined for 1) no restrictions in soil loss, and 2) restricting soil loss to recommended T-values. The same scenarios then were run assuming that cost-sharing for pasture improvement was available from ASCS. The results are presented in Table XII.

Results Assuming No Cost-Share

The profit maximum solution had 78 cow-calf units on the 235 acres, for a return of $1,670. This figure includes returns above all operating costs and pasture charges. The net return figure is to family labor, land, overhead, risk and management.

Only 17.4 acres of pasture are converted to fescue and no acres are converted to bermuda. The total soil loss for 235 acres of pastureland on the representative farm is 601 tons; and two of the three soil series (Goldston-Carnasaw-Sacul and Carnasaw-Goldston) are eroding at rates in excess of their recommended T-values.

TABLE XII

PROFIT MAXIMIZATION SOLUTIONS FOR THE SOUTHEASTERN OKLAHOMA FARM ASSUMING ALTERNATIVE SCENARIOS, 1985

PARAMETERS	UNIT	NO RESTRICTION ON SOIL LOSS	SOIL LOSS RESTRICTED TO T-VALUES	SOIL LOSS RESTRICTED TO T-VALUES (ASCS COST-SHARING FUNDS AVAILABLE)
Net Returns	Dollars	$1670	$1378	$1491
Cow-Calf Units	Head	78	84	84
Native Pasture on G-C-S[a]	Acres[d]	83	70	70
Native Pasture on C-G[b]	Acres	69	47	47
Native Pasture on FL[c]	Acres	66	66	66
Bermuda on G-C-S	Acres	0	20	20
Bermuda on C-G	Acres	0	0	0
Bermuda on FL	Acres	0	0	0
Fescue on G-C-S	Acres	17	9	9
Fescue on C-G	Acres	0	22	22
Fescue on FL	Acres	0	0	0
G-C-S Annual Soil Loss	Tons	231	200	200
Average Annual Soil Loss	Tons per Acre	2.3	2.0	2.0
C-G Annual Soil Loss	Tons	291	207	207
Average Annual Soil Loss	Tons per Acre	4.2	3.0	3.0
FL Soil Loss	Tons	79	79	79
Average Annual Soil Loss	Tons per Acre	1.2	1.2	1.2

a) Goldston - Carnasaw - Sacul
b) Carnasaw - Goldston
c) Felker Loam
d) Acres have been rounded to the nearest whole number

For the objective of profit maximization with tolerable soil loss, each soil series was limited to total average erosion being less than or equal to T. For example, the T-value for Carnasaw-Goldston-Sacul is 2. Erosion could be greater than 2 tons on some acreage as long as the total erosion for the 100 acres was less than or equal to 200 tons. It was felt that with soil erosion rates being lower on pastureland than on cropland, this would be an allowable practice with no detrimental long-term effects.

Given these objectives and constraints, the optimum solution was 84 cow-calf units, with a net return of $1,378. Since erosion was limited, more native pasture was converted to improved pasture (both bermuda and fescue). Even though this conversion provided a greater carrying capacity and allowed a higher stocking rate, the costs of conversion and annual maintenance costs were greater than the returns of the additional cow-calf units. This had a negative impact on net returns. However, soil loss was decreased 19 percent for the 235 acres as a whole and each soil type had an average erosion rate of less than or equal to its T-value.

Results Assuming ASCS Cost-Share

Since the initial model of profit maximization selected only native pasture or fescue pasture that already had been converted and thus had no establishment charges, cost-sharing had no impact.

However, when the objective was profit maximization with tolerable soil loss, there was a change in the optimum solution. Net returns did decrease from $1,670 to $1,491, but not as much as the T-value solution without cost sharing, which decreased from $1,670 to

$1,378. The land mix and total erosion are the same as in the case of no cost-sharing.

Net Returns for Conversion of Woodland to Productive Timber

The representative farm also consisted of 50 acres of woodland on Pickens Silt soil. It was assumed that this area would not be cleared for pasture at this time due to the depressed cattle market. Therefore, the only alternatives are to leave it as is, or to convert the timber stand to a more marketable product. Due to the long run nature of timber it would have been difficult to mix timber and pasture in a linear programming model. The information in this example represents an average situation in McCurtain County. The landowner wants to develop his woodland which currently has little or no commercial timber on the farm after years of cutting. The site index, which is the average height the dominant trees should be at age fifty, is 70 feet for loblolly pine on the Pickens Silt series.

The timber market price in this example is a "stumpage-price," or the actual amount the landowner would receive per cord or board feet for the wood that is cut and removed by someone else. The "delivered price" is sometimes twice as high, but that would require labor, machinery, and other capital expenses by the farmer. With the "stumpage-price," the landowner does not have to cut the timber. This example also has a 10 percent increase in the base price per two inch increase in diameter at breast height due to increase in quality of the wood.

Total gross receipts over fifty years is $1,790 per acre or $89,510 for the fifty acres. Discounted at four percent, the present value will be $335 per acre or $16,750 for all of the woodland. (Table XIII). This can then be compared to the establishment cost of $34.35 per acre assuming cost-sharing of $71.05 per acre by ASCS. The fifty acres therefore has a return to land and management of $15,033 when discounted at four percent.

Effects on Soil Loss

Well-managed forests are unsurpassed as a vegetative cover to help reduce soil erosion. Leaves, branches, and the leafy organic layer on the forest floor break the velocity of falling raindrops.

In this example, assuming that the site started as a poor and over-cut stand, the erosion rate is eventually decreased by about 90 percent (Table XIV). Although there is the possibility of some increased soil loss in the first year due to less cover, the soil loss is soon reduced to a rate of less than one-half of the recommended T-value for the soil series.

Whole Farm Plan

Given no consideration to soil loss, the whole farm plan has an optimum solution of raising 78 cow-calf units on the 235 acres of pastureland, and converting the fifty acres of woodland to commercial timber. Net returns would be $16,703 (with timber discounted) and total soil loss on the pastureland amounts to 601 tons per year. Because the timber example would have decreasing soil erosion over the

TABLE XIII

ESTIMATED RETURNS PER YEAR PER ACRE FOR LOBOLLY PINE, SOUTHEASTERN OKLAHOMA, 1985

Year[a]	Volume Per Acre Removed	Gross Income[b]	Present Value[c]
15	4.0 cords	$ 40.00	$ 22.21
22	9.0 cords	99.00	41.77
29	9.0 cords	108.00	34.63
36	1,100 board feet	114.40	27.88
43	1,400 board feet	156.80	29.03
50	10,600 board feet	1,272.00	178.99
		$1,790.00	$334.51

a) Each of these years is a recommended thinning year up to years 43 and 50.

b) Base price $10/cord; $80/MBF (1,000 board feet). As indicated in text, the base price increases 10 percent every seven years.

c) A discount rate of 4 percent was used.

TABLE XIV

SOIL LOSS AT STAGES OF FORESTATION (PICKENS SILT LOAM)

Stage	Tons/Acre/Year	T-Value
Poor timber stand[a]	1.20	1
Medium timber stand[b]	.50	1
Well-managed stand[c]	.10	1

Source: Table VII presented earlier.

a) Poor timber stand has 20-35 percent canopy cover of the area.

b) Medium timber stand has 40-70 percent canopy cover of the area.

c) Well-managed timber stand has 75-100 percent canopy cover of the area.

fifty years, it would be incomplete to express erosion at only one time period. A good estimate would be for erosion rates of 1.2 tons per acre per year up to year five, .5 tons/acre/year for years five to ten, and .1 tons/acre/year afterwards.

If average soil loss is limited to the T-value of each soil series, the optimum farm plan would include 84 cow-calf units on the pastureland and returns of $16,411 with the discounted timber sales. Soil loss on the pastureland would be reduced to 486 tons. If cost-sharing was available for the improvement of pastureland, returns would increase to $16,524.

Federal and State Tax Benefits for Soil Conservation Practices

Farmers and ranchers may choose to deduct certain expenditures for soil and water conservation that would otherwise be considered capital expenditures. Some deductible expenditures include: grading, terracing, leveling, restoration of fertility, eradication of brush, and planting of windbreaks. The total deduction of capital expenditures for soil and water conservation in any tax year is limited to 25 percent of the gross income from farming during the year. Any unused deduction can be carried over to succeeding years (54).

Environmental and Aesthetic Considerations

Since the soil is a natural resource with limited quantities, we must look further than just the impact on net returns. Off-site damages from soil erosion have an effect on the farmer, but a more direct effect on society. The major off-site impact of soil erosion is on water quality and on the condition of the nation's waterways. Soil erosion runoff (sediment) decreases storage capacity in lakes and reservoirs, increases flooding, and increases water treatment cost. By weight and volume, sediment is the greatest pollutant of surface waters in the United States. A more direct effect to the farmer is the higher stocking rates that can be realized due to increased AUM's from the bermuda and fescue pastures.

Improving forest stands not only offers benefits to the landowner through increased income and reductions in soil loss, but also offers direct benefits to the surrounding community. The type 1 multipliers (a measure of the total amount of economic activity in the state generated by a dollar's worth of output delivered to final consumers) are \$2.05, \$1.71, and \$2.03, respectively for lumber and wood products, furniture and fixtures, and paper and allied products (32). Therefore, forestry can have a positive impact on communities where unemployment runs as high as 16 percent in the region studied.

Finally, the increased market value of the land must be considered. A properly managed tract of land with improved pastures and woodlands that are lacking gullies and inferior species will have both an aesthetically and financially higher value over land which has not been properly managed.

CHAPTER VII

SUMMARY AND CONCLUSIONS

The primary objective of this study was to determine if the adoption of some low risk recommended management practices could increase the part-time farmer's income over a period of time, without significant increases in labor or capital investment. A concurrent objective was to select those best management practices for soil conservation, and/or those enterprises that would reduce current levels of soil erosion on part-time operations.

Personal surveys were conducted in five counties in Southeastern Oklahoma with the sample being chosen with the assistance of OSU County Extension Directors, ASCS County Executive Directors and SCS District Conservationists. The population included farmers and ranchers who receive over one half of their annual income from nonfarm sources, and also who work over one half of their available time off the farm.

The survey included questions on property description, soil characteristics, farm enterprises, agricultural management practices, and soil conservation practices. Information on their use of technical assistance from any government agencies, and cost-sharing also were obtained.

Based on results of the surveys, it was felt that an in-depth case analysis of one representative farm for the region could adequately reflect the study area as a whole. This case study consisted of three phases or steps. First, costs and returns were estimated for establishment and annual maintenance of native, fescue and bermuda pastures as computed by the OSU Budget Generators. Costs and returns also were estimated for a cow-calf operation under two pasture management schemes. These figures were then used in a linear programming model designed to maximize net returns. The initial solution represented the highest net returns available from the given enterprises without regard to soil loss.

Using soil loss estimates obtained from the USLE, the objective function then was changed to maximize profits while restricting average erosion on each soil series to its T-value. Total soil loss and net farm returns from the two objectives then were compared. The final step incorporated funds received from ASCS to determine the optimum enterprise combination and the resulting net returns and soil erosion for the representative farm.

Due to the long term nature of forestry, this enterprise was not included in the linear programming analysis. Instead, net returns and soil loss were estimated at various years of the investment, with the income ultimately being discounted back to a present value. This was done so that a comparison could be made between the investment and expected returns.

In the situation where cost-sharing funds were not used, net income decreased from $1,670 to $1,378 when soil loss was restricted to T-values. However, there was an increase in the number of animal units that could be grazed due to the higher carrying capacity of fescue and bermuda pasture over native grass. Converting more native pasture to these improved stands decreased soil loss by about 20 percent.

When cost-sharing was available, there was still a decrease in net farm returns when soil loss was restricted. The decline was fairly small though, due to ASCS cost-sharing funds making the establishment costs paid by the farmer lower. Reductions in soil loss were the same as without cost-sharing.

The potential returns of forestry were more promising even though it represents a long term investment. The present value returns above costs were calculated assuming that cost-sharing funds were available from the ASCS under the FIP. The impacts on soil loss of improving a forestry stand are great. In this example, soil loss decreased by close to 90 percent after the tree canopy was well developed.

Other Considerations

Although the analysis indicated that conserving soil by converting from native to improved pastures (both bermuda and fescue) resulted in lower returns, there are longer term factors to consider. Saving soil is not a matter of "pay as you go." The economic costs to us today will outweigh the immediate benefits.

Water is a valuable resource, perhaps even more so than the soil. Soil conservation and water preservation are so interrelated that they can only be accomplished together. There are relatively few techniques for conserving soil that do not also conserve and preserve water. Since sediment is the greatest pollutant of water, many goals are accomplished with the reduction of soil loss.

A higher market value is sure to be realized on acreage which has been properly managed and is free of gullies and brushy pastures. This increased value could be based on both aesthetic and production considerations. Improved pastures not only decrease soil loss, but they also offer higher AUM's. This increased carrying capacity means that the same acreage has the potential to boost stocking rates and off-set some of the pasture charges. Aesthetics however require a more personal judgement and are beyond the more absolute values that have been presented in this research.

Development of woodland to a commercial product offers many benefits. The farmer realizes a decrease in soil loss and perhaps some supplemental income over time. The community not only benefits from increased water quality, but also notices some increased economic activity due to the type 1 multipliers. The average acre of forestland in Oklahoma is capable of growing two to three times more timber than it presently does. About 87 percent of the commercial forest acreage in Oklahoma is in private ownership. Therefore, increased timber production must occur on private lands if the nation's future wood fiber demands are to be met (33).

Limitations of Study and Suggestions for Further Research

The major limitation of this research is the lack of a workable relationship between soil loss and productivity loss. Further research in the area of soil erosion and productivity would improve the estimation of SCS recommended soil loss limits. Also, more accuracy in measuring the benefits of restricting soil loss which accrue to the landowner and society as a whole are needed.

This research did not take into account tax considerations for soil conservation practices. Since they are very case specific, each landowner would need to make an analysis of his individual situation.

Researchers also need to look at the long term effect on property values of improving the land through better pastures and well managed timber stands. A properly managed tract of land with improved pastures and woodlands that are lacking gullies and inferior species will have both an aesthetically and financially higher value over land which has not been properly managed.

The surveys indicated that the part-time operators in Southeastern Oklahoma have different needs than other Oklahoma farmers, and perhaps some traditional extension practices need to be modified to disseminate information to them. It is often infeasible for the farm operator, who has a full time job, to take time off to attend meetings which are held on week-days. Time and capital have been stated as major constraints restricting the productivity of these farmers and ranchers. Research and development needs to be oriented to lessen the technology gap that exists between large operations and the smaller, part-time farmers. Finally, more emphasis needs to be placed on proven techniques such as rotational grazing, growth implants, herbicides and fertilizers.

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APPENDIXES

APPENDIX A

SURVEY FORM

CONFIDENTIAL

CONFIDENTIAL

SURVEY ON

ATTITUDES ON ADOPTION OF TECHNOLOGY BY
PART-TIME FARMERS IN SOUTHEASTERN OKLAHOMA

SUMMER 1984

BACKGROUND INFORMATION

NAME______________________________

ADDRESS______________________________

COUNTY______________ TELEPHONE ______________

1. AGE OF OPERATOR: (CIRCLE APPROPRIATE LETTER)
   A. UNDER 25 C. 35-44 E. 55-64
   B. 25-34 D. 45-54 F. 65 AND OLDER
2. EDUCATION OF OPERATOR (CIRCLE THE HIGHEST NUMBER OF YEARS COMPLETED)
   LESS THAN 6,7,8 — ELEMENTARY
   9,10,11,12 — HIGH SCHOOL
   13,14,15,16,17,18 — COLLEGE
3. EXPERIENCE OF OPERATOR IN FARMING:______________YEARS.
4. HOW LONG HAVE YOU OWNED OR OPERATED THIS FARM?______________YEARS.
5. HOW OFTEN DO YOU CONTACT OR USE INFORMATION FROM: (CIRCLE ONE IN EACH)
   A. OSU EXTENSION FREQUENTLY SOMETIMES SELDOM NEVER
   B. SCS FREQUENTLY SOMETIMES SELDOM NEVER
   C. ASCS FREQUENTLY SOMETIMES SELDOM NEVER
6. DO YOU INTEND TO RETIRE, SELL, OR CEASE OPERATING THE FARM IN THE NEXT FIVE (5) YEARS? YES______ NO______
7. IF YOU DO PLAN TO DISCONTINUE OPERATING THE FARM, WILL ONE OR MORE OF YOUR CHILDREN OPERATE THE FARM? YES______ NO______
   PLEASE EXPLAIN______________________________
   ____
   ____
8. ACRES OPERATED: CROPLAND______PASTURELAND______WOODLAND______TOTAL______
   A. ACRES OWNED AND OPERATED BY YOU______________
   B. ACRES RENTED IN AND OPERATED BY YOU______________
      1. CASH LEASE______________
      2. SHARE LEASE______________
      3. OTHER (PLEASE SPECIFY)______________

C. ACRES RENTED OUT TO OTHERS TO OPERATE
   1. CASH LEASE________________
   2. SHARE LEASE________________
   3. OTHER (PLEASE SPECIFY)________________

9. TYPE OF FARM ORGANIZATION (CIRCLE APPROPRIATE LETTER):
   A. SOLE PROPRIETOR (INDIVIDUALLY OPERATED)
   B. FAMILY OWNERSHIP (EXCLUDE PARTNERSHIP AND CORPORATIONS)
   C. PARTNERSHIP WITH FAMILY MEMBERS
   D. PARTNERSHIP WITH NON-FAMILY MEMBERS
   E. FAMILY CORPORATION
   F. NON-FARM CORPORATION
   G. OTHER (PLEASE SPECIFY)________________

10. WHAT TYPE OF SOILS DO YOU HAVE AND ACRES OF EACH?
____
____
   A. HOW MANY ACRES OF YOUR LAND ARE ON SLOPES AND WHAT IS THE COVER ON EACH?

PERCENT SLOPE	# OF ACRES	COVER (TREES,PASTURE,ETC.)
0-3	______	______
4-9	______	______
10-15	______	______
15-29	______	______
30 Plus	______	______

   B. HOW MUCH SOIL LOSS HAS OCCURRED ON THESE FIELDS IN PAST YEARS? (NUMBER OF INCHES OF TOP SOIL LOST OR OTHER MEASURES OF DECLINING PRODUCTIVITY)________________
____
____
   C. WHICH OF THE ABOVE FIELDS HAVE SUFFERED THE GREATEST LOSS?
____
____
   D. DO YOU HAVE ANY GULLIES ON YOUR LAND? YES________NO________
   E. IF YES, ARE THEY STILL ACTIVELY ERODING? YES________NO________
   F. HAVE YOU TRIED TO ELIMINATE OR REDUCE THE EROSION PROBLEMS CAUSED BY THESE GULLIES? YES______NO______ IF YES, EXPLAIN________
____
____

11. TENANCY
    A. FULL OWNER-OPERATOR__________ CASH RENT OPERATOR ONLY______
       PART OWNER-OPERATOR__________ CROP SHARE RENT ONLY________
    B. DO YOU CONSIDER YOURSELF TO BE:
       1. PART-TIME FARMER_________
       2. FULL-TIME FARMER_________
       3. IF YOU WORK OFF THE FARM, HOW MANY HOURS PER WEEK, WEEKS, AND/OR DAYS PER YEAR DO YOU WORK OFF THE FARM?_______________
       4. WHERE DO YOU WORK?
          NAME OF FIRM________________________________
          ADDRESS________________________________
          TYPE OF BUSINESS________________________________
          JOB DESCRIPTION________________________________
          HOURS OF WORK (i.e. 8 to 5, 2 days per week, etc.)__________
          ____

12. PERCENT OF FAMILY INCOME FROM THE FARM?
    A. 100%__________ B. 80-99%__________ C. 60-79%________
    D. 40-59%_________ E. 20-39%__________ F. 0-19%________

CATTLE

1. NUMBER OF: COWS_______ CALVES_______ BULLS_______ BREED_________
2. WHICH OF THE FOLLOWING MANAGEMENT TECHNIQUES DO YOU CURRENTLY PRACTICE? (PLEASE CHECK EACH ONE USED)
   A. RECORD KEEPING YES___ NO___
   B. SPECIFIC BREEDING SEASONS YES___ NO___ DATES OF BREEDING SEASONS: ____________________
   C. SPECIFIC CALVING SEASONS YES___ NO___ WHEN?____________________
   D. CALVING PERCENTAGE (OR NUMBER OF CALVES SAVED)____________________
   E. VACCINATIONS (TYPE GIVEN AND HOW OFTEN GIVEN)____________________
   ____
   F. PARASITE CONTROL (METHOD AND HOW OFTEN)____________________
   ____
   G. IMPLANTS____
   ____
   H. NUTRITIONAL ANALYSIS OF HAY____
   ____
   I. PASTURE FENCING AND ROTATION OF PASTURES____________________
3. MARKETING
   A. WHEN DO YOU MARKET THE CALVES?____________________
   B. WHAT WEIGHTS ARE THE CALVES WHEN SOLD?____________________
   C. WHERE ARE THE CALVES SOLD?____________________
   HOW ARE THEY TRANSPORTED?____________________
   IS TRANSPORTATION: OWNED_____ HIRED_____

TIMBER

1. DO YOU HAVE ANY LAND IN FORESTS? YES___ NO___ HOW MANY ACRES?________
2. WHAT TREES ARE INCLUDED IN THESE ACRES?
   HARDWOOD (OAK, WALNUT, HACKBERRY)____________________
   SOFTWOOD (PINE, CYPRESS, RED CEDAR)____________________
3. ARE YOU AWARE OF THE COST SHARING "FIP" PROGRAMS AND HAVE YOU TAKEN ADVANTAGE OF THEM?
   A. AWARE OF THEM
   B. USED THEM
   C. UNAWARE OF THEM
   D. AWARE, BUT NEVER USED THEM

4. WHAT WAS THE TOTAL COST OF THE PROJECT AND WHAT WAS THE AMOUNT OF COST SHARED BY ASCS? TOTAL COST $__________ ASCS SHARE____________%
ASCS DOLLAR AMOUNT $____________
5. WHAT INCENTIVES WOULD CAUSE YOU TO INCREASE YOUR TIMBER OUTPUT?________
6. HAVE YOU CONSIDERED THE POSSIBILITY OF RAISING CHRISTMAS TREES?
YES___ NO___ PLEASE EXPLAIN____________________

PASTURE

1. ACRES OF PASTURE: IMPROVED________________ NATIVE____________
2. DO YOU BRUSH-HOG? YES____ HOW OFTEN?____________________
NO____
3. DO YOU USE A FIELD SPRAYER FOR WEED CONTROL? YES___ NO___ IF YES, HOW OFTEN?____________________
IF YOU DO NOT USE A FIELD SPRAYER, DO YOU USE ANOTHER METHOD OF WEED AND BRUSH CONTROL? PLEASE EXPLAIN____________________
4. IF YOU USE ANOTHER METHOD, IS THE METHOD: OWNED___ RENTED___
5. HAVE YOU HAD YOUR SOIL ANALYZED IN THE LAST FIVE (5) YEARS? YES________
NO________
6. HOW ARE YOUR PASTURES DIVIDED (SIZE OF EACH FIELD)?________________
7. HOW HAS THIS HELPED YOU ON ROTATION GRAZING AND/OR ALLOWED HAY TO BE CUT AND BALED?____________________
8. HAVE YOU HEARD OF "GRASLAN" OR OTHER DEFOLIAGE PRODUCTS? YES__________
NO__________
WHICH ONE(S)?____________________
9. HAVE YOU EVER USED THEM? YES___ NO___ IF YES, WHICH ONE(S)?__________
10. WHAT INCENTIVES WOULD YOU NEED TO:
A. IMPROVE THE QUALITY OF YOUR PASTURE B. CLEAR MORE OF YOUR LAND

11. WHAT RATE AND ANALYSIS OF FERTILIZER DO YOU APPLY, AND WHEN?
    RATE (LBS. PER ACRE) ANALYSIS DATE

    ____
    ____
    ____

HORTICULTURE

1. WHICH OF THE FOLLOWING HORTICULTURE CROPS ARE YOU CURRENTLY GROWING FOR SALE AND WHAT IS THE APPROXIMATE SIZE OF THE OPERATION?

	Acres	Yield		Acres	Yield
OKRA			BLACK EYE PEAS		
WATERMELON			CABBAGE		
CANTALOPE			SPINACH		
ASPARAGUS			CARROTS		
SWEET CORN			PEACHES		
BLACKBERRIES			PECANS		
BLUEBERRIES			CUCUMBER		
BEANS			TOMATO		

2. PLEASE IDENTIFY WHICH OF THE PRACTICES YOU FOLLOW. WHEN AND HOW OFTEN DO YOU USE EACH PRACTICE, AND AT WHAT RATE?
   IRRIGATION (DRIP OR SPRINKLER)______________________________
   PEST CONTROL______________________________
   FUNGICIDES______________________________
   LIMING______________________________
   FERTILIZERS______________________________
   CROP ROTATION______________________________

3. HOW DO YOU SELL YOUR CROPS?
   A. PICK YOUR OWN____ B. ALONG ROADSIDE____
   C. FRESH MARKET OR GROCERY STORE____ D. OTHER (PLEASE SPECIFY)______
   ____

CROPS

1. WHICH OF THE FOLLOWING CROPS ARE YOU CURRENTLY GROWING?

	Acres	Yield Per Acre
WHEAT	______	________
CORN	______	________
SOYBEANS	______	________
PEANUTS	______	________
ALFALFA HAY	______	________
NATIVE HAY	______	________
OTHER (PLEASE SPECIFY)		
______	______	________

2. WHERE AND TO WHOM DO YOU SELL THESE CROPS?

	Sold To	Location
WHEAT	____________	____________
CORN	____________	____________
SOYBEANS	____________	____________
PEANUTS	____________	____________
ALFALFA HAY	____________	____________
NATIVE HAY	____________	____________
OTHER (PLEASE SPECIFY)		
______	____________	____________

3. PLEASE IDENTIFY WHICH OF THE PRACTICES YOU FOLLOW. WHEN AND HOW OFTEN DO YOU USE EACH PRACTICE, AND AT WHAT RATE?

IRRIGATION (DRIP OR SPRINKLER)______________________________

____

PEST CONTROL______________________________________

____

FUNGICIDES_______________________________________

____

LIMING____

____

FERTILIZERS______________________________________

____

CROP ROTATION____________________________________

____

CONSERVATION PRACTICES

1. DO YOU USE ANY OF THE FOLLOWING CONSERVATION PRACTICES?
   A. WIND BREAKS YES__ NO__ # OF FEET____ # OF ACRES____________
   B. TERRACING YES__ NO__ # OF LINEAR FEET_____ # OF ACRES________
   C. DOUBLE CROPPING YES__ NO__ CROPS PLANTED______________________
   ____
   D. MINIMUM OR NO-TILLAGE PLANTING YES__ NO__ # OF ACRES IN 1984______
   ____
   E. FARM PONDS: FOR STUCK WATER____________FOR IRRIGATION____________
2. HAVE YOU RECEIVED TECHNICAL ASSISTANCE ON ANY OF THESE PRACTICES?
   YES__ NO__ IF YES, WHICH ONES, FROM WHOM, AND WHEN (WHAT YEAR)?
   ____
3. HAVE YOU RECEIVED COST SHARING ON ANY OF THESE PRACTICES? YES__ NO__ IF YES, WHICH ONES?______________________________________
   ____

   WHAT WAS THE RATE OR AMOUNT PAID BY ASCS?
   Practice____________ Rate______________
   Practice____________ Rate______________
   Practice____________ Rate______________

GENERAL

1. IF YOU WOULD LIKE TO EARN MORE INCOME FROM FARMING, WHAT ARE THE OBSTACLES YOU FACE (PLEASE RANK FROM MOST IMPORTANT TO LEAST IMPORTANT)
   A. DON'T HAVE CASH OR EQUITY TO GET CREDIT______
   B. DON'T LIKE TO RISK GOING INTO DEBT______
   C. DON'T HAVE SKILLS TO MANAGE THE FARM TO INCREASE INCOME______
   D. DON'T HAVE MORE TIME TO SPEND ON FARMING______
   E. DON'T HAVE MARKET FACILITIES AROUND HERE FOR THE PRODUCTS THAT WOULD INCREASE INCOME______
   F. DON'T BELIEVE THE PAYOFF IS WORTH THE EFFORT______
   G. OTHER (PLEASE SPECIFY)______________________________
2. IF YOU WOULD LIKE TO EARN MORE OFF THE FARM, WHAT ARE THE OBSTACLES YOU FACE (PLEASE RANK IN ORDER OF THE MOST IMPORTANT TO THE LEAST IMPORTANT)
   A. DON'T HAVE SKILLS_____
   B. NO JOBS AVAILABLE EVEN IF I HAD SKILLS_____
   C. DON'T HAVE TRANSPORTATION TO GET TO WORK_____

D. DON'T HAVE MORE TIME TO SPEND IN OFF-FARM WORK______

E. DON'T BELIEVE THE PAYOFF IS WORTH THE EFFORT______

3. DO YOU PLAN TO CHANGE ANY ENTERPRISE? YES__ NO__ IF YES, PLEASE EXPLAIN

____

____

____

4. DO YOU PLAN TO CHANGE ANY MANAGEMENT PRACTICES? YES__ NO__ IF YES, PLEASE EXPLAIN____

____

5. WOULD YOU ATTEND?

A. ON-FARM TOURS YES__ NO__

B. RESEARCH PLOT DEMONSTRATIONS YES__ NO__

C. SEMINARS ON MANAGEMENT TECHNIQUES YES__ NO__

WHAT DAYS AND TIMES COULD YOU ATTEND ANY OF THE ABOVE?_______________

____

6. IF YOU PLAN TO ADOPT PRACTICES TO IMPROVE PRODUCTIVITY, FROM WHICH SOURCE(S) WOULD YOU SEEK INFORMATION?

LOCAL OSU EXTENSION OFFICE____ ASCS PERSONNEL____

SCS PERSONNEL____ KERR FOUNDATION____ NEARBY RESEARCH STATION____

LOCAL VOCATIONAL AG TEACHER OTHER (PLEASE SPECIFY)_______________

7. HAVE YOU CONSIDERED THE POSSIBILITY OF OTHER ENTERPRISES SUCH AS:

A. SOWS FOR RAISING PIGS YES__ NO__

B. FEEDER PIG OPERATION YES__ NO__

C. SOW AND FEEDER PIG OPERATION COMBINED YES__ NO__

D. RAISING SHEEP FOR LAMBS AND WOOL YES__ NO__

E. RAISING GOATS FOR MILK AND MEAT YES__ NO__

F. CATFISH FARMING (RAISING FISH IN PONDS) YES__ NO__

G. FARM BASED RECREATION ENTERPRISE (CAMPING, FISHING) YES__ NO__

H. OTHER (PLEASE SPECIFY)_______________________________

8. PLEASE EXPLAIN WHY YOU ARE OR ARE NOT INTERESTED IN ANY OF THE ABOVE ENTERPRISES.

____

____

____

APPENDIX B

BUDGETS FOR THE REPRESENTATIVE FARM

TABLE XV

PRODUCTION COSTS FOR BERMUDA GRASS ESTABLISHMENT (PER ACRE)

BERMUDA GRASS ESTABLISHMENT
SANDY LOAM SOIL
SOUTHEASTERN OKLAHOMA

OPERATING INPUTS:	UNITS	PRICE	QUANTITY	VALUE	YOUR VALUE
NITROGEN (N)	LBS.	0.250	100.000	25.00	________
PHOSPH (P205)	LBS.	0.260	40.000	10.40	________
POTASH (K20)	LBS.	0.100	80.000	8.00	________
HERBICIDE	LBS.	3.000	2.000	6.00	________
LIME	TONS	20.000	2.000	40.00	________
CUSTOM SPRIGGING	ACRE	20.000	1.000	20.00	________
RNTFERTSPRD/ACRE	ACRE	1.250	2.000	2.50	________
ANNUAL OPERATING CAPITAL	DOL.	0.140	55.628	7.79	________
LABOR CHARGES	HR.	4.250	1.425	6.06	________
MACHINERY FUEL, LUBE, REPAIRS	ACRE			10.38	________
TOTAL OPERATING COST				136.12	________

FIXED COSTS		VALUE	YOUR VALUE
MACHINERY			
INTEREST AT 14.0%	DOL.	8.815	________
DEPR., TAXES, INSUR.	DOL.	8.400	________
LAND			
INTEREST AT 0.0%	DOL.	0.000	________
TAXES	DOL.	0.000	________
TOTAL FIXED COSTS		17.22	________

PRODUCTION:	UNITS	PRICE	QUANTITY	VALUE	YOUR VALUE
BERMUDA PASTURE	AUMS	0.000	7.100	0.00	________
RETURNS ABOVE TOTAL OPERATING COSTS				-136.12	________
RETURNS ABOVE ALL COSTS EXCEPT OVERHEAD, RISK AND MANAGEMENT				-153.34	________

HERBICIDE IS SIMAZINE (PRINCEP)
USING 100 POUNDS N 40 POUNDS P AND 80 POUNDS K
PAT MCCOLLOCH

PROCESSED BY DEPT. OF AGRI. ECON. - OKLAHOMA STATE UNIVERSITY
PROGRAM DEVELOPED BY DEPT. OF AGRI. ECON. OKLAHOMA STATE UNIVERSITY

TABLE XVI

PRODUCTION COSTS FOR FESCUE ESTABLISHMENT (PER ACRE)

FESCUE ESTABLISHMENT
SANDY LOAM SOIL
SOUTHEASTERN OKLAHOMA

OPERATING INPUTS:	UNITS	PRICE	QUANTITY	VALUE	YOUR VALUE
FESCUE SEED	LBS.	0.450	15.000	6.75	________
NITROGEN (N)	LBS.	0.250	40.000	10.00	________
PHOSPH (P205)	LBS.	0.260	60.000	15.60	________
POTASH (K20)	LBS.	0.130	60.000	7.80	________
LIME	TONS	15.000	2.000	30.00	________
RNTFERTSPRD/ACRE	ACRE	1.250	1.000	1.25	________
ANNUAL OPERATING CAPITAL	DOL.	0.140	33.663	4.71	________
LABOR CHARGES	HR.	4.250	1.430	6.08	________
MACHINERY FUEL, LUBE, REPAIRS	ACRE			14.52	________
TOTAL OPERATING COST				96.71	________

FIXED COSTS		VALUE	YOUR VALUE
MACHINERY			
INTEREST AT 14.0%	DOL.	12.018	________
DEPR., TAXES, INSUR.	DOL.	12.150	________
LAND			
INTEREST AT 0.0%	DOL.	0.000	________
TAXES	DOL.	0.000	________
TOTAL FIXED COSTS		24.17	________

PRODUCTION:	UNITS	PRICE	QUANTITY	VALUE	YOUR VALUE
FESCUE	AUMS	0.000	8.300	0.00	________
RETURNS ABOVE TOTAL OPERATING COSTS				-96.71	________
RETURNS ABOVE ALL COSTS EXCEPT OVERHEAD, RISK AND MANAGEMENT				-120.88	________

PURE STAND ESTABLISHMENT COSTS
USING 40 POUNDS N 60 POUNDS P AND 60 POUNDS K
PAT MCCOLLOCH

PROCESSED BY DEPT. OF AGRI. ECON. - OKLAHOMA STATE UNIVERSITY
PROGRAM DEVELOPED BY DEPT. OF AGRI. ECON. OKLAHOMA STATE UNIVERSITY

TABLE XVII

ANNUAL BERMUDA GRASS MAINTENANCE CHARGES (PER ACRE)

BERMUDA GRASS MAINTENANCE(N-P-K)
SANDY LOAM SOIL
SOUTHEASTERN OKLAHOMA

OPERATING INPUTS:	UNITS	PRICE	QUANTITY	VALUE	YOUR VALUE
NITROGEN (N)	LBS.	0.250	200.000	50.00	______
PHOSPH (P205)	LBS.	0.260	40.000	10.40	______
POTASH (K20)	LBS.	0.130	80.000	10.40	______
RNTFERTSPRD/ACRE	ACRE	1.250	5.000	6.25	______
2-4-D	ACRE	2.500	0.330	0.82	______
ANNUAL OPERATING CAPITAL	DOL.	0.140	29.642	4.15	______
LABOR CHARGES	HR.	4.250	0.565	2.40	______
MACHINERY FUEL,LUBE,REPAIRS	ACRE			2.82	______
TOTAL OPERATING COST				87.24	______

FIXED COSTS		VALUE	YOUR VALUE
MACHINERY			
INTEREST AT 14.0%	DOL.	2.276	______
DEPR.,TAXES,INSUR.	DOL.	2.060	______
LAND			
INTEREST AT 0.0%	DOL.	0.000	______
TAXES	DOL.	0.000	______
TOTAL FIXED COSTS		4.34	______

PRODUCTION:	UNITS	PRICE	QUANTITY	VALUE	YOUR VALUE
BERMUDA PASTURE	AUMS	0.000	7.100	0.00	______
RETURNS ABOVE TOTAL OPERATING COSTS				-87.24	______
RETURNS ABOVE ALL COSTS EXCEPT OVERHEAD,RISK AND MANAGEMENT				-91.58	______

2,4-D EVERY THREE YEARS
USING ONLY N-P-K FERTILIZER WITH RENTED SPREADER
PAT MCCOLLOCH

PROCESSED BY DEPT. OF AGRI. ECON. - OKLAHOMA STATE UNIVERSITY
PROGRAM DEVELOPED BY DEPT. OF AGRI. ECON. OKLAHOMA STATE UNIVERSITY

TABLE XVIII

ANNUAL FESCUE MAINTENANCE CHARGES (PER ACRE)

FESCUE PASTURE (STOCK PILE)
GRAZED DECEMBER THRU MAY
SOUTHEASTERN OKLAHOMA

OPERATING INPUTS:	UNITS	PRICE	QUANTITY	VALUE	YOUR VALUE
NITROGEN (N)	LBS.	0.250	120.000	30.00	________
PHOSPH (P205)	LBS.	0.260	60.000	15.60	________
POTASH (K2O)	LBS.	0.100	60.000	6.00	________
RNTFERTSPRD/ACRE	ACRE	1.250	2.000	2.50	________
ANNUAL OPERATING CAPITAL	DOL.	0.140	29.494	4.13	________
LABOR CHARGES	HR.	4.250	0.094	0.40	________
MACHINERY FUEL, LUBE, REPAIRS	ACRE			0.43	________
TOTAL OPERATING COST				59.06	________

FIXED COSTS		VALUE	YOUR VALUE
MACHINERY			
INTEREST AT 14.0%	DOL.	0.291	________
DEPR., TAXES, INSUR.	DOL.	0.271	________
LAND			
INTEREST AT 0.0%	DOL.	0.000	________
TAXES	DOL.	0.000	________
TOTAL FIXED COSTS		0.56	________

PRODUCTION:	UNITS	PRICE	QUANTITY	VALUE	YOUR VALUE
PASTURE	AUMS	0.000	8.300	0.00	________
RETURNS ABOVE TOTAL OPERATING COSTS				-59.06	________
RETURNS ABOVE ALL COSTS EXCEPT OVERHEAD, RISK AND MANAGEMENT				-59.62	________

USING N-P-K
GRAZING IS DEFERRED UNTIL DEC 1ST
PAT MCCOLLOCH

PROCESSED BY DEPT. OF AGRI. ECON. - OKLAHOMA STATE UNIVERSITY
PROGRAM DEVELOPED BY DEPT. OF AGRI. ECON. OKLAHOMA STATE UNIVERSITY

TABLE XIX

ANNUAL NATIVE PASTURE MAINTENANCE
CHARGES (PER ACRE)

NATIVE GRASS MAINTENANCE(N-P-K)
SANDY LOAM SOIL
SOUTHEASTERN OKLAHOMA

OPERATING INPUTS:	UNITS	PRICE	QUANTITY	VALUE	YOUR VALUE
2-4-D	ACRE	1.400	0.250	0.35	
NITROGEN (N)	LBS.	0.270	80.000	21.60	
PHOSPH (P205)	LBS.	0.250	30.000	7.50	
POTASH (K20)	LBS.	0.130	60.000	7.80	
RNTFERTSPRD/ACRE	ACRE	1.250	5.000	6.25	
ANNUAL OPERATING CAPITAL	DOL.	0.140	15.419	2.16	
LABOR CHARGES	HR.	4.250	0.296	1.26	
MACHINERY FUEL,LUBE,REPAIRS	ACRE			1.25	
TOTAL OPERATING COST				48.17	

FIXED COSTS		VALUE	YOUR VALUE
MACHINERY			
INTEREST AT 14.0%	DOL.	0.854	
DEPR.,TAXES,INSUR.	DOL.	0.812	
LAND			
INTEREST AT 0.0%	DOL.	0.000	
TAXES	DOL.	0.000	
TOTAL FIXED COSTS		1.67	

PRODUCTION:	UNITS	PRICE	QUANTITY	VALUE	YOUR VALUE
PASTURE	AUMS	0.000	4.020	0.00	
RETURNS ABOVE TOTAL OPERATING COSTS				-48.17	
RETURNS ABOVE ALL COSTS EXCEPT OVERHEAD,RISK AND MANAGEMENT				-49.84	

2,4-D EVERY FOUR YEARS
USING ONLY N-P-K FERTILIZER WITH RENTED SPREADER
PAT MCCOLLOCH

PROCESSED BY DEPT. OF AGRI. ECON. - OKLAHOMA STATE UNIVERSITY
PROGRAM DEVELOPED BY DEPT. OF AGRI. ECON. OKLAHOMA STATE UNIVERSITY

TABLE XX

PER HEAD COSTS AND RETURNS -- HIGH PASTURE PRODUCTION

COW CALF COST AND RETURN PER COW, 100 COW UNIT
SPRING CALVING
NATIVE PASTURE

OPERATING INPUTS:	UNITS	PRICE	QUANTITY	VALUE	YOUR VALUE
41-45% PRO. SUP.	LBS.	0.185	252.000	46.62	________
BERMUDA HAY	TONS	52.000	1.120	58.24	________
SALT & MIN.	LBS.	0.090	26.880	2.42	________
VET & MED.	DOL.	5.000	1.000	5.00	________
HAULING & MKTG.	CWT.	2.250	4.220	9.49	________
PERSONAL TAXES	HD.	2.000	1.030	2.06	________
LVSTOCK SUPPLIES	HD.	3.250	1.000	3.25	________
HERD BULLS	CWT.	100.000	0.140	14.00	________
PARASITE CONTROL	DOL.	3.500	1.000	3.50	________
ANNUAL OPERATING CAPITAL	DOL.	0.140	81.402	11.40	________
MACHINERY LABOR	HR.	4.250	3.420	14.53	________
EQUIPMENT LABOR	HR.	4.250	0.540	2.29	________
LIVESTOCK LABOR	HR.	4.250	5.650	24.01	________
MACHINERY FUEL,LUBE,REPAIRS	DOL.			21.09	________
EQUIPMENT FUEL,LUBE,REPAIRS	DOL.			1.64	________
TOTAL OPERATING COST				219.55	________

FIXED COSTS	AMOUNT	VALUE		YOUR VALUE
MACHINERY				
INTEREST AT 14.00%	44.35	6.21		________
DEPR., TAXES INSURANCE		7.83		________
EQUIPMENT				
INTEREST AT 14.00%	77.70	10.88		________
DEPR., TAXES INSURANCE		7.82		________
LIVESTOCK				
BEEF COW	624.00		________	
BEEF BULL	27.00		________	
BEEF HEIFER	66.00		________	
INTEREST AT 14.00%	717.00	100.38		________
DEPR., TAXES INSURANCE		11.90		________
LAND				
NATIVE PASTURE 9.82 AUMS		0.00		________
INTEREST AT 0.00%	0.00	0.00		________
TAXES		0.00		________
TOTAL FIXED COST			145.02	________

PRODUCTION:	UNITS	PRICE	QUANTITY	VALUE	YOUR VALUE
STR CALVES (4-50	CWT.	72.000	1.849	133.13	________
HFR CALVES (4-50	CWT.	64.000	1.255	80.35	________
COMMERCIAL COWS	CWT.	41.000	0.950	38.95	________
AGED BULLS	CWT.	46.000	0.160	7.36	________
TOTAL RECEIPTS				259.79	________
RETURNS ABOVE TOTAL OPERATING COSTS				40.24	________
RETURNS ABOVE ALL COSTS EXCEPT OVERHEAD,RISK,AND MANAGEMENT				-104.79	________

TABLE XXI

PER HEAD COSTS AND RETURNS -- LOW PASTURE PRODUCTION

COW CALF COST AND RETURN PER COW, 100 COW UNIT
SPRING CALVING
IMPROVED PASTURE

OPERATING INPUTS:	UNITS	PRICE	QUANTITY	VALUE	YOUR VALUE
BERMUDA HAY	TONS	52.000	0.504	26.21	______
SALT & MIN.	LBS.	0.090	26.880	2.42	______
VET & MED.	DOL.	5.500	1.120	6.16	______
PARASITE CONTROL	DOL.	4.000	1.120	4.48	______
HAULING & MKTG.	CWT.	2.250	4.410	9.92	______
PERSONAL TAXES	HD.	2.000	1.030	2.06	______
LVSTOCK SUPPLIES	HD.	3.500	1.120	3.92	______
HERD BULLS	CWT.	100.000	0.140	14.00	______
41-45% PRO. SUP.	LBS.	0.185	67.200	12.43	______
ANNUAL OPERATING CAPITAL	DOL.	0.140	40.978	5.74	______
MACHINERY LABOR	HR.	4.250	2.820	11.98	______
EQUIPMENT LABOR	HR.	4.250	0.700	2.97	______
LIVESTOCK LABOR	HR.	4.250	5.650	24.01	______
MACHINERY FUEL, LUBE, REPAIRS	DOL.			17.47	______
EQUIPMENT FUEL, LUBE, REPAIRS	DOL.			2.47	______
TOTAL OPERATING COST				146.25	______

FIXED COSTS		AMOUNT	VALUE		YOUR VALUE
MACHINERY					
INTEREST AT 14.00%		38.46	5.38		______
DEPR., TAXES INSURANCE			6.75		______
EQUIPMENT					
INTEREST AT 14.00%		118.20	16.55		______
DEPR., TAXES INSURANCE			11.81		______
LIVESTOCK					
BEEF COW		624.00		______	
BEEF BULL		27.00		______	
BEEF HEIFER		66.00		______	
INTEREST AT 14.00%		717.00	100.38		______
DEPR., TAXES INSURANCE			11.90		______
LAND					
FESCUE PASTURE	8.06 AUMS		0.00		______
BERMUDA PASTURE	4.14 AUMS		0.00		______
INTEREST AT 0.00%		0.00	0.00		______
TAXES			0.00		______
TOTAL FIXED COST				152.77	______

PRODUCTION:	UNITS	PRICE	QUANTITY	VALUE	YOUR VALUE
STR CALVES (4-50	CWT.	72.000	1.978	142.42	______
HFR CALVES (4-50	CWT.	64.000	1.333	85.31	______
COMMERCIAL COWS	CWT.	41.000	0.950	38.95	______
AGED BULLS	CWT.	46.000	0.160	7.36	______
TOTAL RECEIPTS				274.04	______

RETURNS ABOVE TOTAL OPERATING COSTS	127.79	______
RETURNS ABOVE ALL COSTS EXCEPT OVERHEAD, RISK, AND MANAGEMENT	-24.98	______

APPENDIX C

INITIAL LINEAR PROGRAMMING TABLEAUS

FOR THE REPRESENTATIVE FARM

ABBREVIATIONS USED IN LINEAR PROGRAMMING TABLEAUS

CCPAS	Cow-Calf Operation With High Pasture Production
CCSUP	Cow-Calf Operations With Low Pasture Production
NGCS	Native Pasture on Goldston-Carnasaw-Sacul
NCG	Native Pasture on Carnasaw-Goldston
NFL	Native Pasture on Felker Loam
BGCS	Bermuda Pasture on Goldston-Carnasaw-Sacul
BCG	Bermuda Pasture on Carnasaw-Goldston
BFL	Bermuda Pasture on Felker Loam
FGCS	Fescue Pasture on Goldston-Carnasaw-Sacul
FCG	Fescue Pasture on Carnasaw-Goldston
FFL	Fescue Pasture on Felker Loam
BUYSUP	Purchase of Supplement
BUYHAY	Purchase of Hay
CAPBRW	Borrowed Capital
JLABY	January Purchase of Labor
FLABY	February Purchase of Labor
MLABY	March Purchase of Labor
ALABY	April Purchase of Labor
MYLABY	May Purchase of Labor
JNLABY	June Purchase of Labor
JYLABY	July Purchase of Labor
AGLABY	August Purchase of Labor
SLABY	September Purchase of Labor
OLABY	October Purchase of Labor

NLABY	November Purchase of Labor
DLABY	December Purchase of Labor
JPAS	January Pasture Production or Requirement
FPAS	February Pasture Production or Requirement
MPAS	March Pasture Production or Requirement
APAS	April Pasture Production or Requirement
MYPAS	May Pasture Production or Requirement
JNPAS	June Pasture Production or Requirement
JYPAS	July Pasture Production or Requirement
AGPAS	August Pasture Production or Requirement
SPAS	September Pasture Production or Requirement
OPAS	October Pasture Production or Requirement
NPAS	November Pasture Production or Requirement
DPAS	December Pasture Production or Requirement
JLAB	January Labor Requirements or Availability
FLAB	February Labor Requirements or Availability
MLAB	March Labor Requirements or Availability
ALAB	April Labor Requirements or Availability
MYLAB	May Labor Requirements or Availability
JNLAB	June Labor Requirements or Availability
JYLAB	July Labor Requirements or Availability
AGLAB	August Labor Requirements or Availability
SLAB	September Labor Requirements or Availability
OLAB	October Labor Requirements or Availability
NLAB	November Labor Requirements or Availability
DLAB	December Labor Requirements or Availability
SUPTR	Supplement Requirements

HAYTR	Hay Requirements
OPCAP	Operating Capital Requirements
GCS	Goldston-Carnasaw-Sacul Soil
CG	Carnasaw-Goldston Soil
FL	Felker Loam
GCSSL	Soil Loss on Goldston-Carnasaw-Sacul
CGSL	Soil Loss on Carnasaw-Goldston
FLSL	Soil Loss on Felker Loam

TABLE XXII

INITIAL LINEAR PROGRAMMING TABLEAUS FOR THE REPRESENTATIVE FARM

		CCPAS	CCSUP	NGCS	NCG	NFL	BGCS	BCG	BFL	FGCS	FCG	FFL	BUYSVP	BUYHAY	CAPBRW	JLABY	FLABY	MLABY	ALABY	MYLABY	JNLABY	JYLABY	AGLABY	SLABY	OLABY	NLABY	DLABY	B
C	N	C	C	-B	-B	-B	-B	-B	-B	-B	-B	-B	-T	-B	-T	-A	-A	-A	-A	-A	-A	-A	-A	-A	-A	-A	-A	
JPAS	L	T	T	-T	-T	-T				-A	-A	-A																
FPAS	L	T	T	-T	-T	-T	-U	-U	-U	-A	-A	-A																
MPAS	L	A	T	-T	-T	-T	-T	-T	-T	-A	-A	-A																
APAS	L	A	T	-T	-T	-T	-T	-T	-T	-1	-1	-1																
MYPAS	L	A	A	-T	-T	-T	-1	-1	-1																			
JNPAS	L	A	A	-T	-T	-T	-A	-A	-A																			
JYPAS	L	A	A	-T	-T	-T	-A	-A	-A																			
AGPAS	L	A	A	-T	-T	-T	-A	-A	-A																			
SPAS	L	A	A	-T	-T	-T	-1	-1	-1																			
OPAS	L	A	A	-T	-T	-T	-T	-T	-T	-1	-1	-1																
NPAS	L	A	A	-T	-T	-T				-A	-A	-A																
DPAS	L	T	T	-T	-T	-T				-A	-A	-A																
JLAB	L	T	T													-1												C
FLAB	L	T	A							U	U	U					-1											C
MLAB	L	T	T															-1										C
ALAB	L	T	T	U	U	U	U	U	U										-1									C
MYLAB	L	T	T	T	T	T	U	U	U											-1								C
JNLAB	L	T	T	U	U	U	T	T	T												-1							C
JYLAB	L	T	T	U	U	U	U	U	U													-1						C
AGLAB	L	T	T	U	U	U	U	U	U														-1					C
SLAB	L	T	T							U	U	U												-1				C
OLAB	L	A	A																						-1			C
NLAB	L	T	T																							-1		C
DLAB	L	T	T																								-1	C
SUPTR	L	B	C										-1															
HAYTR	L	T	A											-1														
OPCAP	L	B	B	B	B	B	B	B	B	B	B	B			-1													
GCS	E			1			1			1																		B
CG	E				1			1			1																	B
FL	E					1			1			1																B
GCSSL	N			A			T			T																		
CGSL	N				A			T			T																	
FLSL	N					A			U			U																

TABLE XXII (Continued)

MPSX/370 R1.6 PTF9 MCCURTN

SUMMARY OF MATRIX

SYMBOL	RANGE			COUNT (INCL.RHS)
Z	LESS	THAN	.000001	
Y	.000001	THRU	.000009	
X	.000010		.000099	
W	.000100		.000999	
V	.001000		.009999	
U	.010000		.099999	35
T	.100000		.999999	87
1	1.000000		1.000000	36
A	1.000001		10.000000	59
B	10.000001		100.000000	25
C	100.000001		1,000.000000	15
D	1,000.000001		10,000.000000	
E	10,000.000001		100,000.000000	
F	100,000.000001		1,000,000.000000	
G	GREATER	THAN	1,000,000.000000	

MINIMUM = .500000E-01 MAXIMUM = .252000E+03

TABLE XXII (Continued)

MPSX/370 R1.6 PTF9 MCCURTN

ACTIVITY	CCPAS	CCSUP	NGCS	NCG	NFL	BGCS	BCG	BFL	1....1 ACTIVITY
	.	.	.	.	.	.	.	.	
C	211.13000	181.86000	44.75000-	44.75000-	44.75000-	82.93000-	98.83000-	98.83000-	C
JPAS	.67000	.27000	.20000-	.20000-	.20000-	.	.	.	JPAS
FPAS	.90000	.22000	.33000-	.33000-	.33000-	.10000-	.10000-	.10000-	FPAS
MPAS	1.12000	.44000	.33000-	.33000-	.33000-	.20000-	.20000-	.20000-	MPAS
APAS	1.12000	.78000	.33000-	.33000-	.33000-	.50000-	.50000-	.50000-	APAS
MYPAS	1.12000	1.12000	.40000-	.40000-	.40000-	1.00000-	1.00000-	1.00000-	MYPAS
JNPAS	1.12000	1.12000	.40000-	.40000-	.40000-	1.25000-	1.25000-	1.25000-	JNPAS
JYPAS	1.12000	1.12000	.40000-	.40000-	.40000-	1.25000-	1.25000-	1.25000-	JYPAS
AGPAS	1.12000	1.12000	.40000-	.40000-	.40000-	1.25000-	1.25000-	1.25000-	AGPAS
SPAS	1.12000	1.12000	.40000-	.40000-	.40000-	1.00000-	1.00000-	1.00000-	SPAS
OPAS	1.12000	1.12000	.33000-	.33000-	.33000-	.50000-	.50000-	.50000-	OPAS
NPAS	1.12000	1.12000	.30000-	.30000-	.30000-	.	.	.	NPAS
DPAS	.67000	.27000	.20000-	.20000-	.20000-	.	.	.	DPAS
JLAB	.80000	.84000	.	.	.	.	.	.	JLAB
FLAB	.96000	1.06000	.	.	.	.	.	.	FLAB
MLAB	.86000	.90000	.	.	.	.	.	.	MLAB
ALAB	.75000	.73000	.05000	.05000	.05000	.05000	.05000	.05000	ALAB
MYLAB	.58000	.62000	.11000	.11000	.11000	.05000	.05000	.05000	MYLAB
JNLAB	.64000	.68000	.05000	.05000	.05000	.13000	.13000	.13000	JNLAB
JYLAB	.64000	.62000	.05000	.05000	.05000	.05000	.05000	.05000	JYLAB
AGLAB	.64000	.68000	.05000	.05000	.05000	.05000	.05000	.05000	AGLAB
SLAB	.58000	.62000	.	.	.	.	.	.	SLAB
OLAB	1.24000	1.34000	.	.	.	.	.	.	OLAB
NLAB	.70000	.62000	.	.	.	.	.	.	NLAB
DLAB	.80000	.84000	.	.	.	.	.	.	DLAB
SUPTR	67.20000	252.00000	.	.	.	.	.	.	SUPTR
HAYTR	.50000	1.12000	.	.	.	.	.	.	HAYTR
OPCAP	40.98000	81.40000	15.42000	15.42000	15.42000	40.09000	40.09000	40.09000	OPCAP
GCS	.	.	1.00000	.	.	1.00000	.	.	GCS
CG	.	.	.	1.00000	.	.	1.00000	.	CG
FL	.	.	.	.	1.00000	.	.	1.00000	FL
GCSSL	.	.	2.75000	.	.	.22000	.	.	GCSSL
CGSL	.	.	.	4.22000	.	.	.33000	.	CGSL
FLSL	.	.	.	.	1.20000	.	.	.09000	FLSL

TABLE XXII (Continued)

MPSX/370 R1.6 PTF9 MCCURTN

ACTIVITY	FGCS	FCG	FFL	BUYSVP	BUYHAY	CAPBRW	JLABY	FLABY	2....1 ACTIVITY
	.	.	.	.	.	.	.	.	
C	58.13000-	68.95000-	68.95000-	.18400-	52.00000-	.14000-	4.25000-	4.25000-	C
JPAS	1.25000-	1.25000-	1.25000-	.	.	.	.	.	JPAS
FPAS	1.25000-	1.25000-	1.25000-	.	.	.	.	.	FPAS
MPAS	1.25000-	1.25000-	1.25000-	.	.	.	.	.	MPAS
APAS	1.00000-	1.00000-	1.00000-	.	.	.	.	.	APAS
OPAS	1.00000-	1.00000-	1.00000-	.	.	.	.	.	OPAS
NPAS	1.25000-	1.25000-	1.25000-	.	.	.	.	.	NPAS
DPAS	1.25000-	1.25000-	1.25000-	.	.	.	.	.	DPAS
JLAB	.	.	.	.	.	.	1.00000-	.	JLAB
FLAB	.05000	.05000	.05000	.	.	.	.	1.00000-	FLAB
SLAB	.05000	.05000	.05000	.	.	.	.	.	SLAB
SUPTR	.	.	.	1.00000-	.	.	.	.	SUPTR
HAYTR	.	.	.	.	1.00000-	.	.	.	HAYTR
OPCAP	37.27000	37.27000	37.27000	.	.	1.00000-	.	.	OPCAP
GCS	1.00000	.	.	.	.	.	.	.	GCS
CG	.	1.00000	.	.	.	.	.	.	CG
FL	.	.	1.00000	.	.	.	.	.	FL
GCSSL	.22000	.	.	.	.	.	.	.	GCSSL
CGSL	.	.33000	.	.	.	.	.	.	CGSL
FLSL	.	.	.09000	.	.	.	.	.	FLSL

MPSX/370 R1.6 PTF9 MCCURTN

ACTIVITY	MLABY	ALABY	MYLABY	JNLABY	JYLABY	AGLABY	SLABY	OLABY	3....1 ACTIVITY
	.	.	.	.	.	.	.	.	
C	4.25000-	4.25000-	4.25000-	4.25000-	4.25000-	4.25000-	4.25000-	4.25000-	C
MLAB	1.00000-	.	.	.	.	.	.	.	MLAB
ALAB	.	1.00000-	.	.	.	.	.	.	ALAB
MYLAB	.	.	1.00000-	.	.	.	.	.	MYLAB
JNLAB	.	.	.	1.00000-	.	.	.	.	JNLAB
JYLAB	.	.	.	.	1.00000-	.	.	.	JYLAB
AGLAB	.	.	.	.	.	1.00000-	.	.	AGLAB
SLAB	.	.	.	.	.	.	1.00000-	.	SLAB
OLAB	.	.	.	.	.	.	.	1.00000-	OLAB

TABLE XXII (Continued)

MPSX/370 R1.6 PTF9 MCCURTN

	NLABY	DLABY	B	
ACTIVITY	.	.	.	ACTIVITY
C	4.25000-	4.25000-	.	C
JLAB	.	.	117.00000	JLAB
FLAB	.	.	108.00000	FLAB
MLAB	.	.	154.00000	MLAB
ALAB	.	.	144.00000	ALAB
MYLAB	.	.	160.00000	MYLAB
JNLAB	.	.	160.00000	JNLAB
JYLAB	.	.	168.00000	JYLAB
AGLAB	.	.	160.00000	AGLAB
SLAB	.	.	156.00000	SLAB
OLAB	.	.	148.00000	OLAB
NLAB	1.00000-	.	156.00000	NLAB
DLAB	.	1.00000-	123.00000	DLAB
GCS	.	.	100.00000	GCS
CG	.	.	69.00000	CG
FL	.	.	66.00000	FL

VITA 2

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