MINIMUM RESOURCE REQUIREMENTS AND ADJUSTMENT ALTERNATIVES FOR LIVESTOCK PRODUCERS ON THE EASTERN PRAIRIES OF OKLAHOMA

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PREFACE

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CHAPTER I

INTRODUCTION

This agricultural resource adjustment study is applicable to livestock farms on the eastern prairie soils of East Central and South Central Oklahoma. The purpose of the study is to provide information for use in resource adjustment that is consistent with current and prospective economic conditions, a variety of farmer objectives and off-farm employment opportunities, and long run survival of farm units.

The need for resource adjustments is not unique to this area or to livestock farms. A dynamic economy with changing production technologies and product demands requires that resource adjustments be a continuing process if resource owners are to secure maximum returns from the use of their resources. If adjustments in resources are not made as economic conditions change, resources employed in the production of some products can be expected to earn a lower return than if used in the production of other products.

The area is selected for study because low farm incomes in the area indicate resource malallocation and imply a need for adjustments. Since livestock producers are the principal users of the agricultural resources of the area, any major agricultural resource adjustments will involve livestock producers.

Symptoms of Resource Malallocation

There are many indications that the allocation of resources between farm and nonfarm uses is not optimum and that an adjustment of resources from agricultural uses to non-agricultural uses is desirable. Some of the malallocation symptoms are:[1]

1. Lower returns to resources employed in agriculture than to similar resources employed in non-agricultural uses. The best estimates available show that per capita farm incomes are less than 60 percent of nonfarm incomes.[2]

2. High government costs incurred to subsidize resources used in agricultural production.

3. Excessive production of some agricultural products in terms of what can be sold at socially acceptable prices.[3]

Causes of Resource Malallocation

The causes of excess resources allocated to agriculture are many, varied, and complex. The following have been cited as causes for excess resources in agriculture.

1. The adoption of new technologies in agricultural production has reduced costs and increased output. The competitive structure of

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[1]Dale E. Hathaway, Government and Agriculture (New York, 1963), pp. 36-45.

[2]United States Department of Agriculture, Farm Income Situation, Economic Research Service (Washington, July, 1965), p. 54.

[3]Fred H. Tyner and Luther G. Tweeten, "Excess Capacity in U. S. Agriculture," Agricultural Economics Research, Vol. XVI, No. 1 (Washington, 1964), pp. 23-30.

agriculture encourages rapid adoption of available new technologies. The specialized nature of some inputs reduces their mobility once committed to agricultural production even though a new technology may have rendered them obsolete.

2. The nature of the demand for farm products may contribute to resource malallocation over a period of time since most agricultural products have low elasticities of both price and income demands.

3. The goals and values of farm people may not coincide with the requirements of measurable economic efficiency.[4]

4. The performance of the national economy may influence the adjustments of resources. Resource transfers from agriculture may be impeded by unemployment in the nonfarm sectors, by labor union entry restrictions into some occupations, and by minimum wage legislation.

5. There may be a lack of information concerning alternative employment opportunities.

6. Government intervention may prevent free market prices for agricultural products and resource inputs, thereby keeping resource returns in agriculture above that of free market conditions.

Resource adjustments have been occurring rapidly within agriculture and between agricultural and nonagricultural sectors. The total number of farms has decreased, average farm size has increased, and net farm labor outmigration has occurred.[5] Despite these relatively rapid

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[4]Olaf F. Larson, "Basic Goals and Values of Farm People," Goals and Values in Agricultural Policy (Ames, 1961), pp. 143-157 and John M. Brewster, "Society Values and Goals in Respect to Agriculture," Goals and Values in Agricultural Policy (Ames, 1961), pp. 114-137.

[5]U. S. Department of Commerce, U. S. Census of Agriculture, 1950, 1954, 1959, Bureau of the Census (Washington, 1950, 1954, 1959).

resource adjustments in recent years, the symptoms of resource maldistribution still exist for the United States in general and some areas particularly.

The Problem

In general terms, the agricultural problem can be defined as excess resources used in agricultural production. Given that net national product would be increased by the transfer of resources -- especially labor -- from farm to nonfarm uses, the immediate problem is the most efficient way to accomplish this transfer. Decision makers at all levels need information about possible consequences of alternative adjustments. Generally, adjustment information is needed by two groups of decision makers, (1) farmers who face adjustments on or off the farm and (2) administrators and policy makers concerned with the area effects of agricultural adjustments.

Those who make adjustments and remain in farming must decide (1) how many and what kinds of resources are needed to secure an "opportunity cost" or prespecified level of income to the human and nonhuman resources involved; and (2) how these resources should be organized, i.e., what crops, pastures and livestock activities should be utilized. These problems are often expressed by farmers as "How much land or capital do I need to make a living?", "Can I make a living on 160 acres?" or "Would cows or steers make more money?"

Problems also are created by the adjustment process itself. As the number of farms and farmers in an area decreases, the impact may extend to schools, government services, and farm supply

businesses.[6] The farm community is affected by changes in demands for productive inputs and by changes in its social structure as resources leave the farm. The social and economic structure of the nonfarm community or sector is affected by the necessity of absorbing the farm resources into nonfarm uses. The economic impact of farm adjustments on any given geographic area depends on how total economic activity is affected and on how demands for particular products or resources are affected.

This study will not consider the detailed effects of farm adjustments on the area economy such as whether total economic activity will be decreased or whether the demand for specific farm inputs will change.[7] However, the study will provide information as to the quantities of resources for which nonfarm employment will be required under specified conditions.

The Objective

The major objective is to determine the nature and magnitude of adjustments needed to obtain specified minimum income levels to livestock producers on the eastern prairies of Oklahoma under alternative potential adjustments. More specifically the objective includes the determination of:

1. The impact of off-farm employment on enterprise combinations

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[6]Odell L. Walker, Luther G. Tweeten, and Larry J. Connor, "Potential Economic and Social Adjustments in the Southwest," Proceedings of Agricultural Economics and Rural Sociology Section, Southwest Social Science Association Meeting (Dallas, Texas, March, 1964), pp. 1-24.

[7]For a study of this type see: Carl E. Olson, "The Impact of Agricultural Resource Adjustments on the Economy of Southwestern Oklahoma" (Unpublished Ph.D. dissertation, Oklahoma State University, 1966).

and on the minimum amounts of land, capital and labor required for specified levels of income to operator owned resources.

2. The effect of yield levels or yield expectations on enterprise combinations and minimum resources required for specified levels of income to operator owned resources.

3. The importance of owner equity in land, machinery, and livestock to enterprise combinations and minimum resources required to obtain specified levels of income to operator owned resources.

4. The effect land quality has on enterprise combinations and minimum resources required for specified levels of income to operator owned resources.

The Geographic Area

The geographic areas to which this study applies are Oklahoma Economic Areas Six and Eight as designated by the 1959 Census of Agriculture. More specifically, the area consists of all or part of the thirty east central and south central counties as shown in Figure 1. The 1959 Census of Agriculture shows the area contains approximately ten million acres of farmlands divided into 34,450 farm units.[8] Statistical data for selected items of interest for the area and the relative importance of each to state totals is presented in Appendix A, Table I. In general, the area contains a high proportion of the population and farm units of the state; however, farm size, annual farm income, cropland per farm, and value of land and buildings per farm are

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[8]U. S. Department of Commerce, U. S. Census of Agriculture 1959, Bureau of the Census (Washington, 1959).

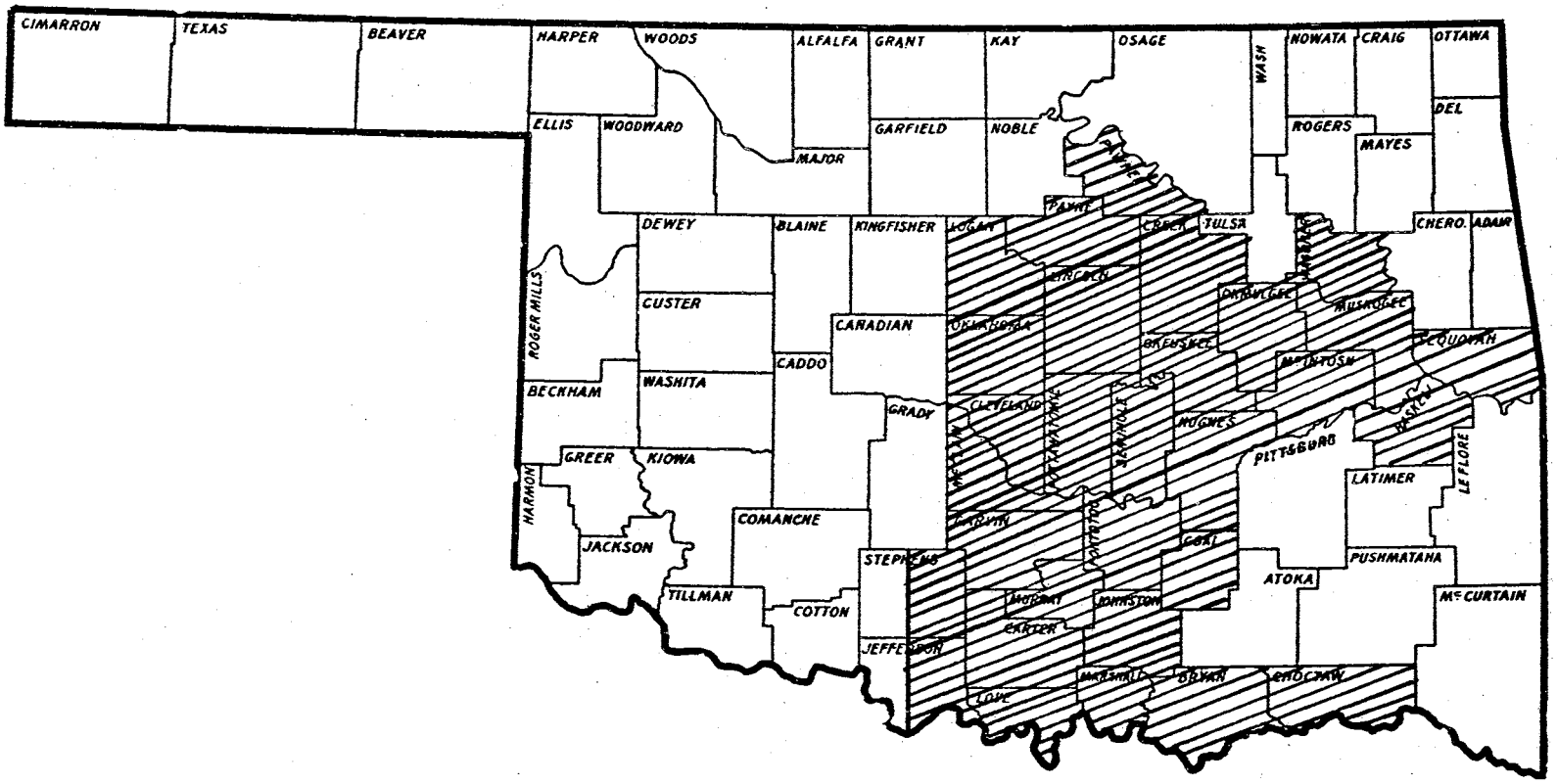

Figure 1. Map of Oklahoma Showing the Area of Study

all below the average for the state.

The proximity of the study area to the urban centers of the state may be an important factor in agricultural adjustments. The cities of Ada, Ardmore, Norman, Oklahoma City, Okmulgee, Muskogee, Sapulpa, Seminole, Shawnee, and Stillwater are located in the study area; while Tulsa, Duncan, McAlester, and Fort Smith, Arkansas are near the area. Therefore, residents have access to a high percentage of the nonfarm employment centers of the state.

Climatically the area is adapted to the production of a large variety of crops and livestock enterprises. Average annual rainfall varies from 30 inches in the west to 42 inches in the east, and there is an average of 225 frost free days during the year.[9]

The soil resource base of the area is rather heterogenous with large acreages of cross timber soils interspersed with prairie soils throughout the area.[10] Soil resources also include the bottomlands and associated terrace soils along the Arkansas, Red, Cimarron, and Canadian rivers and the lesser streams of the area. Three major prairie soil types are found within the area. The central reddish prairie soils are found primarily along the western edge of the area from Pawnee south to Pauls Valley. The Eastern or Cherokee prairie soils are concentrated in the Wagoner, Muskogee, Okmulgee area and extend south to Johnson County. The Grand Prairie soils are in and along the southern part of the area from Carter County east to Choctaw

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[9]Ibid., Climatological Data, Oklahoma, Annual Summary 1965, Vol. 74, No. 13 (Washington, 1960), pp. 220-224.

[10]Fenton Gray and H. M. Galloway, Soils of Oklahoma, Oklahoma Agricultural Experiment Station, Mis. Pub. MP-56 (Stillwater, 1959).

County.

About 70 percent, or 7,000,000 acres, of the total farm land in the area was classified as in either livestock farms or livestock ranches by the 1959 census of agriculture, as shown in Appendix A, Table II. The census classification was considered more heterogenous than desired for an adjustment study. To provide the homogenity of institutions, soil type, and type of farming that was desired for this study, the following were excluded from the census classifications: (1) livestock farms and ranches on bottomland, terrace, and cross timber soils; (2) livestock farms and ranches with acreage allotments of cotton, wheat, or peanuts, and (3) livestock ranches where farm size and method of operation are distinctly different than livestock farms. The exclusions are described in Appendix A, Table III.

Livestock farms on the soil resource base thus defined represent approximately 16 percent, or 1,600,000 acres, of the total farm area represented in Figure 1. The farms are not necessarily contiguous but are concentrated in Creek, Okmulgee, Muskogee, Okfuskee, Wagoner, Hughes, and Coal counties, those with large acreages of eastern prairie soils. The study area can be visualized as consisting of livestock farms that are located between the good prairie crop soils and the rougher cross timber soils, and actually shading over into each.

Since the study area does not conform to any census or political subdivision, descriptive information for these farms (such as average farm size and annual farm income) is limited. For example, the 1959 census of Agriculture reported 16,325 livestock farms (average size of 205 acres) and 7,893 livestock ranches (average size of 550 acres)

for the entire area.[11] The study area, as defined above, includes some farms in each classification, but how many and what size would involve a more intensive sampling than seemed justified. Where specific information for the study area is not available -- such as average farm size and average farm income -- the average for the entire area as given in Appendix A, Table I will be used.

Previous Research

The concept of "minimum resources for specified income levels" is relatively new in agricultural research. Brewster of the United States Department of Agriculture set forth the basic concepts of minimum resource research in 1957.[12] In this work, Brewster raised the following questions that minimum resource research could help answer:

> What bundle of resources is needed to enable farmers with average ability to obtain earnings (labor and management) similar to the median earnings of semiskilled and skilled workers in nonfarm employment? . . . For various regions and types of farming systems, what bundle of resources represents the minimum size of farms and the minimum earnings that would offer a reasonable chance for success? . . . What is the nature and magnitude of the adjustments involved in raising all farms that are now below a specified level of operator earnings up to that level?[13]

Brewster's 1957 work considered the minimum resources required for specified income levels in six different areas by types of farms. The

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[11] See Appendix A, Table I.

[12] John M. Brewster, Farm Resources Needed for Specified Income Levels, Agricultural Research Service, USDA, Agricultural Information Bulletin No. 180 (Washington, 1957).

[13] Ibid., p. 4.

USDA expanded Brewster's early work to include 15 major types of farming areas in 1962 and to 29 types of farming areas in 1964.[14]

Brewster discussed the methodological problems of a minimum resource study at the Southern Farm Management Research Committee meeting in October, 1957.[15] In this paper he discussed the methodological problems of (1) the attributes of the income requirements, (2) the resource to be minimized, and (3) the construction of resource situations to be considered.

Strickland determined minimum resource requirements for an area in the low rolling plains of Southwestern Oklahoma.[16] This study used variable hired labor prices, land prices, and soil types. It also introduced the concept of owned resources (nonlabor resources owned by the operator) into minimum resource studies.

Plaxico and Goodwin presented a paper at the Agricultural Policy Institute in North Carolina in 1961, in which they compared the minimum resources needed to obtain the equivalent of an average factory wage for three areas of the south under alternative assumptions with

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[14]Harold E. Barnhill, Resource Requirements on Farms for Specified Operator Incomes, Economic Research Service, USDA, Agricultural Economics Report No. 5 (Washington, 1964).

[15]John M. Brewster, "Analyzing Minimum Resource Requirements for Specified Income Levels," Farm Size and Output Research, South Cooperative Series, Bulletin No. 56 (Stillwater, Oklahoma, June, 1958).

[16]Percy L. Strickland Jr., James S. Plaxico, and William F. Lagrone, Minimum Land Requirements for Specified Income Levels, Southwestern Oklahoma, Oklahoma Agricultural Experiment Station, Bulletin B-608 (Stillwater, 1963).

respect to product prices and institutional restrictions.[17]

Varley and Tolley pointed out the aggregate effects on input prices within an area if adjustments are made.[18] Prices of factors fixed to the area, such as land, will change as adjustments are made. The minimum resource model under varying land prices approaches the profit maximization model -- or economic equilibrium -- under these conditions. The theoretical framework developed by Varley and Tolley will be used in this analysis and is discussed in more detail in Chapter II.

Connor further developed the analytical approach suggested by Varley and Tolley and applied this method to a minimum resource study of the Oklahoma Panhandle.[19] Connor's study extended the owned resource concept as an adjustment criterion under different yields, land prices and soil resource conditions.[20] The operational model developed by Connor will be utilized in the remainder of this study.

Other studies using the minimum resource approach are those by

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[17]James S. Plaxico and John W. Goodwin, "Minimum Land and Capital Required for Farmers to Earn an Average Factory Wage," Agricultural Policy Review, North Carolina State College, The Agricultural Policy Institute (Raleigh, N. C., 1961).

[18]A. P. Varley and G. S. Tolley, "Simultaneous Target Planning for Farms and the Area," Journal of Farm Economics, XLIV (1962), pp. 979-991.

[19]Larry Jean Connor, "Long-Run Adjustment Hypotheses for Farm Operators in a Sparsely Populated, High-Risk Area of the Great Plains" (Unpublished Ph.D. Dissertation, Oklahoma State University, 1964).

[20]Larry J. Connor and Odel L. Walker, Potential Long-Run Adjustments for Oklahoma Panhandle Farms, Oklahoma Agricultural Experiment Station, Technical Bulletin T-114 (Stillwater, 1965).

Tyner,[21] Lanham,[22] Tweeten,[23] and Jones.[24]

Economic Terminology

In Economics, certain terms are used with the assumption that their meanings are well defined and need no explanation. Only when these terms are used in a context different than that usually used is an explanation necessary. Hypothesis, criterion, opportunity costs, and opportunity returns are such terms. As used in this study, these terms will imply the usual Economic meanings; however, since they are used quite frequently a short explanation is presented.

Hypothesis is used to indicate a proposition that is offered as a theoretical or factual solution of a problem (e.g., how will farms in the study area adjust?). The purpose of formulating a hypothesis is to serve as a guide for further investigation. In some usage it may indicate a possible explanation of some economic phenomena of interest.

Criterion, as used in this study, will mean a standard or a rule

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[21]Fred H. Tyner, Jr., "Minimum Land Requirements for Specified Levels of Income in the Delta Area of Mississippi" (Unpublished M. S. Thesis, Mississippi State University, 1962).

[22]W. J. Lanham and A. J. Coutu, Area Resource Adjustments for Specified Net Revenue Goals and Levels of Factor Prices on Farms in Economic Area 7, North Carolina, A.E. Information Series No. 109, Department of Agricultural Economics (Raleigh, N. C., 1964).

[23]Luther G. Tweeten, Alan W. Reichardt, and William F. Lagrone, Profitable Plans for Farms in the Major Bottomlands of South Central and East Central Oklahoma, Oklahoma Agricultural Experiment Station, Bulletin B-641 (Stillwater, 1965), pp. 25-35.

[24]Gary C. Jones, P. L. Strickland, Jr., and Earl J. Partenheimer, Minimum Open Land Requirements for a $5,000 Farm Income, Wiregrass Area Lower Coastal Plains Alabama, Agricultural Economic Series 6, Agricultural Experiment Station of Auburn University (Auburn, Alabama, 1965).

for decision making. An adjustment criterion of a $5,000 operator income means that farm adjustments are assumed to be made until each farm operator in the area meets the standard of a $5,000 income.

The opportunity cost of a resource to a firm is the value of that resource in its best alternative use. An opportunity return is used to mean the return to a resource owner that can be secured from using the resource in its best alternative use. In this study the base opportunity cost of capital used in the farm business is assumed to be five percent of land capital and six percent of nonland capital.

Other terms with special meanings in this study will be defined in the appropriate part of the study.

Outline of Following Chapters

The order of presentation for the remainder of this dissertation is as follows:

Chapter II describes the decision environment and the concepts of the minimum resource model. The theoretical effect of different levels of off-farm employment, yields, operator equity, land quality, and operator income levels is evaluated using land as the resource to be minimized.

Chapter III describes the linear programming model and discusses the operational problems and research procedures relevant to this analysis. Restrictions and terminology applicable to the analysis are explained.

Chapter IV presents the effects of three levels of off-farm employment on the minimum resource requirements to obtain two income levels. Implications of the results for decision making at both the

individual and area level are discussed.

Chapter V presents the effects of three yield levels on the minimum resources required to secure specified incomes. Results are interpreted to include decision making under conditions of uncertainty.

Chapter VI presents the effects of five levels of operator equity on the amounts of resources required to obtain given incomes. Implications are explored of the amount of equity required and who will be able to adjust as full time livestock producers.

In Chapter VII, three land qualities are programmed to determine the effect of productivity on resource requirements. Implications of productivity on land pricing and labor requirement are explored.

Chapter VIII summarizes the results of the study and presents the conclusions and their implications.

CHAPTER II

DECISION ENVIRONMENT AND CONCEPTUAL DEVELOPMENT

The purposes of this chapter are to define the general decision environment that is relevant to the study and to outline the theoretical model within which adjustment potentials are to be analyzed.

Decisions are made by individuals, but it is virtually impossible to study all the individual decision environments of an area. Representation of decision units by homogenous groups is necessary so that the effects of key variables can be analyzed. The necessary homogenity, or representative decision situation, is secured by standardizing components of the decision environment that are not of special interest in the analysis. However, if the model is to have descriptive or predictive value, the decision environment assumed must be reasonably representative of that faced by many decision makers in the area.

The Decision Environment

By specifying the decision environment, many extraneous variables and certain levels of exogenous variables can be specified so that the effects of the variables of interest to the study can be analyzed. The components of the decision environment are (1) the objectives of the decision makers, (2) the technical production relationships, and (3) the economic relationships. Assumptions are therefore made about the components in order to analyze the effects of the variables of interest.

Motives and Objectives of Decision Makers

The objective assumed for this study is that managers attempt to secure at least a minimum income level from the resources they command and a motivation for adjustment exists when incomes fall below this minimum amount. Only in the special case where the minimum income is equal to the maximum profit would this hypothesis be consistent with the traditional economic objective of profit maximization.

Producers pursuing profit maximizing objectives under competitive conditions guarantee efficiency in production and correct allocation of resources among industries. Some economists have questioned whether producers actually do maximize profits and whether profits are the relevant criterion on which decisions are made.[1] These questions are especially relevant to agricultural decisions because farm management studies indicate that farmers may not in fact maximize profits, especially in the short run, that resources are not correctly allocated among industries and maximum economic growth is not attained. Therefore, motives other than profit may exist among farm managers.

Farm management research indicates that over a wide range of farm sizes total labor and management returns are practically a linear function of the number of acres.[2] If this is true and profit

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[1]William J. Baumol, Economic Theory and Operations Analysis (2d ed., Englewood Cliffs, 1965), pp. 295-310.

[2]James S. Plaxico and Daniel Capstick, Optimum Wheat-Beef Farming Systems in North Central Oklahoma, Okla. State Univ. Exp. Sta. Bul. B-532, August, 1959 and James H. White, James S. Plaxico, and William F. Lagrone, Influence of Selected Restraints on Normative Supply Relationships for Dryland Crop Farms on Loam Soils, Southwestern Oklahoma, Okla. State Univ. Exp. Sta. Tech. Bul. T-101, May, 1963.

maximization is the only objective, the problem of small farms and low returns to resources would not persist. However, small farms and low incomes have been a part of agriculture for several decades.

A part of the confusion about whether the profit maximizing objective is valid as a decision criterion hinges on the definition of profits. White has summarized some of the profit concepts and states:

> The goal or objective of the firm most widely accepted by economists and business men is the maximization of profits. Unfortunately, at least a part of this general agreement stems from a diversity of interpretations of the term profit and of the conditions under which this quantity is maximized . . . . In fact, all business decisions can be justified on the basis of profit maximization, given a suitable broad interpretation of this objective.[3]

White refers to Frank Knight's statement that "perhaps no term or concept in economic discussion is used with a more bewildering variety of well-established meanings than profit." White goes on to say that many contemporary writers have made much over the fact that pure profit must not include any return to entrepreneurs for wages or invested capital.[4] The attention is focused upon the residual return after such imputed costs are deducted.

White further points out that survival of the firm may rank higher as an objective than profits.

> The firm as a social and economic organization, like many other organisms, has a compelling urge to survive. More fundamental than the profit motive, the motive to survive is

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[3]C. Michael White, "Multiple Goals in the Theory of the Firm," Linear Programming and the Theory of the Firm, Ed. Kenneth E. Boulding and W. Allen Spivey (New York, 1960), p. 181.

[4]Ibid., p. 183.

> implicit in most decisions within the firm, though the possibility of organizational suicide should not be ruled out entirely . . . . In the short-run all positive profit may have to be sacrificed to permit survival.[5]

If profit is defined as the residual return to the entrepreneur after all money costs and imputed costs to operator labor and owned resources have been deducted, then profit maximization is the only objective consistent with long run firm survival and asset maintenance under pure competition. In summarizing some of the problems in the theory of the firm, Papandreau points to Higgins' work which indicates that in imperfect competition the entrepreneur may have some margin with which to pursue goals other than maximum profits.[6] Farmers generally operate in price elastic product markets; however, one explanation for farmers pursuing goals other than profit maximization and staying in business is their willingness to take less than an opportunity return for their owned resources in order to pursue goals other than profit maximization.

Farmers may place a high value on living in a particular community, working at a particular type of work, having more leisure time, or operating a firm larger than the profit maximizing size. If so, they may be willing to sacrifice some monetary returns in order to achieve these goals. In each case, however, a minimum monetary return exists, below which earnings are not allowed to fall.

Simon has argued that in many cases the calculations included in

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[5]Ibid., p. 189.

[6]Andrew G. Papandreau, "Some Basic Problems in the Theory of the Firm," A Survey of Contemporary Economics, Volume II, Ed. Bernard F. Haley (Homewood, 1952), pp. 183-222.

profit maximization are very complex and the key to the simplification of the choice processes is to replace the goal of profit maximization with the goal of satisficing or finding a course of action that is "good enough."[7] Watson states that the major trouble with a satisficing assumption would be to find a single clear definition of satisfactory profits.[8] However, he goes on to say that standards such as "a satisfactory income" can be useful in the analysis of a given company or industry at a given time. Baumol discusses the work of Simon and others who have used a satisficing objective, and questions whether they have provided a theory or an empirical approach and evidence for the construction of a theory.[9] Although the satisficing objective has some theoretical deficiencies, it presents some operational advantages and is used in this study.

Income Levels

The satisfactory income level is not the same for all operators. The needs and wants of the operator will determine the minimum income level acceptable, and the quantity and quality of operators' resources will determine the income level attainable. For this study two income levels are specified, a $3,000 income and a $5,000 income. These incomes are assumed to approximate the wage rates for unskilled and semiskilled nonfarm workers in the area. A $1,500 income level is also

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[7]Herbert A. Simon, Models of Man (New York, 1957), pp 204-205.

[8]Donald Stevenson Watson, Price Theory and Its Uses (Boston, 1963), p. 130.

[9]Baumol, p. 308.

used to approximate semi-retired or part-time farming situations.

Brewster has stated that ideally, the appropriate income levels to specify as the minimum acceptable would be industrial workers earnings adjusted for differences in the purchasing power of money, cost of living, and values of nonmonetary income.[10] That is, the opportunity cost of farming is earnings in industrial work. If this ideal is met, the implication is that farm labor is obtaining an opportunity return and an efficient allocation of labor between farm and nonfarm sectors has occurred.

The terms income, specified income, minimum income and income levels will be used throughout this report. Income is herein defined to mean the total net income to the farm operator, derived from all sources. The sources may be both farm and nonfarm, and the income may represent a return to operator labor only or to labor plus other owned resources. For example, a $3,000 income may be obtained from (1) farm only, (2) $1,500 from the farm and $1,500 from nonfarm work, or (3) all from nonfarm work. The only restriction is that the nonlabor owned resource returns be from the farm business.

The Technical Environment

Production theory traditionally begins with the production function which shows the relationships between resource inputs and product outputs. This technological information can be summarized as

$$(2.1) \quad Y = f(X_1, X_2 \ldots X_n)$$

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[10] Brewster, Farm Size and Output Research, p. 98.

where Y represents physical output and $X_1 \ldots X_n$ represents the resource inputs.

For a specific analysis, inputs are assumed to be either (1) variable inputs or (2) fixed inputs. The technical relationships can then be written as

$$(2.2) \quad Y = f(X_1, X_2, \ldots . X_k : X_{k+1} \ldots X_n)$$

where $X_1 \ldots . X_k$ represents the variable resource inputs, and $X_{k+1} \ldots X_n$ represents given levels of specified fixed inputs.

With appropriate assumptions about divisibility and homogenity of inputs and outputs, and diminishing returns to the variable factor, the production function in its simplest form can be represented as OA in Figure 2. This study specifies a single production function for the area (such as OA in Figure 2), which can be shifted from OA to OB or OC by (1) changing the quality of the variable input, or (2) changing the quantity of the fixed factors.

The Economic Environment

The economic environment includes the prices paid and received for resources and products, and also includes the assets owned by the operator and changes in their value over time. Since the returns to the operator are the main concern of this study, the prices are specified so that the effects of key variables can be analyzed under a variety of conditions.

All resource and product prices are assumed to be known with certainty and to be determined by a competitive market. The area is assumed to be small enough so that demand and supply within the area

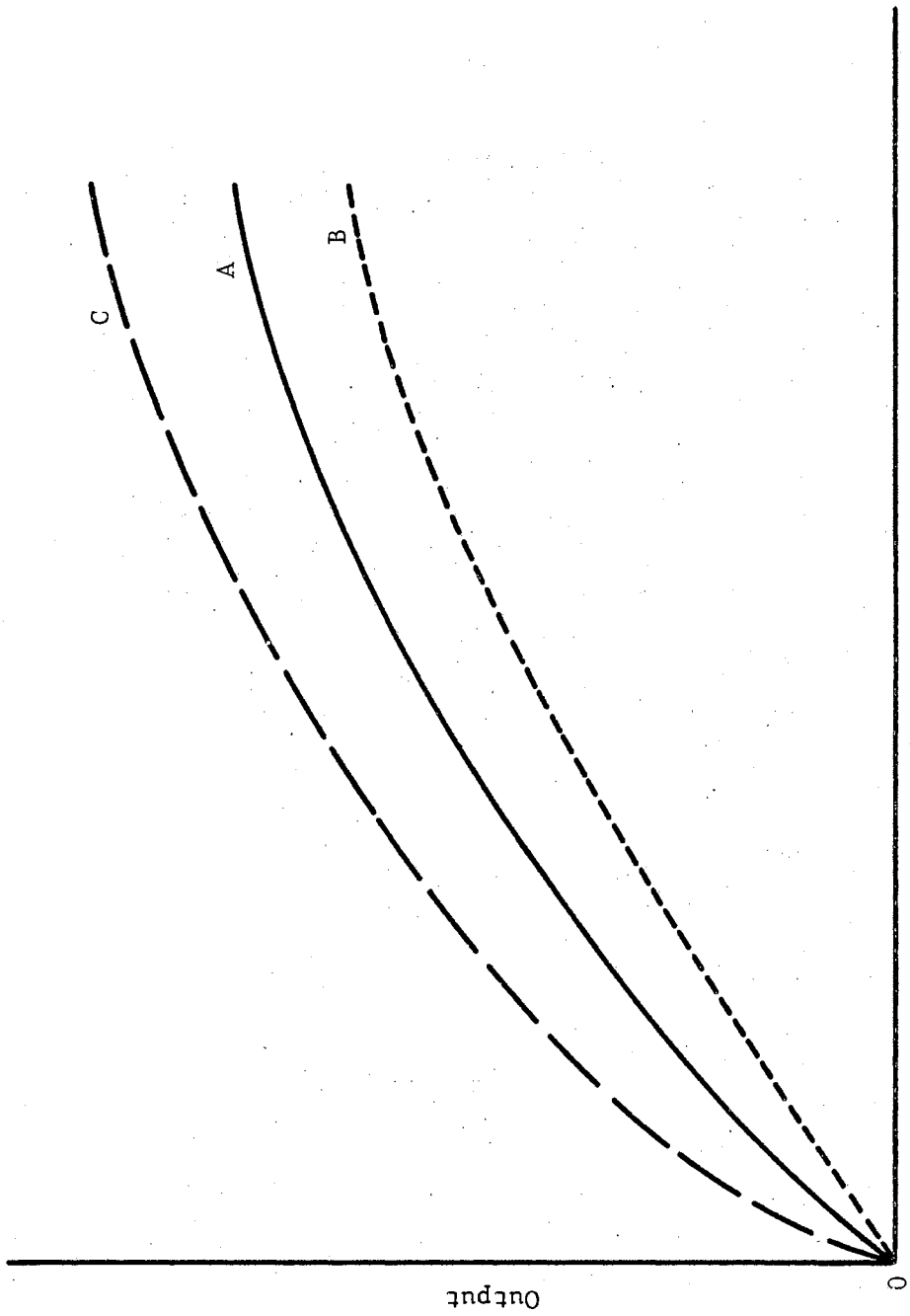

Figure 2. Theoretical Production Function

will have no effect on resource and product prices even though this assumption is invalid in the case of land that is physically fixed to the area.

The reservation price the operator places on his labor and owned resources may vary under different assumed conditions. These reservation prices may or may not be those indicated by the competitive model, depending upon the motives and objectives of the owner-operator.

Alternative Conceptual Models

It is hypothesized that agricultural adjustment decisions are made within the decision environment described above. Conceptual models are specified in this section to evaluate the theoretical effects of key variables on agricultural adjustments.

The Basic Minimum Resource Model

In the basic conceptual model assumed (Figure 3), the revenue curve portrays the typical pattern of diminishing returns for additional increments of land. It approximates a smooth curve by a series of linear segments with kinks toward lesser slope as different levels and combinations of enterprises enter the solution within the resource restrictions and with the increasing acreage of land. Such kinks are indicative of (1) increases in activities that are land intensive, (2) reduction of enterprises that are land extensive, (3) indivisibilities of certain inputs, and (4) exhaustion of a certain type of input and substitution of another with different costs -- such as hired labor for operator labor.

The segmented revenue curve OABCDE (Figure 3) represents the

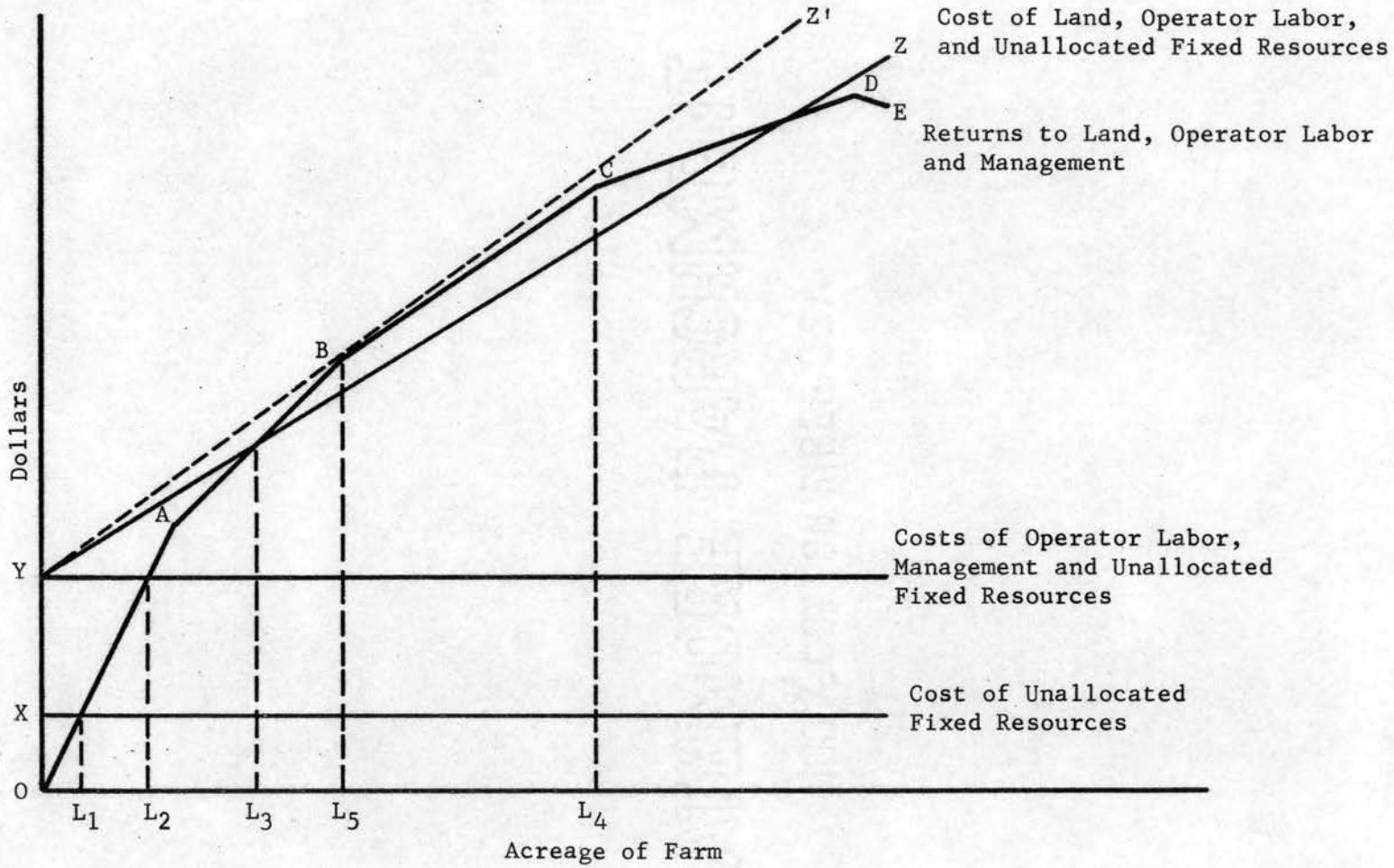

Figure 3. Theoretical Minimum Resource Model Showing Area Adjustments

return to land, operator labor and management from various farm sizes before land, operator labor, and management costs have been deducted. All costs such as feed, seed, interest on operating capital, fertilizer, fuel, etc., have previously been deducted from gross revenue to give OABCDE.

If OX represents fixed overhead costs, a farm size of L_1 would be required to cover fixed costs. If XY represents opportunity returns for operator labor and management, then OY is a fixed cost and a farm size of L_2 is required to cover fixed overhead costs plus an opportunity return to operator labor and management. Land costs -- rent or interest on investment plus taxes -- are represented by the slope of line YZ. Total costs for land, operator labor, management, and unallocated overhead costs are represented by the height of line YZ. A minimum farm size of L_3 is required to cover all costs.

Given the costs and returns of Figure 3, farm sizes larger than L_3 will provide profits. If profit maximizing motives are followed, land prices (rent) in the area would tend to increase, increasing the slope of YZ to YZ'. The minimum land required to cover all costs is now L_5, which is also the profit maximizing size of farm. Before area adjustments, the minimum resource solution was farm size L_3, while the profit maximizing solution was farm size L_4. However, given the "satisfactory income" objective, area adjustments may not be made beyond size L_3.

Minimum Resource Model with Off-Farm Employment

The potential effects of three levels of off-farm employment are depicted in Figure 4. The necessary farm labor returns are lowered

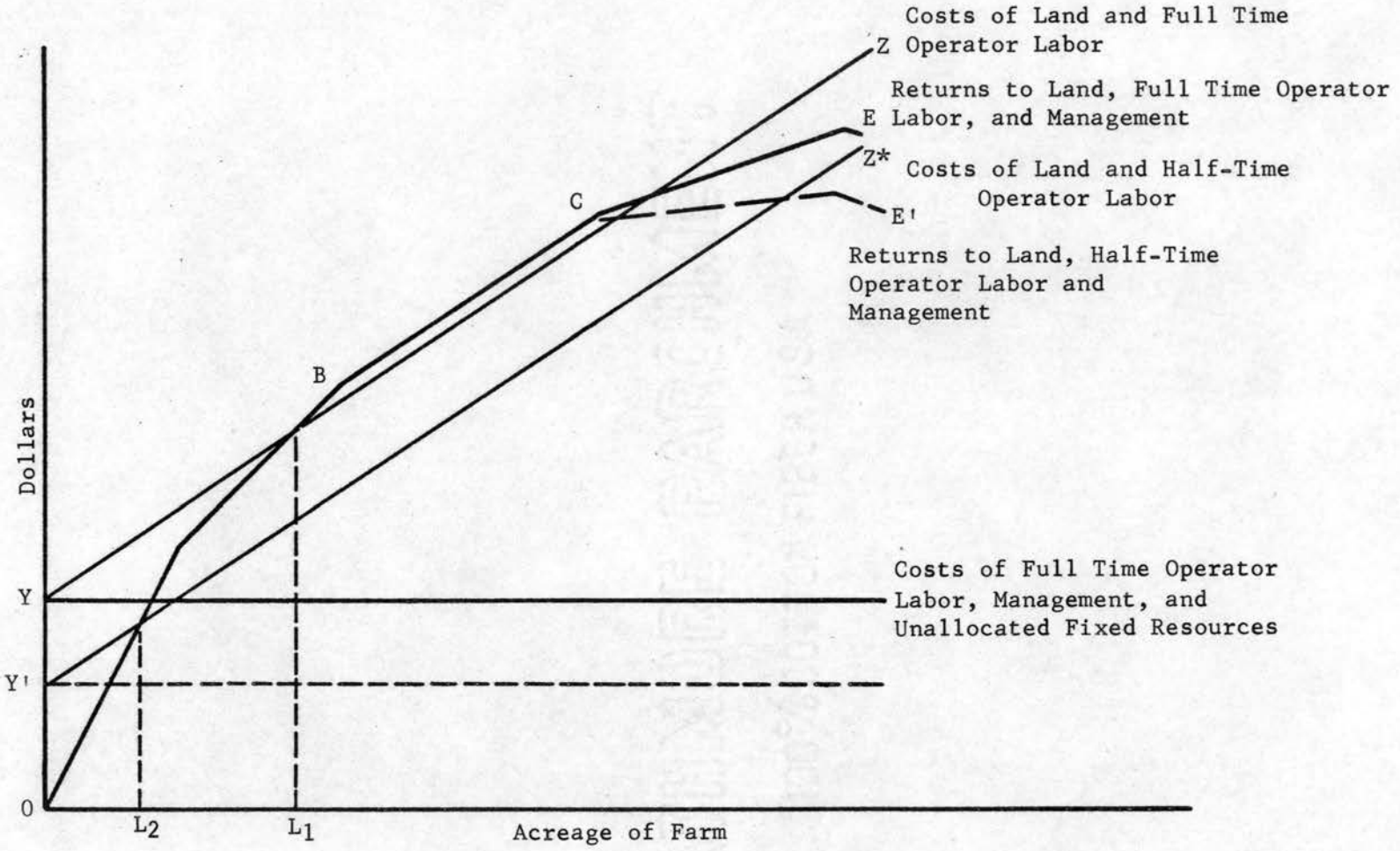

Figure 4. Theoretical Minimum Resource Model for Off-Farm Employment of Operator Labor

(OY to OY') as less labor is fixed to the farm and the revenue curve is changed (OCE to OCE') as hired labor replaces operator labor on the farm. The revenue curve OBCE represents full time farm employment and OBCE' represents half-time off-farm employment. The difference between CE and CE' represents the cost of hired labor. Total costs of land, operator labor and management are represented by YZ and Y'Z*.

The minimum land requirements with increasing off-farm employment levels are L_1 and L_2. As drawn in Figure 4, the reduction in operator farm labor is not critical because no hired labor is required at farm sizes L_1 and L_2, i.e. operator labor is sufficient to operate the minimum farm size required. That is, line Y'Z* intersects returns function OBCE rather than OBCE'. It is believed that this is the usual situation in the area with half-time off-farm employment; however, it is possible that this may not be the case at higher levels of off-farm employment.

Minimum Resource Model with Variable Levels of Owner Equity

Owner equity is defined as the nonlabor owned resources of the operator. The effects of owned resources on minimum land requirements may be shown as lower capital costs -- Figure 5. First, as land equity increases, land capital costs may decrease and the slope of the land cost curve YZ may change to YZ*; second, as nonland equity increases less interest on operating capital is deducted, raising the returns curve from OE to OE*. Conceptually, the zero equity level is the same as the basic minimum resource model illustrated in Figure 3.

A farm size of L_1 acres is required for a minimum income level at zero equity, but a farm size of only L_2 acres is required at a 50 percent equity level. At the 100 percent equity level, land cost (the

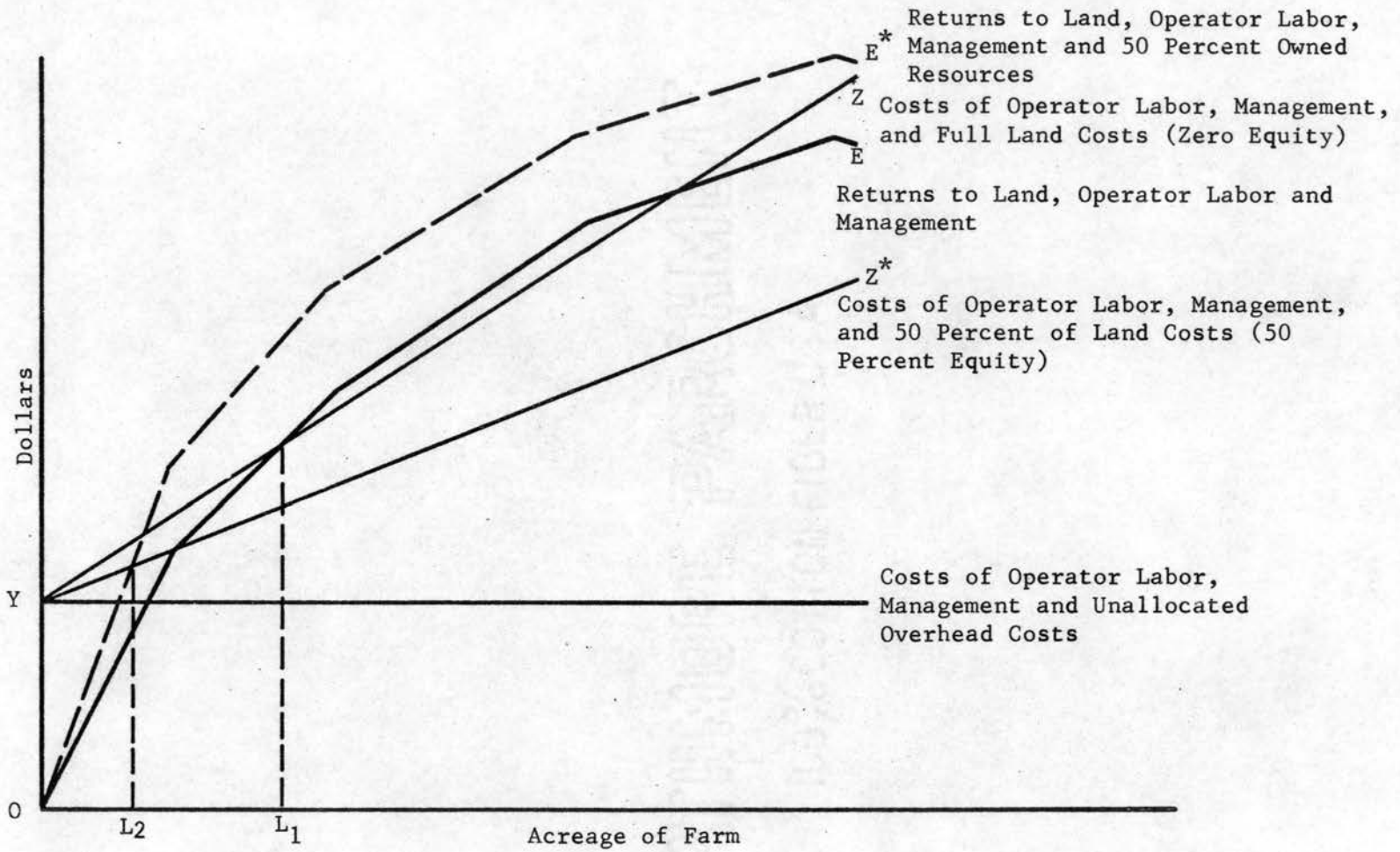

Figure 5. Theoretical Minimum Resource Model Showing Variable Levels of Operator Equity.

slope of YZ) is not zero due to the cost of land taxes.

Minimum Resource Model with Variable Yields

The conceptual minimum resource model with variable yields includes not one but a family of total revenue curves, as illustrated in Figure 6. Average yields require L_2 acres of land, high yields L_1 acres, and low yields L_3 acres to obtain the specified income. If the slope of YZ had been greater than that depicted in Figure 6, no farm size would offer a solution with low yields.

This model suggests possibilities for analyzing minimum sizes of farms needed in an uncertain environment. For example, joint probability distributions might be developed for critical, uncertain events. The distributions would in turn provide a basis for specifying a minimum farm size using expected values for costs and revenues. Alternatively, sizes of farms and confidence intervals for achieving minimum returns could be developed. Farm size L_1 might give the specified income level 50 percent of the time, L_2 80 percent of the time and L_3 95 percent of the time. Clearly, farmers must recognize impacts of their variable environments. Survival considerations, expected income level, income variability and economic environment jointly affect choice of farm sizes.

Minimum Resource Model with Variable Land Quality

Variable land qualities can be analyzed with the same basic model as that used for variable yields, if OE is defined as returns from average land, OE* returns from good land, and OE** returns from poor land. The only theoretical difference is that land price is a function of productivity, which requires a different land cost curve YZ for each

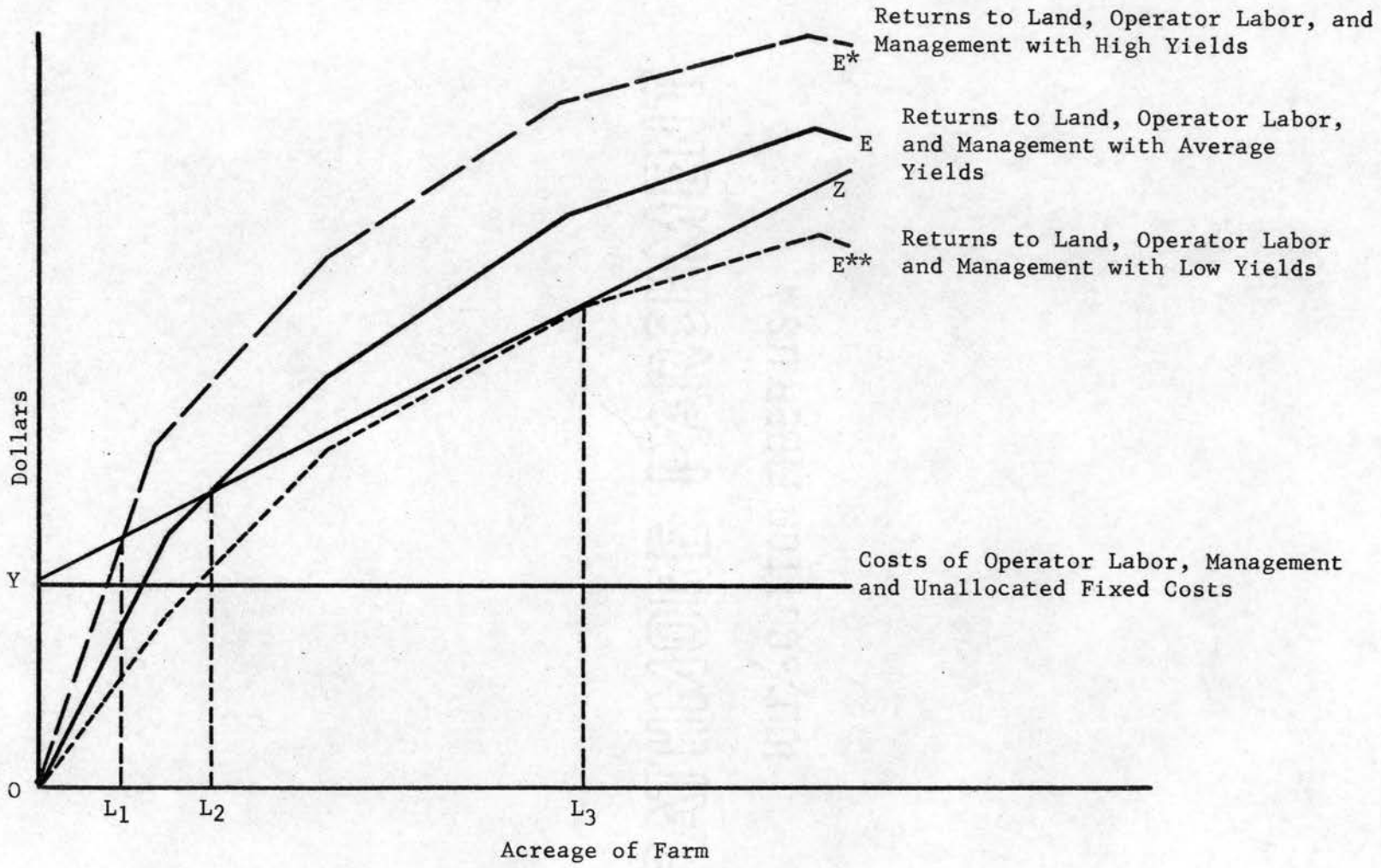

Figure 6. Theoretical Minimum Resource Model Showing Variable Yields

land quality. Whether more or less of the different land qualities would be required than of the average quality would depend upon the relative prices and productivity.

Although the conceptual models for both variable yields and variable land qualities are similar, i.e., both shift the total revenue curve, the rationale for, and the magnitude of, the shifts are entirely different.

Summary of Conceptual Models

The alternative conceptual models allow an evaluation of the minimum resources required for different levels of each key variable. The procedure provides information for individual and area adjustment decisions under a variety of conditions. The key variables of interest are (1) off-farm employment, (2) yields, (3) operator equity, and (4) land quality. Each variable is assumed to have an effect on the farm operators income, which affects the minimum amount of resources required to obtain a specified income and the magnitude of agricultural adjustments in the area.

The effect of various combinations of the four variables on minimum resource requirement can be determined. Theoretically, the smallest amount of resources would be required for high yields, good land, 100 percent owner equity, with full time off-farm employment at the $3,000 income level. The largest amount of resources should be required for low yields, poor land, zero owner equity, and no off-farm employment at the $5,000 income level. The present farm size and the future adjusted farm size should be found somewhere between these two extremes. The size of the adjustment gap will depend on the assumed

conditions under which adjustments are made.

CHAPTER III

OPERATIONAL MODEL AND RESEARCH PROCEDURE

The objectives of this chapter are to (1) present the operational model used in determining minimum resource requirements for specified income levels, (2) discuss research problems encountered in using the model, and (3) describe how these problems are handled for this particular study.

Linear programming was used to determine the minimum resources required for specified income levels for each of the assumed situations. The linear programming technique is used to maximize (or minimize) a criterion function subject to a set of restrictions. This technique assumes that the production process can be broken down into elementary processes or activities tied together by a set of linear relations.

The components of a linear programming problem are (1) a quantifiable objective, (2) alternative methods or processes for attaining the objectives, and (3) restrictions.[1] The linear programming model, like any other model, is an abstraction from reality. The degree of abstraction can be judged by its assumptions. The assumptions required are (1) additivity and linearity of activities, (2) divisibility of resources and products, (3) a finite number of activities and

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[1] Earl O. Heady and Wilfred Candler, Linear Programming Methods (Ames, 1963), p. 2.

and restrictions, and (4) single-valued expectations.[2]

Given these assumptions, the necessary conditions can be expressed as:

(1) The objective function to minimize land, L, can be represented as:

$$\sum_j a_j X_j = L, \quad \text{with } X_j \geq 0, \quad j = 1, 2, \ldots n,$$

where a_j is the quantity of land required per unit of the j^{th} product, and X_j is the quantity of the j^{th} product produced.

(2) The minimum income requirement is given by

$$\sum_j C_j X_j \geq Y,$$

where Y is the minimum income target, and C_j is the net income from producing one unit of the j^{th} product.

(3) The resource restrictions are

$$\sum_j a_{ij} X_j \leq B_i \quad \text{with } i = 1, 2, \ldots m,$$

and where a_{ij} is the quantity of the i^{th} input required to produce one unit of the j^{th} product, and B_i is the amount of the i^{th} restricted input for the firm, and m is the number of restricted inputs.

In order to make the conceptual model described in Chapter II operational -- within the linear programming framework -- certain crucial operational and procedural decisions must be made. These decisions are vital to both the operation of the model, and the usefulness of results. These decisions must be made with respect to the

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[2]Ibid., pp. 17-18.

problem to be solved, or the hypothesis to be tested.

Operational Problems and Research Procedure

Programmed results of the linear programming model are valid only if the right questions are asked of the model, and if the technical and economic coefficients used are relevant to the questions asked. Some of the major problems and procedures for securing the relevant coefficients for this study are covered in this section.

The problems that require specific answers in terms of the model are:

1. determining what resource should be minimized.
2. defining the land resource base, and the population to which the results will apply.
3. determining what technology level, management level, and input-output data to use.
4. specifying the resource restrictions applicable to the area.
5. determining the relevant crop and livestock production alternatives to use.
6. determining what prices, machinery and overhead costs to use.
7. determining the relevant institutional restraints.

Resource to be Minimized

To achieve the objectives of this study, only three objective functions were considered for the operational model specified; they were minimize land, minimize capital, and minimize labor.

Labor was not seriously considered as the resource to be minimized because previous research indicates that labor is not a particularly

restrictive resource in the area.[3]

Restrictions of both capital and farm size are considered serious handicaps to operators in their efforts to increase farm incomes. Land was chosen as the resource to be minimized in this study for the following reasons:

1. Land is a major input and accounts for a high proportion of total capital requirements of the livestock activities included in this study; therefore, the minimum land and minimum capital solutions should be similar.

2. The quantity of land has absolute limits within a given geographic area for a given time, while capital does not.

3. The focal point of this study is on adjustments. In order to adjust, someone must sell (or rent) if someone else buys (or borrows). Within a given area, the pressure on land price in the adjustment process is greater than on capital price because of the supply situation of each.

4. After area adjustments are made, only one optimal solution is possible as reflected by the theoretical model in Figure 3. The price of land will directly affect the farm income level attainable.

Defining the Land Resource Base

The population of livestock producers was defined to include only beef producers located on the eastern prairie (or Cherokee) soils who produced no crops that required acreage allotments.

The size of the soil resource base was estimated to be 1,600,000

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[3]E. J. R. Booth, Agricultural Adjustment and Farm Labor Underemployment in Eastern Oklahoma, Oklahoma Agricultural Experiment Station, Technical Bulletin T-91 (Stillwater, 1961).

acres with 480,000 acres of cropland. The estimated size was determined by using total acreage in livestock farms and deducting (1) all soils except the eastern prairies, and (2) all livestock farms except those that met the above definition. The deductions and acreages in this study are given in Appendix A, Table III.

The eastern prairie soils are the clayey prairie soils of the area. Land suitable for crop production was divided into productivity classes designated as C_1, C_2, C_3, and C_4. The definition of each productivity class, the key soil series, and estimated average yields for included crops are given in Appendix B, Table II.

The percent of each productivity class and the noncropland acreage was determined from a random sample and is given in Appendix B, Table I. Budgets showing input-output data for each productivity class were developed.[4]

Technology, Management, and Input-Output Data

It is difficult to separate the effects of management and technology since shifts in the production function may be caused by either. The effects may take the form of increased yields, reduced costs, or both.

Input-output coefficients for enterprise budgets are based on advanced technologies applicable to the area. The input-output

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[4]Kenneth C. Schneeberger et al, Resource Requirements, Costs and Expected Returns; Beef Cattle and Improved Pasture Alternatives; East Central and South Central Oklahoma, Oklahoma Agricultural Experiment Station Processed Series P-544 (Stillwater, 1966) and Herman E. Workman et al, Alternative Crop Enterprises on Major Upland Soils of East Central and South Central Oklahoma: Resource Costs and Returns, Oklahoma Agricultural Experiment Station Processed Series P-523 (Stillwater, 1966).

coefficients are derived from crop and livestock budgets previously prepared for the area. These coefficients reflect current production practices used and yields obtained by the better farmers in the area.

Under certain hypotheses, yields are assumed to vary and shift the production function. Different yield levels may be attributed to management, technology, weather, or other causes. Yield levels used are defined in the following manner:

High Yields: means that yields of all crops including native pasture and hay are ten percent above the average yields expected for the area.

Average Yields: means that yields of all crops including native pasture and hay are the average yields expected for the area.

Low Yields: means that yields of all crops including native pasture and hay are ten percent below the average yields expected for the area.

Although yield variation is generalized to include other technical and economic variables, the terms were used in the programming model as defined above.

Resource Restrictions

Land: Land is assumed to be a variable resource that can be added in completely divisible and homogenous units. The respresentative or average unit of land is assumed to be composed of 30 percent cropland, 40 percent native pasture and hay, and 30 percent woods and waste as given in Appendix B, Table I.

Under alternative land quality hypotheses, the representative unit is assumed to vary from 15 to 45 percent cropland and the other

components in like proportion. The following land qualities are defined and will be used throughout the remainder of this study.

Good Quality Land is defined as a representative acre of land that contains 45 percent cropland, 31 percent native pasture and hay, and 24 percent woodland and waste.

Average Quality Land is defined as a representative acre of land that contains 30 percent cropland, 40 percent native pasture and hay, and 30 percent woodland and waste.

Poor Quality Land is defined as a representative acre of land that contains 15 percent cropland, 49 percent native pasture and hay, and 36 percent woodland and waste.

Land values are assumed to vary with the percentage of cropland. Land prices used were $60 per acre for poor land (15 percent cropland), $80 per acre for average land (30 percent cropland), and $110 per acre for good land (45 percent cropland). The land prices were derived from interviews with farmers, appraisers, professional agricultural workers, and from reports of recent land sales in the area.

Labor: A fixed amount of operator labor is assumed for the operational model. The amount of operator labor available for farm work varies under alternative hypotheses from one man year to the amount assumed to be available by an operator who is also working off-farm 40 hours per week. Both the available annual labor and the labor requirements for crop and livestock enterprises were divided into four time periods -- January through April, May through July, August through September, and October through December (see Appendix B, Table III). These periods were used to reflect seasonal periods of the farm labor requirements.

The annual operator labor assumed available for farm work with different levels of off-farm employment are as follows:

Full Time Farm Labor means the farm operator works full time on the farm and the annual farm labor available is 2,206 hours annually.

Half-Time Off-Farm Labor means the farm operator works 20 hours per week off-farm, and the labor available for farm work is 1,214 hours annually.

Full Time Off-Farm Labor means the farm operator works off-farm 40 hours per week and the labor available for farm work is 441 hours annually. This amount of labor is assumed to be available after regular working hours and on weekends.

Additional labor can be hired in any time period when needed at the rate of $1.00 per hour. Labor for harvesting crops and sodding or sprigging bermuda is considered to be handled by custom operators and the labor for these jobs does not enter into the labor requirements used in the enterprise budgets for this study.

Capital: Capital is assumed to be a variable resource that can be borrowed without limit so long as returns to the firm are greater than or equal to its cost. The basic capital costs used are six percent annually for operating capital -- such as for the purchase of cows, feeders, machinery, and fertilizer -- and five percent annually for land capital.

The operational model is designed to provide information on opportunity costs of capital less than the basic five and six percent rates. For example, lower cash capital costs are possible if the operator owns some capital resources. The relationship between operator equity levels and interest rates is given in Table I. Three

TABLE I

THE RELATIONSHIPS BETWEEN EQUITY LEVELS, INTEREST RATES, AND OPPORTUNITY COSTS AS USED IN THE OPERATIONAL MODEL; EASTERN PRAIRIE LIVESTOCK SITUATION, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Equity Level	Interest Rates		Average Opportunity Cost[a]
	Land Capital	Operating Capital	
(Percent)	(Percent)		(Percent)
Zero	5.00	6.00	5.40[b]
25	3.75	4.50	4.05
33[c]	2.50	6.00	3.90
50	2.50	3.00	2.70
100	0.00	0.00	0.00

[a]Land capital was estimated to be 60 percent and operating capital 40 percent of capital requirements on livestock farms.

[b]The zero equity level or 5.40 interest rate is considered the opportunity cost for capital in this study. Other rates may be the appropriate opportunity costs on some types of investments.

[c]The 33 percent equity level is an approximation. The actual percent equity will depend on the proportions of land capital and operating capital required.

equity levels are defined as follows:

Zero Operator Equity means the operator owns no capital resources and must pay six percent for all operating capital and five percent for all land capital used.

50 Percent Operator Equity means the operator owns 50 percent and borrows the balance of the capital (land and operating) required. Interest rates of 3 percent on operating capital and 2½ percent on land capital are charged to reflect the 50 percent operator equity position.

100 Percent Operator Equity means that the operator owns all the operating and land capital required in the farm business. Therefore, no capital is borrowed and a zero interest rate is used in the operational model.

Both the total capital requirements and the annual capital requirements are considered important for adjustment decisions. Total capital is considered the limiting factor in estimating capital needs, but annual capital is considered the relevant cost factor. For example, feeder cattle purchased September 1, and sold June 1, may cost $100 per head. Total capital for cattle purchase is $100, but interest is charged for only the nine months the $100 was used. In this case the annual capital is three-fourths of total capital. In all cases the annual capital requirements are less than or equal to the total capital requirements.

Production Alternatives

Alternative crop and livestock enterprises are restricted to those that can be produced efficiently in the area and for which there are no major obstacles to adjustments of considerable magnitude.

Those excluded were considered to be of minor importance to the adjustment potential of the area because of technical, economic or institutional limitations.

Crop Alternatives: Crop enterprises included were bermuda grass pastures, small grain pastures, alfalfa, oats, grain sorghum and soybeans. Emphasis was placed on providing bermuda budgets with different levels of management, fertilizer use, method of establishment, and bermuda-legume combinations.

Small grain grazing was limited to two alternatives; (1) a limited amount of grazing from oats grown primarily for grain; and (2) small grains grown only for grazing.

Other pastures included are native pastures both on woods and open land. The open land pastures were divided into (1) native pasture and (2) native hay because of differences in productivity.

Production of other crops was limited to grain sorghum, soybeans, oats, and alfalfa. Alfalfa was limited to C_1 and C_2 land, and to not over 80 percent of this land during any one year. Grain sorghum, oats, and soybeans were limited to C_1, C_2, and C_3 lands only.

Livestock Alternatives: Livestock alternatives are limited to selected stocker feeder and cow-calf systems. Other livestock -- dairy, hogs, poultry -- enterprises are not included because of lack of markets, lack of demonstrated managerial skills, or lack of potential area volume significant for adjustments.

Cow-calf systems included in the analysis are listed in Appendix B, Table IV. Emphasis is placed on alternative calving dates, wintering rations, and selling dates. Three of the cow-calf activities involve fall calving with different methods of wintering.

Three consider spring calving with different types of pasture utilization.

All feeder calf activities are for fall buying with different selling dates (Appendix B, Table V). Two activities utilize small grain and vetch pasture and are sold in either March or May. Two winter on bermuda and native hay and cottonseed meal, pasture on bermuda, and are sold in August.

Prices

The prices paid for resources and received for products that are used in this study are given in Appendix B, Tables VI and VII. The prices approximate those prevailing in the area in 1963. Land, machinery, and labor prices that are used are discussed in other parts of this study.

Machinery

Machinery prices and costs used in this study are based on previous machinery studies in the area.[5] The operating costs and ownership costs are those for four-row equipment, calculated on a per hour basis, and prorated to each enterprise on the basis of hours used. The operating costs should be fairly representative of the average operating costs in the area. Ownership costs will vary with farm size, land quality, and crops grown. Whether ownership costs are overestimated or underestimated for a particular farm size will depend on the method used to obtain the machinery needed. Two-row equipment,

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[5]Workman, pp. 30, 31.

four-row equipment, used machinery, and custom hire are methods currently used on livestock farms to meet ownership needs. Some examples of programmed ownership costs for different farm sizes and organizations are given in Appendix G, Table I.

Unallocated Overhead Costs

Some costs are practically independent of farm size and therefore cannot be allocated to specific enterprises while others are related to farm size. Such costs as hay storage, fencing, building depreciation, machinery ownership costs are included in enterprise budgets and total costs per farm vary with farm size. Total real estate taxes also vary with farm size.[6] Insurance, bookkeeping, tax service, telephone, and farm pickup expenses cannot be allocated to specific enterprises. The per farm unallocated overhead costs assumed for this study are $1,108 and the items are listed in Appendix B, Table VIII.

In the operational model, the overhead costs are added to the specified income level so that the farm size will cover both overhead costs and the specified income.

Institutional Restraints

Allotments: As previously mentioned, no allotments of cotton, wheat, or peanuts, are presently available to the farms studied.

Credit: No institutional limits on credit or capital are assumed for this analysis.

Tenure: For simplicity of calculations, owner-operated farm units

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[6]Taxes are calculated at a 50 mil rate on 20 percent (assessed value) of estimated land prices.

are assumed. This analysis is not concerned with the problem of how operators obtain control over resources, whether by ownership, renting, or hiring; however, some form of control must be assumed for the operational model.

Markets: No market restraints for outputs or inputs are assumed.

CHAPTER IV

THE EFFECT OF OFF-FARM EMPLOYMENT ON MINIMUM RESOURCE REQUIREMENTS

A generally recognized deterrent to agricultural resource (primarily labor) adjustments is the lack of knowledge of, and the risk and uncertainty associated with, the transfer of resources from farming to nonfarm uses. Theoretically, part-time off-farm employment can be visualized as an intermediate adjustment step in the transfer of farm resources to nonfarm uses, during which time information and knowledge are obtained about the nonfarm uses of the resources. Observations indicate that over time most part-time farming situations develop into either full time farming or full time nonfarm employment. Usually the development is toward full time nonfarm employment. This would be expected if the nonfarm returns increased over time and the farm returns decreased.[1]

If the concept of part-time farming as an intermediate adjustment step is accepted, part-time farming can be a permanent aspect of a developed economy where resource adjustments out of agriculture are continually taking place and only the participants change. The extent

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[1]For a theoretical discussion of farm-nonfarm resource allocation see John E. Lee, Jr., "Allocating Farm Resources Between Farm and Non-Farm Uses," Journal of Farm Economics, Vol. 47, No. 1 (1965), pp. 83-92.

to which it is profitable for farmers in a given area to engage in part-time farming depends on (1) the number, kind and wage rates of available nonfarm jobs, and (2) the extent to which economies of scale and timing of farm jobs are important in the farming operation.

The area and type of farming studied are conducive to a high level of part-time farming. Above a minimum size, economies of scale and the timing of farm jobs are relatively unimportant in livestock production (except for routine livestock management), and the study area is located near the large potential markets for nonfarm jobs in Oklahoma.

The term "productively employed labor" is used in this chapter to differentiate the operator labor included in the programmed results from the labor used at various jobs that yield no immediate return. Full time operator labor can be employed at some job on practically any size farm, but the returns may be zero or realized only when the farm is sold.

Summary of Off-Farm Employment Results

Programmed results showing the minimum resource requirements for $3,000 and $5,000 operator incomes; average and low yields; 100 percent, 50 percent, and zero operator equity levels; and no off-farm labor, half-time off-farm labor, and full time off-farm labor are presented in this chapter. Major results and implications are summarized as follows:

1. No combination of resources would yield a $3,000 or $5,000 operator income at the zero operator equity level for any level of off-farm employment with average or low yields. Land prices in the area apparently are higher than can be justified from livestock

production only. Thus, the adjustment criterion of opportunity returns to all resources cannot be used in this study. Four alternative adjustment criteria were used to evaluate area adjustment.

2. To productively employ operator labor full time on the farm (1) a farm size of about 1,100 acres is needed, (2) only about 30 percent or 1,450 of the present 5,000 farm operators are needed, and (3) operator returns to labor and 50 percent equity would approach a $5,000 income.[2]

3. To productively employ operator labor half-time on the farm requires (1) a farm size of about 600 acres and (2) about 53 percent or 2,667 of the present operators for a $3,000 income to operator labor and 50 percent equity.

4. The adjustment criterion of a $3,000 return to operator full time farm labor and 50 percent equity indicates (1) a farm size of 787 acres is needed, and (2) approximately 2,000 farm units would be required in the area.

5. To secure a $5,000 income to operator full time farm labor and 50 percent equity implies (1) a farm size of 1,268 acres is needed, and (2) only 1,262 farm units are needed in the area.

6. Off-farm employment of any unused operator labor will increase operator income. If, however, lower farm yields are a result of the off-farm employment, the net value of the job is reduced. If crop yields are 10 percent lower due to off-farm work, the net value of a $3,000 off-farm job will vary from $2,760 on a 150 acre farm to $150 on a 1,268 acre farm.

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[2]The 5,000 farm units were determined by assuming an average farm size of 320 acres on the soil resource base of 1,600,000 acres.

The Effect of Off-Farm Employment on Farm Organization

The degree to which off-farm employment affects the farm organization depends on the amount of operator labor available for farming, and the farm labor requirements for specified income levels. If the operator labor available for farming is greater than or equal to that required for the specified income level, there will be no effect on farm organization. If hired labor is required, the farm organizational change indicated is the substitution of small grain grazing for bermuda with vetch on C_3 cropland. The minimum farm size that will productively employ different amounts of operator labor will be discussed in a later section.

The programmed farm organizations for three levels of operator labor under different equity, yield, and income situations are given in Appendix C, Tables I through IV.

In all programmed solutions, cropland was used to produce bermuda with vetch. In some solutions, soybeans and small grains for grazing replaced bermuda on C_1 and C_3 lands. The proportion of each crop depended on the equity and labor situations used. The stocker-feeder livestock activities P-55 and P-57 were included in all solutions. Levels of each livestock activity varied in proportion to the crops grown. The P-55 activity uses more vetch and small grain grazing while the P-57 activity utilizes the bermuda and native pastures.

The buy-sell activities entered the solutions rather than the more popular cow-calf livestock systems probably as a result of the programming method. Only the mean returns from each activity were used. If the income variance had been considered, with discounting for

variability of returns, it is possible that other livestock activities would have been included in the solutions obtained. Using minimum land as the objective function also affects the activities included in the final solution. Activities with the greatest return per unit of land would be expected to enter the program first, and in most cases this indicates buy-sell rather than cow-calf activities.

The Effect of Off-Farm Employment on Land Requirements

The amount of land required for specified income levels under two equity levels, two yield levels and three operator labor situations, all programmed with average land quality, is given in Table II.

Results with both average and low yields (10% below average) are analyzed with part-time farming situations. Under the part-time farming situation, the operator's absence from the farm may result in above average costs and/or below average yields because of the lack of attention to the farming operations. Effects of possible higher costs and/or lower yields can be interpreted from the programmed "low yield" solutions. For example, the comparison of minimum resources required can be made between average yields for full time farming and low yields for part-time farming. A full time farmer with 100 percent equity needs 459 acres to secure a $3,000 income with average yields. Under the same equity conditions, a farmer working half-time off-farm (making $1,500 annually) needs 291 acres with average yields or 344 acres with low yields to achieve the same income. The 344 acres with low yields may be a more relevant comparison.

For an operator with 100 percent equity to secure a $3,000 income with average land quality and average yields, 459 acres are required

TABLE II

ESTIMATED MINIMUM RESOURCE REQUIREMENTS TO OBTAIN $3,000 AND $5,000 OPERATOR INCOMES WITH SPECIFIED LEVELS OF OFF-FARM EMPLOYMENT; TWO YIELD LEVELS, THREE EQUITY LEVELS AND AVERAGE LAND QUALITY, EASTERN PRAIRIE LIVESTOCK SITUATION, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

			Operator Labor		
Yield	Item	Unit	Full Time Farm	Half-Time Off-Farm	Full Time Off-Farm
$3,000 Income, 100 Percent Equity					
	Land	Acres	459	291	124
Average	Capital	Dollars	62,906	39,905	16,983
	Labor	Hours	952	604	257
	Land	Acres	541	344	146
Low	Capital	Dollars	71,520	45,449	19,297
	Labor	Hours	1,031	654	278
$5,000 Income, 100 Percent Equity					
	Land	Acres	682	527	393
Average	Capital	Dollars	93,495	72,271	52,780
	Labor	Hours	1,415	1,093	780
	Land	Acres	807	631	477
Low	Capital	Dollars	106,647	83,494	61,973
	Labor	Hours	1,536	1,202	876
$3,000 Income, 50 Percent Equity					
	Land	Acres	787	508	224
Average	Capital	Dollars	105,328	66,410	28,152
	Labor	Hours	1,571	970	393
	Land	Acres	1,070	714	318
Low	Capital	Dollars	132,656	86,941	38,756
	Labor	Hours	1,816	1,166	510

TABLE II (Continued)

Yield	Item	Unit	Operator Labor: Full Time Farm	Operator Labor: Half-Time Off-Farm	Operator Labor: Full Time Off-Farm
$5,000 Income, 50 Percent Equity					
Average	Land	Acres	1,268	1,038	818
	Capital	Dollars	159,373	130,642	103,202
	Labor	Hours	2,221	1,818	1,433
Low	Land	Acres	1,806	1,570	1,237
	Capital	Dollars	221,678	196,472	155,056
	Labor	Hours	2,985	2,679	2,111
$3,000 or $5,000 Income, Zero Equity					
Average	Land	Acres			
	Capital	Dollars	N. S.[a]	N. S.	N. S.
	Labor	Hours			
Low	Land	Acres			
	Capital	Dollars	N. S.	N. S.	N. S.
	Labor	Hours			

[a]No solutions were available for all situations labeled N. S.

with full time farm labor, 291 acres with half-time farm labor, and 124 acres with full time off-farm labor. Half-time off-farm employment reduced the land requirement 37 percent and full time off-farm employment reduced the land requirement 73 percent as given in Table III. If yields are "low," as a result of off-farm employment, the reduction in land required was only 25 percent for half-time off-farm employment and 68 percent for full time off-farm employment. At the $5,000 income level, 682 acres are required with full time labor, 527 acres with half-time off-farm labor, and 393 acres with full time off-farm labor. Full-time off-farm employment reduced the land required 42 percent.

The minimum land requirements at the 50 percent equity level followed the same general pattern as that observed at the 100 percent equity level. Farm sizes were larger than at the 100 percent equity level, which magnified the effects of yield levels.

The full time off-farm job is assumed to pay $3,000. Therefore, the $3,000 income level with 100 percent equity and full time off-farm employment situation is strictly a hobby-farm operation. The minimum resources required, and the income produced, are only enough to cover the fixed expenses given in Appendix B, Table VIII. The operator receives no return for his labor nor the land and capital employed. However, he does receive the unmeasured benefits of residence and any asset appreciation.

The Effect of Off-Farm Employment on Capital Requirements

Amounts of capital required are given in Table II. For an operator with a 100 percent equity, the capital required for a $3,000

TABLE III

ESTIMATED MINIMUM LAND REQUIREMENTS TO OBTAIN $3,000 AND $5,000 OPERATOR INCOMES WITH SPECIFIED LEVELS OF OFF-FARM EMPLOYMENT, AND THE PERCENT CHANGE FROM AVERAGE YIELDS AND FULL TIME FARM LABOR: TWO EQUITY LEVELS AND AVERAGE LAND QUALITY, EASTERN PRAIRIE LIVESTOCK SITUATION, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

			Operator Labor		
Yield	Item	Unit	Full Time Farm	Half-Time Off-Farm	Full Time Off-Farm
	$3,000 Income, 100 Percent Equity				
Average	Land	Acres	459	291	124
Average	Change[a]	Percent	0	-37	-73
Low	Change[a]	Percent	+18	-25	-68
	$5,000 Income, 100 Percent Equity				
Average	Land	Acres	682	527	393
Average	Change[a]	Percent	0	-23	-42
Low	Change[a]	Percent	+18	-07	-30
	$3,000 Income, 50 Percent Equity				
Average	Land	Acres	787	508	224
Average	Change[a]	Percent	0	-35	-72
Low	Change[a]	Percent	+36	-09	-60
	$5,000 Income, 50 Percent Equity				
Average	Land	Acres	1,268	1,038	818
Average	Change[a]	Percent	0	-18	-35
Low	Change[a]	Percent	+42	+24	-02

[a]The percent change is calculated from the base of full time farm labor and average yields in each case.

income with average yields was $62,906 with full time farm labor, $39,905 with half-time off-farm labor, and $16,983 with full time off-farm labor (see Table II). Half-time off-farm employment reduced the capital requirement 37 percent and full time off-farm employment reduced the capital requirement 73 percent. However, if low yields were used for comparison, the capital reduction would be only 28 percent and 69 percent respectively (see Table IV). For a $5,000 income, the capital required was $93,495 with full time farm labor, $72,271 with half-time off-farm labor, $52,780 with full time off-farm labor. Half-time off-farm employment reduced the capital requirement 23 percent and full time off-farm employment reduced the capital requirement 44 percent. If low yields were associated with off-farm employment, the capital reduction would be only 11 percent and 34 percent respectively.

In general, different incomes, yields, and off-farm employment levels had the same type of effect on capital requirements at the 50 percent equity level as at the 100 percent equity level.

The Effect of Off-Farm Employment on Labor Requirements

In the operational model, operator labor was considered fixed to the farm. Operator labor available was 2,206 hours for full time farm labor, 1,214 hours for half-time off-farm employment, and 441 hours for full time off-farm employment. A transfer from farm to nonfarm uses of any unused operator farm labor would be expected to increase total income. Therefore, the amount of operator labor used on the farm at various farm sizes would be of major interest. Equally important, however, is whether nonfarm job opportunities are available in the area for operator labor. This study will not attempt to evaluate the

TABLE IV

ESTIMATED MINIMUM CAPITAL REQUIREMENTS TO OBTAIN $3,000 AND $5,000 OPERATOR INCOMES WITH SPECIFIED LEVELS OF OFF-FARM EMPLOYMENT, AND THE PERCENT CHANGE FROM AVERAGE YIELDS AND FULL TIME FARM LABOR; TWO EQUITY LEVELS AND AVERAGE LAND QUALITY, EASTERN PRAIRIE LIVESTOCK SITUATION, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

			Operator Labor		
Yield	Item	Unit	Full Time Farm	Half-Time Off-Farm	Full Time Off-Farm
	$3,000 Income, 100 Percent Equity				
Average	Capital	Dollars	62,906	39,905	16,983
Average	Change[a]	Percent	0	-37	-73
Low	Change[a]	Percent	+14	-28	-69
	$5,000 Income, 100 Percent Equity				
Average	Capital	Dollars	93,495	72,271	52,780
Average	Change[a]	Percent	0	-23	-44
Low	Change[a]	Percent	+14	-11	-34
	$3,000 Income, 50 Percent Equity				
Average	Capital	Dollars	105,328	66,410	28,152
Average	Change[a]	Percent	0	-37	-73
Low	Change[a]	Percent	+26	-17	-63
	$5,000 Income, 50 Percent Equity				
Average	Capital	Dollars	159,373	130,642	103,202
Average	Change[a]	Percent	0	-18	-35
Low	Change[a]	Percent	+39	+23	-03

[a]The percent change is calculated from the base of full time farm labor and average yields in each case.

nonfarm job opportunities of the area, but it can estimate the number of nonfarm jobs that would be required under alternative farm-nonfarm labor use combinations. Approximately 50 percent of the farmers in the area worked off-farm more than 100 days in 1959, and over 50 percent had off-farm income that exceeded farm income.[3]

Since there were no major changes in farm organization due to off-farm employment, the total farm labor requirements are approximately proportional to farm size.

Since operator labor is considered as a fixed cost, no change in farm organization is noted until hired labor is necessary. When hired labor is necessary, the farm organization may change to include those activities which provide greater returns to the labor used. This change was reflected in the minor changes noted in farm organization due to hired labor. Comparing the labor required for different size farms with the operator labor available should give a close estimate of farm sizes that will productively utilize different amounts of operator labor. A more detailed breakdown of labor requirements and operator labor availability is presented in Table V for the programmed results presented in Table II.

Comparing the labor required with full time operator labor available shows that considerable surplus operator labor was available at farm sizes up to about 1,000 acres. No surplus operator labor existed at the farm sizes of 1,268 acres but only 269 hours of hired labor was necessary. Interpolation of results indicate that the minimum size livestock farm on which an operator can be productively employed full

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[3] U. S. Census of Agriculture, 1959, County Table 5.

TABLE V

ESTIMATED LABOR REQUIREMENTS AND ASSUMED OPERATOR LABOR AVAILABLE FOR SPECIFIED OFF-FARM EMPLOYMENT LEVELS TO OBTAIN $3,000 AND $5,000 OPERATOR INCOMES; TWO EQUITY LEVELS, AVERAGE YIELDS AND AVERAGE LAND QUALITY, EASTERN PRAIRIE LIVESTOCK SITUATION, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Unit	Operator Labor		
		Full Time Farm	Half-Time Off-Farm	Full Time Off-Farm
$3,000 Income, 100 Percent Equity				
Farm Size	Acres	459	291	124
Operator Labor Available	Hours	2,206	1,214	441
Labor Required	Hours	952	604	257
Operator Labor Used	Hours	952	604	257
Hired Labor	Hours	0	0	0
$5,000 Income, 100 Percent Equity				
Farm Size	Acres	682	527	393
Operator Labor Available	Hours	2,206	1,214	441
Labor Required	Hours	1,415	1,093	780
Operator Labor Used[a]	Hours	1,415	986	433
Hired Labor[a]	Hours	0	107	347
$3,000 Income, 50 Percent Equity				
Farm Size	Acres	787	508	224
Operator Labor Available	Hours	2,206	1,214	441
Labor Required	Hours	1,571	970	393
Operator Labor Used[a]	Hours	1,571	962	373
Hired Labor[a]	Hours	0	8	20
$5,000 Income, 50 Percent Equity				
Farm Size	Acres	1,268	1,038	818
Operator Labor Available	Hours	2,206	1,214	441
Labor Required	Hours	2,221	1,819	1,432
Operator Labor Used	Hours	2,206	1,214	441
Hired Labor	Hours	269	605	991

[a]Annual labor requirements were broken down into four time periods; therefore, labor may be hired in some time periods even though surplus operator labor exists in other periods.

time is approximately 1,100 acres. Returns to operator labor and a $65,000 investment will approach $5,000 on such a unit.

Comparing the labor required with half-time operator labor showed that surplus operator labor existed at farm sizes up to about 600 acres. However, some hired labor was used at certain times of the year for farm sizes of 508 and 527 acres. At the farm size of 1,038 acres, all operator labor was used and 605 hours of hired labor were necessary. Interpolation of these results indicate that the minimum size livestock farm on which operator labor can be productively employed half-time is approximately 600 acres.

Comparing the labor required with the operator labor available when the operator was working full time at an off-farm job showed that some surplus operator labor existed at farm sizes up to 224 acres. Only 20 hours of hired labor were necessary for the farm size of 224 acres with some surplus operator labor. Farm sizes of 393 and 818 acres required large amounts of hired labor. These results indicate that the minimum size livestock farm on which an operator employed full time at an off-farm job could be productively employed is about 240 acres.

Implications for Farm Management Decisions

Choice of off-farm employment as the alternative to increase income will depend on the estimated gains and losses from other alternatives available. Estimates of the gains and losses from off-farm employment associated with different farm sizes can be calculated from the programmed results as given in Figure 7. The estimated net gains can then be compared with those from other alternatives.

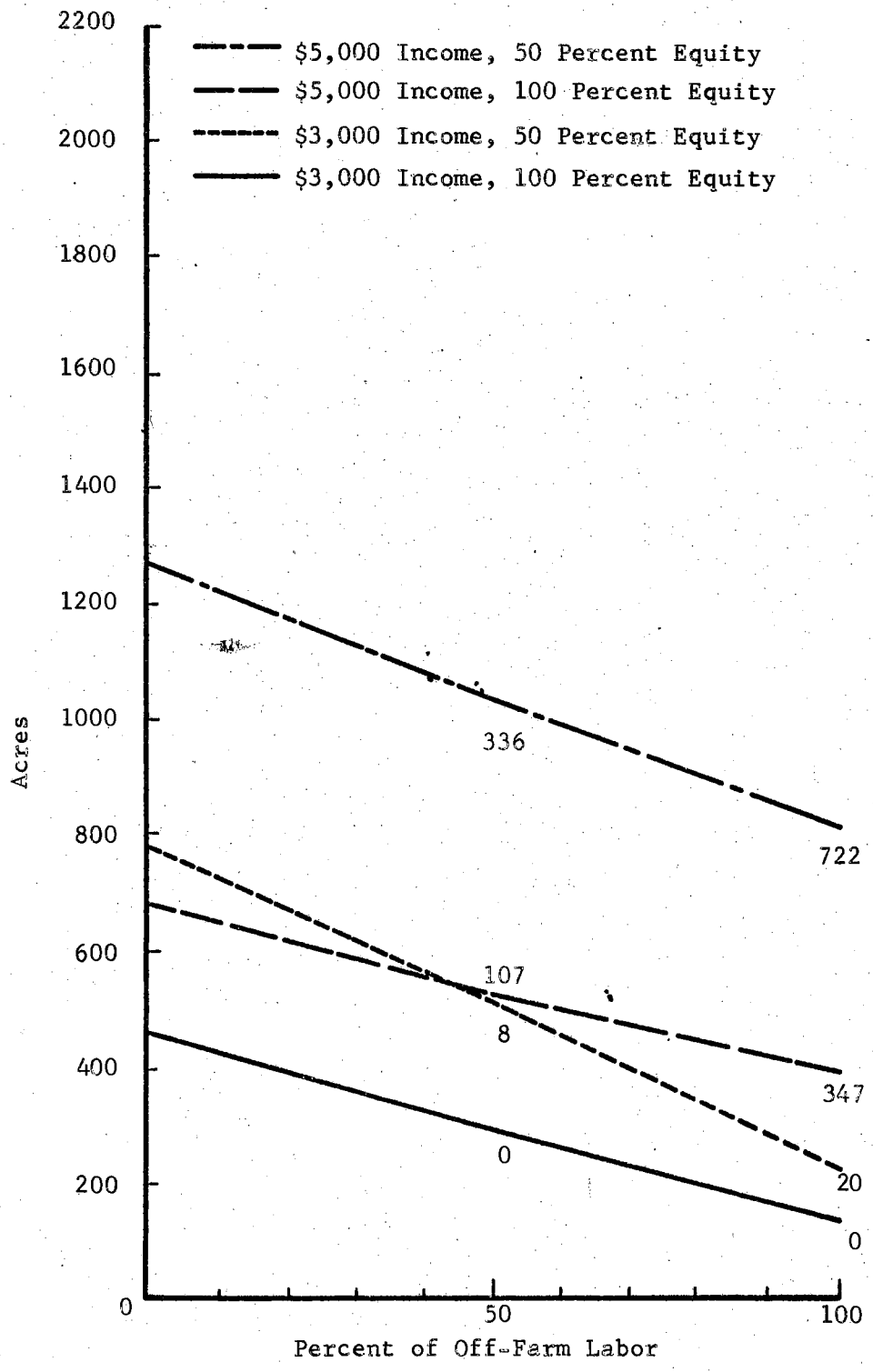

Figure 7. Estimated Substitution Rates Between Farm Size and Off-Farm Employment, Two Income Levels, and Two Equity Levels

To estimate net income gains from off-farm employment using Figures 7 and 8, the assumption is needed that the substitution rates between off-farm employment and farm size are linear between the discrete points programmed. Two estimates are then available depending on (1) whether yields are assumed to remain at present levels (Figure 7) or (2) whether yields are assumed to be lower with off-farm employment (Figure 8).

The emphasis in both Figures 7 and 8 is on labor requirement for a given farm size. Although equity was very important in determining the farm sizes listed in Figures 7 and 8, it has very little effect on labor per acre and is largely ignored in the discussion of labor requirements for different farm sizes.

Two iso-income lines ($3,000 and $5,000) for two equity levels are used in Figure 7. The additional hired labor necessary is given at the programmed points. The hired labor also is assumed to be linear between the programmed point estimates. Therefore, the net gain from an off-farm job at any given farm size is the value of the off-farm job minus the cost of hired labor due to off-farm employment.

Some examples of the estimated net gains from full time off-farm work for different farm sizes are (1) farm sizes up to 224 acres, net gain $3,000; (2) farm size 393 acres, net gain $2,653 ($3,000 - $347); farm size 818 acres, net gain $2,278 ($3,000 - $722).

The estimated net gains from half-time off-farm work for different farm sizes are: (1) farm size 291 acres, net gain $1,500; (2) farm size 508 acres, net gain $1,492 ($1,500 - $8); (3) farm size 527 acres, net gain $1,393 ($1,500 - $107).

If the assumption is made that yields will be lower with off-farm

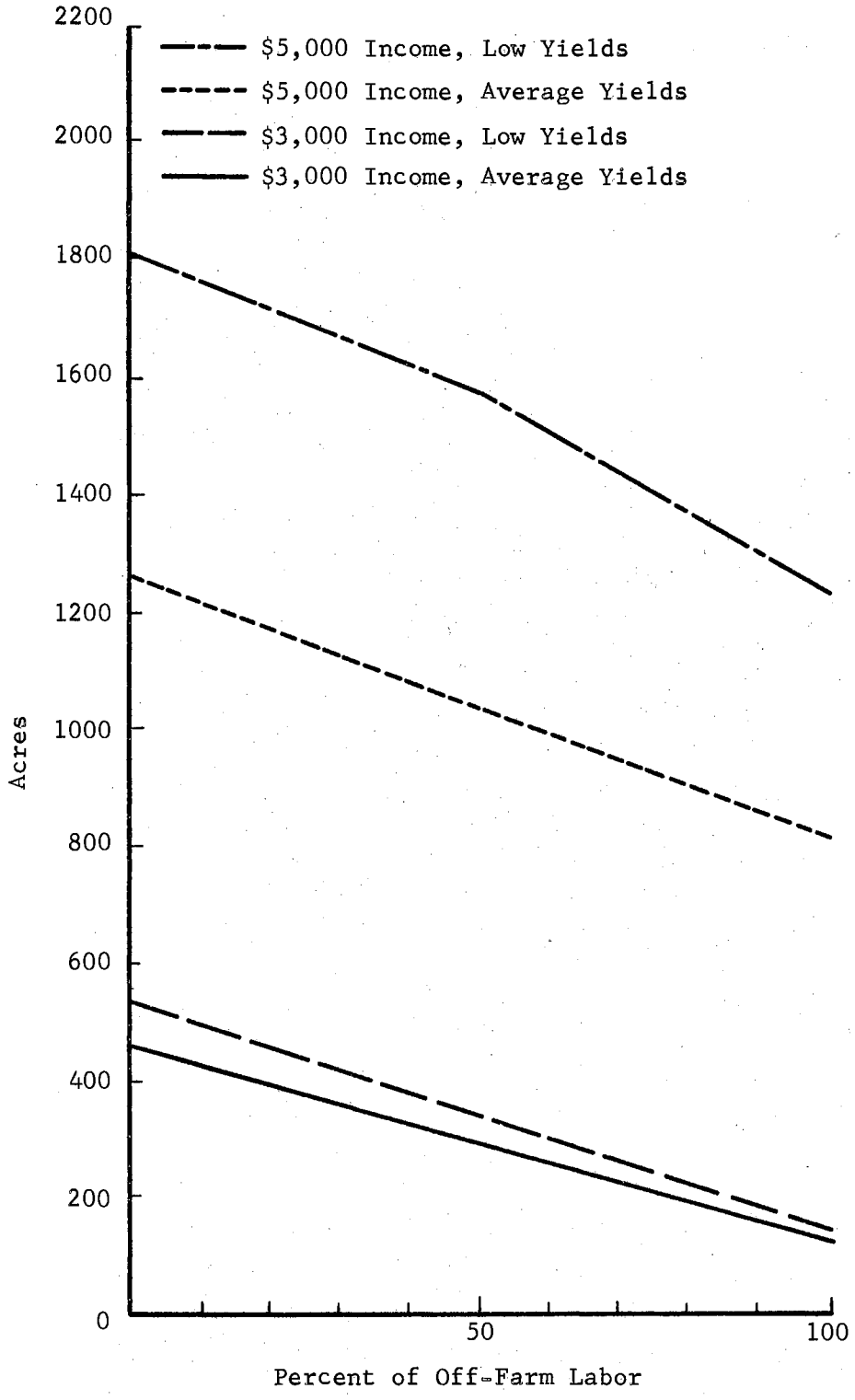

Figure 8. Estimated Substitution Rates Between Farm Size and Off-Farm Employment, Two Income Levels and Two Yield Levels

employment, the estimated net gains can be calculated from Figure 8. The income loss due to lower yields caused by working off-farm can be estimated as the percentage of the horizontal distance between the iso-income lines of Figure 8 at any given farm size. For example, the losses due to lower yields on a farm of 460 acres will be approximately 23 percent of the value of the off-farm job. The $3,000 income level can be reached with a 460 acre farm, full time farm labor, and average yields. It can also be reached with a 460 acre farm with low yields and 23 percent off-farm work.

At a farm size of 460 acres the operator has considerable unused labor; therefore, he may increase income by taking a full time off-farm job even though yields decrease. The net value of the off-farm job for a 460 acre farm can be estimated by first deducting hired labor required at that farm size (about $400 -- estimated from Table II, 477 acre farm) and second, deducting the losses due to yields (23% of 3,000 or $690 -- estimated from Figure 8) from the $3,000 value of the off-farm job for a net gain of about $1,910. The off-farm job even with lower yields would provide about $4,910 as compared with $3,000 for either a full time farm job (average yields) or a $3,000 nonfarm job, plus returns to owned resources. The calculated estimate of $4,910 for full time off-farm labor for a 460 acre farm was fairly close to the programmed $5,000 income with low yields which required a farm size of 477 acres.

The larger the farm size the greater will be the loss due to lower yields. At a farm size of 150 acres the loss would be only about 8 percent of the value of the off-farm job, while a farm size of 1,268 acres indicates a loss in yields that would be 95 percent of the

value of the off-farm job.

Implications for Area Adjustments

This study provides information on the magnitude of off-farm and/or nonfarm employment opportunities needed under alternative adjustment hypotheses for the area studied. Since opportunity returns to all resources were not possible on these farms, the alternative adjustment criteria used are (1) adjust to a farm size that utilizes all operator labor available, (2) adjust to a farm size that utilizes half-time operator labor, (3) adjust to a farm size that provides a $3,000 income to an operator who owns 50 percent of the investment required, and (4) adjust to a farm size that provides a $5,000 income to an operator who owns 50 percent of the investment required.

Full Utilization of Operator Labor: Programmed results indicate that if full utilization of operator labor on the farm is the criterion for adjustment, a minimum farm size of about 1,100 acres is needed. The income for a 1,100 acre farm would be slightly less than $5,000 with 50 percent operator equity. This would mean that the present 5,000 farms (assuming 320 acre farm size and 1,600,000 acre study area) would need to be reorganized into about 1,450 farm units. The total nonfarm labor adjustment would be about 3,550 farm operators.

If the reorganization does not take place, underemployment of farm operators with resulting lower incomes is implied. In fact, underemployment becomes more severe in time as a result of developing technology. Farm incomes for the area in recent years verify that a 70 percent underemployment is a valid estimate. In 1959, per farm incomes in the area averaged $1,585 (see Appendix A, Table I). The

median family income for the United States in 1959 was $5,660.[4] If farm operators productively employed 30 percent of the time have incomes of $1,585, then 100 percent employed would provide an income near the median family income for the United States. Although the two incomes are not strictly comparable, the estimated farm size of 1,100 acres approaches the 1,268 acre farm size indicated by this study that would give a $5,000 operator income if a 50 percent equity were owned in the operation.

If the adjustment criterion of fully utilized operator labor is used, nonfarm employment must be secured for about 70 percent or 3,550 present farm operators or the equivalent in off-farm work.

Half-Time Farm Labor: If the agricultural adjustment criterion is to utilize farm operator labor one-half time on the farm and one-half time at off-farm work (20 hours per week off-farm), the programmed results indicate a minimum farm size of about 600 acres is needed. In terms of agricultural adjustments this means that the present 5,000 farms would need to be reorganized into 2,667 farm units. Approximately 2,333 full time off-farm jobs would be needed, plus 2,667 half-time off-farm jobs for the entire area.

$3,000 Income to Operator Labor and 50 Percent Equity: To provide an income of $3,000 to operator labor and 50 percent equity, the programmed results indicate that a minimum farm size of 787 acres is needed. If farms in the area are organized according to this criterion, approximately 2,033 farms would replace the 5,000 farm units. This implies that almost 3,000 nonfarm jobs would be needed to absorb

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[4]John J. Klein, et al, The Oklahoma Economy, Oklahoma Research Series Number 1, OSU College of Business (Stillwater, 1963), p. 11.

the farm labor caused by the farm reorganization.

$5,000 Income to Operator Labor and 50 Percent Equity: For each farm operator to make a $5,000 return to labor and 50 percent equity, the estimated minimum farm size should be 1,268 acres. This implies that the present 5,000 farms would need to be reorganized into only 1,262 farm units. This criterion would require approximately 3,740 nonfarm jobs for the area.

Any application of the adjustments indicated by this study to a particular area should be corrected to include estimates of (1) the number of farms that now exceed the minimum programmed farm size, and (2) the number of farm operators presently employed off-farm (or receiving off-farm income). These corrections in the adjustments indicated can be more accurately estimated at the time and for the particular place needed than for the entire area at the present time. Evaluating farm adjustments within a particular area by considering producer groups -- which include such characteristics as age, education, job skills, capital position, and motivation -- is discussed in Chapter VIII.

CHAPTER V

THE EFFECT OF YIELDS ON MINIMUM RESOURCE REQUIREMENTS

Given constant production costs and output prices, net farm returns will vary directly with yields, and the minimum land and capital required for a specified income level will vary inversely with yields. The purpose of this chapter is to analyze the extent that a ten percent increase or decrease in all crop and pasture yields will affect land, labor, and capital requirements, and then to generalize these effects to selected physical and economic production uncertainties.

Operationally, only the physical outputs of crops and pastures were varied. The direction of the effects on the minimum resources required would have been the same as a result of (1) varying livestock productivity, (2) varying output prices of crops and/or livestock, (3) varying production costs, (4) using different soil types -- if costs were constant, and (5) any combination of these variables. The model used for the programmed results can be represented as:

$$(5.1)\quad M = \sum Py_{1i}Y_{1i} + \sum Py_{2i}Y_{2i} - \sum Px_{1i}X_{1i} - \sum Px_{2i}X_{2i} - \sum Pz_{3i}X_{3i} - Px_4X_4 - F$$

where M = income level specified

Py_{1i} = prices received for crops

Y_{1i} = amount of crops produced

Py_{2i} = prices received for livestock

Y_{2i} = amount of livestock marketed

Px_{1i} = prices of inputs used in crop production

X_{1i} = amount of inputs used in crop production

Px_{2i} = prices of inputs used in livestock production

X_{2i} = amount of inputs used in livestock production

Px_{3i} = price of nonland capital

X_{3i} = amount of nonland capital

Px_4 = price of land capital

X_4 = amount of land capital

F = unallocated fixed costs

The solutions obtained assumed all prices and amounts known with certainty, and by holding M constant and varying Y_1, the minimum resource requirements were determined for different yield levels.

Since farm managers typically operate in a situation where yields and prices are not known with certainty, it is not unrealistic to interpret the results obtained by varying Y_1 as being caused by variations in other variables and coefficients in the equation. It is realized that the results obtained by varying Y_1 plus and minus 10 percent from the average may not cover the range of uncertainty typically encountered by decision makers. However, it should provide a guide for decision making under uncertainty.

It is difficult in agricultural adjustment research to establish a norm or average for production costs, crop yields, livestock yields, soil productivity base, and output prices that is representative of the area. For simplicity and uniqueness of solutions, perfect knowledge and single valued coefficients are assumed. By establishing

norms in this manner, the degree of abstraction from individual farm situations may limit the use of the results for individual decision making. Use of a range of yields provides a means of estimating effects of uncertainty within a static framework and makes the programmed results applicable to a larger audience of individual decision makers. At the macro level, variable yields provide a range of possible outcomes for policy decisions rather than a single point estimate. A crude estimate of the cost or value of technology or other conditions that affect yields or prices can be determined. Area losses from failure to adopt a technology can also be estimated.

As defined in Chapter III, the yield levels assumed for this study were (1) an average or normal yield, (2) high yields which are average yields plus 10 percent, and (3) low yields which are average yields minus 10 percent.

Summary of Variable Yield Results

In this chapter the programmed minimum resource requirements for high, average, and low yields are presented for income levels of zero, $1,500, $3,000, and $5,000, and two operator equity levels.

The major findings and implications are:

1. A ten percent change in yield had no effect on farm organization over the range of programmed results.

2. Minimum resource requirements varied inversely with yields. The higher the interest charge on capital the greater percentage effect yields had on the minimum resource requirements.

3. Interpreting the results from the three yield levels to

include uncertainty shows that both mean income and variance are increased as farm size increases. The increased range of income variability should not be a deterrent to farm enlargement because the increase is concentrated in the higher income bracket.

4. Expanding the yield results to management and technology implies that above average management or a new technology pays off faster on a large farm.

5. A ten percent increase or decrease in yield directly affects the area farm income by about (plus or minus) two million dollars.

The Effect of Yields on Farm Organization

The farm organizations for high, average, and low yields at two income levels, two equity levels, and three off-farm employment levels all on average quality land are given in Appendix D, Tables I and II. The farm organization was relatively stable over the entire range of all variables. Evaluation of programmed results indicates there are no organizational changes attributable to different yield levels. The organizational changes that are observed are attributed to other variables in the program.

The Effect of Yields on Land Requirements

The minimum amounts of land required to obtain four different income levels under two different levels of operator equity are shown in Table VI. The zero and $1,500 income levels were programmed with off-farm employment but the $3,000 and $5,000 incomes were programmed

TABLE VI

ESTIMATED MINIMUM RESOURCE REQUIREMENTS TO OBTAIN SPECIFIED OPERATOR INCOMES WITH HIGH, AVERAGE, AND LOW YIELDS; AVERAGE LAND QUALITY AND TWO EQUITY LEVELS, EASTERN PRAIRIE LIVESTOCK SITUATION, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Yields	Item	Unit	Income Levels			
			Zero[a]	1,500[b]	3,000[c]	5,000[c]
			(Dollars)			
	100 Percent Equity					
	Land	Acres	107	253	398	592
High	Capital	Dollars	15,216	35,906	56,517	84,051
	Labor	Hours	241	567	893	1,328
	Land	Acres	124	291	459	682
Average	Capital	Dollars	16,983	39,905	62,906	93,495
	Labor	Hours	257	604	952	1,415
	Land	Acres	146	344	541	807
Low	Capital	Dollars	19,297	45,449	71,520	106,647
	Labor	Hours	278	654	1,031	1,536

TABLE VI (Continued)

Yields	Item	Unit	Income Levels			
			Zero[a]	1,500[b]	3,000[c]	5,000[c]
			(Dollars)			
	50 Percent Equity					
	Land	Acres	174	404	636	980
High	Capital	Dollars	23,481	55,949	88,128	127,263
	Labor	Hours	357	871	1,373	1,846
	Land	Acres	224	508	787	1,268
Average	Capital	Dollars	30,389	71,998	106,328	159,373
	Labor	Hours	393	970	1,571	2,221
	Land	Acres	318	714	1,070	1,806
Low	Capital	Dollars	38,756	86,941	132,656	221,678
	Labor	Hours	520	1,166	1,816	2,985

[a]Programmed with full time off-farm employment and 441 hours of operator farm labor available.

[b]Programmed with half-time off-farm employment and 1,214 hours of operator farm labor available.

[c]Programmed with no off-farm employment and 2,206 hours of operator farm labor available.

with full time farm labor.

For an operator with a 100 percent equity in the farm business, the minimum land required to obtain a $3,000 income was 398 acres with high yields, 459 acres with average yields, and 541 acres with low yields as shown in Table VI. High yields reduced the land requirement 13 percent while low yields increased the land requirement 18 percent as shown in Table VII. The minimum land required to obtain a $5,000 income was 592 acres with high yields, 682 acres with average yields, and 807 acres with low yields. At the $5,000 income level, high yields reduced the land requirement 13 percent and low yields increased the land requirement 18 percent.

For an operator with a 50 percent equity in the farm business, the minimum land required to obtain a $3,000 income varied from 636 acres with high yields, to 1,070 acres with low yields. For a $5,000 income, farm size ranged from 980 acres with high yields, to 1,806 acres with low yields.

No amount of land would produce a $3,000 or $5,000 income at zero operator equity except with high yields. This has implications for beginning farmers in the area, but will be covered in detail later in this study.

The Effect of Yields on Capital Requirements

Yields affect the capital required to secure a specified income through the effect on both land capital and nonland capital. As yields are increased, the land requirement is reduced, thereby reducing the land capital. Since land price is constant, land capital and acres of land are perfectly correlated; therefore, the percentage

TABLE VII

ESTIMATED MINIMUM LAND REQUIREMENTS TO OBTAIN $3,000 and $5,000 OPERATOR INCOMES WITH SPECIFIED YIELD LEVELS, AND THE PERCENT CHANGE IN LAND REQUIREMENTS DUE TO YIELD LEVELS; TWO EQUITY LEVELS AND AVERAGE LAND QUALITY, EASTERN PRAIRIE LIVESTOCK SITUATION, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Yields	Unit	Income Levels	
		3,000	5,000
		(Dollars)	
100 Percent Equity			
High	Acres	398	592
Percent Change From Average Yields	Percent	-13	-13
Average	Acres	459	682
Low	Acres	541	807
Percent Change From Average Yields	Percent	+18	+18
50 Percent Equity			
High	Acres	636	980
Percent Change From Average Yields	Percent	-19	-23
Average	Acres	787	1,268
Low	Acres	1,070	1,806
Percent Change From Average Yields	Percent	+36	+42

changes in land capital and acres of land are identical. The nonland capital change is not necessarily proportional to changes in land requirements if modifications in farm organization occur.

For an operator with a 100 percent equity in the farm business, the annual capital required for a $3,000 income varied from $56,517 with high yields to $71,520 with low yields as shown in Table VI. High yields reduced capital requirements 10 percent and low yields increased capital requirements 14 percent (see Table VIII). For a $5,000 income, capital varied from $84,051 with high yields to $106,647 with low yields.

With a 50 percent operator equity, the annual capital required for a $3,000 income varied from $88,128 with high yields to $132,658 with low yields. For a $5,000 income, the range of capital requirements was from $127,263 to $221,678.

The Effect of Yields on Labor Requirements

Labor requirements are affected by the crop and livestock actvities included in the farm organization and by the magnitudes of the activities. Since yields do not affect the farm organization, the variation in labor requirements due to yields is a result of the decreased farm size as yields increased.

For an operator with an equity of 100 percent in the farm business, the labor required to obtain a $3,000 income was 893 hours with high yields, 952 hours with average yields, and 1,031 hours with low yields. The same general trend was followed for the $5,000 income level and for operators with a 50 percent equity.

TABLE VIII

ESTIMATED CAPITAL REQUIREMENTS TO OBTAIN $3,000 AND $5,000 OPERATOR INCOMES WITH SPECIFIED YIELD LEVELS AND THE PERCENT CHANGE IN CAPITAL REQUIREMENTS DUE TO YIELD LEVELS; TWO EQUITY LEVELS AND AVERAGE LAND QUALITY, EASTERN PRAIRIE LIVESTOCK SITUATION, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Yields	Unit	Income Levels	
		3,000	5,000
		(Dollars)	
100 Percent Equity			
High	Dollars	56,517	84,051
Percent Change From Average Yields	Percent	-10	-10
Average	Dollars	62,906	93,495
Low	Dollars	71,520	106,647
Percent Change From Average Yields	Percent	+14	+14
50 Percent Equity			
High	Dollars	88,128	127,263
Percent Change From Average Yields	Percent	-17	-20
Average	Dollars	106,328	159,373
Low	Dollars	132,656	221,678
Percent Change From Average Yields	Percent	+25	+39

Implications of Yields for Management Decisions

Results from variable yields can provide information on environments characterized by risk and uncertainty rather than perfect knowledge. These results can also provide information for groups of producers whose environment (yields and/or costs) is above or below the average assumed for this study.

Uncertainty: Implicit in all programmed results is the assumption that the amounts and prices of all inputs and outputs are known with certainty. Programming with high, average, and low crop yields is a method of providing information on a range of possible outcomes. However, the effect on operator incomes will be the same if any of the assumed constants in Equation 5.1 are allowed to vary.

Theoretically, uncertainty implies additional costs in grass not grazed, untimely livestock sales, extra hay storage space built, or less fertilizer used with resulting lower outputs than under conditions of certainty. This study made no attempt to determine the range or standard deviation of net income variability encountered by livestock producers. If the probability is low that net income will vary more than that associated with yield changes of plus and minus ten percent from average, these results will be useful for evaluating management decisions under uncertainty. On the other hand, if the probability is high that net income will vary more than that associated with these yields, the results will be of limited value in evaluating uncertainty.

For some firms, uncertainty is closely associated with firm survival. If a normal distribution can be assumed for the programmed incomes, 50 percent of the time incomes will be less than that specified.

If firm survival requires a minimum income that is obtainable at least 80 percent of the time, this implies a need for larger farms than indicated by average yields. For example, an operator with a 50 percent equity needs a farm size of 1,070 acres with low yields to obtain a $3,000 income, but only 787 acres are needed with average yields.

Another aspect of uncertainty that may be of interest to farm managers is the variability of income about the mean, the range or standard deviation. The programmed results in Figure 9 indicate a range of incomes for different farm sizes with three yield levels. The income range increases as farm size increases, which means that uncertainty may influence farm enlargements, especially when enlargements are made with borrowed capital. Except for one difference, the results presented in Figure 9 are comparable to "the principle of increasing risk."[1] An example can show the difference between the programmed results and the theory of increasing risk.

A farm manager with a 100 percent equity in a 400 acre farm can expect a mean income of $2,400 with a range from $1,900 to $3,000 (Figure 9). An 800 acre farm would provide a mean income of $3,050 with a range from $1,900 to $4,000. If farm enlargement from 400 acres to 800 acres is accomplished with borrowed capital, the equity position on the larger farm would approximate 50 percent. Farm enlargement with borrowed funds would (1) increase the expected mean income, (2) increase the range of expected incomes, (3) increase the

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[1] A summary of the work of Kalecki and Steindl on increasing risk is presented by Earl O. Heady, Economics of Agricultural Production and Resource Use (Englewood Cliffs, 1961), pp. 543-549.

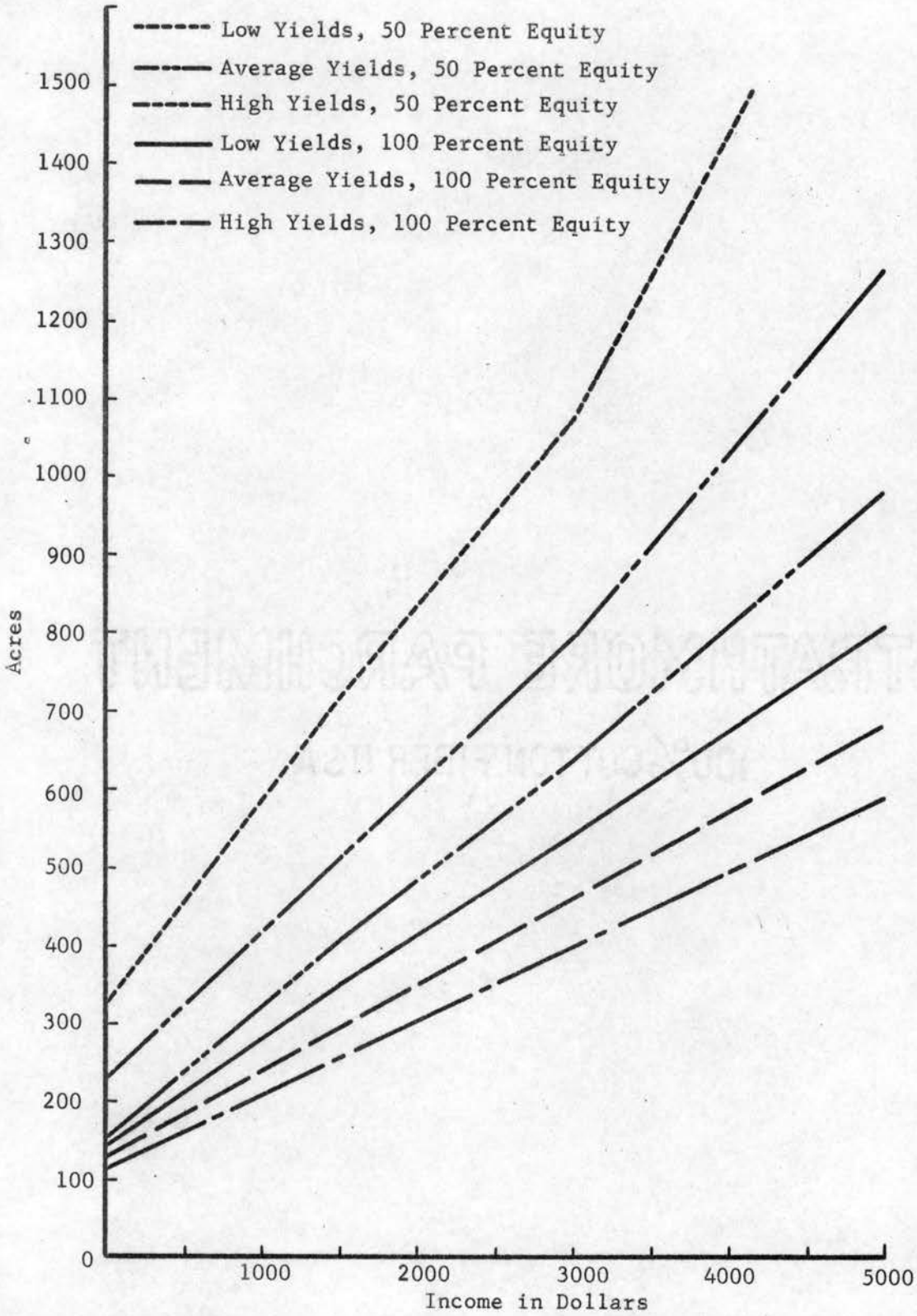

Figure 9. Acres of Land Required to Obtain Specified Income Levels with High, Average, and Low Yields for Average Land Quality and Two Equity Levels

expected income in good years, and (4) have no effect on expected income in adverse years (about $1,900 in both cases).

The same operator income in adverse years for both equity positions does not correspond to the example of "increasing risk" given by Heady.[2] Heady assumes a plus or minus 20 percent rate of return on investment regardless of size of plant or equity position. The results presented in Figure 9 show higher rates of return to capital on larger farms because operator labor is handled as a fixed cost. As programmed, the rate of return on investment at 100 percent equity was 4.8 percent (farm size 459 acres), and 5.6 percent at 50 percent equity (farm size 787 acres), with average yields and full time farm labor.[3]

The implication is that operators have much to gain and little to lose by farm enlargement even with borrowed capital once operator labor is committed to farm use. This analysis would be valid only for farm sizes up to about 1,100 acres or the farm size that would completely utilize all operator labor available.

Environments Above or Below Average: Individual farm managers have different "average" returns from the same set of production conditions. This difference in returns (from identical conditions) is often attributed to either a difference in managerial skills or a difference in production techniques used. The "average" for some operators may be represented by the "high yields," and the "average" for others may approximate the "low yields."

If the programmed results cover the practical range of variability

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[2]Heady, p. 543.

[3]Calculated from Appendix F, Table I.

of management skills in the area, the results presented in Figure 9 may be used to compute probable gains and losses from different levels of management employed on different farm sizes. In the short run, the farm size is fixed, and any increase in farm income must come from increased production (or decreased cost, etc.). Increasing yields from "average" to "high" on a 250 acre farm will increase income about $300. Under the same conditions, farm income can be increased about $1,200 on a farm of 1,000 acres.

The low opportunity cost of a mediocre management job on small farms is probably one reason that alternatives, such as off-farm employment discussed in the previous chapter, are more advantageous to managers of these units. The handicap of accumulating the necessary resources plus the additional management skills is practically formidable. Unfortunately, managers of small farm units may also lack the skills necessary for off-farm jobs.

Programmed results of high, average, and low yields imply that an increase in farm size (if labor is fixed to the farm) will help overcome the problem of an uncertain production environment, and will also provide greater returns to superior management skills.

Area Implications of Yields

A ten percent increase or decrease in yields can have a large impact on the economy of an area. An increase of ten percent in yields can increase farm incomes of the area by approximately two million dollars, as shown in Table IX. Total economic activity of the area will be increased by two million times the multiplier effect. It is apparent that nonfarm businesses, as well as farmers, have an

TABLE IX

THE ESTIMATED EFFECT OF HIGH, AVERAGE AND LOW YIELDS ON THE NUMBER OF FARMS THE AREA WILL SUPPORT, THE PERCENT CHANGE FROM THE ESTIMATED PRESENT NUMBER OF FARMS, AND THE EFFECT ON NET FARM INCOME FOR THE AREA; FOR SPECIFIED INCOME LEVELS AND TWO EQUITY LEVELS, EASTERN PRAIRIE LIVESTOCK SITUATION, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Yield	Item	Unit	Income Levels 1,500	3,000	5,000
				(Dollars)	
	100 Percent Equity				
	Area Farms[a]	Number	6,324	4,020	2,703
High	Change[b]	Percent	+27	-20	-46
	Area Income[c]	Dollars[d]	17.8	17.8	17.8
	Area Farms	Number	5,498	3,486	2,346
Average	Change	Percent	+10	-30	-53
	Area Income	Dollars	15.6	15.6	15.6
	Area Farms	Number	4,651	2,957	1,983
Low	Change	Percent	-7	-41	-60
	Area Income	Dollars	13.4	13.4	13.4
	50 Percent Equity				
	Area Farms	Number	3,960	2,516	1,633
High	Change	Percent	-21	-50	-67
	Area Income	Dollars	17.6	17.6	16.8
	Area Farms	Number	3,150	2,033	1,262
Average	Change	Percent	-37	-59	-75
	Area Income	Dollars	15.4	15.4	14.4
	Area Farms	Number	2,241	1,495	886
Low	Change	Percent	-55	-70	-82
	Area Income	Dollars	12.7	12.7	11.9

[a]The number of farms is calculated from the estimated 1,600,000 acres in the study and the minimum land requirements given in Table VI.

[b]An estimated 5,000 farm units at the present time are used as a base.

[c]Area income used here includes only returns to operator labor, unallocated fixed costs, a five percent return on land capital, a six percent return on operating capital, and real estate taxes.

[d]These units are in millions.

economic interest in farm technology such as new crop varieties and livestock feeding and breeding technologies that will increase yields. On the other hand, the area's economy can lose two million dollars times the multiplier if output increasing technologies are adopted by other areas -- thereby reducing output prices -- and are not adopted by the particular area.

Results presented in Table IX indicate that farm returns are practically a linear function of the number of acres in the farm, up to farm sizes that require hired labor. Therefore, how livestock farms in the area are organized by income levels has little effect on total farm income of the area. If all the farms in the area were organized to give a per farm return of $1,500, total farm income for the area would be comparable to that of a per farm return of $3,000. Under some conditions, farms organized for a per farm income of $5,000 would reduce total area income as compared to other area organization. (Returns per acre are less with some organizations.) The amount of the reduction is relatively small as compared to the reduction in income caused by lower yields.

Although the specific income level to which farmers of the area adjust does not materially affect the total farm income of the area, it does have a direct effect on the number of farms the area will support. The number of farmers and farm income level are important for decisions concerning schools, social institutions and non-farm firms.

The number of farms and per farm incomes are also important for evaluating product demand within an area. If adjustments are made such that farm numbers are halved and per farm incomes doubled, the

demand schedule for a particular product may be changed. The amount of change will depend on the tastes and preferences of the individuals involved, and the income elasticity of demand for the particular good.

CHAPTER VI

THE EFFECT OF OPERATOR EQUITY ON MINIMUM RESOURCE REQUIREMENTS

There is considerable evidence that farm managers make no distinction between returns from labor, management, and other owned resources. If this is true, operator equity is a factor in farm adjustment decisions and the effect of operator equity on minimum resource requirements for specified incomes is relevant. The resources owned by the operator -- other than his labor and management -- are referred to in this study as the equity of the operator.

Operationally, two methods are available for determining the effect of equity on minimum resources required. One method is to assume an equity of a given absolute amount such as a given farm size plus a machinery complement.[1] The second method is to program equity as a percent of capital requirements (by varying interest rates), and then determine the absolute amount of equity required in each case. The second method was used in this study.

Given the assumption that a satisfactory level of returns to all owned resources is the relevant decision criterion, the objective of this chapter is to determine the effect of equity levels on the

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[1] Connor, "Long Run Adjustment Hypotheses for Farm Operators in a Sparsely Populated, High-Risk Area of the Great Plains," p. 69.

minimum resources required to obtain the "satisfactory" income. Opportunity cost is therefore ignored in this chapter except in the discussion of Table XI which shows the percent increase in land price that is necessary to meet the opportunity cost of capital.

Summary of Operator Equity Results

The minimum resources required to obtain a $3,000 operator income were programmed for five equity levels (interest rates). Results of the five equity levels programmed with various combinations of yields and land quality are presented in this capter.

The main findings and implications are:

1. With average yields, the minimum operator equity required for a $3,000 income was in excess of $40,000.

2. For any given amount of operator equity, the highest possible income was secured (within the range programmed) when the equity was combined with borrowed funds to increase farm size.

3. The equity position of the operator may affect the farm organization. At high operator equity levels (low interest rates) bermuda and native grasses were the only crops grown. At low operator equity (high interest rates) soybeans and small grain for grazing replaced bermuda on some cropland.

4. Only with high yields (ten percent above average) were solutions possible when the operator owned no equity in the farm business.

5. An average of about $12,000 (varying from $10,000 to $19,000) of operator equity was required for each $1,000 of farm income (includes unallocated fixed costs as farm income).

The Effect of Operator Equity on Farm Organization

The programmed farm organizations for five equity levels, three yield levels, $3,000 income, and average land quality, are given in Appendix E, Tables I and II. Results indicate that the equity position of the operator did affect the crop and livestock activities included in the farm organization. Bermuda was grown on all cropland at the 100 percent operator equity level. Soybeans replaced bermuda on the C_1 cropland with operator equity at 50 percent. This change in land use indicates that (1) gross returns were greater for bermuda than soybeans on C_1 land (entered solutions when capital costs were zero), and (2) net returns (after deducting a 50 percent opportunity capital cost) were greater for soybeans than for bermuda. In some solutions the 50 percent operator equity level indicated a farm size so large that hired labor was necessary. If hired labor was necessary, small grain for grazing replaced bermuda on some C_3 cropland. The livestock activity P-55 increased and decreased with the amount of small grain and vetch pasture available, while the quantity of the P-57 activity in the solutions varied with the bermuda pasture available.

The Effect of Operator Equity on Land Requirements

The programmed effect of operator equity on the minimum land required to obtain a $3,000 income at five different equity levels for two land qualities and three yield levels is given in Table X.

To obtain a $3,000 income with average land and high yields, 398

TABLE X

ESTIMATED MINIMUM RESOURCE REQUIREMENTS TO OBTAIN A $3,000 OPERATOR INCOME WITH SPECIFIED LEVELS OF OPERATOR EQUITY; THREE YIELD LEVELS, TWO LAND QUALITIES AND FULL TIME FARM LABOR, EASTERN PRAIRIE LIVESTOCK SITUATION, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

			Operator Equity Levels				
Yield	Item	Unit	100 Percent	50 Percent	33 Percent[a]	25 Percent	Zero Percent
	Average Land						
	Land	Acres	398	636			2,148
High	Capital	Dollars	56,517	88,128	N.A.[b]	N.A.	278,967
	Labor	Hours	893	1,373			4,019
	Land	Acres	459	787	1,163	1,332	
Average	Capital	Dollars	62,906	105,328	146,107	167,405	N.S.[c]
	Labor	Hours	952	1,571	2,037	2,332	
	Land	Acres	541	1,070	1,848		
Low	Capital	Dollars	71,520	132,656	214,092	N.A.	N.S.
	Labor	Hours	1,031	1,816	2,704		

TABLE X (Continued)

Yield	Item	Unit	Operator Equity Levels 100 Percent	50 Percent	33 Percent[a]	25 Percent	Zero Percent
	Good Land						
	Land	Acres	312	520			4,719
High	Capital	Dollars	60,379	97,922	N.A.[b]	N.A.	828,786
	Labor	Hours	942	1,502			11,592
	Land	Acres	363	674	1,109	1,423	
Average	Capital	Dollars	67,856	119,463	188,332	241,867	N.S.[c]
	Labor	Hours	1,014	1,713	2,558	3,282	
	Land	Acres	434	1,016	2,723		
Low	Capital	Dollars	78,264	167,328	397,909	N.S.	N.S.
	Labor	Hours	1,114	2,192	4,740		

[a]The 33 percent level will vary slightly because results were programmed with interest rates of 2 1/2 percent for land capital and 6 percent for operating capital.

[b]Not programmed.

[c]No solution possible.

acres were required with a 100 percent equity, 636 acres with a 50 percent equity, and 2,148 acres with no equity. The 25 and 33 percent equity levels were not programmed. Under the same conditions except with average yields, 459 acres were required with 100 percent equity, 787 acres with 50 percent equity and 1,332 acres with 25 percent equity. No amount of land would produce the specified income level at zero equity. With low yields, 541 acres were required with 100 percent equity, 1,070 acres with 50 percent equity, 1,848 acres with 33 percent equity. The 33 percent equity level was programmed with land capital at 2½ percent, and nonland capital at 6 percent. The 25 percent equity level was not programmed, and the zero equity level indicated no land quantity would provide the specified income.

Fewer acres of good land were required than of average land in the 50 and 100 percent equity solutions; however, the reverse was true for the zero and 25 percent equity solutions. This means that the land prices used for the three land qualities were not in proportion to the differences in productivity. At low interest rates (50 and 100 percent equity), the difference in productivity was greater than the difference in land costs (or price). At high interest rates (25 and zero percent equity) the difference in productivity was less than the difference in land costs (or price). Given the land prices and productivity of the three land qualities used in this study, the lower quality land was the best buy if the market rate of interest was five percent on land capital.

The Effect of Operator Equity on Capital Requirements

Capital requirements for any given income level are determined by (1) the farm size required, (2) the price (or cost) of land, and (3) the farm organization that specifies the amount of nonland capital required. As the operator equity level decreased (Table X), farm size and capital requirements increased. Capital requirements associated with good land were greater than those for average land at each equity level because of the higher price for good land.

Although low operator equity levels (higher interest rates) required larger farm sizes and greater annual capital requirements to produce a specified operator income, the amount of operator equity required actually decreased from $62,906 at the 100 percent equity level to $41,852 (25 percent of $167,405) at the 25 percent equity level.

The Effect of Operator Equity on Labor Requirements

Farm labor requirements are functions of farm size, land quality, and farm organization. For any given land quality, the effects of equity on labor requirements are primarily those related to farm size as shown by Table X.

Implications of Operator Equity for Farm Management Decisions

No solutions with average yields and zero equity imply that opportunity returns to all inputs can only be secured under

exceptionally "good conditions." "Good Conditions" means higher yields or a combination of yields, prices, costs, management or technology better than those defined as average for this study. The specific reason why opportunity returns cannot be obtained with average yields is not obvious from the programmed solutions. Higher land prices than can be justified by livestock production is the most reasonable explanation.

Assuming that land prices are higher than can be justified for use in livestock production, it is still possible for an operator to achieve an opportunity return on all resources via an increase in land values. Since land prices have been increasing for over 25 years, to expect some return in the form of land appreciation may not be entirely irrational. If land appreciation is necessary to achieve opportunity returns, what are the implications of different equity levels for managerial decisions?

Programmed results with average land and average yields for different equity levels (Table X and Appendix E, Table I), showed that annual capital and operator equity of $62,906 were required at the 100 percent equity level to produce a $3,000 income, while at the 25 percent equity level, annual capital of $167,405 and operator equity of $41,851 were required. If the entire $3,000 income was assigned to operator labor, this leaves a zero return to the operator's owned capital of $62,906 in one case, and $41,851 in the other. In order to secure opportunity returns to all resources through land appreciation, land values must increase by an amount equal to an opportunity return on the operator owned capital in each case.

With the farm size of 459 acres (100 percent equity), land prices must increase over $7.00 per acre or 9.3 percent annually to provide

the opportunity return on the $62,906 of operator owned capital. With farm size of 1,332 acres (25 percent equity), an increase in land prices of only 2.1 percent annually is necessary to provide the necessary return on $41,851 of operator owned capital.

The percent increase in land values required to provide a five percent return on the capital invested in land, and six percent on the capital used for other purposes is given in Table XI. Similar tables can be constructed for other yields, land quality, or labor incomes, from results presented in Appendix E, Tables I and II.

The reason why a smaller percent increase in land values is required to provide opportunity returns with larger farms was discussed in Chapters IV and V. When operator labor is considered as a fixed cost, the farm sizes of less than 1,100 acres do not completely utilize the fixed labor, while a farm size of 1,332 acres can utilize all the operator labor available.

Area Implications of Operator Equity

Programmed results with different operator equity provided a range of farm sizes and per farm incomes from which area adjustments can be analyzed. The effect on the total economic activity of the area via farm sizes, number of farmers, and per farm incomes was discussed in Chapter V.

Inferences can also be drawn from the study concerning the characteristics of the future full time livestock producers in the area. With average yield conditions, some operator equity was required for all solutions. The minimum amount of equity required to provide a $3,000 operator income varied from $41,000 to $65,000, depending on

TABLE XI

PROGRAMMED FARM SIZES FOR DIFFERENT OPERATOR EQUITY LEVELS AND THE AVERAGE RATE OF RETURN ON INVESTMENT FOR EACH, WITH THE REQUIRED GROWTH RATE IN LAND VALUES TO PROVIDE AN OPPORTUNITY RETURN TO ALL CAPITAL INVESTED[a]

Operator Equity (Percent)	Farm Size (Acres)	Average Rate of Return on Capital[b] (Percent)	R[c] (Percent)
Zero	-----	----	0.0
25	1,332	4.02	2.1
33	1,163	3.77	2.6
50	787	2.70	4.5
100	459	0.00	9.3

[a]Calculated from Appendix F, Table I, with average yields, average land quality and full time farm labor for $3,000 operator income.

[b]Average rate of return on capital is calculated by using a five percent return to land capital and six percent to nonland capital. This could also represent an opportunity return at rates less than those used in this study. The 25 percent equity rate will approximate the opportunity returns on savings, while 3.77 percent might be comparable to opportunity returns of investments in insurance.

[c]The annual rate of increases in land values that would be required to provide the operator with a return of five percent on land capital and six percent on nonland capital used in the farm business.

how the equity was combined with borrowed funds. For most farm operators, a $3,000 return does not provide much chance of capital accumulation; therefore, the operators that presently have an equity in excess of $40,000 may be expected to be the full time commercial livestock producers in the future. The most efficient farm operation was indicated when this equity was combined with borrowed capital, if needed, to provide a farm size of at least 1,100 acres.

CHAPTER VII

THE EFFECT OF LAND QUALITY ON MINIMUM RESOURCE REQUIREMENTS

For this analysis, land quality was varied by changing the percentage of cropland in a representative acre. The programmed effects of land quality are a direct result of the cropland-noncropland makeup of the farm and are indirectly the results of changes in productivity.

The percentage of cropland, native pasture, native hay, woods, and waste for good, average, and poor land quality was given in Chapter III and Appendix B, Table I.

Programmed results using good, average and poor land with four income levels, two equity levels, and average yields were evaluated. The main findings and implications were:

1. Land quality had no effect on the crops grown on a particular soil productivity class except indirectly through the labor requirements. Land quality did affect the amount of each soil productivity class on a given farm size and therefore the amounts of each crop and livestock activity.

2. For the land qualities, land prices, and equity levels programmed, as land quality increased, the minimum land required decreased; however, labor and capital requirements both increased.

3. The better quality land required more labor per acre. About

900 acres of good land, 1,100 acres of average land, and 1,600 acres of poor land were required to productively employ operator labor full time on the farm.

The Effect of Land Quality on Farm Organization

Land quality determines the crops and pastures that can be grown most profitably, which in turn affects the livestock activities that best utilize the crops and pastures produced.

So far as can be determined from the programmed results, land quality had no direct effect on land use for any given soil productivity class. However, the cropland-noncropland proportions varied with land quality; therefore, even though the same crops, pastures, and livestock activities were included in the farm organizations, the amounts differed for farms of the same size. Indirectly, land quality may also affect farm organization through the effect of labor requirements. Since good quality land has a higher percentage of cropland, a greater proportion of the farm is in tame pasture grasses which require more labor per acre than native pastures. Farm organizational changes resulting from hired labor were discussed in Chapter IV.

The farm organizations for the three land qualities at two income levels and two equity levels all with average yields are given in Appendix F, Tables I and II.

The Effect of Land Quality on Land Requirements

The amount of land required for three levels of land quality, each evaluated at four income levels and two equity levels, is given in Table XII. The $3,000 and $5,000 income levels were programmed with

TABLE XII

ESTIMATED MINIMUM RESOURCE REQUIREMENTS TO OBTAIN SPECIFIED OPERATOR INCOMES WITH SPECIFIED QUALITIES OF LAND; TWO EQUITY LEVELS AND AVERAGE YIELDS, EASTERN PRAIRIE LIVESTOCK SITUATION, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Land Quality	Item	Unit	Income Levels			
			Zero[a]	1,500[b]	3,000[c]	5,000[c]
			(Dollars)			
	100 Percent Equity					
	Land	Acres	98	231	363	541
Good	Capital	Dollars	18,312	43,139	67,856	101,095
	Labor	Hours	273	644	1,014	1,509
	Land	Acres	124	291	459	682
Average	Capital	Dollars	16,983	39,905	62,906	93,495
	Labor	Hours	257	604	952	1,415
	Land	Acres	172	404	637	947
Poor	Capital	Dollars	16,691	39,236	61,841	91,941
	Labor	Hours	232	546	860	1,279

TABLE XII (Continued)

Land Quality	Item	Unit	Income Levels			
			Zero[a]	1,500[b]	3,000[c]	5,000[c]
			(Dollars)			
	50 Percent Equity					
	Land	Acres	197	441	674	1,111
Good	Capital	Dollars	33,413	74,932	119,463	188,698
	Labor	Hours	454	1,022	1,713	2,563
	Land	Acres	224	508	787	1,268
Average	Capital	Dollars	30,389	71,998	106,328	159,373
	Labor	Hours	393	970	1,571	2,221
	Land	Acres	296	681	1,070	1,673
Poor	Capital	Dollars	27,438	65,214	103,902	152,886
	Labor	Hours	364	898	1,446	1,990

[a]Programmed with full time off-farm labor and 441 hours available for farm labor.

[b]Programmed with half-time off-farm labor and 1,214 hours available for farm labor.

[c]Programmed with full time farm labor of 2,206 hours annually.

full time operator labor, while the zero and $1,500 income levels were programmed with part-time operator labor.

Within any given land quality, the minimum land requirements were practically a linear function of the income level (Table XII). This was especially true until a farm size was reached that used all operator labor available.

An important effect of land quality on minimum land requirements was the relationship between land quality and equity levels. Results at the 100 percent equity level provide an estimate of the relative differences in productivity of the three land qualities because the only difference in land costs at this equity level was the small difference in taxes between the three land qualities. A representative acre of good land was approximately 21 percent more productive than average land, while an acre of poor land was approximately 39 percent less productive than average land (Table XIII). This means that the land prices (of $60, $80, and $110) used in this study were not representative of productivity alone.

Results at the 50 percent equity level reflect some difference in land costs for different land qualities. The differences in costs partially offset the difference in productivity. The amount of good land required to produce a $5,000 income was only 12 percent less than the amount of average land required with 50 percent equity, but was 21 percent less with 100 percent equity (Table XIII).

The Effect of Land Quality on Capital Requirements

The annual capital requirement is composed of both land capital and nonland capital. Land quality affects both. Land capital is

TABLE XIII

ESTIMATED MINIMUM LAND REQUIREMENTS TO OBTAIN $3,000 AND $5,000 OPERATOR INCOMES WITH SPECIFIED LAND QUALITIES, AND THE PERCENT CHANGE FROM AVERAGE QUALITY LAND; TWO EQUITY LEVELS, AVERAGE YIELDS AND FULL TIME FARM LABOR, EASTERN PRAIRIE LIVESTOCK SITUATION, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Land Quality	Unit	Income Level 3,000	5,000
		(Dollars)	
100 Percent Equity			
Good	Acres	363	541
Percent Change From Average Land	Percent	-21	-21
Average	Acres	459	682
Poor	Acres	637	947
Percent Change From Average Land	Percent	+39	+39
50 Percent Equity			
Good	Acres	674	1,111
Percent Change From Average Land	Percent	-14	-12
Average	Acres	787	1,268
Poor	Acres	1,070	1,673
Percent Change From Average Land	Percent	+35	+32

affected via farm size and land price, and nonland capital via the crops and livestock enterprises best suited to a particular land quality. The annual capital requirements for the three land qualities evaluated at four income levels and two equity levels are given in Table XII.

Capital requirements associated with poor quality land were less than those for better land qualities for all programmed situations. With the land prices used in this study, investment in a farm of poor quality land would be preferable to investment in one of a better land quality. As expected from the minimum land requirements of Table XIII, the capital spread between land qualities increased as the equity level decreased (Table XIV). With different land prices for different land qualities, as the percent change in acres decreased, the percent change in capital should increase.

The Effect of Land Quality on Labor Requirements

The variability of labor by land qualities was due to different labor requirements for different types of pastures. Tame pastures (on cropland) required more annual labor for fertilizing, reseeding and general maintenance than did native pastures; therefore, the good land with a high proportion of cropland suitable for tame pastures required more labor per acre than the poor land with a low proportion of bermuda pasture.

For all programmed results, the labor requirements for specified income levels varied directly with land quality as shown in Table XII. For an operator with a 100 percent equity in the farm business to obtain a $3,000 income, the labor requirements were 1,014 hours for

TABLE XIV

ESTIMATED CAPITAL REQUIREMENTS TO OBTAIN $3,000 AND $5,000 OPERATOR INCOMES WITH SPECIFIED LAND QUALITIES, AND THE PERCENT CHANGE FROM AVERAGE QUALITY LAND; TWO EQUITY LEVELS, AVERAGE YIELDS AND FULL TIME FARM LABOR, EASTERN PRAIRIE LIVESTOCK SITUATION, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Land Quality	Unit	Income Levels	
		3,000	5,000
		(Dollars)	
100 Percent Equity			
Good	Dollars	67,856	101,095
Percent Change From Average Land	Percent	+8	+8
Average	Dollars	62,906	93,495
Poor	Dollars	61,841	91,941
Percent Change From Average Land	Percent	-02	-02
50 Percent Equity			
Good	Dollars	119,463	188,698
Percent Change From Average Land	Percent	+12	+18
Average	Dollars	106,328	159,373
Poor	Dollars	103,902	152,886
Percent Change From Average Land	Percent	-02	-04

good land, 952 hours for average land, and 860 hours for poor land. The same general trend -- the higher the land quality the greater the labor requirements -- followed for all income and equity levels.

Although land quality differences may have important implications for labor utilization in the area, these effects and implications are covered in more detail in this study under off-farm employment opportunities.

Implications of Land Quality Results for Farm Management Decisions

Again, all programmed results presented in this section (Table XII) represent some losses of opportunity returns. For example, results at 100 percent operator equity imply a zero return to capital (if the $3,000 income is all credited to operator labor) and losses equal to the opportunity return on the capital used. Therefore, the land quality that minimizes capital requirements would minimize losses. Since poor land quality required the smallest amount of capital for a given income level, it would represent the most economical land buy if different land qualities are available at the prices assumed.

The programmed difference in capital requirements for the three land qualities may be due to errors in specifying land prices. However, prices for resources are determined by the best alternative use and some land qualities may be priced too high for livestock production costs on these lands to be competitive with costs on lower quality land. If the land prices (and other costs) used in this study are fairly representative of the area, the more land extensive feed production methods associated with low quality land will produce beef

at a lower cost than the more land intensive methods used on the better croplands.

Land quality results also show that the minimum farm size required to completely utilize operator labor will vary with different land qualities. It was estimated (Chapter IV) that approximately 1,100 acres of average quality land were needed to completely utilize operator labor. Results presented in Table XII indicate that about 900 acres of good quality land and 1,600 acres of poor quality land are needed to utilize operator labor full time on the farm.

CHAPTER VIII

SUMMARY AND CONCLUSIONS

The central purpose of this study was to determine the nature and magnitude of potential adjustments of livestock producers on the eastern prairie soils of east central and south central Oklahoma under alternative adjustment hypotheses. The specific objectives were to determine the effects of off-farm employment, yields, operator equity, and land quality on the enterprise combinations and the minimum resources required to obtain specified levels of operator incomes.

The soil resource base for the study was restricted to the eastern prairie soils and soils of similar productivity. Institutional and economic restrictions were imposed on the study in accordance with the adjustment possibilities of the defined set of livestock farm resources. All crops requiring acreage allotments and all livestock enterprises except beef production were excluded. The included crop enterprises were soybeans, oats, alfalfa, grain sorghum, small grains for grazing, and bermuda grass at several levels of management. Included livestock enterprises were selected cow-calf and feeder calf systems. Product and resource input prices were based on current estimates for the area.

Conceptual models were developed for analyzing alternative adjustment hypotheses in a minimum resource framework. Linear programming techniques were used to determine the farm organization and the minimum resources required to obtain a $3,000 or a $5,000 operator income for

(1) three levels of off-farm employment, (2) three levels of yields, (3) three levels of operator equity, and (4) three land qualities.

Results

No solutions were obtained using costs of five percent for land capital and six percent for operating capital. Therefore, potential adjustments must be analyzed with results from lower interest rates than those considered as market rates. The effects of off-farm employment, yields, and equity levels on minimum resource requirements can be evaluated from Table XV. The number of farms that can be supported on the 1,600,000 acre soil resource base for alternative income criteria and different levels of the variables is also given in Table XV.

Programmed results indicate that the minimum resource requirements for specified incomes will vary widely depending on the assumptions made for equity, yields, and land quality in combinations with off-farm employment. The minimum farm size varied from 107 acres to 1,806 acres; the annual capital requirements from $15,216 to $221,678; and the annual labor requirements from 241 hours to 2,985 hours as given in Table XV.

The organization of crops and livestock activities remained fairly stable over all ranges of the variables programmed. The basic farm organization indicated that bermuda overseeded with vetch should be grown on all cropland plus native pastures on all noncropland. Changes in the levels of yields and land quality had no effect on the basic organization. However, by assumption, land quality changed the proportions of cropland to noncropland. Land use changes were noted at equity levels less than 100 percent. Soybeans were grown on C_1

TABLE XV

SUMMARY OF ESTIMATED RESOURCE REQUIREMENTS TO OBTAIN $3,000 OR $5,000 OPERATOR INCOME AND THE ADJUSTED NUMBER OF FARMS FOR THE STUDY AREA; TWO EQUITY LEVELS, THREE YIELD LEVELS, THREE OFF-FARM EMPLOYMENT LEVELS AND AVERAGE LAND QUALITY, EASTERN PRAIRIE LIVESTOCK SITUATION, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Unit	100 Percent Equity			50 Percent Equity		
		High Yields	Average Yields	Low Yields	High Yields	Average Yields	Low Yields
$5,000 Income -- Full Time Farm Labor							
Average Quality Land	Acres	592	682	807	980	1,268	1,806
Capital	Dollars	84,051	93,495	106,647	127,263	159,373	221,678
Labor	Hours	1,328	1,415	1,536	1,846	2,221	2,985
Number of Area Farms[a]	Farms	2,703	2,346	1,983	1,633	1,262	886
$5,000 Income -- Full Time Off-Farm Employment[b]							
Average Quality Land	Acres		393	477		818	1,237
Capital	Dollars	c	52,780	61,973	c	103,202	155,056
Labor	Hours		780	876		1,433	2,111
Number of Area Farms[a]	Farms		4,071	3,354		1,956	1,293
$3,000 Income -- Full Time Farm Labor							
Average Quality Land	Acres	398	459	541	636	787	1,070
Capital	Dollars	56,517	62,906	71,520	88,128	106,328	132,656
Labor	Hours	893	952	1,031	1,373	1,571	1,816
Number of Area Farms[a]	Farms	4,020	3,486	2,957	2,516	2,033	1,495

TABLE XV (Continued)

Item	Unit	100 Percent Equity			50 Percent Equity		
		High Yields	Average Yields	Low Yields	High Yields	Average Yields	Low Yields
$3,000 Income -- Half-Time Off-Farm Employment[d]							
Average Quality Land	Acres	253	291	344	404	508	714
Capital	Dollars	35,906	39,905	45,449	55,949	71,998	86,941
Labor	Hours	567	604	654	404	970	1,166
Number of Area Farms[a]	Farms	6,324	5,498	4,651	3,960	3,150	2,241
$3,000 Income -- Full Time Off-Farm Employment[b]							
Average Quality Land	Acres	107	124	146	174	224	318
Capital	Dollars	15,216	16,983	19,297	23,481	30,389	38,756
Labor	Hours	241	257	278	357	393	520
Number of Area Farms[a]	Farms	14,953	12,903	10,959	9,195	7,143	5,031

[a]Number of area farms was determined from the resource base of 1,600,000 acres and the programmed average farm size.

[b]Full time off-farm employment assumed an annual income of $3,000 and required 40 hours of labor per week.

[c]High yields were not programmed for this level of income and off-farm employment.

[d]Half-time off-farm employment assumed an annual income of $1,500 and required 20 hours of labor per week.

cropland, substituting for bermuda with vetch. When hired labor was necessary, small grains for grazing substituted for bermuda with vetch on C_3 cropland. Stocker-feeder activities designated as P-55 and P-57 were the basic livestock systems in the farm organization. The activity P-55 utilized vetch and small grain grazing. The P-57 activity used bermuda and native pasture supplemented with grain. The level of each livestock activity in the farm organization depended on the amount of the particular pasture crop produced.

Summary of Off-Farm Employment Results

Minimum resource requirements to obtain $3,000 and $5,000 operator incomes were estimated for three combinations of farm-off-farm employment (and income) of operator labor. Each level of off-farm employment corresponded to a given level of fixed operator farm labor. The major findings and implications of the effects of off-farm employment are:

1. No combination of resources would yield a $3,000 or $5,000 operator income at any off-farm employment level -- with average yields and average land quality -- when cost of land capital was five percent and operating capital six percent.

2. Approximate farm sizes necessary to completely utilize the fixed amounts of labor -- with average land quality -- were (a) 1,100 acres for no off-farm employment, (b) 600 acres for half-time off-farm employment, and (c) 240 acres for full time off-farm employment. If full time operator labor is fixed to the farm, underemployment on livestock farms in the area would be about 70 percent, assuming a present farm size of 320 acres for the area. Indications are that over 25 percent of the operator labor in the area is currently employed

off-farm, which lowers the estimated rate of present underemployment.[1]

3. A minimum farm size -- with full time farm labor, 50 percent equity, average yields, and average land quality -- of 787 acres was required to obtain a $3,000 operator income and 1,268 acres to obtain a $5,000 income.

4. Even with a loss in yields of ten percent because of off-farm employment, total operator income can be increased by some off-farm work until farm size approaches 1,000 acres (assuming about $1.50 per hour for off-farm work).

Summary of Yield Results

Minimum resource requirements to obtain a $3,000 and a $5,000 operator income were estimated for (a) yield conditions assumed to be normal or average for all crops and pastures, (b) yield conditions ten percent above average (high yields), and (c) yields ten percent below average (low yields). The main findings and implications of the effects of yields on minimum resource requirements are:

1. Yield levels above or below average had no effect on farm organization except for the effects associated with farm size.

2. The minimum resource requirements for specified income levels varied inversely with yield levels. The effect of yield changes on the minimum land requirements was greater with higher interest rates (lower equity levels). To obtain a $3,000 operator income, a ten percent increase in yields decreased the land required by 19 percent with a 50 percent equity level and 13 percent with a 100 percent equity

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[1]See earlier reference (page 59) to census data on amount of off-farm employment in the area.

level. A ten percent decrease in yields increased the land required by 36 percent with a 50 percent equity and 18 percent with a 100 percent equity.

3. Using the three yield levels to represent a range of uncertainty, management levels, or technology, implies that (a) farm enlargement with borrowed funds increases income variability; however, the larger farms more efficiently use fixed resources thereby offsetting some of the increased risk involved in farm enlargement, (b) the larger the farm, the greater the gains from superior management or advanced technology, and (c) a ten percent change in yields increased or decreased farm incomes of the area about two million dollars.

Summary of Equity Level Results

Operator equity levels were programmed as a percent of annual capital requirements by varying the cost of capital. Three equity levels (zero, 50 percent and 100 percent) were programmed with different levels of other variables, while two equity levels (25 percent and 33 percent) were programmed with average and low yields for a $3,000 income level only. The main implications of operator equity on minimum resource requirements are:

1. The only minimum resource solutions obtained at zero operator equity (interest rates of five percent for land capital and six percent for nonland capital) were obtained when yields were ten percent above average. No solutions were obtained when yields were average or below.

2. When operator equity was reduced from 100 percent to 50 percent, soybeans replaced bermuda with vetch on the C_1 cropland. Livestock

activities changed in relation to the change in feed produced.

3. The amount of owned capital needed to obtain a $3,000 income can be estimated from the programmed solutions. With the exception of high yields (where some solutions indicated no operator equity was required), the minimum operator equity required was about $42,000 (25 percent of $167,405). The average operator equity needed (with average yields and land quality) was about $50,000.

4. For any given amount of operator equity (within the range of farm sizes programmed), farm income was higher when the operator equity was combined with borrowed funds to increase farm size.

5. Programmed results indicate that with average yield conditions the returns on livestock farms are not adequate to cover the opportunity costs of resources. Four programmed farm situations were analyzed to determine the amount by which land prices would need to increase in order that returns would equal opportunity costs. A 9.3 percent annual increase in land prices was needed for a farm size of 459 acres, while an increase of only 2.1 percent was needed if the farm size was 1,332 acres.

Summary of Land Quality Results

Minimum resource requirements to obtain $3,000 and $5,000 operator incomes were estimated for land containing 15 percent cropland (poor quality land), 30 percent cropland (average quality land), and 45 percent cropland (good quality land). The major findings and implications are:

1. Land quality as used affected the cropland-noncropland ratio. For a given farm size, the same crop and livestock activities are

included in the farm organization for different land qualities but in different proportions.

2. Per acre labor requirements were greater on good quality land than on poor quality land. The estimated farm size to completely utilize full time operator labor was 900 acres for good land, 1,100 acres for average land, and 1,600 acres of poor land.

3. The difficulty of estimating accurate land prices for different land qualities limits the usefulness of the analysis. However, if the land prices used in the study are representative of the area, then production costs are lower on poor quality land.

Implications for Adjustments

The motives and objectives of managers, their resource position, and efficient resource use all must be considered in evaluating the potential adjustments of an area. For the particular area of this study, it is unlikely that adjustments will be made by all producers to any one single objective. The adjusted number of farms for the study area as given in Table XV actually has no meaning unless a single adjustment criterion is hypothesized. The minimum resource requirements presented in this study will probably be more useful for evaluating the nature and magnitude of adjustments within the study area if consideration is given to characteristics of producer groups with different adjustment potentials. The proportion of each group will vary with different localities within the study area. Characteristics of five groups that are believed to correspond to the minimum resource requirement situations summarized in Table XV are presented.

"Group 1 -- The Retired or Hobby Farmer." This grouping is made

to describe individual livestock producers who have an independent source of income other than from farming. The emphasis is on off-farm income, not restricted to off-farm employment income. These farms are operated by businessmen and professional and retired people who evidently secure nonmonetary benefits -- and perhaps some tax advantage -- from the operation of a livestock farm. Minimum resource requirements representative of the group are listed in Table XV as $3,000 income with full time off-farm employment. Income from off-farm may be considerably higher than the $3,000 assumed for this study. It may be high enough to maintain a $3,000 income even with farm losses. Depending on yields and operator equity levels, minimum farm sizes range from about 100 acres to 300 acres, capital requirements from $15,000 to $40,000 and annual labor from 241 hours to 520 hours.

The minimum amount of owned capital required to operate a farm as described above is about $15,000, i.e. all of the capital requirements listed at 100 percent operator equity or one-half the capital requirements listed at 50 percent operator equity. Farm returns at the 100 percent equity solutions were only enough to cover all costs except operator labor and capital costs. Returns at the 50 percent equity solutions provided some returns to the capital used. Some farm returns above costs are possible depending on farm size and yields. In all cases, speculative returns from increased land values or high product prices may be realized.

Farm adjustments of this group are of no major significance because they can be considered as adjusted farms. However, considerable land resources may be controlled by the group, thereby limiting the potential adjustments of other farmers in the area. Implications for livestock supply response may be deduced from these results. Livestock

prices may have very little effect on the amounts of livestock produced; however, the total amount supplied by the group may be relatively small. The most significant effect on adjustment is probably via the demand and price of land in a given locality.

"Group 2 -- The Semi-Retired, Tired, or Trapped Farmer." This grouping actually includes three categories of farmers, differentiated by resource position and motivation. Minimum resource requirements for all the above groups can be represented as the $3,000 income level with half-time off-farm employment given in Table XV. Farm returns are low in each case and may not represent a satisfactory income level. One group has sources of income other than farming, such as retirement, business, or off-farm employment income. Another classification includes those who are trapped with small farm incomes ($1,500) because of a lack of resources to enlarge the farming operations and a lack of skills or opportunities for off-farm employment. The third group includes those farmers who prefer to accept a small farm income rather than work off-farm or take the risks (and work) involved in farm enlargement. The effect is the same as if they were unqualified for off-farm work.

Depending on yields and equity levels, farm sizes range from 250 acres to 700 acres, capital requirements from $36,000 to $87,000 and labor from 570 hours to 1,170 hours. Equity requirements in this category range from about $28,000 to $45,000. Equity needs are 100 percent of capital requirements at 100 percent equity solutions and one-half of capital requirements at the 50 percent equity solutions. This group may supplement annual income by consuming capital previously accumulated in the form of machinery or land. The amount of land

capital for different farm sizes in the group is given in Appendix D, Tables I and II, and the machinery depreciation for these farms is listed in Appendix G, Table I. The annual returns to operator labor, land and operating capital depend on farm size and vary from about $2,600 ($1,500 plus overhead costs) to $4,500.

The above grouping probably includes the average livestock situation for the study area at the present time, i.e. farm size about 320 acres, equity levels between 50 and 100 percent, and farm incomes to operator resources of about $1,500.

"Group 3 -- The Commercial Farmer." Included in this group are the farmers in the area that devote full time to farming and realize an income that is considered adequate or satisfactory for the area. If a single adjustment criterion were to be established for the area, it would be to adjust at least to this level or get out of farming. The minimum resource requirements representative of this group are listed in Table XV as $3,000 income, full time farm labor. Those farmers with farm sizes in the 50 percent equity group can meet obligations on debts up to 50 percent of the capital requirements and still maintain a $3,000 income for their labor and owned resources. Farm sizes (at least in the 600 to 1,100 acre range) are large enough that any land appreciation could be an important source of income.

Depending on equity position and yield level, farm size may vary from about 400 to 1,100 acres, capital requirements from $57,000 to $133,000 and labor from 893 hours to 1,816 hours. To obtain a $3,000 income, individuals in this group need from about $44,000 (50 percent of $88,000 in Table XV) to $72,000 of equity in the farming operation.

Some individuals in this group can adjust to higher income levels

and be the commercial farmers of the future if so motivated. However, a $3,000 income leaves little for growth and many operators will not be able to accumulate the necessary equity, at least from farming.

"Group 4 -- The Versatile Farmer -- Mr. Adjustable." This grouping was made to depict farmers with the resource potential to adjust in any one of several ways. Individuals in the group may be visualized as young farmers who have considerable equity in a farming operation but have a desire for a higher income level than their farm resources will support, and who have the skills and opportunity for off-farm employment. They can (1) move completely out of farming into nonfarm employment, (2) supplement farm incomes with off-farm income in the short run while accumulating the necessary equity to increase farm size and be a full time farmer of the future, or (3) emphasize off-farm work and operate a farm as a hobby.

The minimum resource requirements for this group are represented by the $5,000 income with full time off-farm employment described in Table XV. Minimum farm size varies from about 400 acres to 1,200 acres, capital requirements from $53,000 to $155,000 and labor from 780 hours to 2,100 hours. An equity of about $55,000 in the farm business is needed. The quantity of resources controlled by this group at any one time is probably quite limited; however, these farmers play an important role in the agricultural adjustment process.

"Group 5 -- The Commercial Farmer of the Future." The commercial livestock farming operation of the future is expected to be larger and more efficient than those of the present time. Income levels that are considered satisfactory will probably increase, requiring larger amounts of resources per farm. The minimum resource requirements listed

in Table XV as $5,000 income with full time farm labor is most nearly representative of this group. If a single representative future farm were to be established, it probably should be for average yields, average land quality and 50 percent operator equity which is a farm size of 1,268 acres, capital requirements of $159,373 (equity requirements one-half this amount), and labor requirements of 2,221 hours.

Depending on yields and equity levels, individuals may secure the $5,000 income level under present conditions with farm sizes ranging from 600 acres to 1,800 acres, capital requirements from about $84,000 to $220,000 and labor from 1,328 hours to 2,985 hours. The amount of operator equity required ranges from about $64,000 to $111,000.

Implications for Area Adjustments

As previously mentioned, the proportion of farms in each of the above groups may vary between localities at any given time. For example, the proportion of farms in one county may be 10 percent in Group 1, 80 percent in Group 2, and 10 percent in Group 3. The proportions in another county (with approximately the same soil resource base and number of farms) may be 40 percent in Group 1, 20 percent in Group 2, and 40 percent in Group 3, the difference is because of off-farm employment opportunities. The potential adjustments over time would be considerably different for the two counties.

Some limits on the adjustments operators can make over time are implied by the equity requirements. The amount of operator equity (Table XV, 50 percent equity and average yields) required was $15,000 for Group 1, $35,000 for Group 2, $53,000 for Group 3, $52,000 for Group 4, and $80,000 for Group 5. Annual incomes of less than $3,000

leaves little for capital accumulation. In the future we would expect operators with less than $53,000 of equity and no other source of income to supplement annual incomes from equity capital as they adjust toward retirement. Operators with over $53,000 of equity may be able to accumulate equity and adjust to larger farms and higher income levels.

Need for Further Study

Farmers are faced with the problems of attaining and maintaining a satisfactory income level. Expanding income by farm enlargement is one solution; off-farm employment is another. This analysis of the resources necessary to attain a satisfactory income level indicated areas where additional study was needed.

Most farm operators have some equity in the farm business, and a farm size adequate to provide a satisfactory income may require even more equity. Investigation of decision strategies that lead to capital accumulation is needed. Which decisions designed to achieve asset growth provide the best chance for success?

Increased production by way of larger farms also involves increased income variability. Problems involving risk that need study include (1) the variance of returns and costs for different enterprises for a given area, (2) the variance of net farm returns for a particular area and type of farming, and (3) possible economies associated with larger farms that may offset some of the increased risk of farm enlargement.

Off-farm employment is a method of attaining a satisfactory income level only if such employment is available. Thus a broad range of research is needed on the demands for labor in the immediate area, the

particular skills demanded, and the skills possessed by the farm labor available. Information is also needed on the conditions such as wage rates and distance from farms under which farmers will accept off-farm employment.

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APPENDIX A

STATISTICAL DATA FOR EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

APPENDIX A, TABLE I

THE RELATIVE IMPORTANCE OF THE EAST CENTRAL AND SOUTH CENTRAL AREA TO THE ENTIRE STATE FOR SELECTED ITEMS, 1959

Item	Unit	State Totals	Area Totals	Area as Percent of State
Land in Farms[a]	Acres[d]	35,801	10,164	28
Cropland[a]	Acres[d]	14,044	2,841	20
Farms[a]	Number	94,678	34,450	36
Size of Farms[a]	Acres	378	295	78
Value of Land and Buildings[a]	Dollars	31,155	20,016	64
Cotton Harvested[a]	Bales	364,833	55,918	15
Wheat Harvested[a]	Bu.[d]	84,737	4,879	6
Peanuts Harvested[a]	Cwt.[d]	1,103	425	39
Value of Livestock and Livestock Products[a]	Dol.[d]	330,121	103,805	31
Population[b]	Number[d]	2,328	1,103	47
Net Farm Income[b]	Dollars[d]	212,000	54,587	26
Income Per Farm[c]	Dollars	2,239	1,585	70

[a]Source: U. S. Department of Commerce, United States Census of Agriculture 1959; Oklahoma, Bureau of the Census, County Table I.

[b]Source: W. Nelson Peach, Richard W. Poole, and James D. Tarver, County Building Block Data for Regional Analysis: Oklahoma, Oklahoma State University, Stillwater, March, 1965.

[c]Calculated from net farm income and number of farms.

[d]These units are in thousands.

APPENDIX A, TABLE II

NUMBER OF FARMS, TOTAL LAND AND CROPLAND, BY TYPE OF FARM, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA 1959[a]

Type of Farm	Number of Farms	Percent of Farms	Land in Farms	
			Total	Cropland
			(Acres)	
Cash Grain	1,635	4.74	480,952	259,535
Cotton	1,539	4.46	301,124	158,236
Field Crop	962	2.79	231,676	99,281
Veg., Fruit and Nuts	369	1.07	40,105	17,660
Poultry	798	2.31	56,790	23,748
Dairy	2,170	6.29	588,691	222,759
Livestock	16,325	47.28	3,345,895	1,129,323
Livestock Ranches	7,893	22.86	4,340,609	585,277
General	2,538	7.35	723,839	334,165
Miscellaneous	296	0.86	48,372	10,833
Total	34,525[b]	100.00	10,164,137	2,840,817

[a]Source: U. S. Department of Commerce, United States Census of Agriculture, 1959: Oklahoma, Bureau of the Census, County Table 5.

[b]The small discrepancy in census data reporting the number of farms used here and in Appendix A, Table I was noted but not reconciled.

APPENDIX A, TABLE III

ESTIMATED CROPLAND DISTRIBUTION FOR EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA BY SOIL RESOURCES AND TYPE OF FARMS

Item	Soil Resources			
	Bottom	Terrace	Prairie	Other
	(1,000 Acres)			
Cropland[a]	756.4	419.0	927.8	668.0
(1) Identified as Commercial Farms with Cotton, Wheat, and Peanut Allotments[b]	274.0	173.0	214.0	0
(2) Identified as Part-Time and Semi-Retired Farms with Cotton, Wheat and Peanut Allotments	42.0	26.0	33.0	0
(3) Wheat Allotments Only[c]	128.4	62.3	198.5	0
(4) Dairy, Fruit, Vegetables[c]	56.0	35.0	62.0	50.0
(5) Livestock Ranches[c]	148.0	79.0	174.0	126.0
(6) Livestock Farms[c]	47.6	0	246.3	95.2
(7) Classified as Livestock Farms for this Study[d]	49.0	0	333.0	98.0

[a]Distribution of cropland by soil resource groups was calculated from SCS land use forms N-2 and checked with agricultural census data.

[b]Distribution of allotment crops among soil groups was calculated from a sample survey, census data, and allotment data.

[c]Distribution by soil groups to type of farms was made from census data after deducting acreage in each type with cotton, wheat, and peanut allotments.

[d]From a soils map sample it was estimated that prairie soils were 70 percent of total cropland, cross timber soils 20 percent, and bottomland soils 10 percent, and that cropland was 30 percent of total land on the farms studied. The 333,000 acres of prairie cropland is the sum of 246,000 acres of residual prairie soils on livestock farms plus 87,000 acres on livestock ranches with similar resource situations.

APPENDIX B

TECHNICAL AND ECONOMIC DATA USED IN THE STUDY

APPENDIX B, TABLE I

ESTIMATED DISTRIBUTIONS OF CROPLAND BY PRODUCTIVITY CLASSES AND NONCROPLAND BY LAND USE FOR A REPRESENTATIVE ACRE OF GOOD, AVERAGE, AND POOR QUALITY LAND, EASTERN PRAIRIE LIVESTOCK SITUATION, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Land Quality		
	Good	Average[a]	Poor
		(Percent)	
Cropland Productivity Classes:			
C_1	3.0	2.0	1.0
C_2	15.0	10.0	5.0
C_3	18.0	12.0	6.0
C_4	9.0	6.0	3.0
Percent Cropland	45.0	30.0	15.0
Noncropland			
Native Pasture	27.0	35.0	43.0
Native Meadow	4.0	5.0	6.0
Woods	20.0	25.0	30.0
Other	4.0	5.0	6.0
Total	100.0	100.0	100.0

[a]The average representative acre was determined from soil maps and a survey of livestock producers in the area.

APPENDIX B, TABLE II

DEFINITION OF LAND RESOURCE SITUATION AND ESTIMATED YIELDS BY PRODUCTIVITY CLASS: EASTERN PRAIRIE SOILS, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Class C_1	Deep, nearly level, loamy upland soils. Key series are Choteau, Okemah, Taloka, and Summit.
Class C_2	Deep, gently sloping, loamy upland soils. Key series are Choteau, Dennis, Durant, Newtonia, and Labette.
Class C_3	Deep, nearly level claypan soils. Key series are Parsons and Woodson.
Class C_4	Shallow, eroded and sloping upland soils not suitable for row crops.

Item	Unit	Productivity Class C_1	C_2	C_3	C_4
		(Yield Per Acre)			
Crop:					
Alfalfa	Ton	3.0	2.0	NR[a]	NR[a]
Grain Sorghum	Cwt.	25.0	23.5	19.0	NR[a]
Oats	Bu.	45.0	40.0	38.0	NR[a]
Soybeans	Cwt.	15.0	12.0	9.8	NR[a]
Grazing:					
Bermuda With Clover (0-15-0)[b]	AUM	3.3	3.3	2.6	2.5
Bermuda With Legume (10-20-10)	AUM	4.5	4.5	3.4	3.3
Bermuda With Legume (15-30-15)	AUM	5.2	5.2	3.8	3.7
Bermuda With Legume (30-40-20)	AUM	5.8	5.8	4.4	4.2
Bermuda With Vetch (0-50-50)	AUM	7.1	7.1	5.0	4.8
Bermuda With Legume (50-50-50)	AUM	6.8	6.8	4.8	4.6
Bermuda With Legume (100-50-50)	AUM	8.5	8.5	6.4	6.2
Bermuda With Legume (200-50-50)	AUM	10.0	10.0	7.5	7.3
Grain Sorghum (stubble)	AUM	0.2	0.2	0.2	0.0
Oats for Grain	AUM	0.6	0.6	0.6	0.0
Small Grain Grazed out	AUM	4.0	4.0	3.0	2.0
Native Range[c]					
Native Meadow[c]					
Woods[c]					

[a]Not recommended for these soils.

[b]Annual Fertilizer.

[c]Native range grazing is figured at 1.2 AUM per acre, native meadow at 2.0 AUM per acre and woods at 0.3 AUM per acre.

APPENDIX B, TABLE III

ESTIMATED OPERATOR LABOR AVAILABLE FOR FOUR TIME PERIODS AND ALTERNATIVE OFF-FARM EMPLOYMENT LEVELS, EASTERN PRAIRIE LIVESTOCK SITUATION, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Period	Full Time On Farm	Half-Time[a] Off Farm	Full Time[b] Off Farm
		(Hours Available)	
January-April	667	367	133
May-July	605	333	121
August-September	418	230	84
October-December	516	284	103
Totals	2,206	1,214	441

[a]It is estimated that a farmer with a half-time off-farm job can devote 55 percent of full-time labor to the farm.

[b]It is estimated that a farmer with a 40 hour per week off-farm job can devote 20 percent of full-time labor to the farm.

APPENDIX B, TABLE IV

DESCRIPTION OF COW-CALF ACTIVITIES USED FOR EASTERN PRAIRIE LIVESTOCK SITUATION, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Activity Number	Calving Time	Marketing Date	Range or Bermuda AUM's per Cow	Wintering Ration
P_{48}	Mar. 1	Oct. 10	13.5	Cottonseed cake, hay, and pasture
P_{49}	Mar. 1	Oct. 10	10.5	Cottonseed cake, hay (substituted for pasture)
P_{50}	Mar. 1	Oct. 10	10.4	Cottonseed cake, hay, and pasture with some small-grain or vetch pasture to substitute for protein and pasture
P_{51}	Nov. 1	Aug. 1	13.5	Cottonseed cake, hay, and pasture
P_{52}	Nov. 1	Aug. 1	10.5	Cottonseed cake, hay (substituted for pasture)
P_{53}	Nov. 1	May 20	8.7	Small grain pasture or vetch with cottonseed cake, hay, and pasture in bad weather

Source: Kenneth C. Schneeburger, et al. Resource Requirements, Costs and Expected Returns; Beef Cattle and Improved Pasture Alternatives; East Central and South Central Oklahoma, Stillwater: Oklahoma Agricultural Experiment Station, Processed Series P 544, 1966.

APPENDIX B, TABLE V

DESCRIPTION OF STOCKER STEER, BUY-SELL ACTIVITIES USED FOR EASTERN PRAIRIE LIVESTOCK SITUATION, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Activity Number	Purchase Date	Sell Date	Purchase Weight	Sell Weight	AUM's per Steer		Components of Ration	
					Range or Bermuda	Tempo-rary	Winter	Summer
P_{54}	Oct. 10	Mar. 1	450	630	.20	2.1	Vetch or smallgrain temporary pasture, with cottonseed cake, hay and pasture in bad weather	
P_{55}	Oct. 10	May 20	450	750	.25	3.5	Vetch or smallgrain temporary pasture with cottonseed cake, hay, and pasture in bad weather	
P_{56}	Oct. 10	Aug. 10	450	716	6.3	0.0	Cottonseed cake, hay and pasture	Pasture
P_{57}	Oct. 10	Aug. 10	450	777	5.8	0.0	Cottonseed cake, hay and pasture	Pasture plus 5 lbs. grain sorghum per day for 90 days

Source: Kenneth C. Schneeberger, et al. Resource Requirements, Costs and Expected Returns; Beef Cattle and Improved Pasture Alternatives; East Central and South Central Oklahoma. Stillwater: Oklahoma Agricultural Experiment Station, Processed Series P-544, 1966.

APPENDIX B, TABLE VI

ASSUMED PRICES FOR CALVES, STEERS AND CULL COWS BY MONTHS, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA, BASED ON OKLAHOMA CITY MARKET[a]

Class and Grade	Monthly Average												Yearly Ave.
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
	(Price per Cwt.)												
Calves													
Steers, 500 lbs. and less	23.64	24.37	25.02	25.26	24.97	24.73	24.20	24.12	24.03	23.42	23.23	23.08	24.17
Heifers, 500 lbs. and less	21.64	22.37	23.02	23.26	22.97	22.73	22.20	22.12	22.03	21.42	21.23	21.08	22.17
Steers													
Good													
500-800 lbs.	21.13	21.75	22.12	22.42	22.29	21.86	21.35	21.24	21.05	20.23	20.47	20.58	21.37
Cows													
Utility													
All Weights	13.83	14.09	14.53	14.87	14.94	14.55	13.95	13.49	13.35	13.13	13.06	13.43	13.94

[a]Leo V. Blakley and Odell L. Walker, Unpublished Data, Department of Agricultural Economics, Oklahoma State University, 1962.

APPENDIX B, TABLE VII

ASSUMED PRICES PAID AND RECEIVED BY FARMERS, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA[a]

Item	Unit	Price
		(Dollars)
Prices Paid		
Seed and Feed:		
Vetch	Pounds	0.13
Grain Sorghum	Pounds	0.20
Soybeans	Pounds	0.06
Oats	Bushels	1.10
Alfalfa	Pounds	0.50
Rye	Bushels	1.20
Clover	Pounds	1.00
Cottonseed Cake	Cwt.	3.80
Bermuda Hay	Tons	18.00
Minerals and Salt	Pounds	0.03
Combining		
Oats and Grain Sorghum	Acres	4.00
Soybeans	Acres	5.00
Hauling		
Oats	Bushels	0.07
Grain Sorghum	Bushels	0.05
Soybeans	Bushels	0.08
Mow, Rake, Bale Alfalfa	Bales	0.20
Fertilizer and Chemicals		
Nitrogen	Pounds	0.12
Phosphorus	Pounds	0.10
Potassium	Pounds	0.05
Lime (Custom Applied)	Tons	5.00
Grain Sorghum Herbicide	Applications/Acre	2.10
Soybean Herbicide	Applications/Acre	2.70
Alfalfa Insecticide	Applications/Acre	1.75
Sprig Bermuda	Acres	10.00
Prices Received		
Grain Sorghum	Cwt.	1.63
Oats	Bushels	0.63
Alfalfa Hay (in Field)	Tons	20.48
Soybeans	Pounds	0.03

[a]These are approximate prices prevailing in the area in 1963. See Workman et al, pp. 28-29 and Schneeberger et al, p. 40.

APPENDIX B, TABLE VIII

ASSUMED ANNUAL OVERHEAD COSTS FOR A LIVESTOCK FARM IN EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA[a]

Item[b]	Annual Cost (Dollars)
Pickup Truck	
Interest on Investment	75.00
Depreciation	305.00
Gas, Oil Lubrication	223.00
Repairs	105.00
Insurance and License	85.00
Telephone	75.00
Bookkeeping and Tax Service	40.00
Insurance on Buildings and Workers	100.00
Miscellaneous[c]	100.00
	1,108.00

[a]Adapted for use in East Central Oklahoma from: Harry H. Hall et al. Resource Requirements, Costs, and Expected Returns; Alternative Crop and Livestock Enterprise; Oklahoma Panhandle. Stillwater: Oklahoma Agricultural Experiment Station, Processed Series P-459 (1963), p. 49, and Percy L. Strickland Jr., James S. Plaxico, and William F. Lagrone, Minimum Land Requirements and Adjustments for Specified Income Levels, Southwestern Oklahoma, Stillwater: Oklahoma Agricultural Experiment Station, Bulletin B-608 (1963).

[b]Costs of buildings, fencing, livestock equipment, machinery, and land taxes were considered to vary with farm size and are included in the enterprise budgets.

[c]Includes such items as farm shop and shop tools, fuel storage tanks, etc.

APPENDIX C

FARM ORGANIZATIONS AND RESOURCE REQUIREMENTS FOR THREE LEVELS OF OFF-FARM EMPLOYMENT

APPENDIX C, TABLE I

ESTIMATED MINIMUM REQUIREMENTS FOR SPECIFIED INCOMES TO OPERATOR LABOR MANAGEMENT AND 100 PERCENT EQUITY; SPECIFIED OFF-FARM EMPLOYMENT LEVELS, AVERAGE YIELDS AND AVERAGE LAND QUALITY, EASTERN PRAIRIE LIVESTOCK SITUATION, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Unit	Operator Labor		
		Full Time Farm	Half-Time Off-Farm	Full Time Off-Farm
$5,000 Operator Income				
Total Land	Acres	682	527	393
Cropland	Acres	205	158	118
Bermuda W. Vetch	Acres	205	158	71
Small Grain Grazing	Acres	0	0	47
Native Pasture	Acres	272	211	157
Woods and Other	Acres	205	158	118
Livestock Activities				
P-55 Feeders	Animals	70	54	67
P-57 Feeders	Animals	230	178	99
Operator Labor	Hours	1,415	986	433
Hired Labor	Hours	0	107	347
Investment				
Land and Buildings	Dollars	54,560	42,160	31,440
Annual Operating Capital	Dollars	38,935	30,111	21,340
Total Operating Capital	Dollars	47,647	36,889	26,082
Annual Capital Requirements	Dollars	93,495	72,271	52,780
Total Capital Requirements	Dollars	102,207	79,049	57,522
Gross Receipts	Dollars	48,469	37,417	26,645
Crop Operating Expenses	Dollars	2,671	2,062	1,615
Livestock Operating Expenses	Dollars	39,144	30,218	21,261
Overhead Expenses	Dollars	1,654	1,530	1,422
Returns to Land	Dollars	0	0	0
Annual Interest on Operating Capital	Dollars	0	0	0
Hired Labor	Dollars	0	107	347
Off-Farm Income	Dollars	0	1,500	3,000
Returns to Operator Farm Labor, Management and Specified Resources	Dollars	5,000	3,500	2,000

APPENDIX C, TABLE I (Continued)

Item	Unit	Operator Labor		
		Full Time Farm	Half-Time Off-Farm	Full Time Off-Farm
$3,000 Operator Income				
Total Land	Acres	459	291	124
Cropland	Acres	138	87	37
Bermuda W. Vetch	Acres	138	87	37
Native Pasture	Acres	184	117	49
Woods and Other	Acres	138	87	38
Livestock Activities				
P-55 Feeders	Animals	47	30	13
P-57 Feeders	Animals	155	98	41
Operator Labor	Hours	952	604	257
Hired Labor	Hours	0	0	0
Investment				
Land and Buildings	Dollars	36,720	23,280	9,920
Annual Operating Capital	Dollars	26,186	16,625	7,063
Total Operating Capital	Dollars	32,045	20,344	8,643
Annual Capital Requirements	Dollars	62,906	39,905	16,983
Total Capital Requirements	Dollars	68,765	43,624	18,563
Gross Receipts	Dollars	32,599	20,696	8,792
Crop Operating Expenses	Dollars	1,797	1,141	485
Livestock Operating Expenses	Dollars	26,327	16,714	7,100
Overhead Expenses	Dollars	1,475	1,341	1,207
Returns to Land	Dollars	0	0	0
Annual Interest on Operating Capital	Dollars	0	0	0
Hired Labor	Dollars	0	0	0
Off-Farm Income	Dollars	0	1,500	3,000
Returns to Operator Farm Labor, Management and Specified Resources	Dollars	3,000	1,500	0,000

APPENDIX C, TABLE II

ESTIMATED MINIMUM REQUIREMENTS FOR SPECIFIED INCOMES TO OPERATOR LABOR MANAGEMENT AND 100 PERCENT EQUITY; SPECIFIED OFF-FARM EMPLOYMENT LEVELS, LOW YIELDS AND AVERAGE LAND QUALITY, EASTERN PRAIRIE LIVESTOCK SITUATION, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Unit	Operator Labor		
		Full Time Farm	Half-Time Off-Farm	Full Time Off-Farm
$5,000 Operaton Income				
Total Land	Acres	807	631	477
Cropland	Acres	242	189	143
Bermuda W. Vetch	Acres	242	189	92
Small Grain Grazing	Acres	0	0	51
Native Pasture	Acres	323	253	191
Woods and Other	Acres	242	189	143
Livestock Activities				
P-55 Feeders	Animals	75	58	71
P-57 Feeders	Animals	244	192	111
Operator Labor	Hours	1,523	1,021	441
Hired Labor	Hours	13	181	435
Investment				
Land and Buildings	Dollars	64,560	50,480	38,160
Annual Operating Capital	Dollars	42,087	33,014	23,813
Total Operating Capital	Dollars	51,481	40,450	29,123
Annual Capital Requirements	Dollars	106,647	83,494	61,973
Total Capital Requirements	Dollars	116,041	90,930	67,283
Gross Receipts	Dollars	51,594	40,367	29,211
Crop Operating Expense	Dollars	3,160	2,473	1,949
Livestock Operating Expenses	Dollars	41,667	32,600	23,337
Overhead Expenses	Dollars	1,754	1,613	1,490
Returns to Land	Dollars	0	0	0
Annual Interest on Operating Capital	Dollars	0	0	0
Hired Labor	Dollars	13	181	435
Off-Farm Income	Dollars	0	1,500	3,000
Returns to Operator Farm Labor, Management and Specified Resources	Dollars	5,000	3,500	2,000

APPENDIX C, TABLE II (Continued)

Item	Unit	Operator Labor: Full Time Farm	Operator Labor: Half-Time Off-Farm	Operator Labor: Full Time Off-Farm
$3,000 Operator Income				
Total Land	Acres	541	344	146
Cropland	Acres	162	103	44
Bermuda W. Vetch	Acres	162	103	44
Native Pasture	Acres	217	138	58
Woods and Other	Acres	162	103	44
Livestock Activities				
P-55 Feeders	Animals	50	32	14
P-57 Feeders	Animals	164	104	44
Operator Labor	Hours	1,031	654	278
Hired Labor	Hours	0	0	0
Investment				
Land and Buildings	Dollars	43,280	27,520	11,680
Annual Operating Capital	Dollars	28,240	17,929	7,617
Total Operating Capital	Dollars	34,541	21,928	9,316
Annual Capital Requirements	Dollars	71,520	45,449	19,297
Total Capital Requirements	Dollars	77,821	49,448	20,996
Gross Receipts	Dollars	34,627	21,981	9,339
Crop Operating Expenses	Dollars	2,121	1,346	572
Livestock Operating Expenses	Dollars	27,965	17,752	7,542
Overhead Expenses	Dollars	1,541	1,383	1,225
Returns to Land	Dollars	0	0	0
Annual Interest on Operating Capital	Dollars	0	0	0
Hired Labor	Dollars	0	0	0
Off-Farm Income	Dollars	0	1,500	3,000
Returns to Operator Farm Labor, Management and Specified Resources	Dollars	3,000	1,500	0,000

APPENDIX C, TABLE III

ESTIMATED MINIMUM REQUIREMENTS FOR SPECIFIED INCOMES TO OPERATOR LABOR MANAGEMENT AND 50 PERCENT EQUITY; SPECIFIED OFF-FARM EMPLOYMENT LEVELS, AVERAGE YIELDS AND AVERAGE LAND QUALITY, EASTERN PRAIRIE LIVESTOCK SITUATION, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Unit	Operator Labor		
		Full Time Farm	Half-Time Off-Farm	Full Time Off-Farm
$5,000 Operator Income				
Total Land	Acres	1,268	1,038	818
Cropland	Acres	381	311	245
Bermuda W. Vetch	Acres	77	62	49
Small Grain Grazing	Acres	279	229	180
Soybeans	Acres	25	21	16
Native Pasture	Acres	507	415	328
Woods and Other	Acres	380	311	245
Livestock Activities				
P-55 Feeders	Animals	297	243	192
P-57 Feeders	Animals	168	138	108
Operator Labor	Hours	1,952	1,213	441
Hired Labor	Hours	269	605	991
Investment				
Land and Buildings	Dollars	101,440	83,040	65,440
Annual Operating Capital	Dollars	57,933	47,602	37,762
Total Operating Capital	Dollars	70,659	58,209	46,376
Annual Capital Requirements	Dollars	159,373	130,642	103,202
Total Capital Requirements	Dollars	172,099	141,249	111,816
Gross Receipts	Dollars	74,978	61,358	48,343
Crop Operating Expenses	Dollars	5,477	4,482	3,532
Livestock Operating Expenses	Dollars	57,836	47,329	37,289
Overhead Expenses	Dollars	2,122	1,938	1,762
Returns to Land	Dollars	2,536	2,076	1,636
Annual Interest on Operating Capital	Dollars	1,738	1,428	1,133
Hired Labor	Dollars	269	605	991
Off-Farm Income	Dollars	0	1,500	3,000
Returns to Operator Farm Labor, Management and Specified Resources	Dollars	5,001	3,500	2,000

APPENDIX C, TABLE III (Continued)

Item	Unit	Operator Labor: Full Time Farm	Operator Labor: Half-Time Off-Farm	Operator Labor: Full Time Off-Farm
$3,000 Operator Income				
Total Land	Acres	787	508	224
Cropland	Acres	236	153	67
Bermuda W. Vetch	Acres	220	82	13
Small Grain Grazing	Acres	0	61	50
Soybeans	Acres	16	10	4
Native Pasture	Acres	315	203	90
Woods and Other	Acres	236	152	67
Livestock Activities				
P-55 Feeders	Animals	77	83	52
P-57 Feeders	Animals	247	118	30
Operator Labor	Hours	1,571	962	373
Hired Labor	Hours	0	8	20
Investment				
Land and Buildings	Dollars	62,960	40,640	17,920
Annual Operating Capital	Dollars	42,368	25,770	10,232
Total Operating Capital	Dollars	51,886	31,358	12,469
Annual Capital Requirements	Dollars	105,328	66,410	28,152
Total Capital Requirements	Dollars	114,846	71,998	30,389
Gross Receipts	Dollars	53,110	32,676	13,260
Crop Operating Expenses	Dollars	3,275	2,206	969
Livestock Operating Expenses	Dollars	42,252	25,659	10,228
Overhead Expenses	Dollars	1,738	1,514	1,287
Returns to Land	Dollars	1,574	1,016	449
Annual Interest on Operating Capital	Dollars	1,271	773	307
Hired Labor	Dollars	0	8	20
Off-Farm Income	Dollars	0	1,500	3,000
Returns to Operator Farm Labor, Management and Specified Resources	Dollars	3,000	1,500	0,000

APPENDIX C, TABLE IV

ESTIMATED MINIMUM REQUIREMENTS FOR SPECIFIED INCOMES TO OPERATOR LABOR MANAGEMENT AND 50 PERCENT EQUITY; SPECIFIED OFF-FARM EMPLOYMENT LEVELS, LOW YIELDS AND AVERAGE LAND QUALITY EASTERN PRAIRIE LIVESTOCK SITUATION, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Unit	Operator Labor		
		Full Time Farm	Half-Time Off-Farm	Full Time Off-Farm
$5,000 Operator Income				
Total Land	Acres	1,806	1,570	1,237
Cropland	Acres	542	471	371
Bermuda W. Vetch	Acres	170	283	222
Small Grain Grazing	Acres	336	157	124
Soybeans	Acres	36	31	25
Native Pasture	Acres	722	628	495
Woods and Other	Acres	542	471	371
Livestock Activities				
P-55 Feeders	Animals	349	234	185
P-57 Feeders	Animals	255	309	243
Operator Labor	Hours	2,206	1,214	441
Hired Labor	Hours	779	1,465	1,670
Investment				
Land and Buildings	Dollars	144,480	125,600	98,960
Annual Operating Capital	Dollars	77,198	70,872	56,096
Total Operating Capital	Dollars	94,535	87,539	69,485
Annual Capital Requirements	Dollars	221,678	196,472	155,056
Total Capital Requirements	Dollars	239,015	213,139	168,445
Gross Receipts	Dollars	97,622	88,258	69,536
Crop Operating Expenses	Dollars	7,701	6,484	5,109
Livestock Operating Expenses	Dollars	75,661	69,179	54,502
Overhead Expenses	Dollars	2,553	2,364	2,098
Returns to Land	Dollars	3,612	3,140	2,474
Annual Interest on Operating Capital	Dollars	2,316	2,126	1,683
Hired Labor	Dollars	779	1,465	1,670
Off-Farm Income	Dollars	0	1,500	3,000
Returns to Operator Farm Labor, Management and Specified Resources	Dollars	5,000	3,500	2,000

APPENDIX C, TABLE IV (Continued)

Item	Unit	Operator Labor: Full Time Farm	Operator Labor: Half-Time Off-Farm	Operator Labor: Full Time Off-Farm
$3,000 Operator Income				
Total Land	Acres	1,070	714	318
Cropland	Acres	321	214	95
Bermuda W. Vetch	Acres	116	43	19
Small Grain Grazing	Acres	184	157	70
Soybeans	Acres	21	14	6
Native Pasture	Acres	429	286	127
Woods and Other	Acres	320	214	96
Livestock Activities				
P-55 Feeders	Animals	192	151	67
P-57 Feeders	Animals	175	85	38
Operator Labor	Hours	1,810	1,065	441
Hired Labor	Hours	6	101	98
Investment				
Land and Buildings	Dollars	85,600	57,120	25,440
Annual Operating Capital	Dollars	47,056	29,821	13,316
Total Operating Capital	Dollars	57,264	36,358	16,255
Annual Capital Requirements	Dollars	132,656	86,941	38,756
Total Capital Requirements	Dollars	142,864	93,478	41,695
Gross Receipts	Dollars	59,360	37,997	16,930
Crop Operating Expenses	Dollars	4,632	3,084	1,374
Livestock Operating Expenses	Dollars	46,206	29,310	13,061
Overhead Expenses	Dollars	1,964	1,679	1,362
Returns to Land	Dollars	2,140	1,428	636
Annual Interest on Operating Capital	Dollars	1,412	895	399
Hired Labor	Dollars	6	101	98
Off-Farm Income	Dollars	0	1,500	3,000
Returns to Operator Farm Labor, Management and Specified Resources	Dollars	3,000	1,500	0,000

APPENDIX D

FARM ORGANIZATIONS AND RESOURCE REQUIREMENTS FOR THREE LEVELS OF YIELDS

APPENDIX D, TABLE I

ESTIMATED MINIMUM REQUIREMENTS FOR SPECIFIED INCOMES TO OPERATOR LABOR MANAGEMENT AND 100 PERCENT EQUITY; VARIABLE YIELD LEVELS, AVERAGE LAND QUALITY AND FULL TIME OPERATOR LABOR AVAILABLE, EASTERN PRAIRIE LIVESTOCK SITUATION, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Unit	Yields		
		High	Average	Low
$5,000 Operator Farm Income				
Total Land	Acres	592	682	807
Cropland	Acres	178	205	242
Bermuda W. Vetch	Acres	178	205	242
Native Pasture	Acres	237	272	323
Woods and Other	Acres	177	205	242
Livestock Activities				
P-55 Feeders	Animals	67	70	75
P-57 Feeders	Animals	219	230	244
Operator Labor	Hours	1,328	1,415	1,523
Hired Labor	Hours	0	0	13
Investment				
Land and Buildings	Dollars	47,360	54,560	64,560
Annual Operating Capital	Dollars	36,691	38,935	42,087
Total Operating Capital	Dollars	44,920	47,647	51,481
Annual Capital Requirements	Dollars	84,051	93,495	106,647
Total Capital Requirements	Dollars	92,280	102,207	116,041
Gross Receipts	Dollars	46,254	48,469	51,594
Crop Operating Expenses	Dollars	2,318	2,671	3,160
Livestock Operating Expenses	Dollars	37,356	39,144	41,667
Overhead Expenses	Dollars	1,582	1,654	1,754
Returns to Land	Dollars	0	0	0
Annual Interest on Operating Capital	Dollars	0	0	0
Hired Labor	Dollars	0	0	13
Off-Farm Income	Dollars	0	0	0
Returns to Operator Farm Labor, Management and Specified Resources	Dollars	5,000	5,000	5,000

APPENDIX D, TABLE I (Continued)

Item	Unit	Yields		
		High	Average	Low
$3,000 Operator Farm Income				
Total Land	Acres	398	459	541
Cropland	Acres	119	137	162
Bermuda W. Vetch	Acres	119	137	162
Native Pasture	Acres	159	184	217
Woods and Other	Acres	120	138	162
Livestock Activities				
P-55 Feeders	Animals	45	47	50
P-57 Feeders	Animals	148	155	164
Operator Labor	Hours	893	952	1,031
Hired Labor	Hours	0	0	0
Investment				
Land and Buildings	Dollars	31,840	36,720	43,280
Annual Operating Capital	Dollars	24,677	26,186	28,240
Total Operating Capital	Dollars	30,211	32,045	34,541
Annual Capital Requirements	Dollars	56,517	62,906	71,520
Total Capital Requirements	Dollars	62,051	68,765	77,821
Gross Receipts	Dollars	31,109	32,599	34,627
Crop Operating Expenses	Dollars	1,559	1,797	2,121
Livestock Operating Expenses	Dollars	25,124	26,327	27,965
Overhead Expenses	Dollars	1,423	1,475	1,541
Returns to Land	Dollars	0	0	0
Annual Interest on Operating Capital	Dollars	0	0	0
Hired Labor	Dollars	0	0	0
Off-Farm Income	Dollars	0	0	0
Returns to Operator Farm Labor, Management and Specified Resources	Dollars	3,000	3,000	3,000

APPENDIX D, TABLE I (Continued)

Item	Unit	Yields		
		High	Average	Low
$1,500 Operator Farm Income[a]				
Total Land	Acres	253	291	344
Cropland	Acres	76	87	103
Bermuda W. Vetch	Acres	76	87	103
Native Pasture	Acres	101	117	138
Woods and Other	Acres	76	87	103
Livestock Activities				
P-55 Feeders	Animals	28	30	32
P-57 Feeders	Animals	94	98	104
Operator Labor	Hours	567	604	654
Hired Labor	Hours	0	0	0
Investment				
Land and Buildings	Dollars	20,240	23,280	27,520
Annual Operating Capital	Dollars	15,666	16,625	17,929
Total Operating Capital	Dollars	19,180	20,344	21,928
Annual Capital Requirements	Dollars	35,906	39,905	45,449
Total Capital Requirements	Dollars	39,420	43,624	49,448
Gross Receipts	Dollars	19,750	20,696	21,981
Crop Operating Expenses	Dollars	990	1,141	1,346
Livestock Operating Expenses	Dollars	15,950	16,714	17,752
Overhead Expenses	Dollars	1,310	1,341	1,383
Returns to Land	Dollars	0	0	0
Annual Interest on Operating Capital	Dollars	0	0	0
Hired Labor	Dollars	0	0	0
Off-Farm Income	Dollars	1,500	1,500	1,500
Returns to Operator Farm Labor, Management and Specified Resources	Dollars	1,500	1,500	1,500

APPENDIX D, TABLE I (Continued)

Item	Unit	Yields		
		High	Average	Low
Zero Operator Farm Income[a]				
Total Land	Acres	107	124	146
Cropland	Acres	32	37	44
Bermuda W. Vetch	Acres	32	37	44
Native Pasture	Acres	43	50	58
Woods and Other	Acres	32	37	44
Livestock Activities				
P-55 Feeders	Animals	12	13	14
P-57 Feeders	Animals	40	41	44
Operator Labor	Hours	241	257	278
Hired Labor	Hours	0	0	0
Investment				
Land and Buildings	Dollars	8,560	9,920	11,680
Annual Operating Capital	Dollars	6,656	7,063	7,617
Total Operating Capital	Dollars	8,148	8,643	9,316
Annual Capital Requirements	Dollars	15,216	16,983	19,297
Total Capital Requirements	Dollars	16,708	18,563	20,996
Gross Receipts	Dollars	8,391	8,792	9,339
Crop Operating Expenses	Dollars	420	485	572
Livestock Operating Expenses	Dollars	6,777	7,100	7,542
Overhead Expenses	Dollars	1,194	1,207	1,225
Returns to Land	Dollars	0	0	0
Annual Interest on Operating Capital	Dollars	0	0	0
Hired Labor	Dollars	0	0	0
Off-Farm Income	Dollars	3,000	3,000	3,000
Returns to Operator Farm Labor, Management and Specified Resources	Dollars	0,000	0,000	0,000

[a]The results presented for both the $1,500 and the zero operator farm incomes were programmed with less than full time farm labor. If no labor were hired, the results should be the same as if programmed for these income levels with full time farm labor. Where hired labor was necessary, the results are not exactly comparable with the $3,000 and $5,000 income levels in this table.

APPENDIX D, TABLE II

ESTIMATED MINIMUM REQUIREMENTS FOR SPECIFIED INCOMES TO OPERATOR LABOR MANAGEMENT AND 50 PERCENT EQUITY; VARIABLE YIELD LEVELS, AVERAGE LAND QUALITY AND FULL TIME OPERATOR LABOR AVAILABLE, EASTERN PRAIRIE LIVESTOCK SITUATION, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Unit	Yields		
		High	Average	Low
$5,000 Operator Farm Income				
Total Land	Acres	980	1,268	1,806
Cropland	Acres	293	381	542
Bermuda W. Vetch	Acres	65	77	170
Small Grain Grazing	Acres	208	279	336
Soybeans	Acres	20	25	36
Native Pasture	Acres	392	507	722
Woods and Other	Acres	295	380	542
Livestock Activities				
P-55 Feeders	Animals	247	297	349
P-57 Feeders	Animals	151	168	255
Operator Labor	Hours	1,808	1,952	2,206
Hired Labor	Hours	38	269	779
Investment				
Land and Buildings	Dollars	78,400	101,440	144,480
Annual Operating Capital	Dollars	48,863	57,933	77,198
Total Operating Capital	Dollars	59,521	70,659	94,535
Annual Capital Requirements	Dollars	127,263	159,373	221,678
Total Capital Requirements	Dollars	137,921	172,099	239,015
Gross Receipts	Dollars	64,107	74,978	97,622
Crop Operating Expenses	Dollars	4,231	5,477	7,701
Livestock Operating Expenses	Dollars	49,520	57,835	75,661
Overhead Expenses	Dollars	1,892	2,122	2,553
Returns to Land	Dollars	1,960	2,536	3,612
Annual Interest on Operating Capital	Dollars	1,466	1,738	2,316
Hired Labor	Dollars	38	269	779
Off-Farm Income	Dollars	0	0	0
Returns to Operator Farm Labor, Management and Specified Resources	Dollars	5,000	5,000	5,000

APPENDIX D, TABLE II (Continued)

Item	Unit	Yields High	Yields Average	Yields Low
$3,000 Operator Farm Income				
Total Land	Acres	636	787	1,070
Cropland	Acres	191	236	321
Bermuda W. Vetch	Acres	178	220	116
Small Grain Grazing	Acres	0	0	184
Soybeans	Acres	13	16	21
Native Pasture	Acres	254	315	429
Woods and Other	Acres	191	236	320
Livestock Activities				
P-55 Feeders	Animals	66	77	192
P-57 Feeders	Animals	222	247	175
Operator Labor	Hours	1,373	1,571	1,810
Hired Labor	Hours	0	0	6
Investment				
Land and Buildings	Dollars	50,880	62,960	85,600
Annual Operating Capital	Dollars	37,248	42,368	47,056
Total Operating Capital	Dollars	45,646	51,886	57,264
Annual Capital Requirements	Dollars	88,128	105,328	132,656
Total Capital Requirements	Dollars	96,526	114,846	142,864
Gross Receipts	Dollars	47,288	53,110	59,360
Crop Operating Expenses	Dollars	2,638	3,275	4,632
Livestock Operating Expenses	Dollars	37,644	42,252	46,206
Overhead Expenses	Dollars	1,617	1,738	1,964
Returns to Land	Dollars	1,272	1,574	2,140
Annual Interest on Operating Capital	Dollars	1,117	1,271	1,412
Hired Labor	Dollars	0	0	6
Off-Farm Income	Dollars	0	0	0
Returns to Operator Farm Labor, Management and Specified Resources	Dollars	3,000	3,000	3,000

APPENDIX D, TABLE II (Continued)

Item	Unit	Yields		
		High	Average	Low
$1,500 Operator Farm Income[a]				
Total Land	Acres	404	508	714
Cropland	Acres	121	153	214
Bermuda W. Vetch	Acres	113	82	43
Small Grain Grazing	Acres	0	61	157
Soybeans	Acres	8	10	14
Native Pasture	Acres	162	203	286
Woods and Other	Acres	121	152	214
Livestock Activities				
P-55 Feeders	Animals	42	83	151
P-57 Feeders	Animals	141	118	85
Operator Labor	Hours	871	962	1,065
Hired Labor	Hours	0	8	101
Investment				
Land and Buildings	Dollars	32,320	40,640	57,120
Annual Operating Capital	Dollars	23,629	25,770	29,821
Total Operating Capital	Dollars	28,954	31,358	36,358
Annual Capital Requirements	Dollars	55,949	66,410	86,941
Total Capital Requirements	Dollars	61,274	71,998	93,478
Gross Receipts	Dollars	30,002	32,676	37,997
Crop Operating Expenses	Dollars	1,676	2,206	3,084
Livestock Operating Expenses	Dollars	23,878	25,659	29,310
Overhead Expenses	Dollars	1,431	1,514	1,679
Returns to Land	Dollars	808	1,016	1,428
Annual Interest on Operating Capital	Dollars	709	773	895
Hired Labor	Dollars	0	8	101
Off-Farm Income	Dollars	1,500	1,500	1,500
Returns to Operator Farm Labor, Management and Specified Resources	Dollars	1,500	1,500	1,500

APPENDIX D, TABLE II (Continued)

Item	Unit	Yields		
		High	Average	Low
Zero Operator Farm Income[a]				
Total Land	Acres	174	224	318
Cropland	Acres	52	67	95
Bermuda W. Vetch	Acres	28	13	19
Small Grain Grazing	Acres	21	50	70
Soybeans	Acres	3	4	6
Native Pasture	Acres	70	90	127
Woods and Other	Acres	52	67	96
Livestock Activities				
P-55 Feeders	Animals	31	52	67
P-57 Feeders	Animals	45	30	38
Operator Labor	Hours	354	373	422
Hired Labor	Hours	3	20	98
Investment				
Land and Buildings	Dollars	13,920	17,920	25,440
Annual Operating Capital	Dollars	9,561	10,232	13,316
Total Operating Capital	Dollars	11,641	12,469	16,255
Annual Capital Requirements	Dollars	23,481	28,152	38,756
Total Capital Requirements	Dollars	25,561	30,389	41,695
Gross Receipts	Dollars	12,288	13,260	16,930
Crop Operating Expenses	Dollars	754	969	1,374
Livestock Operating Expenses	Dollars	9,650	10,228	13,061
Overhead Expenses	Dollars	1,247	1,287	1,362
Returns to Land	Dollars	348	449	636
Annual Interest on Operating Capital	Dollars	286	307	399
Hired Labor	Dollars	3	20	98
Off-Farm Income	Dollars	3,000	3,000	3,000
Returns to Operator Farm Labor, Management and Specified Resources	Dollars	0,000	0,000	0,000

[a]The results presented for both the $1,500 and the zero operator farm incomes were programmed with less than full time farm labor. If no labor were hired, the results should be the same as if programmed for these income levels with full time farm labor. Where hired labor was necessary, the results are not exactly comparable with the $3,000 and $5,000 income levels in this table.

APPENDIX E

FARM ORGANIZATIONS AND RESOURCE REQUIREMENTS FOR FIVE LEVELS OF OPERATOR EQUITY

APPENDIX E, TABLE I

ESTIMATED MINIMUM REQUIREMENTS FOR $3,000 INCOME TO OPERATOR LABOR MANAGEMENT AND SPECIFIED EQUITY LEVELS; AVERAGE LAND QUALITY, FULL TIME OPERATOR LABOR AND SPECIFIED YIELDS, EASTERN PRAIRIE LIVESTOCK SITUATION, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Unit	Operator Equity Levels				
		100 Percent	50 Percent	33 Percent[a]	25 Percent	Zero Percent
High Yields						
Total Land	Acres	398	636			2,148
Cropland	Acres	119	191			644
Bermuda W. Vetch	Acres	119	178			129
Small Grain Grazing	Acres	0	0			472
Soybeans	Acres	0	13			43
Native Pasture	Acres	159	254			859
Woods and Other	Acres	120	191			645
Livestock Activities				Not Programmed	Not Programmed	
P-55 Feeders	Animals	45	66			554
P-57 Feeders	Animals	148	222			313
Operator Labor	Hours	893	1,373			2,206
Hired Labor	Hours	0	0			1,813
Investment						
Land and Buildings	Dollars	31,840	50,880			171,840
Annual Operating Capital	Dollars	24,677	37,248			107,127
Total Operating Capital	Dollars	30,211	45,646			131,174
Annual Capital Requirements	Dollars	56,517	88,128			278,967
Total Capital Requirements	Dollars	62,051	96,526			303,014

APPENDIX E, TABLE I (Continued)

Item	Unit	Operator Equity Levels				
		100 Percent	50 Percent	33 Percent[a]	25 Percent	Zero Percent
Gross Receipts	Dollars	31,109	47,288			139,663
Crop Operating Expenses	Dollars	1,559	2,638			9,274
Livestock Operating Expenses	Dollars	25,124	37,644			107,730
Overhead Expenses	Dollars	1,426	1,617			2,826
Returns to Land	Dollars	0	1,272			8,592
Annual Interest on Op. Cap.	Dollars	0	1,117			6,428
Hired Labor	Dollars	0	0			1,813
Returns to Operator Labor Management and Specified Resources	Dollars	3,000	3,000	Not Programmed	Not Programmed	3,000
Average Yields						
Total Land	Acres	459	787	1,163	1,332	
Cropland	Acres	137	236	349	399	
Bermuda W. Vetch	Acres	137	220	70	80	
Small Grain Grazing	Acres	0	0	256	293	
Soybeans	Acres	0	16	23	26	
Native Pasture	Acres	184	315	465	533	
Woods and Other	Acres	138	236	349	400	
Livestock Activities						
P-55 Feeders	Animals	47	77	272	312	No Solution
P-57 Feeders	Animals	155	247	154	177	
Operator Labor	Hours	952	1,571	1,889	1,991	
Hired Labor	Hours	0	0	148	341	

APPENDIX E, TABLE I (Continued)

Item	Unit	Operator Equity Levels				
		100 Percent	50 Percent	33 Percent[a]	25 Percent	Zero Percent
Investment						
Land and Buildings	Dollars	36,720	62,960	93,040	106,560	
Annual Operating Capital	Dollars	26,186	42,368	53,067	60,845	
Total Operating Capital	Dollars	32,045	51,886	64,686	74,234	
Annual Capital Requirements	Dollars	62,906	105,328	146,107	167,405	
Total Capital Requirements	Dollars	68,765	114,846	157,726	180,794	
Gross Receipts	Dollars	32,599	53,110	68,744	78,709	No Solution
Crop Operating Expenses	Dollars	1,797	3,275	5,021	5,749	
Livestock Operating Expenses	Dollars	26,327	42,252	53,027	60,712	
Overhead Expenses	Dollars	1,475	1,738	2,038	2,174	
Returns to Land	Dollars	0	1,574	2,326	3,995	
Annual Interest on Op. Capital	Dollars	0	1,271	3,184	2,738	
Hired Labor	Dollars	0	0	148	341	
Return to Operator Labor Management and Specified Resources	Dollars	3,000	3,000	3,000	3,000	
Low Yields						
Total Land	Acres	541	1,070	1,848	Not Programmed	No Solution
Cropland	Acres	162	321	555		
Bermuda W. Vetch	Acres	162	116	111		
Small Grain Grazing	Acres	0	184	350		
Soybeans	Acres	0	21	94		
Native Pasture	Acres	217	429	739		
Woods and Other	Acres	162	320	554		

APPENDIX E, TABLE I (Continued)

Item	Unit	Operator Equity Levels				
		100 Percent	50 Percent	33 Percent[a]	25 Percent	Zero Percent
Livestock Activities						
P-55 Feeders	Animals	50	192	317		
P-57 Feeders	Animals	164	175	202		
Operator Labor	Hours	1,031	1,810	2,206		
Hired Labor	Hours	0	6	498		
Investment						
Land and Buildings	Dollars	43,280	85,600	147,840	Not Programmed	No Solution
Annual Operating Capital	Dollars	28,240	47,056	66,252		
Total Operating Capital	Dollars	34,541	57,264	81,147		
Annual Capital Requirements	Dollars	71,520	132,656	214,092		
Total Capital Requirements	Dollars	77,821	142,864	228,987		
Gross Receipts	Dollars	34,627	59,360	85,894		
Crop Operating Expenses	Dollars	2,121	4,632	7,477		
Livestock Operating Expenses	Dollars	27,965	46,206	64,662		
Overhead Expenses	Dollars	1,541	1,964	2,586		
Returns to Land	Dollars	0	2,140	3,696		
Annual Interest on Op. Capital	Dollars	0	1,412	3,975		
Hired Labor	Dollars	0	6	498		
Returns to Operator Labor Management and Specified Resources	Dollars	3,000	3,000	3,000		

[a]The 33 percent equity level will vary slightly with farm size because it was programmed using interest rates of 2 1/2 percent for land capital and 6 percent for operating capital. The percent of equity was calculated from results.

APPENDIX E, TABLE II

ESTIMATED MINIMUM REQUIREMENTS FOR $3,000 INCOME TO OPERATOR LABOR MANAGEMENT AND SPECIFIED EQUITY LEVELS; GOOD LAND QUALITY, FULL TIME OPERATOR LABOR AND SPECIFIED YIELDS, EASTERN PRAIRIE LIVESTOCK SITUATION, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Unit	Operator Equity Levels				
		100 Percent	50 Percent	33 Percent[a]	25 Percent	Zero Percent
High Yields						
Total Land	Acres	312	520			4,719
Cropland	Acres	141	234			2,124
Bermuda With Vetch	Acres	141	218			425
Small Grain Grazing	Acres	0	0			1,557
Soybeans	Acres	0	16			142
Native Pasture	Acres	96	161			1,463
Woods and Other	Acres	75	125			1,132
Livestock Activities						
P-55 Feeders	Animals	53	81	Not Programmed	Not Programmed	1,824
P-57 Feeders	Animals	148	230			642
Operator Labor	Hours	942	1,502			2,206
Hired Labor	Hours	0	0			9,386
Investment						
Land and Buildings	Dollars	34,320	57,200			519,090
Annual Operating Capital	Dollars	26,059	40,722			309,696
Total Operating Capital	Dollars	31,865	49,846			379,965
Annual Capital Requirements	Dollars	60,379	97,922			828,786
Total Capital Requirements	Dollars	66,185	107,046			899,055

APPENDIX E, TABLE II (Continued)

Item	Unit	Operator Equity Levels				
		100 Percent	50 Percent	33 Percent[a]	25 Percent	Zero Percent
Gross Receipts	Dollars	32,388	50,972			396,467
Crop Operating Expenses	Dollars	1,835	3,236			30,564
Livestock Operating Expenses	Dollars	26,102	40,404			302,681
Overhead Expenses	Dollars	1,451	1,680	Not Programmed	Not Programmed	6,299
Returns to Land	Dollars	0	1,430			25,955
Annual Interest on Op. Capital	Dollars	0	1,222			18,582
Hired Labor	Dollars	0	0			9,386
Return to Operator Labor Management and Specified Resources	Dollars	3,000	3,000			3,000
Average Yields						
Total Land	Acres	363	674	1,109	1,423	
Cropland	Acres	163	303	499	640	
Bermuda W. Vetch	Acres	163	162	100	128	
Small Grain Grazing	Acres	0	121	366	470	
Soybeans	Acres	0	20	33	42	
Native Pasture	Acres	112	209	344	441	
Woods and Other	Acres	88	162	266	342	
Livestock Activities						No Solution
P-55 Feeders	Animals	56	164	390	500	
P-57 Feeders	Animals	156	184	136	175	
Operator Labor	Hours	1,014	1,708	2,082	2,206	
Hired Labor	Hours	0	5	476	1,075	

APPENDIX E, TABLE II (Continued)

Item	Unit	Operator Equity Levels				
		100 Percent	50 Percent	33 Percent[a]	25 Percent	Zero Percent
Investment						
Land and Buildings	Dollars	39,930	74,140	121,990	156,530	
Annual Operating Capital	Dollars	27,926	45,323	66,342	85,337	
Total Operating Capital	Dollars	34,132	55,027	80,794	104,108	
Annual Capital Requirements	Dollars	67,856	119,463	188,332	241,867	
Total Capital Requirements	Dollars	74,062	129,167	202,785	260,683	
Gross Receipts	Dollars	34,220	56,601	84,598	108,523	No Solution
Crop Operating Expenses	Dollars	2,135	4,383	7,184	9,215	
Livestock Operating Expenses	Dollars	27,578	44,151	64,579	82,840	
Overhead Expenses	Dollars	1,507	1,848	2,328	2,673	
Returns to Land	Dollars	0	1,854	3,050	5,870	
Annual Interest on Op. Capital	Dollars	0	1,360	3,981	3,840	
Hired Labor	Dollars	0	5	476	1,075	
Returns to Operator Labor Management and Specified Resources	Dollars	3,000	3,000	3,000	3,000	
Low Yields						
Total Land	Acres	434	1,016	2,723	No Solution	No Solution
Cropland	Acres	195	457	1,225		
Bermuda W. Vetch	Acres	195	91	245		
Small Grain Grazing	Acres	0	335	408		
Soybeans	Acres	0	31	572		
Native Pasture	Acres	135	315	844		
Woods and Other	Acres	104	244	654		

APPENDIX E, TABLE II (Continued)

Item	Unit	Operator Equity Levels				
		100 Percent	50 Percent	33 Percent[a]	25 Percent	Zero Percent
Livestock Activities						
P-55 Feeders	Animals	60	321	420		
P-57 Feeders	Animals	168	112	269		
Operator Labor	Hours	1,114	1,974	2,206		
Hired Labor	Hours	0	218	2,534		
Investment						
Land and Buildings	Dollars	47,740	111,760	299,530		
Annual Operating Capital	Dollars	30,524	55,568	98,379		
Total Operating Capital	Dollars	37,284	67,603	123,376	No Solution	No Solution
Annual Capital Requirements	Dollars	78,264	167,328	397,909		
Total Capital Requirements	Dollars	85,024	179,363	422,906		
Gross Receipts	Dollars	36,768	69,652	128,936		
Crop Operating Expenses	Dollars	2,552	6,583	19,925		
Livestock Operating Expenses	Dollars	29,631	53,164	85,984		
Overhead Expenses	Dollars	1,585	2,226	4,102		
Returns to Land	Dollars	0	2,794	7,488		
Annual Interest on Op. Capital	Dollars	0	1,667	5,903		
Hired Labor	Dollars	0	218	2,534		
Returns to Operator Labor Management and Specified Resources	Dollars	3,000	3,000	3,000		

[a]The 33 percent equity level will vary slightly with farm size because it was programmed using interest rates of 2 1/2 percent for land capital and 6 percent for operating capital. The percent equity was calculated from results.

APPENDIX F

FARM ORGANIZATIONS AND RESOURCE REQUIREMENTS FOR THREE LEVELS OF LAND QUALITY

APPENDIX F, TABLE I

ESTIMATED MINIMUM REQUIREMENTS FOR SPECIFIED INCOMES TO OPERATOR LABOR MANAGEMENT AND 100 PERCENT EQUITY; SPECIFIED LAND QUALITIES, AVERAGE YIELDS AND FULL TIME OPERATOR LABOR AVAILABLE, EASTERN PRAIRIE LIVESTOCK SITUATION, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Unit	Land Quality		
		Good	Average	Poor
$5,000 Operator Farm Income				
Total Land	Acres	541	682	947
Cropland	Acres	243	205	142
Bermuda W. Vetch	Acres	243	205	142
Native Pasture	Acres	168	272	464
Woods and Other	Acres	130	205	341
Livestock Activities				
P-55 Feeders	Animals	84	70	48
P-57 Feeders	Animals	232	230	230
Operator Labor	Hours	1,500	1,415	1,279
Hired Labor	Hours	9	0	0
Investment				
Land and Buildings	Dollars	59,510	54,560	56,820
Annual Operating Capital	Dollars	41,585	38,935	35,121
Total Operating Capital	Dollars	50,829	47,647	43,089
Annual Capital Requirements	Dollars	101,095	93,495	91,941
Total Capital Requirements	Dollars	110,339	102,207	99,909
Gross Receipts	Dollars	50,952	48,469	45,108
Crop Operating Expenses	Dollars	3,178	2,671	1,854
Livestock Operating Expenses	Dollars	41,062	39,144	36,578
Overhead Expenses	Dollars	1,703	1,654	1,676
Returns to Land	Dollars	0	0	0
Annual Interest on Operating Capital	Dollars	0	0	0
Hired Labor	Dollars	9	0	0
Off-Farm Income	Dollars	0	0	0
Returns to Operator Farm Labor, Management and Specified Resources	Dollars	5,000	5,000	5,000

APPENDIX F, TABLE I (Continued)

Item	Unit	Land Quality		
		Good	Average	Poor
$3,000 Operator Farm Income				
Total Land	Acres	363	459	637
Cropland	Acres	163	137	96
Bermuda W. Vetch	Acres	163	137	96
Native Pasture	Acres	112	184	312
Woods and Other	Acres	88	138	229
Livestock Activities				
P-55 Feeders	Animals	56	47	33
P-57 Feeders	Animals	156	155	154
Operator Labor	Hours	1,014	952	860
Hired Labor	Hours	0	0	0
Investment				
Land and Buildings	Dollars	39,930	36,720	38,220
Annual Operating Capital	Dollars	27,926	26,186	23,621
Total Operating Capital	Dollars	34,132	32,045	28,980
Annual Capital Requirements	Dollars	67,856	62,906	61,841
Total Capital Requirements	Dollars	74,062	68,765	67,200
Gross Receipts	Dollars	34,220	32,599	30,338
Crop Operating Expenses	Dollars	2,135	1,797	1,247
Livestock Operating Expenses	Dollars	27,578	26,327	24,601
Overhead Expenses	Dollars	1,507	1,475	1,490
Returns to Land	Dollars	0	0	0
Annual Interest on Operating Capital	Dollars	0	0	0
Hired Labor	Dollars	0	0	0
Off-Farm Income	Dollars	0	0	0
Returns to Operator Farm Labor, Management and Specified Resources	Dollars	3,000	3,000	3,000

APPENDIX F, TABLE I (Continued)

Item	Unit	Land Quality		
		Good	Average	Poor
$1,500 Operator Farm Income				
Total Land	Acres	231	291	404
Cropland	Acres	104	87	61
Bermuda W. Vetch	Acres	104	87	61
Native Pasture	Acres	72	117	198
Woods and Other	Acres	55	87	145
Livestock Activities				
P-55 Feeders	Animals	36	30	21
P-57 Feeders	Animals	99	98	98
Operator Labor	Hours	644	604	546
Hired Labor	Hours	0	0	0
Investment				
Land and Buildings	Dollars	25,410	23,280	24,240
Annual Operating Capital	Dollars	17,729	16,625	14,996
Total Operating Capital	Dollars	21,669	20,344	18,398
Annual Capital Requirements	Dollars	43,139	39,905	39,236
Total Capital Requirements	Dollars	47,079	43,624	42,638
Gross Receipts	Dollars	21,725	20,696	19,261
Crop Operating Expenses	Dollars	1,355	1,141	792
Livestock Operating Expenses	Dollars	17,508	16,714	15,619
Overhead Expenses	Dollars	1,362	1,341	1,350
Returns to Land	Dollars	0	0	0
Annual Interest on Operating Capital	Dollars	0	0	0
Hired Labor	Dollars	0	0	0
Off-Farm Income	Dollars	1,500	1,500	1,500
Returns to Operator Farm Labor, Management and Specified Resources	Dollars	1,500	1,500	1,500

APPENDIX F, TABLE I (Continued)

Item	Unit	Land Quality		
		Good	Average	Poor
Zero Operator Farm Income				
Total Land	Acres	98	124	172
Cropland	Acres	44	37	26
Bermuda W. Vetch	Acres	44	37	26
Native Pasture	Acres	30	50	84
Woods and Other	Acres	24	37	62
Livestock Activities				
P-55 Feeders	Animals	15	13	9
P-57 Feeders	Animals	42	41	41
Operator Labor	Hours	273	257	232
Hired Labor	Hours	0	0	0
Investment				
Land and Buildings	Dollars	10,780	9,920	10,320
Annual Operating Capital	Dollars	7,532	7,063	6,371
Total Operating Capital	Dollars	9,206	8,643	7,816
Annual Capital Requirements	Dollars	18,312	16,983	16,691
Total Capital Requirements	Dollars	19,986	18,563	18,136
Gross Receipts	Dollars	9,250	8,792	8,183
Crop Operating Expenses	Dollars	576	485	337
Livestock Operating Expenses	Dollars	7,438	7,100	6,635
Overhead Expenses	Dollars	1,216	1,207	1,211
Returns to Land	Dollars	0	0	0
Annual Interest on Operating Capital	Dollars	0	0	0
Hired Labor	Dollars	0	0	0
Off-Farm Income	Dollars	3,000	3,000	3,000
Returns to Operator Farm Labor, Management and Specified Resources	Dollars	0,000	0,000	0,000

APPENDIX F, TABLE II

ESTIMATED MINIMUM REQUIREMENTS FOR SPECIFIED INCOMES TO OPERATOR LABOR MANAGEMENT AND 50 PERCENT EQUITY; SPECIFIED LAND QUALITIES, AVERAGE YIELDS AND FULL TIME OPERATOR LABOR AVAILABLE, EASTERN PRAIRIE LIVESTOCK SITUATION, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Unit	Land Quality		
		Good	Average	Poor
$5,000 Operator Farm Income				
Total Land	Acres	1,111	1,268	1,673
Cropland	Acres	500	381	251
Bermuda W. Vetch	Acres	101	77	50
Small Grain Grazing	Acres	366	279	184
Soybeans	Acres	33	25	17
Native Pasture	Acres	344	507	820
Woods and Other	Acres	266	380	602
Livestock Activities				
P-55 Feeders	Animals	390	297	196
P-57 Feeders	Animals	137	168	235
Operator Labor	Hours	2,083	1,952	1,854
Hired Labor	Hours	480	269	136
Investment				
Land and Buildings	Dollars	122,210	101,440	100,380
Annual Operating Capital	Dollars	66,488	57,933	52,506
Total Operating Capital	Dollars	80,974	70,659	64,276
Annual Capital Requirements	Dollars	188,698	159,373	152,886
Total Capital Requirements	Dollars	203,184	172,099	164,656
Gross Receipts	Dollars	84,779	74,978	69,727
Crop Operating Expenses	Dollars	7,197	5,477	3,613
Livestock Operating Expenses	Dollars	64,722	57,835	54,781
Overhead Expenses	Dollars	2,330	2,122	2,112
Returns to Land	Dollars	3,055	2,536	2,510
Annual Interest on Operating Capital	Dollars	1,995	1,738	1,575
Hired Labor	Dollars	480	269	136
Off-Farm Income	Dollars	0	0	0
Returns to Operator Farm Labor, Management and Specified Resources	Dollars	5,000	5,000	5,000

APPENDIX F, TABLE II (Continued)

Item	Unit	Land Quality		
		Good	Average	Poor
$3,000 Operator Farm Income				
Total Land	Acres	674	787	1,070
Cropland	Acres	303	236	161
Bermuda W. Vetch	Acres	162	220	161
Small Grain Grazing	Acres	121	0	0
Soybeans	Acres	20	16	0
Native Pasture	Acres	209	315	524
Woods and Other	Acres	162	236	385
Livestock Activities				
P-55 Feeders	Animals	164	77	55
P-57 Feeders	Animals	184	247	260
Operator Labor	Hours	1,708	1,571	1,446
Hired Labor	Hours	5	0	0
Investment				
Land and Buildings	Dollars	74,140	62,960	64,200
Annual Operating Capital	Dollars	45,323	42,368	39,702
Total Operating Capital	Dollars	55,027	51,886	48,708
Annual Capital Requirements	Dollars	119,463	105,328	103,902
Total Capital Requirements	Dollars	129,167	114,846	112,908
Gross Receipts	Dollars	56,601	53,110	50,992
Crop Operating Expenses	Dollars	4,383	3,275	2,097
Livestock Operating Expenses	Dollars	44,151	42,252	41,349
Overhead Expenses	Dollars	1,848	1,738	1,750
Returns to Land	Dollars	1,854	1,574	1,605
Annual Interest on Operating Capital	Dollars	1,360	1,271	1,191
Hired Labor	Dollars	5	0	0
Off-Farm Income	Dollars	0	0	0
Returns to Operator Farm Labor, Management and Specified Resources	Dollars	3,000	3,000	3,000

APPENDIX F, TABLE II (Continued)

Item	Unit	Land Quality		
		Good	Average	Poor
$1,500 Operator Farm Income				
Total Land	Acres	441	508	681
Cropland	Acres	199	153	102
Bermuda W. Vetch	Acres	43	82	96
Small Grain Grazing	Acres	143	61	0
Soybeans	Acres	13	10	6
Native Pasture	Acres	136	203	334
Woods and Other	Acres	106	152	245
Livestock Activities				
P-55 Feeders	Animals	153	83	32
P-57 Feeders	Animals	57	118	160
Investment				
Land and Buildings	Dollars	48,510	40,640	40,860
Annual Operating Capital	Dollars	26,422	25,770	24,354
Total Operating Capital	Dollars	32,107	31,358	29,903
Annual Capital Requirements	Dollars	74,932	66,410	65,214
Total Capital Requirements	Dollars	80,617	71,998	70,763
Gross Receipts	Dollars	33,773	32,676	31,442
Crop Operating Expenses	Dollars	2,858	2,206	1,401
Livestock Operating Expenses	Dollars	25,804	25,659	25,271
Overhead Expenses	Dollars	1,593	1,514	1,517
Returns to Land	Dollars	1,213	1,016	1,022
Annual Interest on Operating Capital	Dollars	793	773	731
Hired Labor	Dollars	12	8	0
Off-Farm Income	Dollars	1,500	1,500	1,500
Returns to Operator Farm Labor, Management and Specified Resources	Dollars	1,500	1,500	1,500

APPENDIX F, TABLE II (Continued)

Item	Unit	Land Quality		
		Good	Average	Poor
Zero Operator Farm Income				
Total Land	Acres	197	224	296
Cropland	Acres	88	67	44
Bermuda W. Vetch	Acres	18	13	16
Small Grain Grazing	Acres	64	50	25
Soybeans	Acres	6	4	3
Native Pasture	Acres	62	90	145
Woods and Other	Acres	47	67	107
Livestock Activities				
P-55 Feeders	Animals	69	52	29
P-57 Feeders	Animals	24	30	49
Operator Labor	Hours	397	373	357
Hired Labor	Hours	57	20	7
Investment				
Land and Buildings	Dollars	21,670	17,920	17,760
Annual Operating Capital	Dollars	11,743	10,232	9,678
Total Operating Capital	Dollars	14,290	12,469	11,834
Annual Capital Requirements	Dollars	33,413	28,152	27,438
Total Capital Requirements	Dollars	35,960	30,389	29,594
Gross Receipts	Dollars	14,991	13,260	12,741
Crop Operating Expenses	Dollars	1,271	969	641
Livestock Operating Expenses	Dollars	11,444	10,228	10,072
Overhead Expenses	Dollars	1,325	1,287	1,286
Returns to Land	Dollars	542	449	444
Annual Interest on Operating Capital	Dollars	352	307	290
Hired Labor	Dollars	57	20	7
Off-Farm Income	Dollars	3,000	3,000	3,000
Returns to Operator Farm Labor, Management and Specified Resources	Dollars	0,000	0,000	0,000

APPENDIX G

MACHINERY OVERHEAD COSTS FOR SELECTED FARM SIZE, ORGANIZATION, AND LAND QUALITY

APPENDIX G, TABLE I

MACHINERY DEPRECIATION FOR SELECTED PROGRAMMED SOLUTIONS BY FARM SIZE, FARM ORGANIZATION, LAND QUALITY AND EQUITY LEVELS; EASTERN PRAIRIE LIVESTOCK SITUATION, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Acres in Farm	Crops Grown	Land Quality	Equity Level (Percent)	Machinery Depreciation (Dollars)
224[c]	Bermuda W. Vetch Small Grain Grazing Soybeans	Average	50	72
253[a]	Bermuda W. Vetch	Average	100	53
312[b]	Bermuda W. Vetch	Good	100	98
344[a]	Bermuda W. Vetch	Average	100	72
434[b]	Bermuda W. Vetch	Good	100	136
441[a]	Bermuda W. Vetch Small Grain Grazing Soybeans	Average	50	211
508[a]	Bermuda W. Vetch Small Grain Grazing Soybeans	Average	50	140
520[b]	Bermuda W. Vetch Soybeans	Good	50	173
714[a]	Bermuda W. Vetch Small Grain Grazing Soybeans	Average	50	229
818[c]	Bermuda W. Vetch Small Grain Grazing	Average	50	263
1,423[b]	Bermuda W. Vetch Small Grain Grazing Soybeans	Good	25	686

[a]Selected from Appendix D, Table I.

[b]Selected from Appendix E, Table II.

[c]Selected from Appendix C, Table III.

VITA

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