LONG-RUN ADJUSTMENT HYPOTHESES FOR FARM OPERATORS IN A SPARSELY POPULATED, HIGH-RISK AREA OF THE GREAT PLAINS

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PREFACE

The research reported in this dissertation is part of the research being conducted under a state project at Oklahoma State University. The Oklahoma project is Agricultural Experiment Station Project 1164, "An Economic Appraisal of Farming Systems in the Oklahoma Panhandle." Indebtedness is acknowledged to the Department of Agricultural Economics for making this study possible and for affording the author the opportunity to pursue graduate training toward the Degree of Doctor of Philosophy.

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CHAPTER I

INTRODUCTION

The nature and timing of adjustments within agriculture, and between agriculture and other industries, is a relevant concern to all individuals and aggregates of society. For example, prices of goods and services, returns to land, labor and capital resources, the size and composition of the Net National Product, national security, national development and growth, and legacies to future generations are all adversely affected if adjustments are nonoptimal. Within the economy, the phenomenon of adjustment in some form is assured by existing economic forces. However, there is a need for anticipating, understanding, and facilitating the actions of these forces so that the resulting adjustments are desirable socially and economically. Thus, this study is oriented to an analysis of what, how, how much, and when adjustments may occur in a specific agricultural area under alternative institutional, technical, and economic conditions.

From an efficiency point of view, economic theory provides a means of specifying the need for and forces leading to adjustments in an economy. It provides a description of optimum resource allocation between various sectors and/or uses. For example, units of a resource are optimally allocated when the marginal value product in one use is equal to the marginal value product in all alternative uses (between

products, industries, economic units and technical units). If this condition does not hold, a resource owner can profitably reallocate his resources.[1] Thus, a tendency for movement to optimality in resource use exists. The maximum rate of growth in a given economy is attained when resources are allocated so that the returns to factors are identical for each use within and between various sectors, and when the most efficient available technology is adopted.[2]

Various symptoms in the United States economy indicate that needed adjustments implied by economic theory have not taken place. Optimum adjustments between agriculture and nonagriculture, and within agriculture, have apparently not occurred in past years, or have not developed at a rate sufficient to promote maximum economic growth. The production of major agricultural products exceeds the total domestic and foreign demand at socially acceptable prices, as evidenced by the persistent surplus problem. The problem of surplus products has been related to a surplus of resources in agriculture by some economists. The low incomes per full-time employee in agriculture, as compared to earnings in other sectors, indicate that agricultural labor is particularly abundant (or it has a low bargaining power). A number of low income, poverty areas are also concentrated within agriculture, particularly within the southern agricultural region.

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[1] In this section, terms such as returns and profitably are used in the broadest sense to encompass multiple benefits including money income, but not money income alone.

[2] In equilibrium, labor returns may not be exactly equal, for example, because of possible disutilities of some jobs.

Various farm programs have been instigated in an effort to alleviate or minimize the problems of overproduction and low incomes in agriculture. Programs have been used to support prices of various agricultural commodities and to restrict production through means such as acreage controls. Although these programs may have been relevant short-run devices, the basic problems of surpluses and depressed incomes still persist. Adjustments thus clearly need to be made between agriculture and nonagriculture.

Within agriculture, needed adjustments have been occurring at a rapid pace. The total number of farms and farmers has decreased and farm sizes have increased considerably. There has been a high rate of technological development and adoption. Fertilizers, new seed varieties, insecticides, and refined methods of production have been developed and adopted. Capital has been substituted for labor in production. Productivity per unit of labor input has shown a marked increase. Despite these advances and their adoption, additional adjustments, such as in farm sizes, appear to be needed and inevitable.

Adjustments in resource use particularly appear to be necessary, both within and between agriculture and other sectors. The definite resource earning differential between agriculture and other industries is symptomatic of this need. The average annual wage per full-time employee in farming is roughly only a third of that of full-time employees in all industries.[3] The returns to invested capital in

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[3]United States Department of Commerce, Survey of Current Business, Office of Business Economics (Washington, July, 1963).

agriculture are, in many instances, not comparable to the returns that can be received in alternative investments.

Adjustment problems faced by farm operators in different areas are not the same. Agricultural areas differ widely not only by location, but also with respect to such factors as the quantity and quality of resource endowments, and climatic characteristics. Thus, research on adjustments needs to be specialized by relatively homogeneous areas. Of specific interest in this study is the large production region known as the Great Plains (particularly the Oklahoma Panhandle area in the Plains).

The Plains region has a number of unique characteristics and problems. A high degree of yield and climatic variability is probably the foremost characteristic of this region. Food and feed grains are the major products in the region and production alternatives are limited. Weather and climatic conditions are quite erratic. Rainfall is extremely variable, not only seasonally, but from year to year. With this variability in precipitation, there is naturally a large fluctuation in yields of the major crops over time. A portion of seeded acreages is often abandoned before harvest. Sustained drought periods in this region create many problems for farm operators. Livestock herds either have to be reduced, or feed must be purchased for them during periods when there are shortages. Farm operators often have to borrow heavily to cover their operating expenses. Purchases of needed inputs, many of which are highly specialized, often must be deferred during adverse drought periods.

Although many adjustments by individual farmers have occurred within this Great Plains region, additional ones appear to be needed and

forthcoming. The acquisition of additional resources appears to be the most promising development for farmers who adjust. Farm operators who are unable to make needed adjustments are faced with the prospect of supplementing their income from off-farm employment, or in seeking full-time employment in nonfarm work.

Statement of Problem

Information is needed about potential adjustments by farm operators in the Great Plains Region. Although a number of adjustments have occurred and are now taking place, farm operators can and probably will be forced to make additional ones in the future. The nature of adjustment potentials, how and how much farmers need to adjust, and when these adjustments will occur are items of interest to not only farm operators, but also to local businesses, policy makers, and administrators as well. The gap between where farmers are now and where they will possibly be forced by market forces is another subject of concern. A number of adjustment hypotheses for farm operators can be formulated. The plausibility of these various hypotheses needs to be examined.

Many questions pertaining to individual farm adjustment problems need to be answered. The following are a few of the most relevant questions: What is the optimum size of farm over time in the area? What combinations of resources and enterprises are required to obtain desired levels of family income? What adjustments are needed in resource use? What environmental or economic factors are likely to deter or facilitate these adjustments? What group of operators will most likely adjust? What would be the effects of changes in farm programs upon

resource requirements and enterprise combinations for individual farms? This study will provide some of the implications of adjustment for individual farmers, and possible extensions to regional and national problems.

Objectives of the Study

The major purpose of this study is to develop and examine potential adjustments for farm operators in a particular area of the Great Plains. The specific objectives of the study are:

(1) To develop alternative adjustment hypotheses for farm operators;

(2) To determine the minimum resource requirements (land, labor, and capital) and implied adjustments needed to obtain specified returns to operator labor and management under selected institutional, technical, and economic conditions;

(3) To specify the combinations of farm enterprises consistent with the minimum resource estimates for epecified income levels and environmental conditions;

(4) To appraise the effects of changes in land prices, owned resources, and yield levels upon the minimum resource requirements and enterprise combinations determined in (2) and (3); and

(5) To examine the implications of different farm programs upon the minimum resource requirements and enterprise combinations specified in (2) and (3).

Area in Study

The geographic area to which this study applies is part of Oklahoma Economic Area 1 in western Oklahoma.[4] This Panhandle area includes Beaver, Texas, and Cimarron counties (Figure 1). It is part of the soil classification area known as the High Plains and also includes part of the Rolling Red Plains in eastern Beaver County.[5]

The two major soil groupings within the area are the loam soils (hardlands) and sandy lands. The Richfield clay loam and Dalhart sandy soils are two of the most common soils within the area. Soil fertility is generally adequate in the area, but natural rainfall is a limiting factor in production. Variation in precipitation is extreme from year to year as evidenced by historical data for the Oklahoma Panhandle (Figure 2). Long drought periods are common. With such a variation in precipitation, there is naturally a large fluctuation in yields of the major crops, such as for wheat (Figure 2). The percentage of seeded land abandoned before harvest is quite high during unfavorable years (Figure 3).

The period of time between killing frosts in the Panhandle is the shortest in Oklahoma and ranges from 180 to 190 days. The major crops are wheat on the hardlands and grain sorghums on the sandy lands. Some

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[4]Ibid., United States Census of Agriculture, Bureau of the Census (Washington, 1954).

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

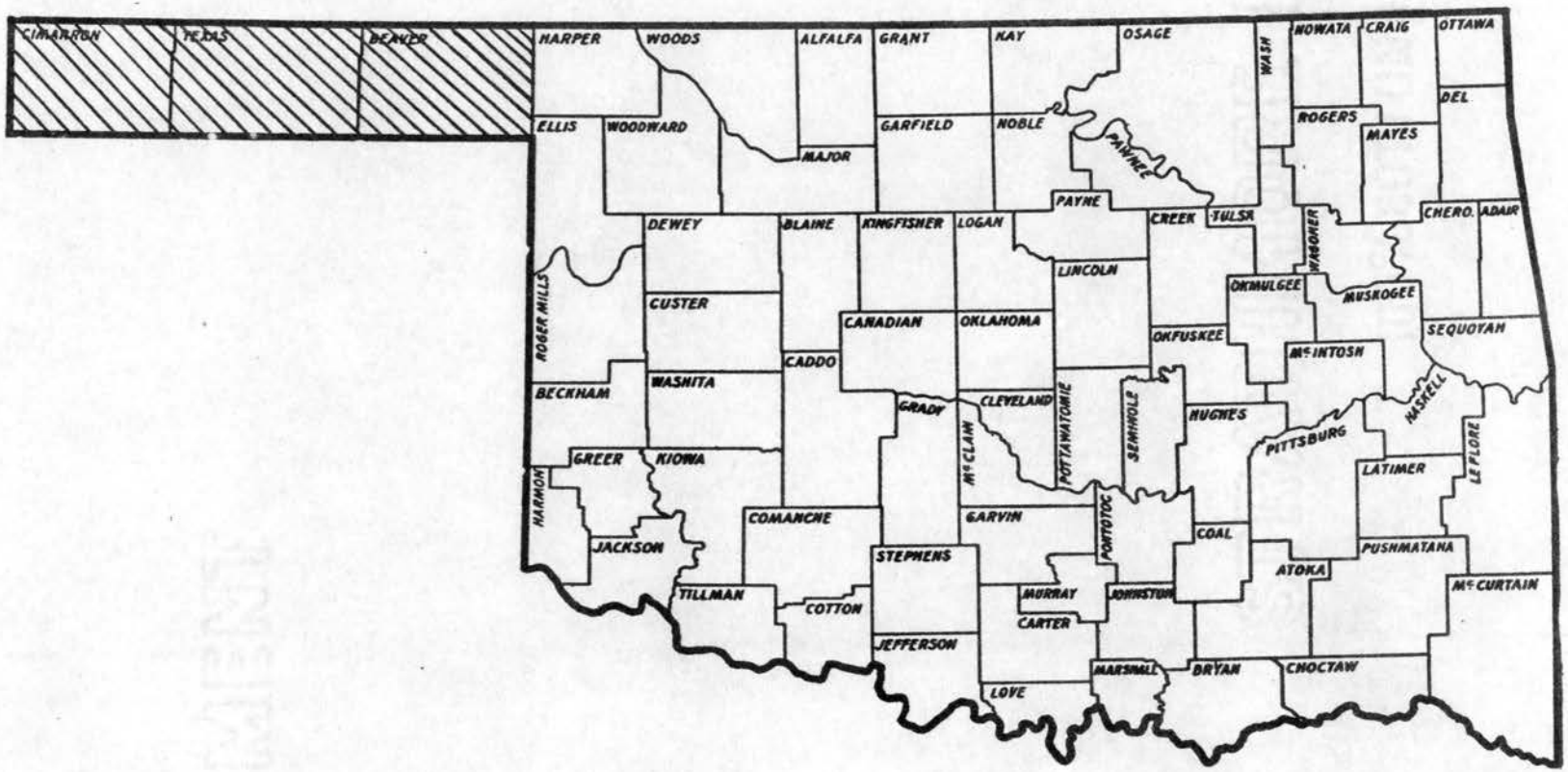

Figure 1.
Map of Oklahoma Showing the Area of Study.

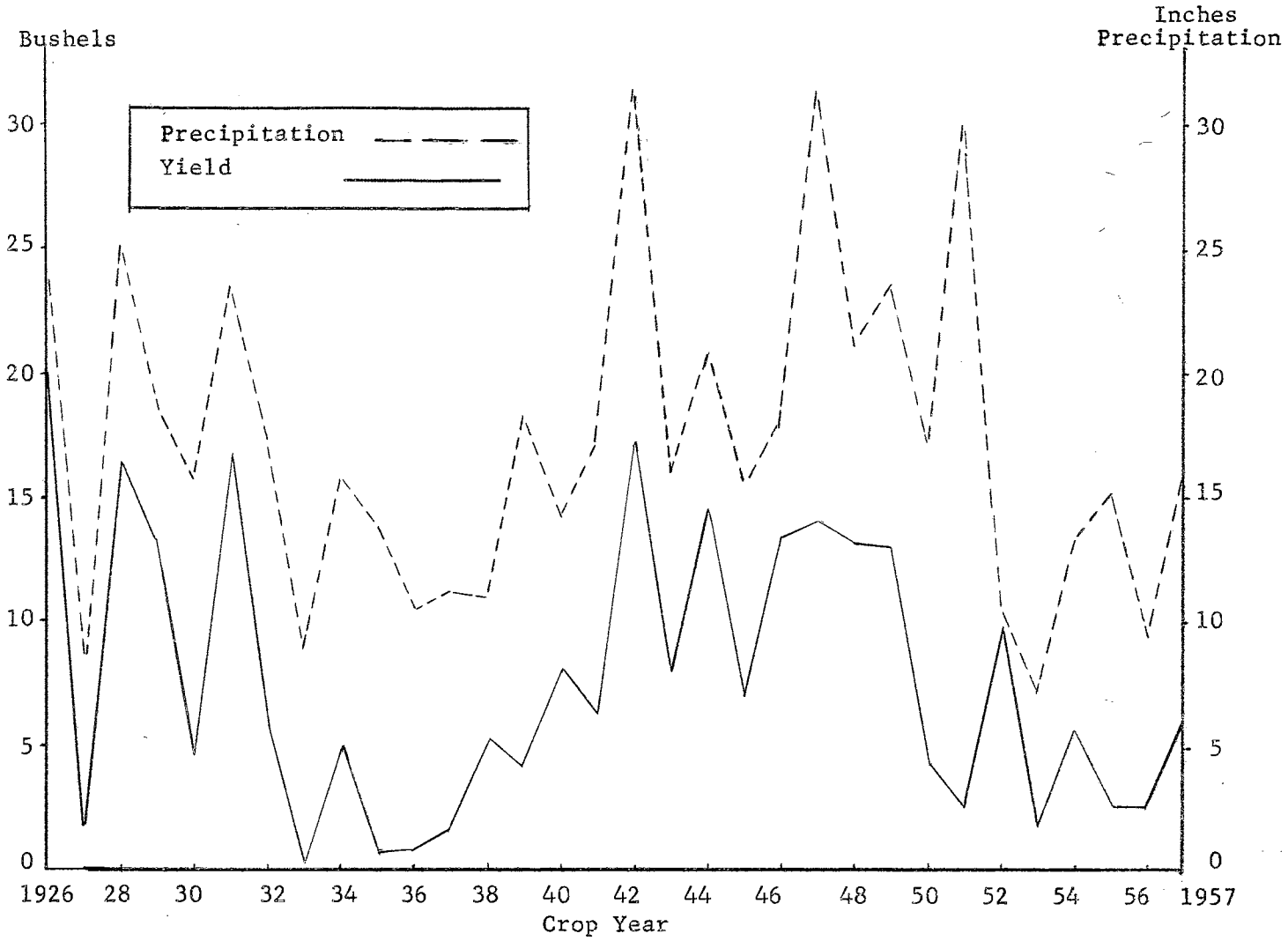

Figure 2. The Average Wheat Production for Texas County, Oklahoma, in Bushels per Seeded Acre in Relation to the Crop-Year Moisture.

Source: United States Department of Agriculture, Soil Survey, Texas County, Oklahoma, Soil Conservation Service in cooperation with Oklahoma Agricultural Experiment Station, Series 1958, No. 6 (Washington, 1961).

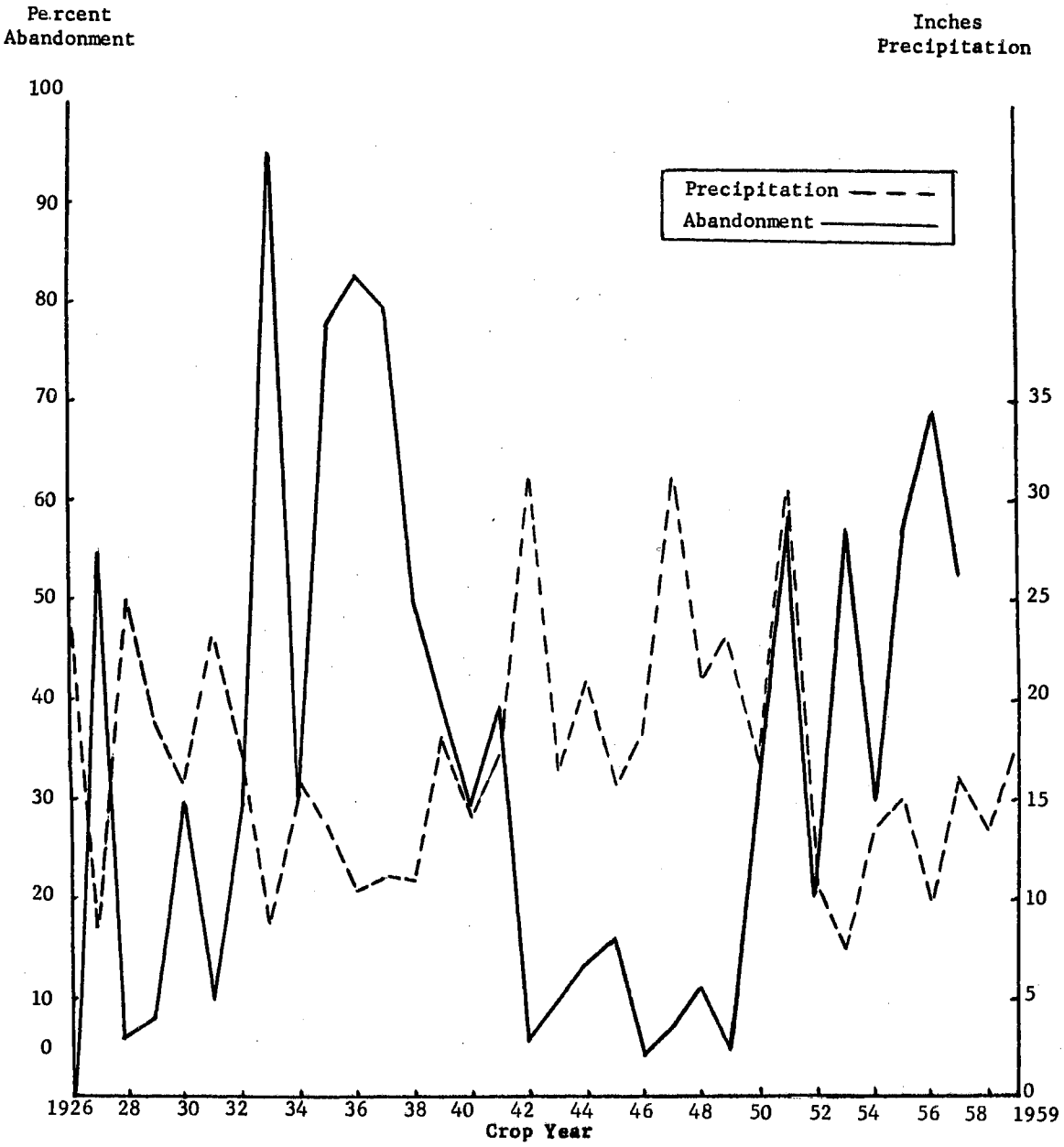

Figure 3. The Percentage of Seeded Acres of Wheat Abandoned Before Harvest in Texas County, Oklahoma, in Relation to Crop-Year Moisture.

Source: United States Department of Agriculture, Soil Survey, Texas County, Oklahoma, Soil Conservation Service in cooperation with Oklahoma Agricultural Experiment Station, Series 1958, No. 6 (Washington, 1961).

broomcorn is produced, and alfalfa is grown on some of the irrigated land. Soils unsuitable for cultivation and the various "breaks" are used mainly for ranching.

The Panhandle is a farming area with no close metropolitan centers. Excluding agriculture, the major industry is production, transportation and processing of natural gas and oil. Most of the agricultural pre-harvest labor in the Panhandle is provided by the farm operator and his family. Some migratory labor is used for broomcorn. Wheat and grain sorghum, the two principal cash crops, are mainly harvested by custom combine crews.

Previous Research

A limited number of farm adjustment studies have been couched in a "minimum resources to attain specified incomes" framework. In contrast, most farm adjustment studies have emphasized the short-run problems of resource use and farm enterprise combinations.

The initial work in determining the minimum resource requirements needed for specified incomes was formulated and conducted by Brewster.[6] A study was undertaken to determine the minimum complements of resources needed to attain specified levels of income for farm operators on given types of farms in selected areas of the United States. Brewster later presented the detailed assumptions and general framework

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[6] John M. Brewster, Farm Resources Needed for Specified Income Levels, United States Department of Agriculture, Agricultural Research Service, Agriculture Information Bulletin No. 180 (Washington, 1957).

to be used in such a study to the Southern Farm Management Committee.[7] In this paper, he discussed many of the methodological questions involved in a minimum resources study. Much of the conceptual basis for this study, particularly the selection of appropriate "income targets," is based upon his work.

Plaxico and Goodwin presented a paper at the Agricultural Policy Institute in North Carolina, in which they estimated the minimum land and capital requirements needed by farmers in various areas to earn the equivalent of an average factory wage under alternative assumptions with respect to product prices and institutional factors.[8] The general programming model for this study is based upon this early work of Plaxico and Goodwin. Barnhill expanded the early work of Brewster and briefly analyzed and pointed out the effects of changes in prices, costs, and yields on resource requirements for specified incomes.[9]

Some of the most recent studies have been those of Strickland, Tyner, and Lanham. Strickland examined the effects of changes in land prices and labor rates upon minimum resource requirements, and briefly

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[7] Ibid., "Analyzing Minimum Resource Requirements for Specified Income Levels," Farm Size and Output Research, Oklahoma Agricultural Experiment Station, Southern Cooperative Series Bulletin No. 56 (Stillwater, 1958), pp. 95-104.

[8] 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, 1961).

[9] H. E. Barnhill, Resource Requirements on Farms for Specified Operator Incomes, United States Department of Agriculture, Agricultural Economics Report No. 5 (Washington, 1962).

explored the implications of owned resources.[10] Many of the basic assumptions underlying the present analysis are based upon this study. Tyner's study was similar to that of Strickland.[11] Lanham pointed out the implications of different factor and product prices in a minimum resources study.[12] He used both current and projected prices for factors and products in his analysis.

The close relationship between a "minimum resources for specified income levels" approach to adjustment problems and economic equilibrium theory has been succinctly reviewed by Varley and Tolley.[13] They noted that, "...farm plans may appropriately strive (1) to attain specified incomes for labor, management and capital, and (2) to maximize the residual return per acre of land."[14] They argue that these goals coincide with the usual economic criteria for optimum allocation of resources. For example, assuming the returns to capital, labor, and

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

[11] 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).

[12] William J. Lanham, "Area Resource Adjustments for Specified Net Revenue Goals and Levels of Factor Prices on Farms in Economic Area 7, North Carolina" (unpublished Ph.D. dissertation, North Carolina State College, 1962).

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

[14] Ibid., p. 981.

management are adequate measures of the additions to national product if these resources are transferred to employment in the nonfarm sector, then the net addition to national product from a farming area is thus solely the return to land. National product is thereby maximized through the procedure of maximizing returns to the area's fixed factors, such as to land. The "minimum resources" approach to adjustment problems is therefore useful, for example, as an aid in determining farm plans which give a return to operator labor and management similar to that which can be earned in nonfarm employment. Analytical procedures suggested by Varley and Tolley are utilized in this study and are presented in the following chapter.

CHAPTER II

CONCEPTUAL DEVELOPMENT

As indicated in the preceding chapter, the major purpose of this study is to examine various adjustment hypotheses for farm operators in the Oklahoma Panhandle. Clearly, the hypotheses considered and the framework for analysis depend on assumptions concerning the length of adjustment period, motives and knowledge of decision makers, technical and economic data, and governmental programs. Considerations affecting the choice of assumptions within each class are, therefore, discussed separately in this chapter, and are followed by the conceptual model employed and a brief summary of the organization for the remainder of the thesis.

Length of Run

The length of run, or time period assumed in an economic analysis, is important because it can influence the nature and type of adjustments needed by or available to a firm. It is especially important in farm adjustment studies, for instance, in specifying what factors and costs are variable, or can be adjusted (changed).

The importance and distinction among various time periods in economics was initially emphasized by Marshall.[1] He suggested four time periods for use in analyzing various economic problems. They were the very short-run or market period, the short-run, the long-run, and the very long-run.

The "very short-run" is a period of time in which a firm cannot change its output.[2] With a given supply, an analysis for such a time period is mainly concerned with the effects of expectations and inventories on prices.

The "short-run" is a period sufficiently long to allow some, but not all, variables in the problem to change.[3] As far as the producing firm is concerned, the short-run is a time period long enough for the firm to change the output, but not long enough to permit the firm to change its capacity. (That is, the actual size of firm cannot be altered.) The actual time involved in the short-run will, of course, depend upon the production conditions within the industry. For example, the short-run period in the automotive industry may be quite different from that of the clothing industry because of differences in the mix and form of inputs used in these industries.

The "long-run" was the third time period specified by Marshall. The following quotation aptly summarizes this concept:

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[1]Alfred Marshall, Principles of Economics (8th ed., London, 1938), pp. 373-379.

[2]H. H. Liebhafsky, The Nature of Price Theory (Homewood, 1963), pp. 154-156.

[3]Ibid.

> The term "long-run" refers to a period of time sufficiently long to allow all of the economic variables in the problem to change except those which are related to the economic growth of an industry or of a group of industries and not of a single firm. In the case of the theory of the firm, for example, in the long-run, all costs are allowed to vary, and thus there are no fixed costs. Consequently, the plant size is no longer considered fixed but becomes an additional variable in the problem...[4]

For the firm, capacity is merely an additional variable to be determined by the firm size chosen.

The "very long-run" is distinguished from the "long-run" by the fact that secular change may occur. That is, the time period is long enough to allow the possibility of the rise or fall of entire industries. A study of economic development in underdeveloped countries would involve considerations of this particular time period.

The relevant time period for adjustments in this study, among those specified by Marshall, is the "long-run" period. Since one of the major objectives of this study is the determination of the minimum resources required for specified incomes, all resources must necessarily be variable. Land, labor, and capital cannot be restricted to an individual firm, although land may be limited within a specific agricultural area. Some transactions, such as the acquisition of additional resources, do not occur instantaneously, but require some time to take place. Changes in institutions, such as in farm programs, may also require an extended time interval. Thus, all resources must be variable, and sufficient time has to be allowed for changes in institutions and transactions to occur.

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[4] Ibid.

Motives of Decision Makers

Any model designed to explain, predict, or evaluate adjustments requires the specification of motives of decision makers, because different motives may lead to different courses of action and end results. In an area study, motives or objectives assumed should characterize those of at least some of the decision makers in that area. Motives of decision makers in the Oklahoma Panhandle are naturally a subject of interest because of the variability associated with their environment. Speculation about their motives has ranged all the way from that of "gambling on a long shot" to financial solvency or firm survival.

The usual assumption in economic research is that the rational entrepreneur is one whose primary purpose is to utilize his resources in the production of various products so as to maximize profits. However, this traditional view has been questioned by scientists from a variety of disciplines, including economics. For example, Higgins pointed out that various desires or forces may lead the entrepreneur to produce at points other than that of profit maximization.[5] He may produce below the profit-maximizing output because of the desire for leisure; he may produce at a level above the profit-maximizing output because of the desire for large firms, power, and prestige; and he may stay at the present level, regardless of where it may be, because of his reluctance to change.

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[5]Benjamin Higgins, "Elements of Indeterminancy in the Theory of Non-Perfect Competition," American Economic Review, XXIX (1939), pp. 468-479.

Scitovsky dealt with the problem of income versus leisure as goals of decision makers.[6] He concluded that the entrepreneur's choice between more income and more leisure must be independent of his income. That is, the motivation for additional profit cannot be increased or decreased by the present amount of one's income. For example, people with low incomes may have different motives than people with very high incomes.

Papandreau presented the idea of preference functions in examining motives of decision makers.[7] He pointed out that when profit is selected as a ranking criterion of an end system, rational behavior must involve profit maximization. However, with the introduction of dynamic and uncertainty considerations, expectations are not single-valued. That is, profits have a probability distribution involving several parameters of interest to decision makers. Papandreau therefore argued that preference-function maximization should be substituted for profit maximization in economic analyses.

White pointed out that a firm may have multiple goals.[8] He further stated that survival of the firm is an even more fundamental goal than profit maximization. According to White, a firm that survives in the long-run may realize some profit, but a firm might plan to

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[6]Tibor Scitovsky, "A Note on Profit Maximization and Its Implications," Review of Economic Studies, XI (1943), pp. 57-60.

[7]Andrew G. Papandreau, "Problems in the Theory of the Firm," A Survey of Contemporary Economics, Vol. II, ed. Bernard F. Haley (Homewood, 1952), pp. 189-219.

[8]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), Chapter 6.

maximize its profits and not survive because of such factors as inadequate liquidity.

According to Baumol, sales maximization is the typical objective of many firms, provided they have secured some minimum profit.[9] As soon as firms attain some desired minimum level of profit, the goal of these firms changes to that of maximizing sales because of the desire for prestige, maintaining their "share" of the market, and so on.

Simon has advanced the hypothesis that entrepreneurs employ a "satisficing" principle in the decision making process.[10] According to this reasoning, decision makers have certain aspiration levels or minimum outcome levels which they wish to attain. Their problem is thus that of selecting a course of action which results in an outcome which is "satisfactory." The profit maximizing motive is hence replaced by this "satisficing" motive.

Within agriculture, some evidence that motives other than profit maximization exist is available. For example, many farm adjustment studies indicate that net returns can be increased on given farm sizes by changes in resource use and enterprise combinations. Also, many farm management studies indicate that net returns to farmers can be increased with increases in farm size over quite a wide range. Farmers interested in maximizing profits would thus want to expand the

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[9]William J. Baumol, Business Behavior, Value and Growth (New York, 1959), pp. 45-54.

[10]Herbert A. Simon, Models of Man (New York, 1957), Chapters 14 and 15.

size of farm to the limit of their managerial ability (assuming a limit on management in the area). Hence, with the assumptions of profit maximization, sufficient adjustment time, perfect knowledge of opportunities, and adequate managerial ability, there should not be any inefficiently organized farms of given sizes, except where short-run resource limits are effective constraints. Given time for resource adjustments, there should also not be any problems associated with small, marginal farms and less than full utilization of resources in agriculture.

However, these problems do exist in agriculture. It is perhaps reasonable to assume that motives other than profit maximization exist to some degree along with impediments such as the lack of knowledge and resource limitations. For example, farmers may have, instead of the goal of profit maximization, the goal of securing some acceptable level of income for the operator and his family. That is, the Simon hypothesis may be applicable. The income goal might, for example, represent the income that can be obtained by the operator in nonfarm employment (the opportunity cost of using labor and management in agriculture). Farm decisions must thus be made so as to obtain this desired income goal.

Strickland lists three possible justifications for accepting income goals as a decision criterion rather than profit maximization.[11]

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[11] P. Leo Strickland, Jr., "Minimum Resource Requirements and Resource Adjustments for Specified Farm Income Levels, Low Rolling Plains of Southwestern Oklahoma," (unpublished Ph.D. dissertation, Oklahoma State University, 1963), p. 20.

These justifications are, "...(1) the income level maintains the 'status quo,' (2) the income level represents the 'opportunity cost' of farming, and (3) the income level gives the maximum efficiency for the individual farm and for the economy." People interested in maintaining the "status quo" may wish to maintain a certain level of living and may not wish to incur additional risk in expanding the size of farm. The "opportunity cost" of farming may represent the return that a farmer can obtain in nonfarm employment. The "efficiency" justification refers to achievement of the otpimum in resource use where adjustments take place between agriculture and nonagriculture until the marginal value productivities of mobile resources are equated. The desirability and rationality of income goals, from the economic efficiency point of view, have also been pointed out by Varley and Tolley.[12]

Income goals may thus be relevant motives of decision makers. They may insure desired levels of living, and meet the "good enough" objective that Simon has pointed out in his "satisficing" principle. Income goals may also provide a synthesis of profit and "satisficing" motives. The efficiency criterion is implied in that the returns are equated for labor and other resources in alternative employments. Finally, the selection of income goals has advantages for adjustment studies because it provides a link between the farm firm and probable long-run relationships with other industries and with other firms within the area.

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[12]Varley and Tolley, pp. 979-980.

Long-Run Adjustments

A number of adjustments by farm operators in the long-run period is possible. Various motives of entrepreneurs were discussed in the preceding section which may affect the type and nature of these adjustments. Among the motives discussed was that of attaining some level of operator labor income. Assuming this motive and a long-run period, the problem of the farm decision maker thus becomes one of determining and acquiring sufficient resources to obtain this level of income. The preceding statement therefore describes a possible long-run adjustment of the farm operator. That is, it represents one long-run adjustment hypothesis.

A conceptual model illustrating long-run adjustments, according to the minimum resources criterion, is shown in Figure 4.[13] The line AB represents a specified return, OA, to operator labor and management. It may also be thought of as a cost, particularly as the "opportunity cost" of using labor for farming. The total land cost is added to this cost of operator labor and management to form AC, the total cost of land, and operator labor and management.

The kinked line, ODEFG, shows the total return to land and operator labor and management. It represents the returns remaining after hired labor and interest on nonland capital and other cash costs have been paid. The kinks on this line may depict effects of various restrictions or resource indivisibilities. For example, D might

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[13]This model is based upon one by Varley and Tolley in the article previously cited.

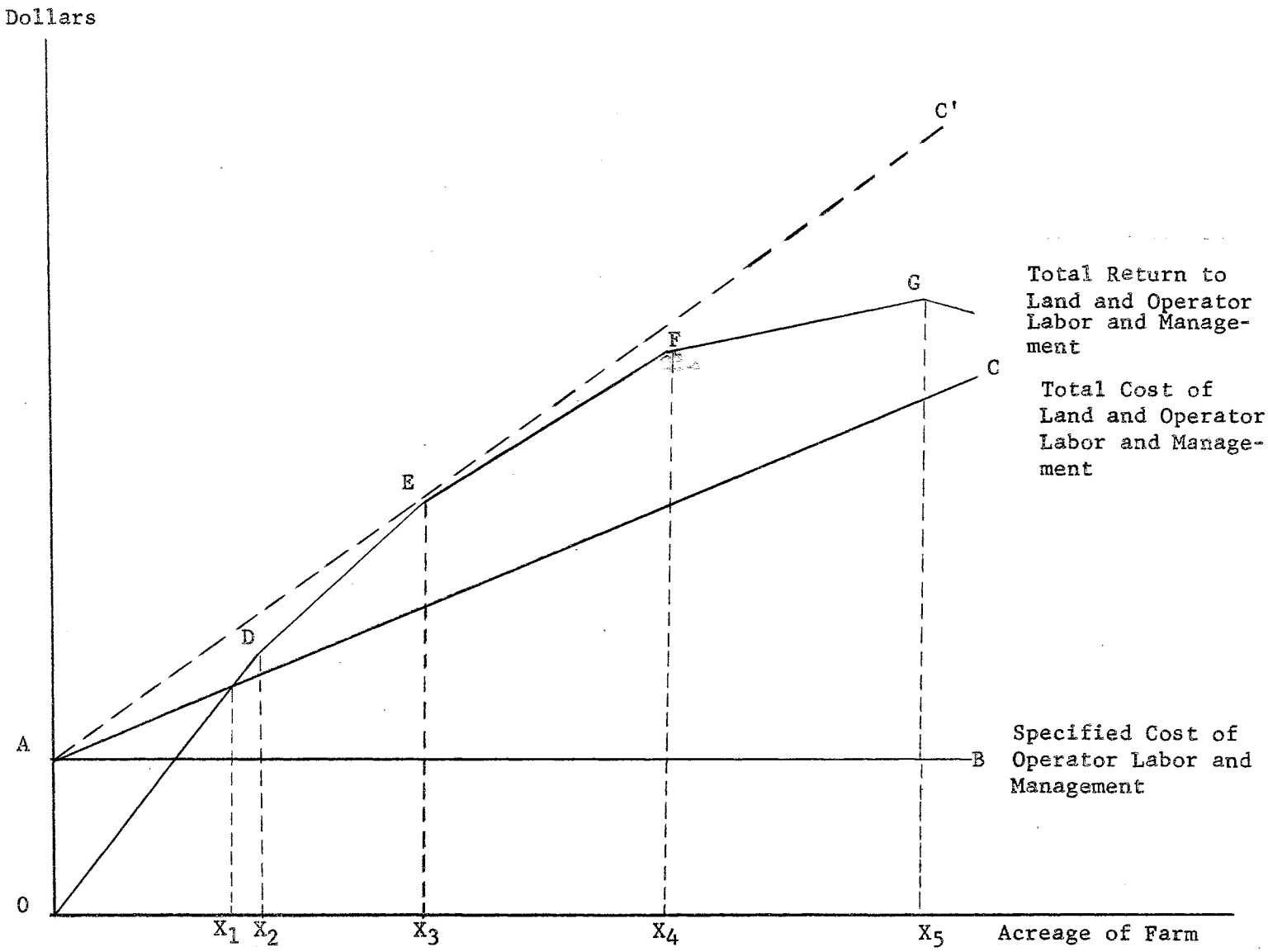

Figure 4. Hypothetical Costs, Returns, and Alternative Long-Run Adjustments in Farm Size in a Minimum Resource Model.

represent the point where the supply of operator labor is exhausted. All additional labor must be hired, so returns per acre will now be smaller and there will accordingly be a kink on the revenue function. Similarly, point G might represent a hypothetical limit to management at which total returns begin to decrease.[14]

Lumpy and discrete inputs, such as machinery, provide similar effects. Initial minimum sets of livestock equipment and machinery may be required which are sufficient to handle some maximum acreage. Above these acreages, additional equipment may be needed and more costs may thus be incurred.[15] Points E and F may designate these points where additional equipment is needed. If this is the case, ODEFG becomes a total return to land, operator labor and management, and owned equipment; and AB becomes a specified cost of operator labor and management, and owned or initial sets of equipment.

At some point, concavity of the revenue line may result from discounting returns for uncertainty. Some amount of uncertainty is associated with increasing the farm size, and returns may be discounted by the farm operator because of the principle of increasing risk.[16] The additions to total returns, ODEFG, may therefore ultimately become smaller and smaller as the farm size is increased.

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[14]This assumes that there is a limit to the required management available in the area.

[15]Above these points, the equipment costs will be constant sums per acre.

[16]For a discussion of the principle of increasing risk, see M. Kalecki, Essays on the Theory of Fluctuations (London, 1939).

The solution to the long-run adjustment problem of determining the amounts of resources required to earn a specified labor and management return and to pay other costs can be shown in Figure 4. The solution is where the total cost of land and operator labor and management, AC, intersects the total return, ODEFG. The minimum acreage required is OX_1. At this point, all costs have been paid and there a specified residual return is provided for operator labor and management. This size of farm may be regarded as the minimal long-run adjustment by farm operators. The acreage (OX_1) is not the most profitable size of farm nor is it the equilibrium farm size as far as the area is concerned. The most profitable size of farm would be OX_4, where the difference between ODEFG and AC is the greatest. However, at OX_4, profits are being made and new entrepreneurs would be attracted to farming. Since land is needed to obtain profits, competition would result and prices for the fixed supply of land would be expected to increase. Market forces would thus cause the total land cost to change and AC would shift upward to AC', reflecting higher land prices and rental rates. The point where AC' is just tangent to ODEFG would therefore represent the long-run equilibrium farm size, assuming prices of other factors or products do not change. This would be OX_3 in Figure 4.

In this long-run model, the minimum resources hypothesis may therefore result in a farm size which is different from the equilibrium farm size, because the land price is not an equilibrium price. However, this size of farm may be the minimum adjustment expected and even forced by various market forces. The "minimum resources" size of farm may also be consistent with the "satisficing" principle of Simon.

A specified level of income is provided for the operator. However, the minimum resources approach goes further in that it implies equality between marginal value productivities of resources and their prices.

Alternative Long-Run Adjustments

Several alternative long-run adjustment hypotheses can be formulated within the context of a "minimum resources" framework. Considered in this section are hypotheses concerning effects of owned resources, yield expectations, and the interaction of owned resources and yield expectations.

Minimum Return to Owned Resources in Farming

Most farmers own some resources, such as land and machinery. The quantity and quality of these owned resources may heavily influence the nature of potential adjustments. For example, an operator may be content with a plan that provides a specified minimum level of income to all owned resources (provided the owned resources remain in farming). The required size of farm, in acres, would be smaller than that required to provide a specified return to labor and management alone. Instead of a return to operator labor and management, the return becomes one to owned resources. This hypothesis is illustrated in Figure 5, where AHC' represents the new total cost of land.[17] The kink in AC' occurs at the acreage of owned land. Such costs as taxes have to be paid to point H, whereas all land costs have to be paid on additional land beyond this

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[17] The returns to owned resources, other than land, may be included in the specified cost of operator labor and management as before. This would again become a specified cost of operator labor and management and owned equipment.

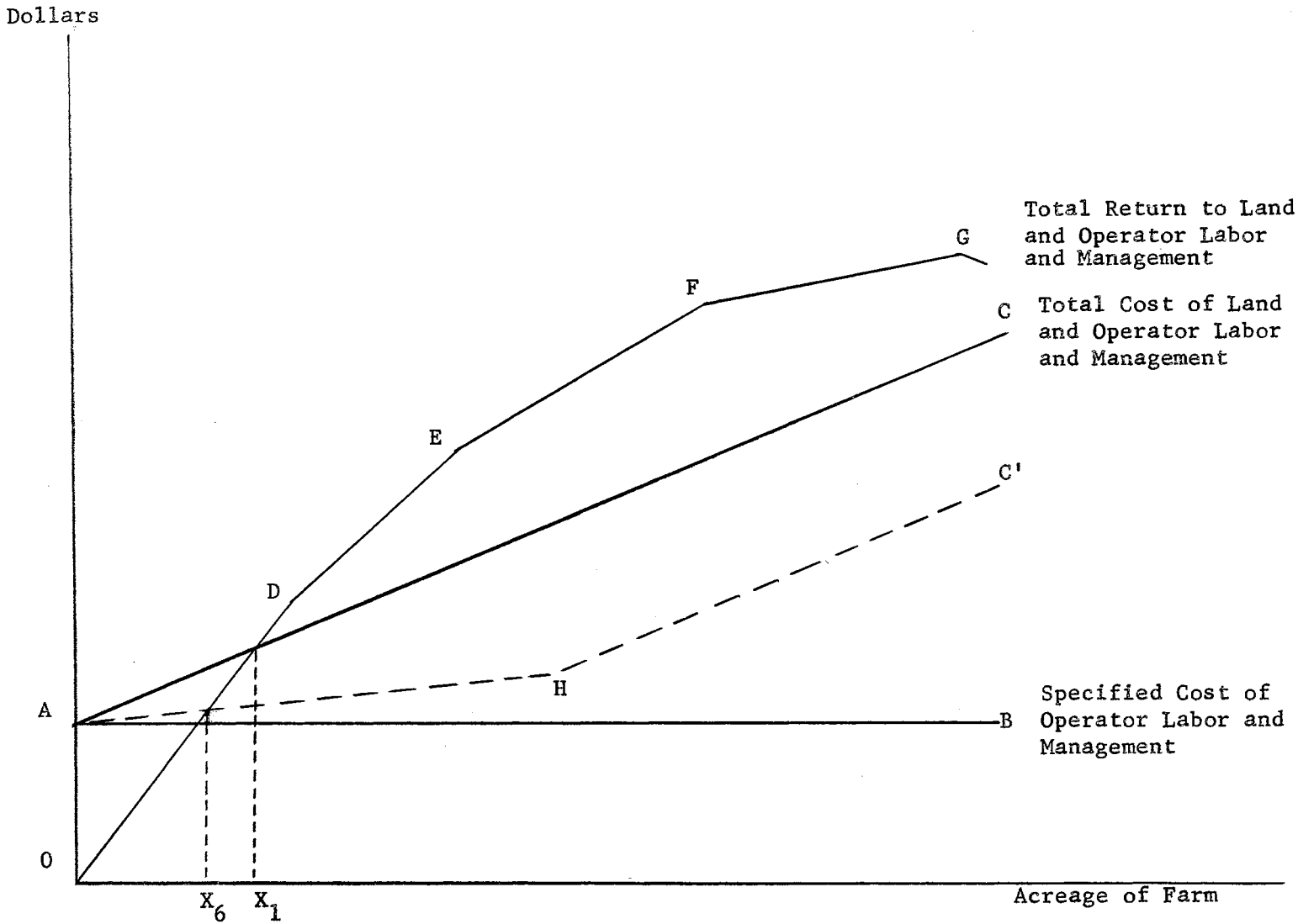

Figure 5. Hypothetical Costs, Returns, and Alternative Long-Run Adjustments in Farm Size in a Minimum Model, with Owned Resources Assumed.

point. If farm operators desire a plan which provides a specified return to all their owned resources, the land requirement is reduced from OX_1 to OX_6. Thus, the long-run adjustment is different from that specified in the previous "minimum resources" model where all resources except labor and management are paid market prices.

Minimum Return with Alternative Yield Expectations

Within the Oklahoma Panhandle, crop yields vary considerably from year to year because of erratic weather and climatic conditions. Hence, farmers may naturally have different expectations about potential yields. Some operators may anticipate the mathematical expectations for yields over time. However, others may be heavily influenced by "good" years and may not consider in their expectations the years in which there are total crop failures. Thus, their yield expectations may be somewhat high. Effects of high expectations are illustrated in Figure 6. OD'E'F'G' represents the new total return to operator labor and management because of high yield expectations. The expected returns for any farm size is higher than before because of the higher expected yields. With such yield expectations, the minimum land requirement is reduced from OX_1 to OX_7. Thus, the long-run adjustment is once again different from that specified in the earlier "minimum resources" hypothesis. A third adjustment hypothesis for the area is therefore postulated in which the minimum income goal is operative but returns expectations are not mathematical expectations.

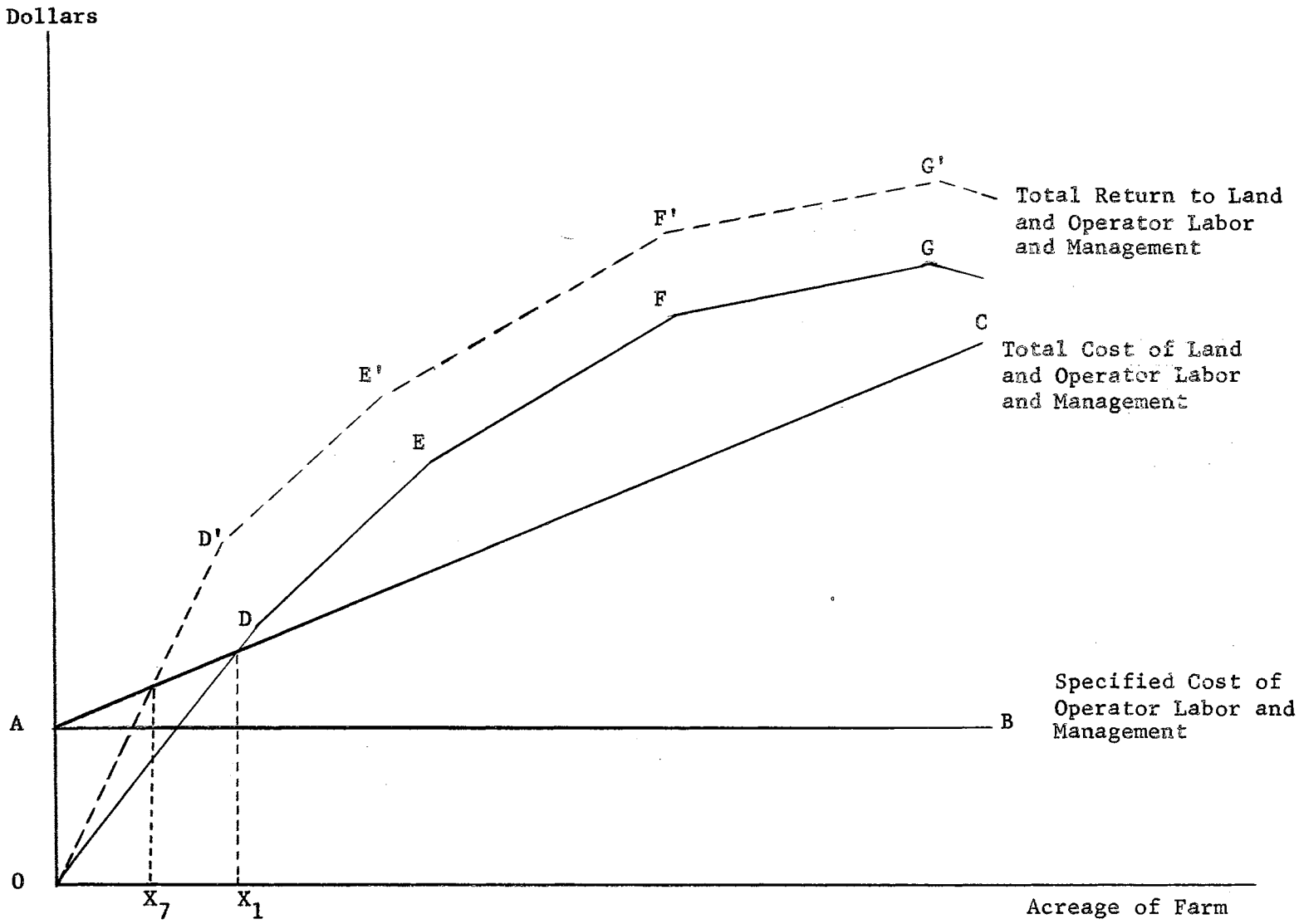

Figure 6. Hypothetical Costs, Returns, and Alternative Long-Run Adjustments in Farm Size in a Minimum Resource Model, with Alternative Yield Expectations.

Minimum Return with Owned Resources and Alternative Yield Expectations

A fourth adjustment estimate can be made which hypothesizes joint effects of the yield expectational level and owned resources. Farm operators may wish to maximize returns to their owned resources, and also have yield expectations which imply a different total return to land and operator labor and management. If this is the case, OD'E'F'G' in Figure 6 would intersect AHC' in Figure 5, and another long-run adjustment would thus be implied. The minimum land requirement associated with this hypothesis would therefore be smaller than any previously specified.

Factors Affecting Long-Run Adjustments

Four long-run adjustment hypotheses were pointed out in the preceding section. They were:

(1) The "minimum resources" hypothesis,

(2) The minimum resources hypothesis with different yield expectations,

(3) The minimum resources hypothesis with owned resources, and

(4) The combined effect of different yield expectations and owned resources in a minimum resource setting.

Obviously, a number of factors may influence these adjustment hypotheses. Changes in input-output ratios, factor and product prices, and institutions may greatly alter the minimum farm acreages. For example, new crop technology involving no additional costs could shift the revenue curve up, assuming crop prices do not decrease proportionately

or more than proportionately, and smaller acreages would be required to obtain a given income level.

Although numerous factors may exert a strong influence upon the farm acreage in a minimum resource model, only a small number are probably important. Changes in the following items may have a pronounced effect upon the solutions obtained under each of the specified adjustment hypotheses:

(1) Land prices,

(2) Land rental or interest rates,

(3) Other factor and product prices,

(4) Yields (reflecting differences in resource endowments and advances in technology),

(5) Actions of institutions such as government programs (prices and allotments), and

(6) Opportunity cost of labor and management in agriculture (returns in nonfarm employments).

The first two items will affect the total land cost, and the next three items will mainly affect the total returns function. The last item will affect the returns to operator labor and management.

The second adjustment hypothesis, which dealt with yield expectations, will be influenced by any changes in expectations (or choice of input-output ratios used in a research study such as this). The acquisition of knowledge may affect expectations and hence the solution for this hypothesis. The owned resources hypothesis will be affected by changes in such factors as the amounts of owned land and farm equity levels. The last hypothesis, or the one which combined yield

expectations and owned resources, will naturally be influenced by anything affecting the two hypotheses which it joins.

In the conceptual model for this study, there is naturally a close relationship between the various factors influencing the adjustment hypotheses. For example, there is a close relationship between not only the amount of owned land and the farm equity level in a minimum resource model, but also with land prices and land rental or interest rates. These factors can all influence the land costs in a minimum resource framework. The relationships between these factors in a minimum resource model, and the corresponding farm sizes needed to attain a specified return to operator labor and management are shown in Table I. Associated with each farm size are the empirical relationships between the various factors. For instance, the minimum farm size obtained with land at 75 percent of the base price is the same as that with an interest rate of .0375 percent and land priced at 100 percent. The empirical results in a minimum resource model can thus be easily adjusted to account for different assumptions pertaining to land costs, and also for different adjustment hypotheses. In making such comparisons, some adjustments may have to be made, such as in the capital requirements.

Organization for Remainder of Thesis

The remainder of the thesis follows the organization below. In general, Chapter III contains the research procedures, IV, V, and VI the results, VII the implications, and VIII the summary.

TABLE I

CONCEPTUAL RELATIONSHIP OF FACTORS AFFECTING LAND COSTS IN A MINIMUM RESOURCE MODEL, AND THE CORRESPONDING FARM SIZES NEEDED TO ATTAIN A SPECIFIED RETURN TO OPERATOR LABOR AND MANAGEMENT[a]

	Factors Affecting Land Costs			
Size of Farm	Land Price	Land Interest or Rental Rate	Farm Equity Level	Owned Land
(Acres)	(Percent)	(Percent)	(Percent)	(Acres)
Y_1	100	.050	0	0
Y_2	75	.0375	25	X_1
Y_3	50	.025	50	X_2
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
Y_n[b]	0	.000	100	X_n[c]

[a]This model assumes a land minimization criterion. Variations of all factors other than land prices are made with respect to land at 100 percent of the assumed current price level. Although the returns are comparable among factors for a given farm size, capital requirements, for example, may have to be adjusted.

[b]$Y_n < Y_i$.

[c]$X_n > X_i$.

Chapter III - Research Procedures. The resource situations, enterprise alternatives, and operational model and basic assumptions underlying the study are explained in this chapter.

Chapter IV - Programmed Minimum Resource Requirements with Support Prices and Allotments. The minimum resource requirements are specified for each resource situation with four land prices, and with support prices and allotments.

Chapter V - Implications of Owned Resources and Increased Yields upon Minimum Resource Requirements. The minimum resource requirements are again determined for the various resource situations, but with alternative assumptions about farmer objectives, levels of owned resources and anticipated yields.

Chapter VI - Programmed Minimum Requirements with No Support Prices or Allotments. Minimum resource requirements are determined for the various resource situations under a farm program of essentially unrestricted production.

Chapter VII - Implications of Alternative Long-Run Adjustments. The plausibility of alternative long-run adjustments, implications of the study, and the limitations of the study and suggestions for future research are included in this chapter.

Chapter VIII - Summary. A brief summary of the objectives, results, and implications of the study are included in this chapter.

CHAPTER III

RESEARCH PROCEDURES

The purposes of this chapter are (1) to define the resource situations included in this study, (2) specify the enterprise alternatives on the various resource situations, and (3) present the operational model and basic assumptions underlying this analysis.

Resource Situations

This study was confined to resource situations containing dryland cropland in the Oklahoma Panhandle. Irrigated cropland and pure range situations were excluded in order to limit the analysis to one of a manageable size. Physical resource situations were first identified on the basis of the major soils in the area. Since the major groupings are hardlands and sandy lands, resource situations were divided into clay loam and sandy situations. Each of these general resource situations was further divided according to geographical locations, differences in productivity because of rainfall, and soil differences. Four resource situations were thus developed: Panhandle Clay Loam, Eastern Clay Loam, Cimarron Sandy, and Eastern Sandy (Table II).

The clay loam situations differ primarily in their respective locations. The Eastern Clay Loam Situation includes the clay loam soils of Beaver County which resemble the soils found to the east in

TABLE II

ESTIMATED ACREAGE AND PERCENTAGE OF EACH SOIL PRODUCTIVITY CLASS, TOTAL CROPLAND, NATIVE PASTURE, TOTAL FARM LAND, AND NUMBER OF FARMS BY RESOURCE SITUATIONS, OKLAHOMA PANHANDLE[a]

Item	Resource Situation							
	Panhandle Clay Loam		Eastern Clay Loam		Cimarron Sandy		Eastern Sandy	
	(Acres)	(Percent)	(Acres)	(Percent)	(Acres)	(Percent)	(Acres)	(Percent)
Soil Productivity Class:								
a	60,111	4.4	0	0.0	0	0.0	156,974	56.3
b	647,653	47.1	0	0.0	78,356	54.3	0	0.0
c	231,984	16.7	76,721	20.4	39,458	27.3	0	0.0
d	215,760	15.7	106,931	28.5	--	--	--	--
Total Cropland[b]	1,155,508	84.1	183,652	48.9	117,814	81.6	156,974	56.3
Native Pasture[c]	175,868	12.8	179,521	47.8	22,090	15.3	112,363	40.3
Total Farm Land[d]	1,373,969	100.0	375,566	100.0	144,380	100.0	278,817	100.0
Number of Farms[e]	1,259	100.0	508	100.0	112	100.0	390	100.0

[a]These estimates are based on Soil Survey Reports, SCS N-2 Soil Inventory Forms, ASC Records, and the 1959 Census of Agriculture. Irrigated cropland is excluded from these estimates as is land in range situations in the Panhandle.

[b]Total dryland cropland amounts to 1,613,948 acres.

[c]Total native pasture is 489,842 acres.

[d]Total farm land is 2,172,732 acres.

[e]Based upon 1959 Census and sample surveys. Estimated total number of dryland farms is 2,269.

the Low Rolling Plains area of western Oklahoma. The Panhandle Clay Loam Situation includes the clay loam soils which are located in the High Plains and are found in all three Panhandle counties. The soils within each of these situations were further delineated into productivity classes on the basis of the productivity and management required. These classes are referred to as a, b, c, and d with "a" being the most productive soil. Classes a and b include the clay loam soils with slight erosion hazards and which are primarily limited by the climate (moisture). Classes c and d include those soils which have some erosion hazards and benefit from such practices as terracing and contour farming. The Eastern Clay Loam Situation includes only the c and d classes, whereas the Panhandle Clay Loam Situation includes all of the productivity classes (Table II). The definitions of the productivity classes and estimated yields for various crops on clay loam soils are shown in Appendix A, Table I.

The sandy situations were also delineated on the basis of differences in soils, location, and productivity resulting from rainfall differences. Two resource situations were specified: the Cimarron Sandy and the Eastern Sandy Situation. The Cimarron Sandy resource situation includes the sandy soils found in Cimarron County and a limited acreage in Texas County (mostly Dalhart loamy fine sand soils). The Eastern Sandy Situation includes most of the sandy soils in Texas County and all in Beaver County. Each of these sandy situations was also further divided into productivity classes a, b, and c on the basis of productivity and management required. Classes a and b include those sandy soils which possibly need terracing and contour production

for erosion control and water conservation. Class "c" includes the sandy soils which require specific measures to limit erosion, particularly wind erosion. The Cimarron Sandy Situation includes classes b and c, whereas the Eastern Sandy resource situation has only class "a" (Table II). The definitions of the productivity classes and estimated yields for various crops on sandy soils are shown in Appendix A, Table II.

The Panhandle Clay Loam Situation, with an estimated 1,155,508 acres of cropland and 1,259 farms, is by far the largest and most important of the four resource situations (Table II). It has more than twice as much cropland as the combined acreage in the other three resource situations. Additionally, it has the highest percentage of cropland, with 84.1 percent. The Cimarron Sandy Situation also has a high percentage of cropland whereas less than half of the Eastern Clay Loam resource situation is in cropland.

Included Enterprises

A limited number of admissible production activities were considered in this analysis because of the restrictions imposed by the variable climate in the area, limited markets for specialized crops, and because of the finiteness of the operational model. Admissible crop enterprises for all situations were wheat, grain sorghum, forage sorghum, small grain grazing, forage sorghum grazing, and reseeding cropland to native grasses. Reseeding cropland was limited to productivity classes c and d for the clay loam resource situations. Various specialized crops were not considered because of the lack of a sufficient

market to permit these crops to be considered by all farmers in the area as adjustment opportunities. Additionally, specialized production practices and restrictions on various production factors limit the possibility of these specialized crops. Broomcorn, for example, is grown on a number of sandy farms in the Panhandle. It is limited, however, by the volume of the market, and the high labor requirements which must be met by migratory labor, and farmer preferences.

Alternative livestock enterprises were limited to beef cow herds and selected feeder calf systems. Swine and sheep were not included as admissible alternatives because they are presently not numerous in the area, and comprise but a small amount of the total livestock production. They are also almost perfectly competitive with cattle.

Beef cow systems included in the analysis emphasized different calving dates and winter rations. Four cow systems were considered with calves being born in the spring and sold in early fall as good-choice feeders. Associated with these budgets were various winter rations involving such feeds as cottonseed cake, native range, forage sorghum, and small grain pasture. Three cow systems were also considered which assumed fall calving and mid-summer selling.

Various feeder systems were specified which could utilize different pastures. Several budgets were prepared for a fall-buy system which utilized different winter pastures and sold the animals in early fall, off summer pasture. A spring-buy system was prepared which utilized native pasture with the animals being sold in the early fall. Several fall-buy, spring-sell systems were specified with different

winter pastures being used. Budgets for these various livestock and crop enterprises have been published.[1]

Operational Model

The minimum resources needed for specified income levels were estimated through the use of linear programming.[2] The linear programming procedure is used to maximize (or minimize) a criterion function subject to a set of restrictions or restraints. The three quantitative components in a programming problem are: an objective, alternative methods for attaining the objective, and some restrictions.[3] Given these components, any problem can be set up as a linear programming problem.

The programming method for determining the minimum resource requirements needed for specified income levels may be illustrated in detail, given the income target of the operator, the resource restrictions, and the admissable enterprises. For example, assuming that the objective is to minimize the land input, the minimum resources problem may be summarized in a programming problem as follows. For the specified farm the objective is to minimize the amount of land, X, subject to

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[1]Harry H. Hall, et al., Resource Requirements, Costs and Expected Returns; Alternative Crop and Livestock Enterprises; Oklahoma Panhandle, Oklahoma Agricultural Experiment Station in cooperation with United States Department of Agriculture, Processed Series P-459 (Stillwater, 1963).

[2]For a discussion of linear programming, see Earl O. Heady and Wilfred Candler, Linear Programming Methods (Ames, 1958), pp. 1-52.

[3]Ibid., p. 2.

$$(1) \qquad \sum_i a_i Y_i = X, \text{ with } Y_i \geq 0,$$

where a_i is the quantity of land required per unit of the i^{th} product and Y_i is the quantity of the i^{th} product produced. Some income target, B, is sought for the use of the minimum amounts of resources. The income requirement is

$$(2) \qquad \sum_i C_i Y_i \geq B,$$

where C_i is the net income from producing one unit of the i^{th} product and B is the specified income target. This inequality is forced to be an equality in the programming process. The resource restrictions are

$$(3) \qquad \Sigma a_{ij} Y_i \leq W_j, \; j = 1, \ldots, m,$$

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

One of the major questions concerning the operational model is what criterion to use for minimizing the resource requirements needed to attain the given income target. Any of the three factors of production (land, labor, or capital) could be chosen for this purpose. The criterion selected minimizes the quantity of the chosen factor so as to attain the desired level of income with the most profitable quantity of the other resources and the minimum quantity of this chosen factor. With this criterion, other resources are thus used to the point where their marginal value products equal their prices.

The criterion equation selected for this study minimized the land requirement. Minimizing labor was rejected because it is not particularly limiting at the present time. Since land investment comprises

such a large proportion of the total capital requirement, minimizing capital and minimizing land would give similar solutions. Land was chosen as the factor to be minimized because of the following reasons:

(1) Land was the critical factor in the conceptual model for this study, as specified in Chapter II;

(2) Land prices are extremely difficult to estimate;

(3) Land is a major factor of production in the agricultural sector;

(4) Land is limited in quantity within a particular area; and

(5) The solutions obtained should be similar to those for a minimum capital criterion.

Restrictions

Land and Allotments

For each resource situation in this study, the total farm land, cropland, native pasture, and distribution of cropland by productivity classes were determined. The model for this analysis was then initially constructed so that each acre of land for a specific situation contained this percentage distribution of cropland, pasture, and the productivity classes. It was necessary to modify the model, however, to account for the nonharvested cropland in the area. An estimated 20 percent of the total cropland in the area is not in harvested crops, because of intentional fallow, crop abandonment, or other reasons, according to records of the area and estimates by specialists. For each acre of land, the percentage of each productivity class was therefore reduced by 20 percent to account for this nonharvested cropland.

Although some individual farms may have a higher or lower percentage than this 20 percent, this is an approximate average figure for the area.

Since wheat has been under allotment programs, the approximate current allotments were estimated for this analysis based upon A.S.C. records and a sample survey of farms. For each resource situation, the total wheat allotments were expressed as a percentage of the total farmland. Each acre of land for a specific resource situation therefore contains this percentage allotment for wheat. The percentage distributions of an acre of land for each of the four resource situations are shown in Table III.

Prices

The assumed prices paid and received by farmers in this study are shown in Appendix B, Tables I and II. The prices received for wheat and grain sorghum are the approximate 1960-61 support prices, adjusted for the storage differential. Beef prices were based upon the approximate current price levels and adjusted for the commodity cycle. Resource prices used in this study are current prices obtained from farmers and agricultural workers in the area, and from an earlier farm survey in the Panhandle.

Land prices in this study refer to the estimated current prices of land within the Panhandle, less any value for dwellings and mineral rights. Insofar as possible, land prices thus refer to the expected market value of land used for agricultural purposes.

TABLE III

THE PERCENT OF EACH LAND PRODUCTIVITY CLASS, TOTAL CROPLAND, WHEAT ALLOTMENT, AND NATIVE PASTURE FOR ONE ACRE OF LAND BY RESOURCE SITUATIONS, OKLAHOMA PANHANDLE, USED IN THE MODEL FOR THIS STUDY

Item	Resource Situation			
	Panhandle Clay Loam	Eastern Clay Loam	Cimarron Sandy	Eastern Sandy
		- Percent -		
Soil Productivity Class:				
a	3.50	0.00	0.00	45.04
b	37.71	0.00	43.42	0.00
c	13.50	16.34	21.86	0.00
d	12.56	22.78	--	--
Total Cropland	67.27	39.12	65.28	45.04
Wheat Allotment	42.72	25.57	27.91	27.47
Native Pasture	12.80	47.80	15.30	40.30

[a]A fallow, failure or idle acreage of 20 percent of the total cropland is assumed.

The prices in this study are based upon 1961-62 estimates for land transactions in the Panhandle. These estimates were obtained by comparing information on land sales with estimates by farm appraisers in the area, and other secondary sources. The land prices specified for each resource situation includes values for service buildings, but exclude any value for either a dwelling or mineral rights. The land price for a specified situation is also a weighted average price which reflects the typical acre for that resource situation. This price was obtained by determining the approximate value for each productivity class and native pasture, and then multiplying these values by the percentages of these productivity classes and pastures in the typical acre. The land price per acre for a resource situation is thus the sum of these values.

The estimated operating and ownership costs for specified power and equipment are presented in Appendix B, Table III. These costs were largely based upon estimates by Oklahoma Panhandle farmers, which were obtained in a farm machinery survey of the area. No costs are listed for combines, mowers, rakes, and hay balers as these operations are usually performed on a custom basis within the area and are not part of owned machinery sets.

Capital

Capital can be utilized by the firm in this analysis as long as returns from this capital are equal to or greater than the market rate of return. Capital is therefore unlimited and can be borrowed as long as returns to the firm exceed or equal this market rate of interest.

In the model for this study, an interest charge of six percent per year was made for borrowing operating capital for purchasing feeders, machinery and various inputs. This rate is approximately the same as that charged by various lending agencies in the area for short term loans. Capital borrowed for land investment was charged five percent per year, which is approximately the rate charged by the Federal Land Bank for farm loans.

Capital requirements for various enterprises were divided into total and annual capital. The model was then constructed so as to determine the minimum resource requirements and optimum enterprise combinations on the basis of the amount of total capital, but to charge interest only on annual capital. Total capital was chosen as the limiting capital factor in estimating the income requirements and farm organizations, because it represents the amount of capital needed to enter farming in this particular area, and the charge on this capital is really an opportunity return on this investment in alternative pursuits such as in the nonfarm sector. The returns obtained through the use of total capital were then adjusted so that the returns reflect the charge made on annual capital. For example, if the total required for seed wheat is $1.60 and the seed are planted the first of September and the crop is harvested on the first of June, then the capital for this seed is used for only nine months or three-fourths of the year. Total capital amounts to $1.60 but annual capital is only three-fourths of this figure, or $1.20. The programming problem and solution are based upon a capital requirement of $1.60, but the returns are adjusted so that interest is paid on only $1.20. The actual interest

paid is thus the equivalent of a full year's interest on three-fourths of the total capital. Total capital is thus always greater than or equal to annual capital.

Labor

One man-year of labor was assumed available in this analysis. Because of program size limitations, this operator labor was allocated to only four periods during the year. These periods are designed to reflect the heavy work periods for the major crops during which labor is substitutable. The amount of labor available in any period is a function of the number of working days during the months and the hours of labor available for each day. For this model, 538 hours of operator labor were assumed for the period of January through April, 506 hours during May through July, 352 hours in August and September, and 462 hours during October through December.[4] The labor for these various periods allows a limited amount of time for work invested in managing the farm business.

Because of peak work periods during the year, and farm sizes considered in this study, it may be necessary for a farm operator to hire additional labor. For this analysis, it is assumed that additional hourly labor can be hired in all months at a rate of $1.25 per hour, the approximate current hourly rate of labor in the area. However, labor may not be variable on a yearly basis because of conflicts with schools,

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[4]This assumes 22 working days per month, excluding February when there are 20 days and allows 6 hours per day in December through March; 7 hours per day in April, May, and November; and 8 working hours per day during June through October for nonmanagement time.

for example. This conflict was not considered a serious limitation, however, since most of the hired labor is utilized during the busy summer months.

Crops which are presently harvested on a custom basis were budgeted according to the 1962 custom rates in the area. Harvesting operations for wheat, grain sorghum, and forage sorghum were handled in this manner.

Technology and Management

This analysis assumes that improved technological and management levels are utilized within the Panhandle area. Presently, there is actually little difference between present and improved management (and technology) within the area. Fertilizers are not recommended for dryland farms, and most improved production practices are centered around soil and water conservation and timeliness of operations. Yields are not significantly different in most cases between present and "improved" levels of management. Differences in management often show up as costs rather than yields.

Machinery

Estimated operating and ownership costs for alternative machine sets in the Oklahoma Panhandle are shown in Appendix B, Table III. These estimates were primarily derived from a machinery survey of farms in the area. Sets of machinery assumed for the study are the most prevalent in the region.

Data from a farm machinery study in the Panhandle indicate that a maximum of 900 acres of cropland can be operated by the one 4-plow

tractor and equipment set and a maximum of 1,500 acres can be operated by the two 4-plow tractor and machinery set.[5] That is, these machinery sets are adequate to handle the machinery requirements on these farm sizes during most peak work periods. These acreages provide estimates of the minimum machinery investment per acre for various farm sizes. For this analysis, the one 4-plow tractor and equipment set was assumed for farms with 900 acres or less of total cropland. For farms with more than 900 acres of cropland, the machinery investment was assumed to be a fixed sum per acre. This fixed sum per acre was based upon the 900 acres and the one 4-plow tractor and machinery set. For this analysis, the machinery assumption was determined by a trial and error process. If the initial programming results indicated that the income target could be reached with less than 900 acres of cropland, a one 4-plow tractor and equipment was assumed. For farms with more than 900 acres of cropland, the machinery investment was assumed to be a fixed amount per acre.

Overhead Costs

Many farm expenses cannot be allocated to a specific enterprise, and are, instead, whole farm costs. An example of some of these expenses, or overhead costs, is found in Appendix B, Table IV, for a 640 acre farm in the Panhandle. Some of these expenses are fairly independent of the size of the farm, while others are closely associated. Other overhead costs may vary with the gross farm receipts.

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[5]Based upon unpublished data, Department of Agricultural Economics, Oklahoma State University, Stillwater, Oklahoma.

For this analysis, some of the overhead items were assumed to be constant and added to the income target requirement in the programming model. Other overhead costs were assumed to vary in relation to farm size. The constant whole farm overhead costs, as developed from Appendix B, Table IV, amount to $1,161. This figure includes the costs for shop tools, pickup truck and pickup truck license, a butane storage tank, telephone, bookkeeping and tax service, and insurance on buildings and workers.

Overhead costs not added onto the income target were assumed to vary in relation to the size of farm. The assumed per acre overhead costs are shown by resource situations in Appendix B, Table V. Some of the differences in the costs per acre among resource situations can be attributed to the different percentages of cropland.

Since an estimated 20 percent of the total cropland is in fallow or abandoned crops, a nonharvested cropland cost was included in the overhead costs.[6] This cost was converted to a cost per acre of total land for each of the resource situations to reflect differences in the percentages of cropland. This cost was treated as an overhead item because fallow, for example, can often not be charged to a specific activity.

Building depreciation and maintenance, and machinery overhead costs were assumed to be constant costs per acre as long as the total acres of cropland were 900 or greater. If, through initial programming,

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[6]An enterprise budget for an acre of this nonharvested cropland has been published by Hall, et al.

the size of farm were less than 900 acres, a fixed sum was charged for the overhead costs and added onto the income target in the programming model. The buildings assumed for a farm with 900 acres or less of cropland were a farm shop, a pole type shed, and two 1,000-bushel metal grain bins.

On most farms in the Panhandle, livestock equipment such as permanent fencing, temporary fencing, corrals, water tanks, and other such items is presently available. It is therefore difficult to allocate overhead costs for this equipment to specific livestock enterprises. The depreciation and maintenance expenses for livestock equipment were hence assumed to be a fixed sum per acre as long as the farm size was equal to or greater than 640 acres.

Institutions

In this analysis, only owner-operated farms are assumed. Although some land in the area is rented or leased by farmers, this study does not consider how operators obtain control of the resources. The objective instead is to determine the minimum resource requirements for specified income levels under various assumptions. However, under certain conditions, the results may apply to rental situations. The commodity programs assumed for wheat and grain sorghum were those prevailing in 1960-62. As one phase of this analysis, however, a basically unrestricted market program was considered in which there were no price supports for wheat or grain sorghum, and no wheat allotments.

Income Targets

One of the major problems in this analysis was that of selecting the levels of income to use in estimating the minimum resource requirements. As Brewster has pointed out, this problem can be approached from the standpoint of comparative welfare.[7] This approach enables an evaluation of returns so that needed reallocations of resources can be pointed out. It is obvious that selecting identical money incomes is not the answer because this does not necessarily equalize real incomes between farming and nonfarming. There may be differences in the purchasing power of money, cost of living, and values of nonmoney incomes between the farm and nonfarm sectors. The benefits of farm produced foods and lower rural housing costs are a few examples of these differences. Brewster concludes that the most appropriate income levels are "...industrial worker earnings adjusted for differences in the purchasing power of money, cost of living, and values of nonmoney income items so that any given level would represent equivalent quantities of want-satisfying goods in both farm and nonfarm modes of live."[8]

Within and among various industries, there are differences in worker earnings. Differences in wages exist because of such factors as differences in training, skills, bargaining power, and so on. Ideally, the income levels should be selected so as to represent the returns

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[7]Brewster, "Analyzing Minimum Resource Requirements for Specified Income Levels," p. 97.

[8]Ibid.

which can be received with different levels of skill in nonfarm occupations. Such levels may also reflect various stages of training.

The average wage per employee in various selected industries is shown in Table IV for the United States and Oklahoma for 1962. The industries selected represent the earnings for workers with various skills. The average wages in Oklahoma ranged from $6,301 for the petroleum products industry to $2,641 for the apparel products industry. The average annual wage per full-time employee in manufacturing in Oklahoma was $4,692. The average wage for all industries in the United States was $5,013. The skills and training required in these various industries vary considerably. For example, a high degree of skill and training may be required in the petroleum products industry whereas less skill and training is required in the apparel products industry.

The levels of income to operator labor and management assumed for this study were $3,000 and $5,000. These income levels represent the "equivalent" of semi-skilled and skilled labor in nonfarm occupations. The $5,000 return also corresponds to the present average wage of nonfarm labor. No higher wage was assumed, although it might be argued that a level of income should have been selected to correspond to highly skilled labor. Also, nonfarm incomes can be expected to increase. However, farm labor might be handicapped when moving to nonfarm employments because of the lack of training. The incomes of these people may thus not increase so rapidly.

TABLE IV

AVERAGE ANNUAL EARNINGS PER FULL-TIME EMPLOYEE FOR SELECTED INDUSTRIES IN THE UNITED STATES AND OKLAHOMA, 1962

Type of Industry	Average Annual Earnings	
	United States[a]	Oklahoma[b]
	- Dollars -	
All Industries	5,013	[c]
Farming	1,623	[c]
Selected Industries		
Manufacturing:	5,715	4,692
Petroleum and Coal Products	7,404	6,301
Primary Metals	6,813	4,905
Machinery (except electrical)	6,456	4,641
Fabricated Metals	6,268	4,549
Printing and Publishing	5,890	5,142
Stone, Clay, and Glass Products	5,674	4,679
Food and Kindred Products	5,220	4,275
Lumber and Wood Products	4,080	3,385
Apparel Products	3,538	2,641
Wholesale Trade	6,372	4,738
Oil and Gas Mining	6,341	5,317
Contract Construction	5,890	5,620
Retail Trade	4,019	3,526

[a]United States Department of Commerce, Survey of Current Business, Office of Business Economics (Washington, D. C., July, 1963).

[b]Oklahoma Employment Security Commission, Research and Planning Division, Handbook of Oklahoma Employment Statistics, 1939-1962, Oklahoma State Employment Service (Oklahoma City, March, 1963).

[c]Not available.

CHAPTER IV

PROGRAMMED MINIMUM RESOURCE REQUIREMENTS WITH SUPPORT PRICES AND ALLOTMENTS

The purpose of this chapter is to examine the minimum resources which are required to obtain specified levels of operator income under the recent type of commodity programs. The long-run adjustment hypothesis implied is that farmers within the Panhandle may wish to acquire sufficient resources so as to attain some desired level of return to operator labor and management and insure financial survival. The 1960-62 support programs for wheat and grain sorghum are assumed with acreage allotments for wheat. For each of the four resource situations, the minimum resource requirements needed to obtain two levels of return were determined. Separate estimates were made for each resource situation with four land prices.

The land price variations used in this study were 100, 75, 50, and 0 percent of the land prices specified in Appendix B, Table I. No price variations above the base land price levels were used, because in preliminary programming, no solutions could be obtained at the base price levels for several of the resource situations. Estimates were made with land prices at zero in order to determine the minimum resource requirements with no return assumed for land. The alternative prices for land may also represent other adjustments for farmers desiring to

reach various income targets. These solutions with various land prices may also represent adjustments in interest rates on the land investment, equity levels, and amounts of owned resources.

Only the total land, capital, and labor requirements for the specified income levels and resource situations are presented in this chapter. Since the land investment accounts for a high percentage of the total capital requirement, the total land and capital requirements vary almost proportionally. The complete programming results for each resource situation are presented in Appendix C, Tables I-VIII, including: (1) the optimum combination of enterprises, (2) the hired labor requirement, (3) the investment in land, buildings, machinery, and the operating capital requirement, (4) the gross return, and (5) operating and overhead expenses.

Panhandle Clay Loam Situation

The minimum land requirement to obtain a $3,000 return to operator labor and management with Panhandle Clay Loam land at the current price level is 5,014 acres (Table V). Associated with this land requirement is a total capital commitment of nearly $600,000. Decreasing the land price by 25 percent (or decreasing the interest rate on land to 3.75 percent) decreases the total land requirement by 3,472 acres or by 69.2 percent. With land at 50 percent of the base price, the land requirement goes down to 985 acres (the approximate, current average farm size). An alternative interpretation is that, if only a 2.5 percent interest rate on land is required, 985 acres again constitutes the minimum land requirement.

Assuming that land prices fall to zero, or no return to land, the minimum land requirement drops to 670 acres. Since land investment comprises such a large part of the total capital requirement, and the labor requirement is largely determined by land based enterprises, the capital and labor requirements vary almost proportionally with the total land requirement. A breakdown of the total capital and total labor requirements is shown in Appendix C.

For a $5,000 return to operator labor and management, 10,927 acres of land are required at the current land price (Table V). Decreasing the land price by 25 percent decreases the land requirement by 8,364 acres, or by 76.5 percent. When the land price is at 50 percent of the assumed current price, the land requirement amounts to 1,565 acres, which is a decrease of 9,362 acres. With land priced at zero, the needed land amounts to 923 acres. The total capital and labor requirements again vary proportionally with the land requirement.

The optimum enterprise combinations associated with a $3,000 and $5,000 return to operator labor and management are shown in Appendix C, Tables I and II. Over half of the cropland is in wheat in all of the solutions for the Panhandle Clay Loam Situation. Grain sorghum, forage sorghum, and small grain grazing are also in the optimum combinations, and some cropland is also reseeded to grass. A small cow-calf herd and a number of feeders are also present in the final solutions.

Eastern Clay Loam Situation

With land at the assumed current price or 75 percent of the current price, neither the $3,000 or $5,000 income target can be reached (Table VI).

TABLE V

ESTIMATED MINIMUM RESOURCE REQUIREMENTS TO OBTAIN SPECIFIED RETURNS TO OPERATOR LABOR AND MANAGEMENT, SPECIFIED LAND PRICES, PANHANDLE CLAY LOAM SITUATION, OKLAHOMA PANHANDLE

Requirement	Unit	Land Price Per Acre[a]			
		$100[b]	$75	$50	$0
$3,000 Return to Operator Labor and Management					
Total Land[c]	Acres	5,014	1,542	985	670
Total Capital	Dollars	599,085	144,803	68,215	14,782
Total Labor	Hours	5,457	1,678	1,088	758
$5,000 Return to Operator Labor and Management					
Total Land[c]	Acres	10,927	2,563	1,565	923
Total Capital	Dollars	1,308,327	241,387	107,848	17,911
Total Labor	Hours	11,893	2,780	1,703	1,037

[a]These land prices correspond to various interest rates in a minimum resource model, as specified in Chapter II.

[b]Assumed current price.

[c]Cropland is approximately 84.1 percent of total land.

TABLE VI

ESTIMATED MINIMUM RESOURCE REQUIREMENTS TO OBTAIN SPECIFIED RETURNS TO OPERATOR LABOR AND MANAGEMENT, SPECIFIED LAND PRICES, EASTERN CLAY LOAM SITUATION, OKLAHOMA PANHANDLE

Requirement	Unit	Land Price Per Acre[a]			
		$65[b]	$49	$33	$0
$3,000 Return to Operator Labor and Management					
Total Land[c]	Acres	No Solution	No Solution	3,438	1,379
Total Capital	Dollars			160,416	20,808
Total Labor	Hours			2,540	1,228
$5,000 Return to Operator Labor and Management					
Total Land[c]	Acres			6,551	1,938
Total Capital	Dollars			307,325	27,037
Total Labor	Hours			4,840	1,545

[a]These land prices correspond to various interest rates in a minimum resource model, as specified in Chapter II.

[b]Assumed current price.

[c]Cropland is approximately 48.9 percent of total land.

Solutions for each income target were attained when prices were dropped to 50 percent of the assumed current price levels. With land priced at $33 per acre, 3,438 acres of land are required to earn a $3,000 return to operator labor and management. With a zero land price, 1,379 acres of land are required. This is a decrease of 2,059 acres, or 59.9 percent.

With land priced at 50 percent of the assumed current level, 6,551 acres of land are required to earn a $5,000 return to operator labor and management. When the land price drops to zero, the land requirement decreases by 4,613 acres, or by 70.4 percent. Capital and labor requirements again decrease proportionally. With no return assumed for land, the requirements are thus sharply reduced.

Wheat is the major enterprise in the optimum enterprise combination associated with each income target (Appendix C, Tables III and IV). Because of the low yields, no grain sorghum is produced until the land price falls to zero. A small cow-calf herd and feeders comprise the livestock systems for these solutions. With zero land prices, no labor is hired.

Cimarron Sandy Situation

Neither the $3,000 or $5,000 income targets can be attained with land at the assumed current price or at 75 percent of the current price level (Table VII). The yields and price levels, particularly land prices, were such that no solutions could be attained with a return assumed to land. The income targets were reached only when the land price was dropped to 50 percent of the current level. For a $3,000

TABLE VII

ESTIMATED MINIMUM RESOURCE REQUIREMENTS TO OBTAIN SPECIFIED RETURNS TO OPERATOR LABOR AND MANAGEMENT, SPECIFIED LAND PRICES, CIMARRON SANDY SITUATION, OKLAHOMA PANHANDLE

Requirement	Unit	Land Price Per Acre[a]			
		$60[b]	$45	$30	$0
$3,000 Return to Operator Labor and Management					
Total Land[c]	Acres	No Solution	No Solution	3,297	1,356
Total Capital	Dollars			142,620	18,254
Total Labor	Hours			3,688	1,462
$5,000 Return to Operator Labor and Management					
Total Land[c]	Acres			5,759	2,134
Total Capital	Dollars			250,452	29,129
Total Labor	Hours			6,441	2,301

[a]These land prices correspond to various interest rates in a minimum resource model, as specified in Chapter II.

[b]Assumed current price.

[c]Cropland is approximately 81.6 percent of total land.

return to operator labor and management, 3,297 acres of land are required for the Cimarron Sandy Situation, when land is priced at $30 per acre. When the land price falls to zero, the land requirement decreases by 1,941 acres, or by 58.9 percent.

For a $5,000 return to operator labor and management, 5,759 acres of land are required with land priced at $30 per acre. With a zero land price, the land requirement is decreased by 3,625 acres, or by 63 percent. The capital and labor requirements again vary in relation to the land requirement.

The Cimarron Sandy Situation is characterized by the adaptability of grain sorghum as evidenced by the high sorghum acreage in the solutions obtained (Appendix C, Tables V and VI). Wheat is present, to a limited extent, in the optimum enterprise combinations. However, the wheat allotment was not always fully utilized. A small cow-calf herd was present in the final basis in order to utilize the available grazing from the native range. Feeders were also produced.

Eastern Sandy Situation

For a $3,000 return to operator labor and management, 2,783 acres of land are required with the assumed current land price (Table VIII). Decreasing the land price by 25 percent decreases the land requirement by 1,292 acres, or by 46.4 percent. With land at 50 percent of the current price level, 1,160 acres are required to reach the $3,000 income target. With a zero land price, 822 acres of land are required for this resource situation.

TABLE VIII

ESTIMATED MINIMUM RESOURCE REQUIREMENTS TO OBTAIN SPECIFIED RETURNS TO OPERATOR LABOR AND MANAGEMENT, SPECIFIED LAND PRICES, EASTERN SANDY SITUATION, OKLAHOMA PANHANDLE

Requirement	Unit	Land Price Per Acre[a]			
		$75[b]	$56	$38	$0
$3,000 Return to Operator Labor and Management					
Total Land[c]	Acres	2,783	1,491	1,160	822
Total Capital	Dollars	256,799	109,529	64,878	17,148
Total Labor	Hours	2,671	1,430	1,112	788
$5,000 Return to Operator Labor and Management					
Total Land[c]	Acres	5,379	2,435	1,663	1,132
Total Capital	Dollars	498,096	178,810	90,568	21,029
Total Labor	Hours	5,161	2,336	1,594	1,085

[a]These land prices correspond to various interest rates in a minimum resource model, as specified in Chapter II.

[b]Assumed current price.

[c]Cropland is approximately 56.3 percent of total land.

With the land price at the assumed current level, 5,379 acres of land are required to earn a $5,000 return to operator labor and management. With the land price at 25 percent below the current level, the land requirement is decreased by 2,944 acres, or by 54.7 percent. At a land price of $38 per acre, 1,663 acres of land are needed to attain the income target. When the land price is zero, the land requirement falls to 1,132 acres.

Since both wheat and grain sorghum are well adapted to this particular resource situation, they are both present in large acreages in the final solutions (Appendix C, Tables VII and VIII). Wheat occupies the largest part of the total cropland, however. As was characteristic of the other resource situations, a number of feeders are produced and a small cow-calf unit is present to utilize the grazing from the native range.

Summary

The purpose of this chapter was to examine the minimum resource requirements needed to attain specified operator labor incomes under the present commodity programs. A long-run adjustment hypothesis was implied in that farmers may wish to acquire sufficient resources so as to insure some level of income and financial survival. The 1960-62 price support programs were assumed along with acreage allotments for wheat.

The total land requirements were fairly large for the Panhandle Clay Loam and Eastern Sandy Situations with the assumed current land prices and rate of return on land. The income targets could not be

reached for either the Cimarron Sandy or Eastern Clay Loam Situations with the assumed current land prices. For these resource situations, no solutions were obtained until land was dropped to 50 percent of the assumed current price levels. Decreasing the land prices substantially decreased the minimum resource requirements in all instances. With zero land prices, or with no return assumed for land, the total land requirement most closely approximates the present average farm sizes in the area.

The labor and capital requirements were also quite large for the various resource situations with the assumed current land prices. They also vary proportionally with the land prices. This is to be expected because the land investment comprises the largest portion of the total capital requirement, and the labor requirement is mainly determined by land based enterprises.

The optimum enterprise combinations again revealed that sorghums are more adapted to sandy soils and wheat to the clay loam soils. No grain sorghum was produced on the Eastern Clay Loam Situation until the land price fell to zero. In contrast, the largest portion of the Cimarron Sandy Situation was occupied by grain sorghum. Grain sorghum and wheat occupied most of the cropland on both the Panhandle Clay Loam and Eastern Sandy resource situations. A small cow-calf unit and various feeder systems were also present in the optimum solutions for all of the resource situations.

The minimum resource requirements were determined for only two levels of income and four land prices. However, as indicated in Chapter II, with minor adjustments, the solutions for the four land

prices may also represent solutions with different interest rates on the land investment, different equity levels, and various amounts of owned land.

CHAPTER V

IMPLICATIONS OF OWNED RESOURCES AND INCREASED YIELDS UPON MINIMUM RESOURCE REQUIREMENTS

In Chapter IV, the minimum resources needed to earn specified returns to operator labor and management under the present commodity programs were examined. The results were based upon selected land prices, specified returns to land, and other assumptions. As was pointed out, these minimum requirements can be affected by such factors as changes in land prices and other related items. The amount and quality of owned resources, yield expectations, and other factors may also greatly influence the minimum requirements. The purpose of this chapter is to examine the implications of (1) owned resources, and (2) increased or higher anticipated yields upon potential long-run adjustments. The total land, labor, and capital requirements are presented for each resource situation, along with the percentage changes in the minimum requirements from the solutions obtained in Chapter IV.

Implications of Owned Resources

Within the Panhandle area, many farmers own some resources, such as varying amounts of land and machinery. Assuming that a given amount of resources is owned, an important problem is determining how much additional land and other resources an operator needs in order to attain the income targets specified in this study. The amount of additional

resources will, of course, depend upon the type of return desired by the farm operator. If no return is required for owned resources above a labor and management return, the minimum resource requirements may be quite different from those specified in Chapter IV. Instead of a return to operator labor and management, the return now becomes one to operator owned resources. The kind and nature of potential long-run adjustments may thus be quite different.

In constructing the model for this analysis, the same general restrictions were used, with two exceptions. The operator was assumed to own 320 acres of land, and no specified return was required for this land. Taxes and other overhead land costs had to be paid on this land, however. For all additional land, a specified return to land and overhead costs had to be met. The operator was also assumed to own a 4-plow tractor and machinery complement. No interest had to be paid on this machinery set. As long as the farm had less than 900 acres of cropland, no interest was paid on machinery. For farms with more than 900 acres, interest and other costs had to be paid on the additional machinery. The returns obtained in this section, hence, represent returns to all operator owned resources.

For each resource situation, only the minimum resource requirements and the percentage changes are shown. The complete programming results are shown in Appendix D, Tables I-VIII. The total land and capital requirements include the owned land and machinery capital.

Panhandle Clay Loam Situation

For a $3,000 return to operator owned resources, a minimum land requirement of 1,635 acres is needed with land at the assumed current price (Table IX). This requires the addition of 1,315 acres to the 320 acres assumed owned. This amounts to a decrease of 67.4 percent from the land requirement with no owned resources. Decreasing the current land price by 25 percent decreases the minimum land requirement to 913 acres, which is a decline of 40.8 percent from the requirement with no owned resources. With land priced at $50 per acre, the minimum land requirement falls to 776 acres, or a decrease of 21.2 percent from the original solution. With a zero land price, only 632 acres are required to meet the income target. This amounts to a decrease of only 5.7 percent from the requirement obtained with no owned resources and results from the reduced level of interest on machinery. The labor and capital requirements once again vary proportionally with the land requirement. The percentage changes in the requirements are almost identical for all of the resources.

For a $5,000 return to operator owned resources, 4,225 acres of land are needed with land at the assumed current price level (Table IX). This is a decrease of 61.1 percent from the requirement obtained in Chapter IV. Diminishing the land price by 25 percent reduces the land requirement to 1,803 acres, which is a decrease of 29.7 percent from the original requirement. With land priced at 50 percent of the assumed current level, 1,253 acres are needed to meet the desired income target. This is a reduction of 19.9 percent from the land associated with a comparable return to operator labor and management.

TABLE IX

ESTIMATED MINIMUM RESOURCE REQUIREMENTS TO OBTAIN SPECIFIED RETURNS TO OPERATOR OWNED RESOURCES; PERCENTAGE CHANGES IN REQUIREMENTS FROM ORIGINAL SOLUTIONS; SPECIFIED LAND PRICES, PANHANDLE CLAY LOAM SITUATION, OKLAHOMA PANHANDLE[a]

Requirement	Unit	Land Price Per Acre			
		$100[b]	$75	$50	$0
$3,000 Return to Operator Owned Resources					
Total Land[c]	Acres	1,635	913	776	632
Percentage Change in Land	Percent	-67.4	-40.8	-21.2	-5.7
Total Capital	Dollars	194,477	86,155	54,839	14,336
Percentage Change in Capital	Percent	-67.5	-40.5	-19.6	-3.0
Total Labor	Hours	1,780	1,023	876	715
Percentage Change in Labor	Percent	-67.4	-39.0	-19.5	-5.7
$5,000 Return to Operator Owned Resources					
Total Land[c]	Acres	4,255	1,803	1,253	884
Percentage Change in Land	Percent	-61.1	-29.7	-19.9	-4.2
Total Capital	Dollars	504,741	214,569	86,136	17,325
Percentage Change in Capital	Percent	-61.4	-11.1	-20.1	-3.3
Total Labor	Hours	4,631	1,963	1,363	1,001
Percentage Change in Labor	Percent	-61.1	-29.4	-20.0	-3.5

[a]Returns to operator labor and management, 320 acres of land, and one 4-plow tractor and machinery complement.

[b]Assumed current price.

[c]Cropland is approximately 84.1 percent of total land.

When the land price is zero, which essentially means no return to the land resource, 884 acres are required. This amounts to reduction of only 4.2 percent from the original requirement.

Eastern Clay Loam Situation

With land priced at 100 and 75 percent of the assumed current price level, neither the $3,000 nor $5,000 income targets can be attained on the Eastern Clay Loam Situation (Table X). Solutions were obtained only when the land price was decreased to 50 percent of the current level. With land at $33 per acre, 2,321 acres of land were required to earn a $3,000 return. This is roughly a reduction of one-third from the requirement needed to earn a similar return to operator labor and management. With a zero land price, 1,301 acres of land are required, which is a decrease of 5.7 percent.

For a $5,000 return to operator owned resources, 4,913 acres of land are required with land priced at $33 per acre. This amounts to a 25 percent decline from the original requirement. Dropping the land price to zero changes the minimum land requirement to 1,827 acres, which is a decrease of 5.7 percent from the original requirement.

Cimarron Sandy Situation

Neither the $3,000 nor $5,000 income targets can be reached with land at the assumed current price (Table XI). However, with owned resources, solutions were obtained for both income targets with land at 75 percent of the current level. These land requirements are quite high. With land priced at $45 per acre, 13,214 acres are needed to earn a $3,000 return. Dropping the land price to $30 per acre decreases

TABLE X

ESTIMATED MINIMUM RESOURCE REQUIREMENTS TO OBTAIN SPECIFIED RETURNS TO OPERATOR OWNED RESOURCES; PERCENTAGE CHANGES IN REQUIREMENTS FROM ORIGINAL SOLUTIONS; SPECIFIED LAND PRICES, EASTERN CLAY LOAM SITUATION, OKLAHOMA PANHANDLE[a]

Requirement	Unit	Land Price Per Acre			
		$65[b]	$49	$33	$0
$3,000 Return to Operator Owned Resources					
Total Land[c]	Acres	No Solution	No Solution	2,321	1,301
Percentage Change in Land	Percent			-32.5	-5.7
Total Capital	Dollars			107,729	19,767
Percentage Change in Capital	Percent			-32.8	-5.0
Total Labor	Hours			1,715	1,158
Percentage Change in Labor	Percent			-32.5	-5.7
$5,000 Return to Operator Owned Resources					
Total Land[c]	Acres			4,913	1,827
Percentage Change in Land	Percent			-25.0	-5.7
Total Capital	Dollars			229,986	25,719
Percentage Change in Capital	Percent			-25.2	-4.9
Total Labor	Hours			3,630	1,518
Percentage Change in Labor	Percent			-25.0	-1.7

[a]Returns to operator labor and management, 320 acres of land, and one 4-plow tractor and machinery complement.

[b]Assumed current price.

[c]Cropland is approximately 48.9 percent of total land.

TABLE XI

ESTIMATED MINIMUM REQUIREMENTS TO OBTAIN SPECIFIED RETURNS TO OPERATOR OWNED RESOURCES; PERCENTAGE CHANGES IN REQUIREMENTS FROM ORIGINAL SOLUTIONS; SPECIFIED LAND PRICES, CIMARRON SANDY SITUATION, OKLAHOMA PANHANDLE[a]

Requirement	Unit	Land Price Per Acre			
		$60[b]	$45	$30	$0
$3,000 Return to Operator Owned Resources					
Total Land[c]	Acres	No Solution	13,214	2,422	1,272
Percentage Change in Land	Percent		--	-26.5	-6.2
Total Capital	Dollars		775,043	105,772	17,112
Percentage Change in Capital	Percent		--	-25.8	-6.4
Total Labor	Hours		14,777	2,615	1,372
Percentage Change in Labor	Percent		--	-29.1	-6.2
$5,000 Return to Operator Owned Resources					
Total Land[c]	Acres		40,269	4,180	2,002
Percentage Change in Land	Percent		--	-27.4	-6.2
Total Capital	Dollars		2,366,649	181,103	27,287
Percentage Change in Capital	Percent		--	-27.7	-6.3
Total Labor	Hours		45,034	4,674	2,159
Percentage Change in Labor	Percent		--	-27.4	-6.2

[a]Returns to operator labor and management, 320 acres of land, and one 4-plow tractor and machinery complement.

[b]Assumed current price.

[c]Cropland is approximately 81.6 percent of total land.

the land requirement to 2,422 acres, which amounts to a 26.5 percent decline from the requirement in the original solution. With a zero land price, 1,272 acres are required, which represents a reduction of 6.2 percent from the requirement associated with a $3,000 return to operator labor and management.

For a $5,000 return to operator owned resources, 40,269 acres are required with land at 75 percent of the assumed current price. With land at 50 percent of the current price level, 4,180 acres are required. This amounts to a 27.4 percent decrease from the requirement in the original solution. When the land price falls to zero, 2,002 acres are required. This is a decrease of 6.2 percent from the original requirement.

Eastern Sandy Situation

For a $3,000 return to operator owned resources, 1,447 acres are required when land is priced at the assumed current level (Table XII). This is a decrease of 48 percent from the original requirement. Dropping the land price to $56 per acre reduces the land requirement to 1,127 acres, which is a 24.4 percentage change from the original requirement. When the land price is at 50 percent of the assumed current level, only 963 acres are needed. With the land price at zero, 776 acres are required, which amounts to a 5.6 percent decrease from the requirement in the original solution.

For a $5,000 return to operator owned resources, 3,274 acres are needed when land is priced at the assumed current level. This represents a 39.1 percent reduction from the land needed to earn a

TABLE XII

ESTIMATED MINIMUM RESOURCE REQUIREMENTS TO OBTAIN SPECIFIED RETURNS TO OPERATOR OWNED RESOURCES; PERCENTAGE CHANGES IN REQUIREMENTS FROM ORIGINAL SOLUTIONS; SPECIFIED LAND PRICES, EASTERN SANDY SITUATION, OKLAHOMA PANHANDLE[a]

Requirement	Unit	Land Price Per Acre			
		$75[b]	$56	$38	$0
$3,000 Return to Operator Owned Resources					
Total Land[c]	Acres	1,447	1,127	963	776
Percentage Change in Land	Percent	-48.0	-24.4	-17.0	-5.6
Total Capital	Dollars	133,605	84,363	55,028	16,570
Percentage Change in Capital	Percent	-48.0	-23.0	-15.2	-3.4
Total Labor	Hours	1,387	1,082	923	744
Percentage Change in Labor	Percent	-48.1	-24.3	-17.0	-5.6
$5,000 Return to Operator Owned Resources					
Total Land[c]	Acres	3,274	1,866	1,420	1,086
Percentage Change in Land	Percent	-39.1	-23.4	-14.6	-4.1
Total Capital	Dollars	302,412	136,729	77,984	20,450
Percentage Change in Capital	Percent	-39.2	-23.5	-13.9	-2.9
Total Labor	Hours	3,141	1,790	1,363	1,042
Percentage Change in Labor	Percent	-39.1	-23.4	-14.5	-4.0

[a]Returns to operator labor and management, 320 acres of land, and one 4-plow tractor and machinery complement.

[b]Assumed current price.

[c]Cropland is approximately 56.3 percent of total land.

comparable return to operator labor and management. Decreasing the land price by 25 percent reduces the land requirement to 1,866 acres. This is a decline of 23.4 percent from the original solution. With land at $38 per acre, 1,420 acres are required, which amounts to a 14.6 percent decrease. Dropping the land price to zero reduces the land requirement to 1,086 acres. This is only a 4.1 percent decline from the original solution.

Implications of Increased Yields

Since the time period assumed for this analysis is the long-run, or a period in which the size of the farm may be altered, technology and the level of management may change. Changes in these items may, in turn, be reflected by changes in the yield levels of the major crops assumed in this analysis. Therefore, if new technology is adopted and better management is forthcoming, the yields specified in Appendix A may increase.

The purpose of this section is to examine the implications of increased yields upon the minimum resource requirements previously specified. These yields may be the results of long-run adjustments in technology and management, such as the adoption of new seed varieties, better insecticides, and moisture conservation practices. The increased yields may also represent superior management in the area, and/or differences in productivity among farms because of differences in the physical resource endowment. Also, farmers may have different anticipations about potential crop yields, which may influence the nature of these long-run adjustments. For example,

some farmers may base anticipations on the best years rather than all types of years. Some farmers in the area may also have less than 20 percent of their total cropland on their farms in nonharvested cropland. An analysis using increased yields can provide a means of compensating for different expectations and higher production on individual farms.

All of the yields for the various crops which were specified in Appendix A, Tables I and II, were increased by 10 percent.[1] This amounts to an increase of .5 to 1.4 bushels per acre of wheat and of 55 to 120 pounds of grain sorghum on the various productivity classes. The same programming model and restrictions were assumed, except for the differences in yield levels. Solutions were obtained only with land priced at 100 and zero percent of the various assumed current prices. Again, only the total resource requirements are specified in this section. The complete programming results are shown in Appendix E, Tables I-VIII.

Panhandle Clay Loam Situation

For a $3,000 return to operator labor and management, 1,496 acres of land are required when land is at the current price level (Table XIII). This represents a 70.2 percent decrease in the requirement obtained with yields at the expected levels. With the land price at zero, the land requirement declines by 921 acres, or to 575 acres. This amounts to a 14.2 percent reduction from the original land requirement.

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[1] Temporary pasture yields were increased, but native pasture yields were not.

TABLE XIII

ESTIMATED MINIMUM RESOURCE REQUIREMENTS TO OBTAIN SPECIFIED RETURNS TO OPERATOR LABOR AND MANAGEMENT WITH YIELDS INCREASED BY 10 PERCENT; PERCENTAGE CHANGES FROM SOLUTIONS OBTAINED WITH YIELDS AT EXPECTED LEVELS; SPECIFIED LAND PRICES, PANHANDLE CLAY LOAM SITUATION, OKLAHOMA PANHANDLE

Requirement	Unit	Land Price Per Acre $100[a]	Land Price Per Acre $0
$3,000 Return to Operator Labor and Management			
Total Land[b]	Acres	1,496	575
Percentage Change in Land	Percent	-70.2	-14.2
Total Capital	Dollars	179,150	14,272
Percentage Change in Capital	Percent	-70.1	-3.5
Total Labor	Hours	1,735	668
Percentage Change in Labor	Percent	-68.2	-11.9
$5,000 Return to Operator Labor and Management			
Total Land[b]	Acres	2,486	788
Percentage Change in Land	Percent	-77.2	-14.6
Total Capital	Dollars	298,416	17,017
Percentage Change in Capital	Percent	-77.2	-5.0
Total Labor	Hours	2,884	917
Percentage Change in Labor	Percent	-75.8	-11.6

[a]Assumed current price.

[b]Cropland is approximately 84.1 percent of total land.

For a $5,000 return to operator labor and management, 2,486 acres are required with the assumed current land price. This represents a 77.2 reduction in the amount of land originally required. When the land price falls to zero, 788 acres are required to achieve the $5,000 income target. With no return assumed for land, the increased yields reduced the original requirements by 14.6 percent.

Eastern Clay Loam Situation

With land at the assumed current price level, neither the $3,000 nor $5,000 income targets can be attained by increasing the yield levels (Table XIV). With a zero land price, however, solutions were obtained and the requirements were naturally lower than those in the original solutions. For a $3,000 return, 1,191 acres are required. For a $5,000 return to operator labor and management, 1,652 acres are needed. This is 14.8 percent smaller than the solution obtained with yields at the expected yields.

Cimarron Sandy Situation

Increasing the yield level by 10 percent made it possible to secure solutions on the Cimarron Sandy Situation with land priced at the assumed current level (Table XV). Solutions could not be attained for either income target when the yields were at the expected levels. The solutions are quite high for both income targets, however. For a $3,000 return to operator labor and management, 13,274 acres are needed when yields are increased by 10 percent. In contrast, only 1,005 acres are needed to achieve this income target when the land price

TABLE XIV

ESTIMATED MINIMUM RESOURCE REQUIREMENTS TO OBTAIN SPECIFIED RETURNS TO OPERATOR LABOR AND MANAGEMENT WITH YIELDS INCREASED BY 10 PERCENT; PERCENTAGE CHANGES FROM SOLUTIONS OBTAINED WITH YIELDS AT EXPECTED LEVELS; SPECIFIED LAND PRICES, EASTERN CLAY LOAM SITUATION, OKLAHOMA PANHANDLE

Requirement	Unit	Land Price Per Acre $65[a]	Land Price Per Acre $0
$3,000 Return to Operator Labor and Management			
Total Land[b]	Acres		1,191
Percentage Change in Land	Percent		-13.6
Total Capital	Dollars		19,191
Percentage Change in Capital	Percent		-7.8
Total Labor	Hours		1,077
Percentage Change in Labor	Percent		-12.3
$5,000 Return to Operator Labor and Management		No Solution	
Total Land[b]	Acres		1,652
Percentage Change in Land	Percent		-14.8
Total Capital	Dollars		24,610
Percentage Change in Capital	Percent		-9.0
Total Labor	Hours		1,454
Percentage Change in Labor	Percent		-5.9

[a]Assumed current price.

[b]Cropland is approximately 48.9 percent of total land.

TABLE XV

ESTIMATED MINIMUM RESOURCE REQUIREMENTS TO OBTAIN SPECIFIED RETURNS TO OPERATOR LABOR AND MANAGEMENT WITH YIELDS INCREASED BY 10 PERCENT; PERCENTAGE CHANGES FROM SOLUTIONS OBTAINED WITH YIELDS AT EXPECTED LEVELS; SPECIFIED LAND PRICES, CIMARRON SANDY SITUATION, OKLAHOMA PANHANDLE

Requirement	Unit	Land Price Per Acre	
		$60[a]	$0
$3,000 Return to Operator Labor and Management			
Total Land[b]	Acres	13,274	1,005
Percentage Change in Land	Percent	--	-25.9
Total Capital	Dollars	948,433	13,836
Percentage Change in Capital	Percent	--	-24.3
Total Labor	Hours	15,227	1,130
Percentage Change in Labor	Percent	--	-22.7
$5,000 Return to Operator Labor and Management			
Total Land[b]	Acres	28,264	1,551
Percentage Change in Land	Percent	--	-27.3
Total Capital	Dollars	2,011,100	20,805
Percentage Change in Capital	Percent	--	-28.6
Total Labor	Hours	32,518	1,745
Percentage Change in Labor	Percent	--	-24.2

[a]Assumed current price.

[b]Cropland is approximately 81.6 percent of total land.

is zero. This amounts to a 25.9 percent decline in the amount of land in the original solution.

For a $5,000 return to operator labor and management, a very large acreage (28,264 acres) is needed with land at the assumed current price. The capital commitment for this solution is enormous. With a zero land price, the land requirement falls to 1,551 acres. This amounts to a 27.3 percent decrease from the requirement obtained with yields at the expected levels.

Eastern Sandy Situation

With the assumed current land price, 1,505 acres are needed to earn a $3,000 return to operator labor and management (Table XVI). This constitutes a 45.9 percent reduction from the land required in the original programmed solution. With a zero land price, or no return assumed to land, the land requirement falls to 719 acres. This amounts to a 12.5 percent decrease in the land required to reach this income target with the expected yield levels.

For a $5,000 return to operator labor and management, the minimum land requirement amounts to 2,490 acres. This constitutes a decline of 53.7 percent from the original requirement. When the land price falls to zero, the minimum land required amounts to 990 acres. This represents a 12.5 percent reduction in the amount required to meet the income target with the original yields.

TABLE XVI

ESTIMATED MINIMUM RESOURCE REQUIREMENTS TO OBTAIN SPECIFIED RETURNS TO OPERATOR LABOR AND MANAGEMENT WITH YIELDS INCREASED BY 10 PERCENT; PERCENTAGE CHANGES FROM SOLUTIONS OBTAINED WITH YIELDS AT EXPECTED LEVELS, SPECIFIED LAND PRICES, EASTERN SANDY SITUATION, OKLAHOMA PANHANDLE

Requirement	Unit	Land Price Per Acre	
		$75[a]	$0
$3,000 Return to Operator Labor and Management			
Total Land[b]	Acres	1,505	719
Percentage Change in Land	Percent	-45.9	-12.5
Total Capital	Dollars	139,882	16,801
Percentage Change in Capital	Percent	-45.5	-2.0
Total Labor	Hours	1,479	746
Percentage Change in Labor	Percent	-44.6	-5.3
$5,000 Return to Operator Labor and Management			
Total Land[b]	Acres	2,490	990
Percentage Change in Land	Percent	-53.7	-12.5
Total Capital	Dollars	231,530	20,551
Percentage Change in Capital	Percent	-53.5	-2.3
Total Labor	Hours	2,447	1,028
Percentage Change in Labor	Percent	-52.6	-5.3

[a]Assumed current price.

[b]Cropland is approximately 56.3 percent of total land.

Summary

The purpose of this chapter was to examine the implications of owned resources and increased yields upon potential long-run adjustments. The owned resources assumed, in addition to operator labor and management, were 320 acres of land and one 4-plow tractor and machinery complement. In the section concerning yields, the levels specified in Appendix A were all increased by 10 percent. Two land prices were used in the section concerning yield levels, whereas four land prices were used in computing the returns to operator owned resources.

The main effect of owned resources was, of course, to reduce the minimum resource requirements rather substantially. However, solutions could still not be obtained for the Eastern Clay Loam Situation with land at 100 and 75 percent of the assumed current price level, or for the Cimarron Sandy Situation with land at the assumed current level. The percentage changes in the resource requirements were usually larger for the solutions associated with a $3,000 return. The biggest changes in resource requirements were associated with current land prices, and as the land price was decreased, the percentage changes in resources from the original solutions also decreased accordingly. The biggest reduction in the land requirement from the original solutions was on the Panhandle Clay Loam Situation, where, with the current land price, the percentage change amounted to 67.4. With zero land prices, there was roughly a five percent change in the land requirements for the various resource situations.

Yield levels were increased so as to reflect the effects of adjustments such as the adoption of new technology, and/or to compensate for differences among farms in productivity, management, yield expectations, and the percent of nonharvested cropland. The overall effect was to again substantially reduce the minimum amount of land needed to reach the income targets. A solution, however, still could not be obtained for the Eastern Clay Loam Situation with land at the assumed current price. The reduction in resource requirements was even greater than was the case with owned resources. On the Panhandle Clay Loam Situation, for example, there was approximately a 75 percent reduction in resource requirements with the assumed current price. With zero land prices, the decrease in the land requirement on the various resource situations varied from one-fourth to one-eighth of those originally obtained.

The labor and capital requirements again varied in relation to the land requirement. However, the variation of these resources was not always of the same magnitude as that of the land resource.

CHAPTER VI

PROGRAMMED MINIMUM REQUIREMENTS WITH NO SUPPORT PRICES OR ALLOTMENTS

In Chapter IV, the minimum resources required for specified income levels were examined. These resource requirements were developed on the basis of the farm programs prevailing in 1960-62. Support prices were assumed for wheat and grain sorghum and acreage allotments for wheat. The same general farm program was assumed in Chapter V where various modifications were introduced into the programming model.

A drastic change in this farm program may have a pronounced effect upon long-run adjustments by farm operators in the Oklahoma Panhandle. A significant change in commodity prices and/or the removal or addition of output restrictions can greatly influence the minimum resource requirements which were specified for various income levels. Depending upon the nature of new programs, there may also be shifts in land use among various enterprises. Agriculture in the Oklahoma Panhandle is particularly sensitive to drastic changes in farm programs, because of the limited number of production alternatives and the high degree of risk and uncertainty associated with a variable climate and weather.

Interest has been recently focused on changing farm programs with the defeat, in a referendum vote of wheat growers, of the proposed 1964

wheat program.[1] This proposed program was essentially one of production controls coupled with price supports. The basic plan included a two level system of price supports with a bushel limitation on marketings by any wheat grower at the higher support level, and a voluntary diversion of land with diversion payments. This proposed plan did not receive a simple majority of the votes cast. Rejection of this price support, production control plan has thus raised many questions about the return to a more "free" market program. Although a completely "free" market program does not appear to be forthcoming in the immediate future, a movement in this direction may be probable.

The major purpose of this chapter is to examine some of the implications of a change in farm programs. Specifically, the objectives are to determine the minimum resource requirements for farms on the various resource situations with no support prices assumed for wheat or grain sorghum and no allotments for wheat. For this analysis, a farm program is assumed in which there is essentially unrestricted production and no price supports (except at maybe extremely low price levels). This does not necessarily mean that "free" markets are assumed. For instance, such programs as the Conservation Reserve, export subsidies under Public Law 480, and other such programs may be continued. Additionally, the government may stand ready to avoid extremely low prices in the event that production should greatly exceed the amounts that can be utilized

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[1]For a summary of the proposed 1964 wheat program provisions, see United States Department of Agriculture, The Wheat Program for 1964, An Economic Analysis (Washington, 1963), pp. 5-7.

at given price levels. In this event, the government might well enter into purchase and storing operations, because of political considerations for example. The general farm program assumed is therefore one of essentially unrestricted production and prices.

For this analysis, the assumed long-run prices are $1.20 per bushel for wheat and $1.65 per hundredweight for grain sorghum. These prices are higher than estimates of "free market" prices.[2] They represent arbitrary values of the lowest prices that society might possibly tolerate. The same general programming model is assumed as before except for the changes in the long-run prices for wheat and sorghum and the absence of wheat allotments.

Only the minimum resource requirements and percentage changes from the requirements obtained with support prices and allotments are presented in this section. The complete programming results are shown in Appendix F, Tables I through VIII. Additionally, the minimum requirements were obtained with land priced at just 100 and zero percent of the current price levels for the various resource situations. Only one long-run price level is used for this analysis, therefore, a section is also included concerning "break-even" prices for wheat and grain sorghum on an acre of land for each of the soil productivity classes in

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[2]For example, see Geoffrey Shepherd, et al., Production, Prices, and Income Estimates and Projections for the Feed-Livestock Economy, Iowa Agricultural Experiment Station, Special Report 27 (Ames, 1960); and Luther G. Tweeten, Earl O. Heady, and Leo V. Mayer, Farm Program Alternatives, Center for Agricultural and Economic Development, Iowa State University, in cooperation with Oklahoma Agricultural Experiment Station, CAED Report No. 18 (Ames, 1963).

order to show the product prices needed to cover various specified costs. A brief summary concludes this chapter.

Panhandle Clay Loam Situation

With land priced at the assumed current level, neither the $3,000 nor $5,000 income targets can be attained in the absence of price supports and acreage allotments (Table XVII). With a zero land price, or no return assumed for land, solutions were obtained for both income targets. However, the minimum requirements are much higher than those obtained with price supports and allotments. For a $3,000 return, 909 acres of land are required. This constitutes a 35.7 percent increase from the original requirements. For a $5,000 return, 1,083 acres are required, which amounts to a 17.3 percent increase in land. The labor and capital requirements vary in approximately the same magnitude as land with respect to their percentage changes.

The optimum enterprise combinations associated with a zero land price vary markedly from the solutions obtained with support prices and allotments (Appendix F, Tables I and II). Despite the fact that the price ratio between wheat and grain sorghum has shifted in favor of grain sorghum, sorghum is not in the new solutions associated with either income target. With no allotment restrictions, wheat enters the final basis on land previously occupied by sorghum. Thus, wheat becomes the sole cash crop on this resource situation. Cows and feeders are again present in the final basis.

TABLE XVII

ESTIMATED MINIMUM RESOURCE REQUIREMENTS TO OBTAIN SPECIFIED RETURNS TO OPERATOR LABOR AND MANAGEMENT WITH NO PRICE SUPPORTS OR ACREAGE ALLOTMENTS; PERCENTAGE CHANGES IN REQUIREMENTS FROM ORIGINAL SOLUTIONS; SPECIFIED LAND PRICES, PANHANDLE CLAY LOAM SITUATION, OKLAHOMA PANHANDLE

Requirement	Unit	Land Price Per Acre	
		$100[a]	$0
$3,000 Return to Operator Labor and Management			
Total Land[b]	Acres		909
Percentage Change in Land[c]	Percent		35.7
Total Capital	Dollars		19,043
Percentage Change in Capital[c]	Percent		28.8
Total Labor	Hours		1,014
Percentage Change in Labor[c]	Percent		33.8
$5,000 Return to Operator Labor and Management		No Solution	
Total Land[b]	Acres		1,083
Percentage Change in Land[c]	Percent		17.3
Total Capital	Dollars		21,560
Percentage Change in Capital[c]	Percent		20.4
Total Labor	Hours		1,208
Percentage Change in Labor[c]	Percent		16.5

[a]Assumed current price.

[b]Cropland is approximately 84.1 percent of total land.

[c]All percentage changes are with respect to the solutions obtained in Chapter IV.

Eastern Clay Loam Situation

Solutions cannot be attained for either the $3,000 or $5,000 income targets when land is priced at the assumed current level (Table XVIII). With no return assumed to land, or a zero land price, both income targets were achieved. However, the resource requirements are again much higher than those obtained with price supports and allotments. For a $3,000 return to operator labor and management, 1,799 acres of land are required. This amounts to a 30.5 percent increase above the original solution. For a $5,000 return, this percentage change goes up to 60.7 percent, which is nearly double that for a $3,000 return. The total land requirement is 3,114 acres.

Again, the adaptability of wheat to clay loam soils in the Panhandle is demonstrated by the optimum enterprise combinations (Appendix F, Tables III and IV). With no allotment restrictions, wheat again replaces grain sorghum in the final solutions despite the shift in the price ratio in favor of sorghum. No grain sorghum is present in the final basis, leaving wheat as the sole cash crop. Cows and feeders are again produced.

Cimarron Sandy Situation

Again, no solutions can be attained for either a $3,000 or $5,000 return to operator labor and management with land at the assumed current price (Table XIX). Solutions were obtained with zero land prices, or with no land return. These solutions are the only ones for any resource situations in which there was a decrease in the resource requirements from the solutions obtained with support prices and

TABLE XVIII

ESTIMATED MINIMUM RESOURCE REQUIREMENTS TO OBTAIN SPECIFIED RETURNS TO OPERATOR LABOR AND MANAGEMENT WITH NO PRICE SUPPORTS OR ACREAGE ALLOTMENTS; PERCENTAGE CHANGES IN REQUIREMENTS FROM ORIGINAL SOLUTIONS; SPECIFIED LAND PRICES, EASTERN CLAY LOAM SITUATION, OKLAHOMA PANHANDLE

Requirement	Unit	Land Price Per Acre	
		$65[a]	$0
$3,000 Return to Operator Labor and Management			
Total Land[b]	Acres	No Solution	1,799
Percentage Change in Land[c]	Percent		30.5
Total Capital	Dollars		24,971
Percentage Change in Capital[c]	Percent		20.0
Total Labor	Hours		1,442
Percentage Change in Labor[c]	Percent		17.4
$5,000 Return to Operator Labor and Management			
Total Land[b]	Acres		3,114
Percentage Change in Land[c]	Percent		60.7
Total Capital	Dollars		43,984
Percentage Change in Capital[c]	Percent		62.7
Total Labor	Hours		2,497
Percentage Change in Labor[c]	Percent		61.6

[a]Assumed current price.

[b]Cropland is approximately 48.9 percent of total land.

[c]All percentage changes are with respect to the solutions obtained in Chapter IV.

TABLE XIX

ESTIMATED MINIMUM RESOURCE REQUIREMENTS TO OBTAIN SPECIFIED RETURNS TO OPERATOR LABOR AND MANAGEMENT WITH NO PRICE SUPPORTS OR ACREAGE ALLOTMENTS; PERCENTAGE CHANGES IN REQUIREMENTS FROM ORIGINAL SOLUTIONS; SPECIFIED LAND PRICES, CIMARRON SANDY SITUATION, OKLAHOMA PANHANDLE

Requirement	Unit	Land Price Per Acre	
		$60[a]	$0
$3,000 Return to Operator Labor and Management			
Total Land[b]	Acres		1,170
Percentage Change in Land[c]	Percent		-13.7
Total Capital	Dollars		14,741
Percentage Change in Capital[c]	Percent		-19.4
Total Labor	Hours		1,440
Percentage Change in Labor[c]	Percent		-1.5
$5,000 Return to Operator Labor and Management		No Solution	
Total Land[b]	Acres		1,842
Percentage Change in Land[c]	Percent		-13.7
Total Capital	Dollars		23,557
Percentage Change in Capital[c]	Percent		-19.1
Total Labor	Hours		2,267
Percentage Change in Labor[c]	Percent		-1.5

[a]Assumed current price.

[b]Cropland is approximately 81.6 percent of total land.

[c]All percentage changes are with respect to the solutions obtained in Chapter IV.

allotments. For a $3,000 return, 1,170 acres are required. This represents a 13.7 percent reduction from the original requirement. For a $3,000 return, 1,842 acres are needed, which again constitutes a 13.7 percent decline in the land requirement.

The decrease in the amount of land required on the Cimarron Sandy Situation can be explained by the change in the wheat-sorghum price ratio and the adaptability of grain sorghum on these sandy soils. Resource requirements are quite high for this situation because of the low yields assumed, particularly for wheat. Grain sorghum is, however, well adapted to this situation and occupied the largest part of the cropland in the solutions obtained with support prices and allotments. With a price ratio favoring sorghum where the sorghum price was increased and the price of wheat fell, wheat dropped out of the final basis and grain sorghum became the sole cash crop (Appendix F, Tables V and VI).

Eastern Sandy Situation

Although the resource requirements are quite high, solutions were obtained for both income targets with land at the assumed current price (Table XX). For a $3,000 return, 9,900 acres are required, which amounts to a huge, 255.7 percent increase. For a $5,000 return, 19,636 acres are needed, which constitutes a 265.0 percentage change from the principal requirement. Dropping the land price to zero results in a land requirement of 902 acres for the $3,000 return. This is a 9.7 percentage increase from the original solution. For a $5,000 return to operator labor and management, 1,291 acres are required, which amounts to a 14.0 percentage increase.

TABLE XX

ESTIMATED MINIMUM RESOURCE REQUIREMENTS TO OBTAIN SPECIFIED RETURNS TO OPERATOR LABOR AND MANAGEMENT WITH NO PRICE SUPPORTS OR ACREAGE ALLOTMENTS; PERCENTAGE CHANGES IN REQUIREMENTS FROM ORIGINAL SOLUTIONS; SPECIFIED LAND PRICES, EASTERN SANDY SITUATION, OKLAHOMA PANHANDLE

Requirement	Unit	Land Price Per Acre	
		$75[a]	$0
$3,000 Return to Operator Labor and Management			
Total Land[b]	Acres	9,900	902
Percentage Change in Land[c]	Percent	+255.7	+9.7
Total Capital	Dollars	853,334	13,796
Percentage Change in Capital[c]	Percent	+232.3	-19.5
Total Labor	Hours	10,049	970
Percentage Change in Labor[c]	Percent	+276.2	+23.1
$5,000 Return to Operator Labor and Management			
Total Land[b]	Acres	19,636	1,291
Percentage Change in Land[c]	Percent	+265.0	+14.0
Total Capital	Dollars	1,694,494	17,064
Percentage Change in Capital[c]	Percent	+240.2	-18.9
Total Labor	Hours	19,930	1,388
Percentage Change in Labor[c]	Percent	+286.2	+27.9

[a]Assumed current price.

[b]Cropland is approximately 56.3 percent of total land.

[c]All percentage changes are with respect to the solutions obtained in Chapter IV.

With no return assumed for land, the capital requirements are decreased from the original ones with support prices and allotments. This decrease in the capital needed, while the other resource requirements are increased can be explained in the shift among enterprises. With the new wheat-sorghum price ratio, wheat goes entirely out of the final basis and is replaced by sorghum. Once again, this points to the adaptability of sorghum on these particular soils. With the removal of wheat and wheat pasture, the number of feeders is reduced sharply. Thus, the land and labor requirements are increased somewhat, whereas the capital requirement is reduced.

Estimated Break-Even Prices for Wheat and Grain Sorghum

The preceding discussion raises some questions pertaining to the prices needed for the major cash crops in order to cover specified costs in different areas of the Panhandle. Changing farm programs, particularly to one of "free" markets, can result in low product prices which may seriously affect the minimum resource requirements needed for desired income levels. Depending upon the costs which have to be covered or the returns which are desired, various price levels or "break-even" prices may be needed to meet specified costs. For example, if no return is required by a farm operator for his labor and land, his "break-even" prices may be quite different from the prices needed when all resources must be paid. Different types of land, with accompanying differences in productivity and land prices, also necessitate different "break-even" prices.

The major purpose of this section is to present estimates of the "break-even" prices for wheat and grain sorghum enterprises on the various land productivity classes specified in Appendix A. These product prices are the minimum ones required to cover the following costs per acre for wheat and grain sorghum:

(1) Variable costs (except labor);

(2) Variable costs (including labor);

(3) Variable costs and machinery annual fixed costs; and

(4) Variable costs, machinery annual fixed costs, and land costs.

These estimates were developed from published data for the Oklahoma Panhandle.[3] The "break-even" prices are only reasonable approximations since they do not allow for lower factor prices (such as for seed as a result of decreased product prices) and whole farm overhead costs such as pickup truck expenses. The land prices used for this analysis are those for each productivity class used in computing the composite price for an acre of land in each resource situation. "Break-even" prices were developed for each productivity class rather than for resource situations in order to provide a basis for estimates for farms with varying percentages of land in the productivity classes. However, these estimates can be easily converted to a resource situation basis.

The estimated "break-even" prices for wheat and grain sorghum on the various clay loam productivity classes are shown in Table XXI. The first two sets of "break-even" prices are primarily of interest for short-run situations in which only variable costs have to be covered.

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[3] Hall, et al.

TABLE XXI

ESTIMATED BREAK-EVEN PRICES FOR WHEAT AND GRAIN SORGHUM ENTERPRISES, CLAY LOAM SOILS, OKLAHOMA PANHANDLE[a]

Item	Unit	Productivity Class C_a	C_b	C_c	C_d
		- Dollars -			
(1) Break-even Prices to Cover Variable Costs (except Labor)[b]					
Wheat	Bu.	.47	.53	.63	.77
Grain Sorghum	Cwt.	.70	1.07	.78	1.07
(2) Break-even Prices to Cover Variable Costs					
Wheat	Bu.	.56	.64	.76	.93
Grain Sorghum	Cwt.	.93	1.44	1.03	1.44
(3) Break-even Prices to Cover Variable Costs and Machinery Annual Fixed Costs[c]					
Wheat	Bu.	.64	.73	.87	1.07
Grain Sorghum	Cwt.	1.08	1.69	1.20	1.69
(4) Break-even Prices to Cover Variable Costs, Machinery Annual Fixed Costs, and Land Costs[d]					
Wheat	Bu.	1.18	1.33	1.46	1.61
Grain Sorghum	Cwt.	1.93	2.99	1.94	2.49

[a]Break-even prices do not allow for lower factor prices as a result of lower product prices, whole farm overhead costs, and nonharvested cropland costs.

[b]Includes interest charged on annual operating capital.

[c]Assumes one 4-plow tractor and machinery complement and based on assumption that machinery is used enough to wear out during its useful life.

[d]Land costs include interest and tax. Interest on land is five percent of current land price for each productivity class.

The last two sets of prices apply to long-run situations in which all costs must be paid. The third set, or the "break-even" prices needed to cover variable costs and annual machinery fixed costs, is useful in analyzing problems where no return is required for land. For example, the "break-even" price for wheat, with no land costs assumed, would range from $.64 to $1.07 for soils included in the Panhandle Clay Loam Situation, and from $.87 to $1.07 for soils in the Eastern Clay Loam Situation. For grain sorghum, the range in the "break-even" price would be from $1.08 to $1.69 for the Panhandle Clay Loam Situation, and $1.20 to $1.69 for the Eastern Clay Loam Situation.

When a return is required for land, and various land costs must be met, the last set of prices is most useful. These prices can be related to the programming which was done with land priced at 100 percent of the current price level and with no owned resources assumed. The range in the "break-even" price for wheat is from $1.18 to $1.61 for the Panhandle Clay Loam Situation, and from $1.46 to $1.61 for the Eastern Clay Loam Situation. For grain sorghum, the range is from $1.93 to $2.99 on the Panhandle Situation, and from $1.94 to $2.49 for the Eastern Situation. It is thus readily apparent why no solutions could be obtained on the clay loam situations when land was priced at 100 percent of the assumed current level, and no support prices or allotments were assumed. The only productivity class on which a price below the assumed nonsupport price is present is C_a where the "break-even" price for wheat is $1.18. This is, however, barely below the assumed wheat price of $1.20.

The estimated "break-even" prices for wheat and grain sorghum on the sandy productivity classes are shown in Table XXII. The same general interpretations may be applied to these sets of "break-even" prices as with those for the clay loam soils. With land commanding no return, the "break-even" price for wheat is $.79 for the Eastern Sandy Situation, and the price ranges from $1.21 to $1.66 for the Cimarron Sandy Situation. For grain sorghum, the "break-even" price is $.84 for the Eastern Situation, and ranges from $.99 to $1.08 for the Cimarron Situation. Wheat is thus at an obvious disadvantage on these soils with these assumptions. With no price supports or allotments, only on S_a soil is the price lower than the $1.20 which was specified in this chapter. The sorghum prices are, in contrast, much below the $1.65 price per hundredweight which was assumed in the preceding section.

When land costs must be met along with other costs previously specified, the last set of "break-even" prices becomes the most pertinent. For wheat, the "break-even" price is $1.33 for the Eastern Sandy Situation, and ranges from $1.86 to $2.34 for the Cimarron Sandy Situation. The "break-even" price for grain sorghum is $1.33 for the Eastern Situation and approximately $1.46 for the Cimarron Situation. Hence, there is no question as to why no wheat and a large acreage of sorghum was produced in the absence of price supports and allotments. On no soil productivity class is the price of wheat $1.20 or less. Grain sorghum was thus, the only cash crop produced on these sandy resource situations with the stated assumptions.

TABLE XXII

ESTIMATED BREAK-EVEN PRICES FOR WHEAT AND GRAIN SORGHUM ENTERPRISES, SANDY SOILS, OKLAHOMA PANHANDLE[a]

Item	Unit	Productivity Class S_a	S_b	S_c
		- Dollars -		
(1) Break-even Prices to Cover Variable Costs (except Labor)[b]				
Wheat	Bu.	.58	.86	1.18
Grain Sorghum	Cwt.	.56	.65	.71
(2) Break-even Prices to Cover Variable Costs				
Wheat	Bu.	.69	1.05	1.44
Grain Sorghum	Cwt.	.73	.85	.93
(3) Break-even Prices to Cover Variable Costs and Machinery Annual Fixed Costs[c]				
Wheat	Bu.	.79	1.21	1.66
Grain Sorghum	Cwt.	.84	.99	1.08
(4) Break-even Prices to Cover Variable Costs, Machinery Annual Fixed Costs, and Land Costs[d]				
Wheat	Bu.	1.33	1.86	2.34
Grain Sorghum	Cwt.	1.33	1.45	1.46

[a]Break-even prices do not allow for lower factor prices as a result of lower product prices, whole farm overhead costs, and nonharvested cropland costs.

[b]Includes interest charged on annual operating capital.

[c]Assumes one 4-plow tractor and machinery complement and based on assumption that machinery is used enough to wear out during its useful life.

[d]Land costs include interest and tax. Interest on land is five percent of land price for each productivity class.

The implications of a "free" market program can thus be readily seen. For example, if wheat prices should fall to between $.90 and $1.00 per bushel, returns would greatly decline on all of the sandy and clay loam productivity classes. Such a price range is not high enough to cover the total costs involved in the last set of "break-even" prices.

Summary

The major purpose of this chapter was to examine some of the implications of a change in the general farm program previously assumed to one which more nearly approximates one of "free" markets. Although price supports and acreage allotments were not assumed, this does not mean that a completely "free" market system was supposed. Because such programs as the Conservation Reserve may be continued, and the government might wish to avoid extremely low prices because of political or other considerations, a farm program of essentially unrestricted production and prices was assumed. The product prices used were $1.20 per bushel for wheat and $1.65 per hundredweight for grain sorghum. The minimum resource requirements were determined for each resource situation with land priced at 100 and zero percent of the assumed current prices.

No solutions could be obtained for any of the resource situations with land priced at 100 percent of the assumed current level, except for the Eastern Sandy Situation where the requirements were enormously high. With no return assumed to land, or zero land prices, solutions were obtained on all of the resource situations. The resource

requirements were higher than those with support prices and allotments for all situations except the Cimarron Sandy. Because of the more favorable initial position of grain sorghum and the change in the wheat-sorghum price ratio in favor of sorghum, the resource requirements were reduced for this situation. The sole cash crop on the sandy situations was grain sorghum, whereas wheat was the only cash crop on the clay loam resource situation.

The estimated "break-even" prices for wheat and grain sorghum on the land productivity classes, as specified in Appendix A, were briefly discussed. These prices were the ones required to cover various specified costs per acre for wheat and sorghum. Two "break-even" prices were estimated which would cover specified variable costs, and two were developed which would also cover additional fixed costs. Of the latter two prices, one included land costs whereas the other price did not.

The relationship of these "break-even" prices to the implications drawn from the programming results for the various resource situations was pointed out. It was explained why it was difficult to secure solutions when land was priced at 100 percent of the current level, and why wheat was the sole cash crop on clay loam resource situations, and grain sorghum on the sandy situations. The implications of a "free" market program were briefly discussed. The differences in "break-even" prices on the various productivity classes point to the possibility of some farm operators adjusting by "putting together" farms with a high proportion of the better soils.

CHAPTER VII

IMPLICATIONS OF ALTERNATIVE LONG-RUN ADJUSTMENTS

The adjustments described in preceding chapters provide alternative bases for estimates of future agricultural organization in the Oklahoma Panhandle. Farm operators require such data in order to evaluate alternative courses of action available to them. Similar estimates are needed by businesses, public institutions serving agriculture, and others in the Panhandle area. Similarly, acceptable solutions to broad policy questions and the administration of specific agricultural programs depend on such estimates. Thus, this chapter is devoted to a comparison of the selected adjustments described in this study, an evaluation of the results as hypotheses for future adjustments, and an examination of the implications of each potential adjustment. Various limitations of the study and suggestions for future research conclude this chapter.

This presentation is centered around the long-run adjustment hypotheses which have been previously identified.[1] The "maximum profit" and "equilibrium" adjustments were discussed in Chapter II. In Chapter IV, the "minimum resources" hypothesis was presented in which

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[1]For ease of reference, hypotheses discussed in preceding chapters are called: (a) maximum profit, (b) equilibrium, (c) minimum resources, (d) owned resources, (e) yield expectations and, (f) owned resources and yield expectations hypotheses.

farm operators desire a specified minimum level of return to their labor and management. The "minimum resources" hypothesis was also examined in Chapter VI under an alternative farm program. In Chapter V, three alternative hypotheses were presented in a minimum resources framework. The "owned resources" hypothesis was developed in which farm operators require some level of return to all of their owned resources which is sufficient to provide for family living and possibly for growth and expansion of the farm business.[2] A "yield expectations" hypothesis also was presented in which different yield expectations result in different long-run adjustments. Lastly, a hypothesis involving the interaction of "owned resources and yield expectations" was introduced which results in still different adjustments.

Comparison of Results

The estimated minimum land requirements to obtain a $3,000 return on the various resource situations are shown in Table XXIII for the alternative long-run adjustments analyzed in this study. Results in this table are for current and zero land prices. That is, either a return compatable with current land prices or no return is assumed for the land factor. Results for other land returns are available in the preceding chapters.

With the "minimum resources" hypothesis, no solutions could be obtained on either the Eastern Clay Loam or Cimarron Sandy Situations

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[2]Full equities in the owned resources are assumed for this hypothesis. The level of return required may also be thought of as the income remaining after the various cash costs have been paid.

TABLE XXIII

ESTIMATED MINIMUM LAND REQUIREMENTS TO OBTAIN A $3,000 RETURN ON SPECIFIED RESOURCE SITUATIONS, WITH ALTERNATIVE LONG-RUN ADJUSTMENTS AND LAND PRICES ASSUMED; OKLAHOMA PANHANDLE

Resource Situations And Land Prices[a]	Long-Run Adjustment			
	Minimum Resources[b]	Minimum Resources With Owned Resources[c]	Minimum Resources With 10 Percent Higher Yields[d]	Minimum Resources With No Price Supports or Allotments[e]
	- Acres -			
Panhandle Clay Loam				
Land-$100/Acre	5,014	1,635	1,496	No Solution
Land-$ 0/Acre	670	632	575	909
Eastern Clay Loam				
Land-$ 65/Acre	No Solution	No Solution	No Solution	No Solution
Land-$ 0/Acre	1,379	1,301	1,191	1,799
Cimarron Sandy				
Land-$ 60/Acre	No Solution	No Solution	13,274	No Solution
Land-$ 0/Acre	1,356	1,272	1,005	1,170
Eastern Sandy				
Land-$ 75/Acre	2,783	1,447	1,505	9,900
Land-$ 0/Acre	822	776	719	902

[a]The specified land prices may also represent land interest rates of five and zero percent in a minimum resource model. The zero land prices may also be interpreted as full-owner situations where no return is required for the land factor.

[b]As specified in Chapter IV. The minimum requirements were also determined with land prices at 75 and 50 percent of the current price levels.

[c]As specified in Chapter V. The minimum requirements were also determined with land prices at 75 and 50 percent of the current price levels.

[d]As specified in Chapter V.

[e]As specified in Chapter VI.

with current land prices, and the requirements were quite high on the other resource situations. With zero land prices, or no return assumed for land, the requirements more nearly approximate current farm sizes. The minimum land requirement with no charge for land ranged from 670 acres on the Panhandle Clay Loam Situation to 1,379 acres on the Eastern Clay Loam Situation.

The introduction of "owned resources" substantially reduced the minimum land requirements with current land prices assumed (Table XXIII). However, solutions could still not be obtained on the Eastern Clay Loam and Cimarron Sandy Situations. With no return assumed to land, the "owned resources" hypothesis resulted in slightly lower land requirements than was the case with the pure "minimum resources" hypotheses.

Introducing higher yields and/or "yield expectations" into the minimum resource model resulted in the lowest land requirements obtained (Table XXIII). However, a solution could still not be obtained for the Eastern Clay Loam Situation with current land prices. The lowest land requirements were obtained when no return for land and higher yields were assumed. These results essentially correspond to the "owned resources and yield expectations" hypothesis. Only 575 acres were required in this case for the Panhandle Clay Loam Situation and a maximum acreage of 1,191 on the Eastern Clay Loam Situation.

An alternative farm program involving no price supports or wheat allotments with the "minimum resources" hypothesis was also considered. A solution was obtained for only the Eastern Sandy Situation when current land prices were used. Compared to the "minimum resources" results obtained with the present commodity programs, the minimum land

requirements were higher in every instance except for the Cimarron Sandy Situation when no return was assumed for land. Because of the more favorable initial position of grain sorghum and the change in the wheat-sorghum price ratio in favor of sorghum, the land requirement was reduced on this resource situation.

The estimated minimum land requirements to obtain a $5,000 return on the various resource situations are shown in Table XXIV for the alternative long-run adjustments assumed in this study. The results are again based on only current and zero land prices, or a normal return and no return assumed for the land resource. The relationships between the various adjustment hypotheses, and between resource situations, are approximately the same as with the $3,000 return. However, the minimum land requirements are much larger.

Plausibility of Alternative Long-Run Adjustments

The adjustment hypotheses considered in this analysis do not necessarily lead to the size of farm which maximizes profits (in the long-run), or to one which represents an equilibrium size for the area. Each hypothesis suggests somewhat different long-run adjustments. A rough check on the appropriateness of each hypothesis is provided by current and historical adjustments and trends. For example, the average size of farm for the included farms in this study, as specified in Table II, was 958 acres. The average farm size for the Panhandle has ranged from 862 acres in 1940, to 1,085 acres in 1956, to 1,250 acres in 1960 (these Census estimates include ranches). These historical data

TABLE XXIV

ESTIMATED MINIMUM LAND REQUIREMENTS TO OBTAIN A $5,000 RETURN ON SPECIFIED RESOURCE SITUATIONS, WITH ALTERNATIVE LONG-RUN ADJUSTMENTS AND LAND PRICES ASSUMED; OKLAHOMA PANHANDLE

Resource Situations And Land Prices[a]	Long-Run Adjustment			
	Minimum Resources[b]	Minimum Resources With Owned Resources[c]	Minimum Resources With 10 Percent Higher Yields[d]	Minimum Resources With No Price Supports or Allotments[e]
	- Acres -			
Panhandle Clay Loam				
Land-$100/Acre	10,927	4,255	2,486	No Solution
Land-$ 0/Acre	923	884	788	1,083
Eastern Clay Loam				
Land-$ 65/Acre	No Solution	No Solution	No Solution	No Solution
Land-$ 0/Acre	1,938	1,827	1,652	3,114
Cimarron Sandy				
Land-$ 60/Acre	No Solution	No Solution	28,264	No Solution
Land-$ 0/Acre	2,134	2,002	1,551	1,842
Eastern Sandy				
Land-$ 75/Acre	5,379	3,274	2,490	19,636
Land-$ 0/Acre	1,132	1,086	990	1,291

[a]The specified land prices may also represent land interest rates of five and zero percent in a minimum resource model. The zero land prices may also be interpreted as full-owner situations where no return is required for the land factor.

[b]As specified in Chapter IV. The minimum requirements were also determined with land prices at 75 and 50 percent of the current price levels.

[c]As specified in Chapter V. The minimum requirements were also determined with land prices at 75 and 50 percent of the current price levels.

[d]As specified in Chapter V.

[e]As specified in Chapter VI.

and other observations are utilized in this section to tentatively evaluate each hypothesis.

The "minimum resources" adjustments in this study represent various minimal adjustments by farm operators because existing economic forces create a tendency for returns to labor and management to be equated in farm and nonfarm uses. That is, managers aware of the opportunity cost of their mobile resources may seek higher paying, alternative uses for their resources.

The programmed resource requirements for the "minimum resources" hypothesis were either very high with current land prices or no solutions could be obtained. Thus, if this hypothesis is appropriate, substantial farm adjustments can be expected over a long period of time. However, only when no return was assumed for land (zero land prices), were farm sizes driven down to levels consistent with past slow increases in sizes under an economic environment essentially identical to that assumed in this study. Thus, the "minimum resources" hypothesis does not appear to be a good explanation of the trend in farm sizes.

Several explanations may be offered as to why the "minimum resources" adjustment hypothesis may appear or actually be inadequate by itself. Price and technical coefficients and relationships may not have been adequately specified, rapid adjustments in factors and/or factor prices may be forthcoming, observed trends in sizes may not cover a time period of sufficient length, or the hypothesis does not adequately describe effects of the psychological, economic and social forces determining farm organization. In addition, real but limited opportunities to produce

specialty crops or feed livestock could allow average farm sizes to be smaller than those indicated.

If the price and technical coefficients were not adequately specified, and their relationships were badly out of proportion, the minimum resource requirements could possibly be too high. The assumed coefficients could under or over estimate the expected (mathematical) values of such items as crop yields. However, most of the technical coefficients in this study are based on experimental work and estimates by specialists. They are largely based on the best sources and information presently available.

Assuming that the minimum resource requirements are indications of the actual requirements for specified incomes, adjustments in resource prices might be implied. For example, land prices could decline enough to reduce the minimum farm size to a point where minimum resource solutions can be obtained. However, this development does not appear likely. Land prices in the Panhandle have apparently been rising for some time.[3] Much of the increase in land values may have come from nonagricultural factors. However, an attempt was made to remove effects of these factors on land prices used in this study. Even if land prices should decline, it is doubtful that they will drop to 50 percent of their current levels--the reduction in land prices needed to secure solutions on several of the resource situations in this study. Such a drop in land prices would indicate that past land buyers have been irrational in their purchases.

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[3]Based on unpublished data, Department of Agricultural Economics, Oklahoma State University, Stillwater, Oklahoma.

Presently, there also does not appear to be any evidence that adjustments in rental rates in the Panhandle may be forthcoming in the near future. In Hall's study of the Panhandle region, he concluded that "...institutional rental rates are not a deterrent to renting land for those farmers who have machinery with sufficient capacity to handle additional land."[4] In addition, usual rental rates in the area are lower than the computed return to land (using agricultural values of land and five percent interest). Adjustments in other factor prices (labor, capital, and purchased nonfarm inputs) are also improbable because of the competition for these resources in nonfarm employments. Thus, it does not appear to be a likely development that resource prices will drop and thereby reduce resource requirements.

Specialty crops and nonland based activities, such as livestock feeding, were not considered as adjustment opportunities in this analysis. The introduction of these activities could alter the minimum resource requirements obtained in this study. However, specialty crops are limited as general production alternatives in the Panhandle because of uncertain market potentials, high labor requirements which must be met by migratory labor in some instances, and farmer preferences. Livestock feeding requires a large amount of capital and a high level of management, and presents much risk. Hence, these activities are not considered to be general production alternatives. However, businesses utilizing intermediate products, such as feeder animals and feed, could

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[4]Harry H. Hall, "Short Run Adjustment Opportunities for Oklahoma Panhandle Farmers." (Unpublished M.S. thesis, Oklahoma State University, 1964), p. 72.

be analyzed separately and then introduced into this analysis. Different types of farm firms (and their corresponding resource requirements) could then be combined, almost in a linear fashion, into an infinite combination of firms.

Since the preceding explanations of the high resource requirements associated with the "minimum resources" hypothesis are not entirely satisfactory, alternative adjustment hypotheses might provide better estimates of present and future farm sizes. Several alternative adjustment hypotheses were placed in the minimum resources framework. The "owned resources" hypothesis is one which appears to offer a more reasonable explanation of the trend in farm sizes.

Many farm operators in the Oklahoma Panhandle own some resources. Over one-fifth of all operators are full-owners, and over one-half are part-owners.[5] Some farm operators may be satisfied with a specified return to their owned resources rather than just to operator labor and management. Strong values attached to the "agrarian life" could explain such a decision criterion, as could lack of knowledge, work or area preferences, and so on. However, the return must be sufficiently large to provide a "satisfactory" family income and maintain financial solvency. If farmers have this decision criterion and own substantial amounts of resources, resource requirements for specified income levels will naturally be smaller. The programming results for this study indicate that this hypothesis may have some merit. When land prices

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[5]United States Department of Commerce, United States Census of Agriculture, Bureau of the Census (Washington, 1959).

were allowed to drop to zero (which can be interpreted to mean that all the land is owned and no separate return is assumed), farm sizes declined considerably. Additionally, with specified levels of owned resources assumed, as in Chapter V, the minimum requirements were again reduced substantially toward the current size trends. Thus, there is some basis for inferring that farm operators think in terms of returns to owned resources, rather than returns to operator labor and management. Additional support of this hypothesis might come from an analysis of the general level of agricultural incomes over a number of years. Although product prices have been moderately high, returns to individual resources have been low (compared to earnings in alternative employments).[6] This might partially indicate that farmers will accept a low return for their owned resources, if the total disposable income meets the minimum income requirement. A persistence of low incomes would thus be inconsistent with usual models of rational economic behavior, but consistent with decision models used in this study.

Alternative yield expectations offer another explanation for the high resource requirements which were obtained in the minimum resource model. Farm operators may have different expectations about yields and resulting total revenues.[7] Failure to take into consideration crop failures may result in anticipations which are higher than the

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[6]For example, see Table IV.

[7]Farmers may also have different product price anticipations which can result in different revenues.

mathematical expectations. If farm operators have these high anticipations, their adjustments in farm size will not be of the same magnitude as those who anticipate the expected yield levels. Also, there is often a "bunchiness" of good years or bad years.[8] If operators correctly anticipate these years, their long-run adjustments may be quite different from those of operators who use long-run expected crop yields. That is, different "yield expectations" may result in different farm sizes than those previously obtained. The programming results with yields increased by 10 percent appear to lend some support to this hypothesis. Farm sizes were substantially reduced to approximate current levels when yields were increased by 10 percent.

It is quite possible that there may be some interaction between the "owned resources" and "yield expectations" hypotheses. Some operators may have high yield expectations, and choose farm plans which provide acceptable returns to all their owned resources. The long-run adjustments in this case could be quite different from those previously specified. For example, a beginning farmer could luckily or shrewdly initiate his farming business at the first of a series of good crop years. His success could be manifest in substantial land and equipment equities. Should an unfavorable series of years then occur, his return to all owned resources might be sufficient for family needs and weathering the bad years, and even allow some additional land investment. Thus, his original high yield expectations (or lack of prior

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[8]For example, see Robert W. Greve, James S. Plaxico, and William F. Lagrone, Production and Income Variability of Alternative Farm Enterprises in Northwest Oklahoma, Oklahoma Agricultural Experiment Station Bulletin B-563 (Stillwater, 1960), pp. 20-25.

analysis) combined with the unique decision criterion of obtaining acceptable total returns from all resouces may keep him in business for a life time. However, his farm business might appear inefficient in terms of size and level of returns when analyzed in the usual economic framework.

Implications

Of the adjustment hypotheses which were considered in this study, the "minimum resources" hypothesis does not seem to be an adequate explanation of the trend in farm sizes by itself. The "owned resources" and "high yield expectations," or the interaction of these two, all appear to be more relevant adjustment hypotheses for farm operators in the Panhandle, when history is used as a check.

Assuming that farmers do choose farm plans which provide acceptable returns to their owned resources and/or possess different expectations, a number of developments appear likely in the Panhandle. The total number of farms and farmers will apparently continue to decline because of the continued demand for the land resource to obtain units of the required size, and the tendency for equilization of earnings to labor and management in different sectors of the economy. Programming results for the Panhandle Clay Loam Situation indicate that the present farm size is approached only when no return is assumed for land. Thus, increases in size levels could be expected to be forthcoming with various tenure situations and returns to land assumed. The number of farms and farmers could therefore be expected to decline.

The total acreages of the major crops apparently will not change significantly with the reduction in number of farms and farmers (assuming no drastic change in farm programs). For example the entire wheat allotment was almost always utilized in the programming results for the Panhandle Clay Loam Situation (the largest resource situation in this study). With no potential changes in the acreages of the major crops, farm output will remain approximately the same. The development and adoption of new technology might result in a slight increase in total output in the long-run.

The programming results for this study again indicate that grain sorghum is most adapted to the sandy soils, and wheat to the hardlands. Barring any drastic changes in government programs, these two enterprises will probably continue as the dominant ones in the Panhandle. The major livestock enterprises will probably continue to be various beef cattle systems, although buy-sell feeder systems utilizing alternative pastures may increase in importance. While some of the buy-sell systems are relatively profitable, they are also quite variable and risky, and thus may be limited in use in many Panhandle farms. However, farm sizes would be higher if buy-sell activities were eliminated.

Assuming that farmers adjust by selecting farm plans which provide acceptable returns to their owned resources, the supply of agricultural products may be quite inelastic.[9] By choosing such farm plans, operators do not require as high product prices to cover specified costs as

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[9]Assuming that product prices and farm equity levels are originally high, and farms are efficiently organized in the region.

would normally be needed with plans which provide a specified level of return to just operator labor and management after all other costs are paid. Thus, prices would have to fall to much lower levels before operators would change enterprises, and thereby affect the supplies of the major products in the region. Alternatively stated, resources used in farming might be subject to some degree of fixity. As long as product prices vary over some given range, farm operators would not have to reassess the "values" of these resources and change the amounts used in farming.

"Owned resources" may have an impact on resource prices in the Panhandle region. As operators with large amounts of owned resources expand their farm sizes, the number of farms and farmers in the region will be reduced. Such changes eventually reduce the amount of slack labor on smaller farms and related businesses. Thus, the total labor supply is affected, and there may be increased wage rates for hired labor. This may be partially offset by the adoption of technology not foreseen in this study and the substitution of capital for labor. However, labor rates will probably increase under a favorable national economic environment. Price increases of mobile resources, such as labor and capital, will be limited by nonfarm opportunities.

Land prices have been increasing for some time in the Panhandle. Much of the increase appears to have come as a result of nonagricultural factors such as minerals and locations relative to urban areas. It would appear that land prices used in this study (reflecting the agricultural value of the land) could need to fall because of the results obtained under the "minimum resources" hypothesis. No solutions would

be obtained on two resource situations with current land prices, and price levels might be expected to fall for these situations. However, if the "owned resources" hypothesis is relevant, this adjustment may not be forthcoming. By selecting farm plans which provide acceptable returns to all owned resources, some capital may be available for expanding the farm size and in competing for available land in the area. Farmers with owned resources and an agrarian or locational orientation may thus bid against each other for land resources and maintain or increase land price levels.

Government programs may exert a strong influence upon the Oklahoma Panhandle. Programs which adversely affect the prices of wheat and grain sorghum will greatly influence the total returns of farm operators and their long-run adjustments, because of the inelastic demand for these products and the lack of production alternatives in the region. Drastic changes in these programs may have a tremendous impact on the resource use and returns in the Panhandle. Farm operators who act according to the "owned resources" hypothesis will not face adjustments as severe as other operators in the area, until product prices fall to lower levels.[10]

Regardless of the type of government programs in existence, a number of farm operators will continue to migrate from the Panhandle region as part of the adjustment process in which farm sizes will increase. In most instances, these people will need some training in making the transition. Programs which will help facilitate this

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[10]See Tables XXI and XXII.

out-migration and retraining will speed up the adjustment process and contribute to national economic growth.

With a reduction in the number of farms and farmers, there will naturally be repercussions for agribusinesses, consumer or service businesses, local governments, schools, churches and other groups in the Panhandle. For example, although some agribusiness groups may survive and prosper, many businesses may be eventually forced to leave the area. All groups must consider location, trade volumes, and other such factors in making new capital investments. There will be a need for adjustments in the location and nature of roads, schools, churches, and governmental services. Long-run agricultural adjustments are thus not simply "agricultural problems."

Limitations of Study and Suggestions for Future Research

The maximum profit and equilibrium farm sizes depicted in the conceptual model for this study were not estimated empirically. These farm sizes would appear to be larger than the sizes associated with the minimum resource adjustments in this study. Further research, possibly utilizing variable resource programming, could be directed to estimating these high profit and equilibrium points.

The technical coefficients, such as yields and percentages of nonharvested cropland, were extremely difficult to estimate for this Panhandle region, because of the high variability associated with the climate and weather. Although crop yields were varied in one phase of this study, additional variations might prove to be useful in analyzing potential adjustments.

Off-farm work and part-time farming were ignored in this study. Income from off-farm employment would substantially reduce the minimum resource requirements needed for desired income levels. Part-time farming can be easily incorporated into the minimum resource model for this study. This would be useful for pointing out the resource requirements of farmers who cannot or will not make the adjustments needed by full-time operators.

Ways and means of acquiring capital and obtaining land were not considered in this study. Detailed research is needed on methods of managing capital flows under varying environmental conditions so as to increase farm sizes to the levels needed to obtain desired incomes. The capital market, particularly policies of credit institutions, can exert a strong influence on potential adjustments by farm operators.

Finally, this study was concerned with an analysis of potential rather than probable long-run adjustments. The results and related implications were based on specific assumptions pertaining to technical, economic, and institutional conditions. Changes in any of these conditions may well lead to different results and implications.

CHAPTER VIII

SUMMARY

The major purpose of this study was to develop and examine potential long-run adjustments for farm operators in the Panhandle region of Oklahoma. The specific objectives of the study were to develop alternative adjustment hypotheses; to determine the minimum resource requirements needed to obtain specified returns to operator labor and management under different adjustment hypotheses; to specify the combinations of farm enterprises consistent with the minimum resources associated with specified income levels; to appraise the effects of changes in land prices, owned resources, and yield levels on minimum resource requirements and enterprise combinations; and to examine the implications of different farm programs on resource requirements and enterprise combinations.

Four dryland resource situations were developed for the Panhandle region. They were the Panhandle Clay Loam, Eastern Clay Loam, Cimarron Sandy, and Eastern Sandy situations. These resource situations were developed on the basis of differences in soils, geographic locations, and productivity resulting from rainfall differences.

Enterprises not considered general adjustment opportunities were excluded from this analysis. Admissible crop enterprises were wheat, grain sorghum, forage sorghum, small grain grazing, forage sorghum

grazing, and reseeding cropland to native grasses. Alternative livestock enterprises were limited to beef cow herds and selected feeder calf systems.

Linear programming techniques were used to determine the minimum resource requirements and enterprise combinations needed to earn specified returns to operator labor and management on each of the four resource situations. The levels of return assumed for this study were $3,000 and $5,000. Alternative assumptions about support prices and allotments, owned resources, yields, and land prices were used in estimating the minimum requirements.

The approximate 1960-61 support prices and allotments were used in the analysis pertaining to the present farm programs. The remaining product and factor prices were based on current estimates for the area. No support prices or allotments were assumed in one phase of the study. The land price variations used in this study were 0, 50, 75, and 100 percent of the assumed current levels.

Alternative long-run adjustment hypotheses for farm operators were developed in a minimum resources framework. A conceptual model for the "minimum resources" adjustment, as well as the profit maximizing and equilibrium adjustments for an area, was developed. Alternative long-run adjustments in the minimum resource setting included hypotheses recognizing the effects, on farm plans, of owned resources, yield expectations, and the interaction of these items. Other factors affecting various long-run adjustments were also analyzed.

The minimum resource requirements needed for a $3,000 and $5,000 return to operator labor and management under the present commodity

programs were quite high or unobtainable with current land prices. At current land price levels, 5,014 acres were required on the Panhandle Clay Loam Situation, and 2,783 acres on the Eastern Sandy Situation in order to earn a $3,000 return. Neither income target could be obtained for either the Cimarron Sandy or Eastern Clay Loam situations until the land price was dropped to 50 percent of the assumed current price level. Decreasing land prices substantially reduced the minimum resource requirements for all resource situations. With no return assumed for land, or zero land prices, the minimum requirements approximated current farm sizes. For example, the minimum amount of land required for a $3,000 return ranged from 670 acres on the Panhandle Clay Loam Situation to 1,379 acres on the Eastern Clay Loam Situation.

The introduction of "owned resources" into the minimum resource model substantially reduced the minimum land requirements. However, solutions could still not be obtained on the Eastern Clay Loam Situation and Cimarron Sandy Situation with land at the assumed current price levels. The land price had to be decreased to 50 percent of the current level on the Eastern Clay Loam Situation before a solution was finally obtained.

Introducing higher yields and/or "yield expectations" into the minimum resource setting again greatly reduced the land requirements. Nevertheless, a solution could still not be obtained for the Eastern Clay Loam Situation with current land prices. The minimum amount of land required for the assumed income levels in this study was obtained when no return for land and 10 percent higher yields were assumed.

An alternative farm program involving no price supports or wheat allotments was analyzed as one phase of this study. With current land prices, a solution was obtained on only the Eastern Sandy Situation. With no return assumed for land, solutions were obtained. However, the land requirements were higher than those with the present commodity programs on all resource situations except the Cimarron Sandy. Because of the more favorable initial position of grain sorghum and the change in the wheat-sorghum price ratio in favor of sorghum, the land requirement was reduced on this sandy resource situation.

Of the adjustment hypotheses considered in this study, the hypothesis that farmers wish to acquire some minimum amount of resources sufficient to obtain an acceptable return to labor and management does not appear to be an adequate explanation of the trend in farm sizes by itself. Different adjustment hypotheses recognizing effects of owned resources, alternative yield expectations, and the interaction of these items appear to be more plausible explanations of present and prospective farm sizes.

Regardless of which of the adjustment hypotheses in this study is emphasized, a number of developments appear likely in the Panhandle region. The number of farms and farmers will probably continue to decline because of the demand for land resources and the tendency for equalization of earnings to labor and management in different sectors of the economy. For commodity price levels considered in this study, the total acreages of the major crops apparently will not change greatly (assuming no drastic change in farm programs). With no significant changes in acreages, prospects are that total output will not be

greatly altered. The supply of the major agricultural products may be quite inelastic because many farm operators apparently choose farm plans which provide some acceptable return to their "owned resources."

Wage rates for agricultural labor may increase because of the number of farmers migrating from the region and the reduction in the amount of slack labor on small farms. It does not appear that the present trend of increasing land prices will be altered because of the effects of nonagricultural influences and "owned resources" in plans of farm operators.

Barring a drastic change in programs, wheat and grain sorghum will probably continue as the dominant enterprises in the Panhandle along with beef cattle systems. Feeder systems, utilizing different pastures, appeared in program solutions, and may possibly increase in importance.

Government programs may exert a strong influence upon resource use and returns within the Panhandle. Drastic changes in programs may have a pronounced effect upon the area because of the inelastic demand for farm products and the lack of production alternatives in the region. Programs and national economic conditions which facilitate the out-migration and retraining of farm operators who cannot make needed long-run changes will speed up the adjustment process. With the reduction in farms and farmers, there will naturally be some accompanying repercussions for agribusinesses, consumer or service businesses, schools, churches, and other groups in the Panhandle.

Additional research might be directed to determining the "equilibrium" farm sizes depicted in this study. The implications of off-farm work and part-time farming opportunities need to be determined as part

of the adjustment process of farm operators in a high-risk area, since part-time farmer adjustments may be of a different type and magnitude than those of full-time farmers. Further study is also needed on ways and means of acquiring capital and obtaining land. Research is needed on methods of managing capital flows under varying environmental conditions so as to increase farm sizes to levels needed to obtain desired incomes. The capital market, particularly policies of credit institutions, can exert a strong influence on potential adjustments by farm operators.

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A P P E N D I C E S

APPENDIX A, TABLE I

DEFINITIONS OF LAND RESOURCE SITUATIONS AND YIELD LEVELS BY PRODUCTIVITY CLASS: CLAY LOAM SOILS, OKLAHOMA PANHANDLE

Dry Land

Management Group I. This group includes the clay loam soils which have slight erosion hazards, but are primarily limited by the climate (low rainfall).

C_a - Productivity Class "a." Richfield loam soils, thick surface, Beaver County (or other equivalents).

C_b - Productivity Class "b." Richfield clay loam soils, Texas County (or other equivalents).

Management Group II. This group includes the clay loam soils which have some erosion hazards and benefit greatly from terracing and contour production.

C_c - Productivity Class "c." Ulysses-Richfield complex, Beaver County (or other equivalents).

C_d - Productivity Class "d." Mansker loam soils, Cimarron County (or other equivalents).

Item	Unit	Productivity Class			
		C_a	C_b	C_c	C_d
		(Yield Per Acre)			
Crop:[a]					
Wheat	Bu.	14	12	10	8
Grain Sorghum	Lb.	900	550	800	550
Forage Sorghum	Ton	1.6	1.2	1.4	1.1
Grazing:[b]					
Grain Sorghum Stubble	AUM	.20	.12	.15	.10
Harvested Small Grain	AUM	.30	.25	.20	.15
Grazed Out Small Grain	AUM	2.10	1.90	1.70	1.50
Grazed Out Forage Sorghum	AUM	1.10	.90	1.00	.80
Reseeded Cropland[c]	AUM	1.00	.90	.80	.70

[a]Yields are expected values and are based upon harvested acreages. A fallow, failure or idle acreage of 20 percent of the total cropland is assumed.

[b]Native range grazing yield is .6 AUM per acre of range.

[c]Grazing beginning with the third year. No yield is available the first two years.

Source: Hall, et al.

APPENDIX A, TABLE II

DEFINITIONS OF LAND RESOURCE SITUATIONS AND YIELD LEVELS BY PRODUCTIVITY CLASS: SANDY SOILS, OKLAHOMA PANHANDLE

Dry Land

Management Group I. This study includes all sandy soils which possibly need terracing and contour production for erosion control and water conservation.

S_a - Productivity Class "a." Sandy soils of Beaver and Texas counties (with the exception of the Dalhart loamy fine sand and Otero fine sandy loam soils in Texas County).

S_b - Productivity Class "b." Sandy soils of Cimarron County (with the exception of the Dalhart loamy fine sand and Dalhart fine sandy loam soils, 0 to 3% slopes, eroded).

Management Group II. This group includes the sandy soils which require specific measures to limit erosion, particularly wind erosion.

S_c - Productivity Class "c." Dalhart loamy fine sand soils in Texas and Cimarron counties (or other equivalents).

Item	Unit	Productivity Class		
		S_a	S_b	S_c
		(Yield Per Acre)		
Crop:[a]				
Wheat	Bu.	11	7	5
Grain Sorghum	Lb.	1,200	1,000	900
Forage Sorghum	Ton	2.0	1.6	1.4
Broomcorn	Lb.	400	325	250
Grazing:[b]				
Grain Sorghum Stubble	AUM	.25	.20	.00
Harvested Small Grain	AUM	.30	.20	.18
Grazed Out Small Grain	AUM	1.70	1.50	1.20
Grazed Out Forage Sorghum	AUM	1.30	1.10	.80
Reseeded Cropland[c]	AUM	.90	.80	.70

[a]Yields are expected values and are based upon harvested acreages. A fallow, failure or idle acreage of 20 percent of the total cropland is assumed.

[b]Native range grazing yield is .6 AUM per acre of range.

[c]Grazing beginning with the third year. No yield is available the first two years.

Source: Hall, et al.

APPENDIX B, TABLE I

ASSUMED PRICES PAID AND RECEIVED BY FARMERS, OKLAHOMA PANHANDLE

Item	Unit	Price (Dollars)
Prices Paid		
Seed and Feed:		
Wheat Seed	Bu.	2.05
Grain Sorghum Seed	Cwt.	15.00
Forage Sorghum Seed	Cwt.	7.00
Clay Loam Land Grass Mixture Seed	Lb.	1.17
Sandy Land Grass Mixture Seed	Lb.	1.13
Cottonseed Cake	Ton	76.00
Salt	Cwt.	1.00
Custom Rates:		
Combining Wheat	Acre	3.00
Combining Grain Sorghum	Acre	2.50
Hauling Wheat and Grain	Bu.	.07
Binding Forage Sorghum	Acre	3.00
Shocking Forage Sorghum	Acre	1.00
Hauling and Stacking Forage Sorghum	Ton	1.50
Fuel and Lubricants:		
Gasoline	Gal.	.22
L. P. Gas	Gal.	.08
Diesel Oil	Gal.	.14
Motor Oil	Gal.	1.04
Lubricant	Lb.	.20
Labor	Hr.	1.25
Land:[a]		
Panhandle Clay Loam	Acre	100.00
Eastern Clay Loam	Acre	65.00
Cimarron Sandy	Acre	60.00
Eastern Sandy	Acre	75.00
Prices Received		
Wheat	Bu.	1.65[b]
Grain Sorghum	Cwt.	1.56[b]
Beef	Cwt.	[c]

[a]Land price excludes values for minerals and dwelling.

[b]Approximate 1960-61 support prices adjusted for storage differential.

[c]See Appendix B, Table II.

APPENDIX B, TABLE II

ASSUMED PRICES FOR CALVES, STEERS AND CULL COWS BY MONTHS, OKLAHOMA PANHANDLE[a]

Class and Grade	Monthly Average												Yearly Average
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
	(Price Per Cwt.)												
Calves													
Good and Choice 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]Approximate current price levels adjusted for commodity cycle.

Source: Blakley, Leo V., and Walker, Odell L., Unpublished Data, Department of Agricultural Economics, Oklahoma State University, 1962.

APPENDIX B, TABLE III

ESTIMATED OPERATING AND OWNERSHIP COSTS FOR ALTERNATIVE MACHINERY SETS, OKLAHOMA PANHANDLE

Machine	Average[a] Annual Investment (Dol.)	Hours[b] Useful Life (Hr.)	Years[c] Useful Life (Yr.)	Annual[d] Fixed Cost (Dol.)	Per Acre[e] Annual Fixed Costs (Dol.)	Machine[f] Variable Cost Per Acre (Dol.)
One 4-Plow Tractor and Equipment						
Tractor, 4-plow	2,344.20	12,000	10	489.83	0.408[g]	0.897[h]
Chisel, 15 ft.	579.60	2,500	16	89.29	0.112	0.057
Cultivator, 4-row	295.80	2,500	18	42.13	0.047	0.131
Drill, 16-10	511.20	1,200	10	108.43	0.167	0.202
Harrow, 4-section	121.20	2,500	16	18.47	0.014	0.003
Lister, 4-row	414.00	1,200	15	66.09	0.157	0.143
Oneway, 15 ft.	697.20	2,000	12	128.32	0.148	0.096
Total	4,963.20			942.56		
Two 4-Plow Tractors and Equipment						
Tractors, (2) 4-plow	4,688.40	12,000	10	979.66	0.816[g]	0.897[h]
Chisel, 15 ft.	579.60	2,500	16	89.29	0.112	0.057
Cultivator, 4-row	295.80	2,500	18	42.13	0.047	0.131
Drills (2) 16-10	1,022.40	1,200	10	216.86	0.167	0.202
Harrow, 4-section	121.20	2,500	16	18.47	0.014	0.003
Lister, 4-row	414.00	1,200	15	66.09	0.157	0.143
Oneway (2) 15 ft.	1,394.40	2,000	12	256.64	0.148	0.096
Total	8,515.80			1,669.14		

[a]A salvage value of 20% of new machine cost was used. This is based on the practice of Panhandle farmers who trade machines before they are completely worn out.

[b]Estimates by the American Society of Agricultural Engineers published in the 1958 Agricultural Engineers Yearbook.

[c]Averages of estimates by Oklahoma Panhandle farmers.

[d]Includes depreciation, interest on investment, insurance and taxes.

[e]Estimates based on the assumption that the machine is used enough to wear out during its useful life. Estimates for lower levels of use can be obtained by dividing the annual fixed cost by the number of acres.

[f]Estimates for the machine only. Power cost is not included.

APPENDIX B, TABLE III (Continued)

[g]Fixed cost per hour of use when the tractor is used enough to wear out during its useful life.

[h]Variable cost per hour of use.

Source: Hall, et al.

APPENDIX B, TABLE IV

ASSUMED ANNUAL OVERHEAD COSTS FOR A 640 ACRE FARM, OKLAHOMA PANHANDLE[a]

Item	Investment	Annual Cost
	(Dollars)	
A. Depreciation and Maintenance:		
Buildings	2,670	261
Livestock Equipment:		
Permanent Fencing	690	110
Temporary Fencing	210	35
Salt Box, Corral, 700 gal. Water Tank, etc.	80	15
B. Machinery Fixed Costs:		
1 4-Plow Tractor and Equipment	4,965	943
Shop Tools	270	50
Pick-up Truck, 1/2 ton	1,230	--
Interest on Investment	--	75
Depreciation	--	305
Gas, Oil, and Lubrication	--	405
Repairs	--	105
Insurance (Liability only)	--	25
Butane Storage Tank (500 gal.)	155	8
Grain Wheel Auger and 4-Wheel Trailer	275	51
C. Taxes:		
Pick-up Truck (License)	--	13
D. Miscellaneous:		
Telephone	--	75
Bookkeeping and Tax Service	--	40
Insurance on Buildings and Workers	--	100
Total Specified Overhead Costs	10,545	2,616

[a]Land taxes, nonharvested cropland costs and interest on land are specified in Appendix B, Table V.

Source: Hall, et al.

APPENDIX B, TABLE V

ASSUMED PER ACRE OVERHEAD COSTS BY RESOURCE SITUATIONS, OKLAHOMA PANHANDLE AS SET UP FOR THE MODEL OF THIS STUDY[a]

Item	Panhandle Clay Loam	Eastern Clay Loam	Cimarron Sandy	Eastern Sandy
		(Dollars)		
Interest on Land	5.00	3.25	3.00	3.75
Land Tax[b]	.78	.55	.76	.60
Nonharvested Cropland Cost[c]	.22	.13	.21	.15
Building Depreciation and Maintenance	.15	.09	.14	.10
Livestock Equipment Depreciation and Maintenance	.41	.41	.41	.41
Machinery Overhead Costs	.96	.56	.94	.65
Total Overhead Cost Per Acre	7.52	4.99	5.46	5.66

[a]Whole farm overhead costs, as developed from Appendix B, Table IV, amount to $1,161.

[b]Assumes $.88 per acre of cropland and $.24 per acre of pasture and other land.

[c]Includes cost of fallow, abandoned crops, etc.

APPENDIX B, TABLE VI

AN EXAMPLE OF A LINEAR PROGRAMMING TABLEAU USED IN THIS STUDY; PANHANDLE CLAY LOAM SITUATION, OKLAHOMA PANHANDLE

Item	Unit	Row	P_0	Wheat				Grain Sorghum			
				P_1	P_2	P_3	P_4	P_5	P_6	P_7	P_8
Cropland:											
C_a	Acre	101	3.50	1.0				1.0			
C_b	Acre	102	37.71		1.0				1.0		
C_c	Acre	103	13.50			1.0				1.0	
C_d	Acre	104	12.56				1.0				1.0
Wheat Allotment	Acre	105	42.72	1.0	1.0	1.0	1.0				
Native Pasture	AUM	106	7.68								
Operator Labor:											
Jan.-Apr.	Hour	107	538					.12	.12	.12	.12
May-July	Hour	108	506	.47	.47	.47	.47	1.47	1.47	1.47	1.47
Aug.-Sept.	Hour	109	352	.57	.57	.57	.57				
Oct.-Dec.	Hour	110	462								
Total Capital	Dol.	111	.1	2.43	2.43	2.43	2.43	2.58	2.58	2.58	2.58
Annual Capital	Dol.	112	.1	2.22	2.22	2.22	2.22	2.30	2.30	2.30	2.30
Hay	Ton	113	.01								
Grazing:											
Wheat											
Oct.1-Mar.1	AUM	114	.1	-.30	-.25	-.20	-.15				
Mar.1-May 30	AUM	115	.1								
Sorghum											
Oct.1-Mar.1	AUM	116	.1					-.20	-.12	-.15	-.10
Wheat	Bu.	117	.1	-14	-12	-10	-8				
Grain Sorghum	Cwt.	118	.1					-9.0	-5.5	-8.0	-5.5
Net Income	Dol.	119	4913	-6.41	-6.27	-6.13	-5.99	-6.20	-5.77	-6.08	-5.77
Min. Land (C_j)											

APPENDIX B, TABLE VI (Continued)

	Forage Sorghum				Small Grain Grazing				Forage Sorghum Grazing			
Row	P_9	P_{10}	P_{11}	P_{12}	P_{13}	P_{14}	P_{15}	P_{16}	P_{17}	P_{18}	P_{19}	P_{20}
101	1.0				1.0				1.0			
102		1.0				1.0				1.0		
103			1.0				1.0				1.0	
104				1.0				1.0				1.0
105												
106												
107	.12	.12	.12	.12					.12	.12	.12	.12
108	1.47	1.47	1.47	1.47	.47	.47	.47	.47	1.47	1.47	1.47	1.47
109					.57	.57	.57	.57				
110												
111	2.55	2.55	2.55	2.55	2.94	2.94	2.94	2.94	2.55	2.55	2.55	2.55
112	2.26	2.26	2.26	2.26	2.49	2.49	2.49	2.49	2.27	2.27	2.27	2.27
113	-1.6	-1.2	-1.4	-1.1								
114					-.30	-.25	-.20	-.15				
115					-1.80	-1.65	-1.50	-1.35				
116									-1.1	-.90	-1.0	-.80
117												
118												
119	-8.95	-8.35	-8.65	-8.20	-2.94	-2.94	-2.94	-2.94	-2.55	-2.55	-2.55	-2.55
Min (C_j)												

APPENDIX B, TABLE VI (Continued)

Row	Reseeded Cropland		Feeders							
	P_{21}	P_{22}	P_{23}	P_{24}	P_{25}	P_{26}	P_{27}	P_{28}	P_{29}	P_{30}
101										
102										
103	1.0									
104		1.0								
105										
106	-.8	-.7	6.70	4.90	4.90	4.25	.50	.50	.50	.50
107			2.80	3.60	2.80	.55	1.50	1.20	1.62	2.12
108			1.50	1.50	1.50	1.50	1.02	1.02		
109			1.00	1.00	1.00	1.00				
110			2.30	2.40	2.30	.55	1.14	1.04	1.14	2.30
111	2.90	2.90	118.10	118.10	118.10	129.18	110.17	110.17	109.42	116.11
112	2.90	2.90	114.07	114.07	114.07	64.37	63.17	63.17	40.08	41.36
113			.025	.80	.025		.45	.025	.33	.025
114							1.40	1.40	2.4	
115							1.40	1.40		
116					1.80			1.0		3.10
117										
118										
119 Min. Land (C_j)	-.20	-.20	32.27	32.27	32.27	23.13	42.94	42.94	17.79	11.10

APPENDIX B, TABLE VI (Continued)

	Cow-Calf						
Row	P_{31}	P_{32}	P_{33}	P_{34}	P_{35}	P_{36}	P_{37}
101							
102							
103							
104							
105							
106	13.4	13.4	11.4	11.0	9.0	9.0	9.0
107	8.10	9.42	9.53	8.10	4.94	6.50	5.28
108	1.12	1.92	1.12	1.12	1.04	1.44	1.04
109	.36	.96	.36	.36	1.00	1.00	1.00
110	1.58	2.22	1.58	1.58	5.78	5.78	5.78
111	205.27	212.85	205.27	200.47	200.47	215.11	205.27
112	201.03	204.82	201.03	197.43	197.43	204.75	201.03
113	.028	.028	.84	.28	.42	.42	.42
114				2.8	2.8	2.8	
115							
116					1.7	1.7	2.8
117							
118							
119 Min. Land (C_j)	74.48	72.51	74.48	79.28	27.26	74.00	74.46

APPENDIX B, TABLE VI (Continued)

Row	Hire-Labor Jan.-Apr. P_{38}	Hire-Labor May-July P_{39}	Hire-Labor Aug.-Sept. P_{40}	Hire-Labor Oct.-Dec. P_{41}	Borrow Capital P_{42}	Buy Hay P_{43}	Sell Wheat P_{44}	Sell Grain Sorghum P_{45}	Buy Land P_{46}
101									-.0350
102									-.3771
103									-.1350
104									-.1256
105									-.4272
106									-.0768
107	-1.0								
108		-1.0							
109			-1.0						
110				-1.0					
111	1.25	1.25	1.25	1.25	-1.0	25.00			
112	.63	.63	.63	.63	-1.0	25.00			
113						-1.0			
114									
115									
116									
117							1.0		
118								1.0	
119	-1.25	-1.25	-1.25	-1.25	-.06	-25.00	1.65	1.56	-7.52
Min. Land (C_j)									-1.0

APPENDIX C, TABLE I

ESTIMATED MINIMUM REQUIREMENTS FOR $3,000 RETURN TO OPERATOR LABOR AND MANAGEMENT WITH SPECIFIED LAND PRICES, NO OWNED LAND ON MACHINERY COMPLEMENT, PANHANDLE CLAY LOAM SITUATION, OKLAHOMA PANHANDLE

Item	Unit	Land Price Per Acre			
		$100[a]	$75	$50	$0
Total Land	Acres	5,014	1,542	985	670
Cropland	Acres	4,217	1,297	828	563
Wheat	Acres	2,142	659	421	286
Grain Sorghum	Acres	483	149	92	84
Forage Sorghum	Acres	118	36	26	20
Grazed Out Small Grain	Acres	450	139	89	60
Reseeded Cropland	Acres	179	55	35	0
Cows	Animal	22	7	5	2
Feeders	Animal	434	134	85	58
Operator Labor	Hour	1,858	1,289	1,088	758
Hired Labor	Hour	3,599	389	0	0
Investment					
Land and Buildings	Dollars	508,921	117,963	50,850	1,600
Machinery	Dollars	24,719	7,602	5,240	5,240
Total Operating Capital	Dollars	65,445	19,238	12,125	7,942
Total Capital Requirement	Dollars	599,085	144,803	68,215	14,782
Gross Income	Dollars	119,344	36,717	23,481	16,086
Operating and Overhead Expense	Dollars	85,461	26,454	17,024	12,092
Return to Land[b]	Dollars	25,070	5,783	2,463	0
Machinery Fixed Costs	Dollars	4,813	1,480	994	994
Return to Operator Labor and Management[c]	Dollars	4,414	3,408	3,252	3,171

[a]Assumed current price.

[b]Five percent of the investment in land.

[c]Returns exceed $3,000 because of the adjustment for the difference between the interest on total operating capital and the interest on annual operating capital.

APPENDIX C, TABLE II

ESTIMATED MINIMUM REQUIREMENTS FOR $5,000 RETURN TO OPERATOR LABOR AND MANAGEMENT WITH SPECIFIED LAND PRICES, NO OWNED LAND OR MACHINERY COMPLEMENT, PANHANDLE CLAY LOAM SITUATION, OKLAHOMA PANHANDLE

Item	Unit	Land Price Per Acre			
		$100[a]	$75	$50	$0
Total Land	Acres	10,927	2,563	1,565	923
Cropland	Acres	9,190	2,155	1,316	776
Wheat	Acres	4,668	1,095	668	394
Grain Sorghum	Acres	1,053	247	151	106
Forage Sorghum	Acres	257	60	37	28
Grazed Out Small Grain	Acres	982	230	141	83
Reseeded Cropland	Acres	391	92	56	10
Cows	Animal	48	11	7	3
Feeders	Animal	947	222	136	80
Operator Labor	Hour	1,858	1,565	1,295	1,037
Hired Labor	Hour	10,035	1,215	408	0
Investment					
Land and Buildings	Dollars	1,109,091	196,070	80,598	1,600
Machinery	Dollars	53,870	12,636	7,715	5,240
Total Operating Capital	Dollars	145,366	32,681	19,535	11,071
Total Capital Requirement	Dollars	1,308,327	241,387	107,848	17,911
Gross Income	Dollars	260,090	61,020	37,255	22,119
Operating and Overhead Expense	Dollars	189,965	43,949	26,840	16,125
Return to Land[b]	Dollars	54,635	9,611	3,913	0
Machinery Fixed Costs	Dollars	10,490	2,460	1,502	994
Return to Operator Labor and Management[c]	Dollars	8,162	5,700	5,415	5,236

[a]Assumed current price.

[b]Five percent of the investment in land.

[c]Returns exceed $5,000 because of the adjustment for the difference between the interest on total operating capital and the interest on annual operating capital.

APPENDIX C, TABLE III

ESTIMATED MINIMUM REQUIREMENTS FOR $3,000 RETURN TO OPERATOR LABOR AND MANAGEMENT WITH SPECIFIED LAND PRICES, NO OWNED LAND OR MACHINERY COMPLEMENT, EASTERN CLAY LOAM SITUATION, OKLAHOMA PANHANDLE

Item	Unit	Land Price Per Acre			
		$65[a]	$49	$33	$0
Total Land	Acres	No Solution	No Sulution	3,438	1,379
Cropland	Acres			1,681	674
Wheat	Acres			879	353
Grain Sorghum	Acres			0	91
Forage Sorghum	Acres			55	42
Grazed Out Small Grain	Acres			133	53
Reseeded Cropland	Acres			278	0
Cows	Animal			83	32
Feeders	Animal			129	52
Operator Labor	Hour			1,674	1,228
Hired Labor	Hour			866	0
Investment					
Land and Buildings	Dollars			114,726	1,600
Machinery	Dollars			9,867	5,240
Total Operating Capital	Dollars			35,823	13,968
Total Capital Requirement	Dollars			160,416	20,808
Gross Income	Dollars			41,505	17,339
Operating and Overhead Expense	Dollars			30,993	13,345
Return to Land[b]	Dollars			5,587	0
Machinery Fixed Costs	Dollars			1,925	994
Return to Operator Labor and Management[c]	Dollars			3,432	3,162

[a]Assumed current price.

[b]Five percent of the investment in land.

[c]Returns exceed $3,000 because of the adjustment for the difference between the interest on total operating capital and the interest on annual operating capital.

APPENDIX C, TABLE IV

ESTIMATED MINIMUM REQUIREMENTS FOR $5,000 RETURN TO OPERATOR LABOR AND MANAGEMENT WITH SPECIFIED LAND PRICES, NO OWNED LAND OR MACHINERY COMPLEMENT, EASTERN CLAY LOAM SITUATION, OKLAHOMA PANHANDLE

Item	Unit	Land Price Per Acre			
		$65	$49	$33	$0
Total Land	Acres			6,551	1,938
Cropland	Acres			3,203	948
Wheat	Acres			1,675	496
Grain Sorghum	Acres			0	28
Forage Sorghum	Acres			104	46
Grazed Out Small Grain	Acres			254	75
Reseeded Cropland	Acres			529	113
Cows	Animal	No Solution	No Solution	159	48
Feeders	Animal			245	73
Operating Labor	Hour			1,858	1,545
Hired Labor	Hour			2,982	0
Investment					
Land and Buildings	Dollars			218,607	1,686
Machinery	Dollars			18,801	5,562
Total Operating Capital	Dollars			69,917	19,789
Total Capital Requirement	Dollars			307,325	27,037
Gross Income	Dollars			79,073	23,742
Operating and Overhead Expense	Dollars			59,474	17,657
Return to Land[b]	Dollars			10,930	0
Machinery Fixed Costs	Dollars			3,669	1,085
Return to Operator Labor and Management[c]	Dollars			5,872	5,226

[a]Assumed current price.

[b]Five percent of the investment in land.

[c]Returns exceed $5,000 because of the adjustment for the difference between the interest on total operating capital and the interest on annual operating capital.

APPENDIX C, TABLE V

ESTIMATED MINIMUM REQUIREMENTS FOR $3,000 RETURN TO OPERATOR LABOR AND MANAGEMENT WITH SPECIFIED LAND PRICES, NO OWNED LAND OR MACHINERY COMPLEMENT, CIMARRON SANDY SITUATION, OKLAHOMA PANHANDLE

Item	Unit	Land Price Per Acre			
		$60[a]	$45	$30	$0
Total Land	Acres			3,297	1,356
Cropland	Acres			2,690	1,106
Wheat	Acres			535	290
Grain Sorghum	Acres			1,512	541
Forage Sorghum	Acres			8	1
Grazed Out Small Grain	Acres			97	53
Reseeded Cropland	Acres			0	0
Cows	Animal			24	7
Feeders	Animal			90	49
Operator Labor	Hour	No Solution	No Solution	1,511	951
Hired Labor	Hour			2,175	511
Investment					
Land and Buildings	Dollars			103,691	1,966
Machinery	Dollars			15,760	6,482
Total Operating Capital	Dollars			23,169	9,836
Total Capital Requirement	Dollars			142,620	18,284
Gross Income	Dollars			45,174	19,773
Operating and Overhead Expense	Dollars			34,129	15,498
Return to Land[b]	Dollars			4,946	0
Machinery Fixed Costs	Dollars			3,099	1,275
Return to Operator Labor and Management[c]	Dollars			3,377	3,174

[a]Assumed current price.

[b]Five percent of the investment in land.

[c]Returns exceed $3,000 because of the adjustment for the difference between the interest on total operating capital and the interest on annual operating capital.

APPENDIX C, TABLE VI

ESTIMATED MINIMUM REQUIREMENTS FOR $5,000 RETURN TO OPERATOR LABOR AND MANAGEMENT WITH SPECIFIED LAND PRICES, NO OWNED LAND OR MACHINERY COMPLEMENT, CIMARRON SANDY SITUATION, OKLAHOMA PANHANDLE

Item	Unit	Land Price Per Acre			
		$60	$45	$30	$0
Total Land	Acres			5,759	2,134
Cropland	Acres			4,699	1,741
Wheat	Acres			934	457
Grain Sorghum	Acres			2,642	852
Forage Sorghum	Acres			14	1
Grazed Out Small Grain	Acres			170	83
Reseeded Cropland	Acres			0	0
Cows	Animal			42	12
Feeders	Animal			158	77
Operator Labor	Hour	No Solution	No Solution	1,805	1,207
Hired Labor	Hour			4,636	1,094
Investment					
Land and Buildings	Dollars			181,409	3,094
Machinery	Dollars			27,528	10,201
Total Operating Capital	Dollars			41,515	15,834
Total Capital Requirement	Dollars			250,452	29,129
Gross Income	Dollars			78,912	31,104
Operating and Overhead Expense	Dollars			59,860	24,098
Return to Land[b]	Dollars			8,639	0
Machinery Fixed Costs	Dollars			5,413	2,006
Return to Operator Labor and Management[c]	Dollars			5,689	5,284

[a]Assumed current price.

[b]Five percent of the investment in land.

[c]Returns exceed $5,000 because of the adjustment for the difference between the interest on total operating capital and the interest on annual operating capital.

APPENDIX C, TABLE VII

ESTIMATED MINIMUM REQUIREMENTS FOR $3,000 RETURN TO OPERATOR LABOR AND MANAGEMENT WITH SPECIFIED LAND PRICES, NO OWNED LAND OR MACHINERY COMPLEMENT, EASTERN SANDY SITUATION, OKLAHOMA PANHANDLE

Item	Unit	Land Price Per Acre			
		$75[a]	$56	$38	$0
Total Land	Acres	2,783	1,491	1,160	822
Cropland	Acres	1,567	839	653	463
Wheat	Acres	765	410	319	226
Grain Sorghum	Acres	246	132	103	73
Forage Sorghum	Acres	34	18	14	10
Grazed Out Small Grain	Acres	209	112	87	62
Reseeded Cropland	Acres	0	0	0	0
Cows	Animal	42	23	18	13
Feeders	Animal	209	112	87	62
Operator Labor	Hour	1,695	1,331	1,112	788
Hired Labor	Hour	976	99	0	0
Investment					
Land and Buildings	Dollars	211,508	85,469	45,100	1,600
Machinery	Dollars	9,184	5,240	5,240	5,240
Total Operating Capital	Dollars	36,107	18,820	14,538	10,308
Total Capital Requirement	Dollars	256,799	109,529	64,878	17,148
Gross Income	Dollars	55,347	29,659	23,064	16,355
Operating and Overhead Expense	Dollars	40,102	21,472	16,895	12,361
Return to Land[b]	Dollars	10,436	4,193	2,175	0
Machinery Fixed Costs	Dollars	1,809	994	994	994
Return to Operator Labor and Management[c]	Dollars	3,655	3,335	3,258	3,183

[a]Assumed current price.

[b]Five percent of the investment in land.

[c]Returns exceed $3,000 because of the adjustment for the difference between the interest on total operating capital and the interest on annual operating capital.

APPENDIX C, TABLE VIII

ESTIMATED MINIMUM REQUIREMENTS FOR $5,000 RETURN TO OPERATOR LABOR AND MANAGEMENT WITH SPECIFIED LAND PRICES, NO OWNED LAND OR MACHINERY COMPLEMENT, EASTERN SANDY SITUATION, OKLAHOMA PANHANDLE

Item	Unit	Land Price Per Acre			
		$75[a]	$56	$38	$0
Total Land	Acres	5,379	2,435	1,663	1,132
Cropland	Acres	3,028	1,371	936	637
Wheat	Acres	1,478	669	457	311
Grain Sorghum	Acres	476	215	147	100
Forage Sorghum	Acres	67	30	21	14
Grazed Out Small Grain	Acres	403	182	125	85
Reseeded Cropland	Acres	0	0	0	0
Cows	Animal	82	37	25	17
Feeders	Animal	403	183	125	85
Operator Labor	Hour	1,858	1,657	1,425	1,085
Hired Labor	Hour	3,303	679	169	0
Investment					
Land and Buildings	Dollars	408,804	139,404	64,026	1,600
Machinery	Dollars	17,751	8,036	5,488	5,240
Total Operating Capital	Dollars	71,541	31,370	21,054	14,189
Total Capital Requirement	Dollars	498,096	178,810	90,568	21,029
Gross Income	Dollars	106,948	48,422	33,066	22,512
Operating and Overhead Expense	Dollars	78,281	34,991	23,867	16,518
Return to Land[b]	Dollars	20,171	6,848	3,118	0
Machinery Fixed Costs	Dollars	3,496	1,583	1,081	994
Return to Operator Labor and Management[c]	Dollars	6,319	5,567	5,376	5,252

[a]Assumed current price.

[b]Five percent of the investment in land.

[c]Returns exceed $5,000 because of the adjustment for the difference between the interest on total operating capital and the interest on annual operating capital.

APPENDIX D, TABLE I

ESTIMATED MINIMUM REQUIREMENTS FOR $3,000 RETURN TO OPERATOR OWNED RESOURCES WITH SPECIFIED LAND PRICES, PANHANDLE CLAY LOAM SITUATION, OKLAHOMA PANHANDLE

Item	Unit	Land Price Per Acre			
		$100[a]	$75	$50	$0
Total Land	Acres	1,635	913	776	632
Cropland	Acres	1,375	768	653	532
Wheat	Acres	699	390	331	270
Grain Sorghum	Acres	158	109	97	79
Forage Sorghum	Acres	38	27	26	19
Grazed Out Small Grain	Acres	147	82	70	57
Reseeded Cropland	Acres	58	6	0	0
Cows	Animals	7	3	2	2
Feeders	Animals	142	79	67	55
Operator Labor	Hours	1,315	1,023	876	715
Hired Labor	Hours	465	0	0	0
Investment					
Land and Buildings	Dollars	165,953	70,075	40,400	1,600
Machinery	Dollars	8,061	5,240	5,240	5,240
Total Operating Capital	Dollars	20,463	10,840	9,199	7,496
Total Capital Requirement	Dollars	194,477	86,155	54,839	14,336
Gross Income	Dollars	38,932	21,885	18,634	15,183
Operating and Overhead Expense	Dollars	28,049	15,965	13,798	11,487
Returns to Nonowned Land[b]	Dollars	6,575	2,224	1,140	0
Machinery Fixed Costs	Dollars	1,308	696	696	696
Returns to Operator Owned Resources[c]	Dollars	3,435	3,233	3,198	3,162

[a]Assumed current price.

[b]Five percent of the investment in nonowned land.

[c]Returns to operator labor and management, 320 acres of land, and one 4-plow tractor and machinery complement. Returns exceed $3,000 because of the adjustment for the difference between the interest on total operating capital and the interest on annual operating capital.

APPENDIX D, TABLE II

ESTIMATED MINIMUM REQUIREMENTS FOR $5,000 RETURN TO OPERATOR OWNED RESOURCES WITH SPECIFIED LAND PRICES, PANHANDLE CLAY LOAM SITUATION, OKLAHOMA PANHANDLE

Item	Unit	Land Price Per Acre			
		$100[a]	$75	$50	$0
Total Land	Acres	4,255	1,803	1,253	884
Cropland	Acres	3,578	1,516	1,054	743
Wheat	Acres	1,818	770	535	378
Grain Sorghum	Acres	410	174	121	111
Forage Sorghum	Acres	100	42	29	27
Grazed Out Small Grain	Acres	382	162	113	80
Reseeded Cropland	Acres	152	64	45	0
Cows	Animals	19	8	5	3
Feeders	Animals	369	156	109	77
Operator Labor	Hours	1,839	1,362	1,208	1,001
Hired Labor	Hours	2,792	601	155	0
Investment					
Land and Buildings	Dollars	431,883	183,005	64,530	1,600
Machinery	Dollars	17,640	8,889	6,177	5,240
Total Operating Capital	Dollars	55,218	22,675	15,429	10,485
Total Capital Requirement	Dollars	504,741	214,569	86,136	17,325
Gross Income	Dollars	101,292	42,931	29,832	21,239
Operating and Overhead Expense	Dollars	73,213	29,074	21,497	15,543
Returns to Nonowned Land[b]	Dollars	19,675	7,415	2,333	0
Machinery Fixed Costs	Dollars	3,404	1,442	1,002	696
Returns to Operator Owned Resources[c]	Dollars	6,190	5,483	5,326	5,226

[a]Assumed current price.

[b]Five percent of the investment in Nonowned Land.

[c]Returns to operator labor and management, 320 acres of land, and one 4-plow tractor and machinery complement. Returns exceed $5,000 because of the adjustment for the difference between the interest on total operating capital and the interest on annual operating capital.

APPENDIX D, TABLE III

ESTIMATED MINIMUM REQUIREMENTS FOR $3,000 RETURNS TO OPERATOR OWNED RESOURCES WITH SPECIFIED LAND PRICES, EASTERN CLAY LOAM SITUATION, OKLAHOMA PANHANDLE

Item	Unit	Land Price Per Acre			
		$65[a]	$49	$33	$0
Total Land	Acres			2,321	1,301
Cropland	Acres			1,135	636
Wheat	Acres			593	333
Grain Sorghum	Acres			0	86
Forage Sorghum	Acres			37	40
Grazed Out Small Grain	Acres			90	50
Reseeded Cropland	Acres			188	0
Cows	Animals	No Solution	No Solution	56	31
Feeders	Animals			87	49
Operator Labor	Hours			1,584	1,158
Hired Labor	Hours			131	0
Investment					
Land and Buildings	Dollars			77,452	1,600
Machinery	Dollars			6,661	5,240
Total Operating Capital	Dollars			23,616	12,927
Total Capital Requirement	Dollars			107,729	19,767
Gross Income	Dollars			28,019	16,365
Operating and Overhead Expense	Dollars			20,699	12,669
Returns to Nonowned Land[b]	Dollars			3,252	0
Machinery Fixed Costs	Dollars			1,068	696
Returns to Operator Owned Resources[c]	Dollars			3,275	3,153

[a]Assumed current price.

[b]Five percent of the interest in nonowned land.

[c]Returns to operator labor and management, 320 acres of land, and one 4-plow tractor and machinery complement. Returns exceed $3,000 because of the adjustment for the difference between the interest on total operating capital and the interest on annual operating capital.

APPENDIX D, TABLE IV

ESTIMATED MINIMUM REQUIREMENTS FOR $5,000 RETURN TO OPERATOR OWNED RESOURCES WITH SPECIFIED LAND PRICES, EASTERN CLAY LOAM SITUATION, OKLAHOMA PANHANDLE

Item	Unit	Land Price Per Acre			
		$65[a]	$49	$33	$0
Total Land	Acres	No Sulution	No Solution	4,913	1,827
Cropland	Acres			2,402	893
Wheat	Acres			1,256	467
Grain Sorghum	Acres			0	36
Forage Sorghum	Acres			78	54
Grazed Out Small Grain	Acres			190	71
Reseeded Cropland	Acres			398	87
Cows	Animals			119	46
Feeders	Animals			184	68
Operator Labor	Hours			1,794	1,518
Hired Labor	Hours			1,836	0
Investment					
Land and Buildings	Dollars			163,947	1,600
Machinery	Dollars			14,100	5,240
Total Operating Capital	Dollars			51,939	18,879
Total Capital Requirement	Dollars			229,986	25,719
Gross Income	Dollars			59,306	22,567
Operating and Overhead Expense	Dollars			44,582	16,871
Return to Nonowned Land[b]	Dollars			7,464	0
Machinery Fixed Costs	Dollars			2,260	696
Return to Operator Owned Resources[c]	Dollars			5,639	5,214

[a]Assumed current price.

[b]Five percent of the investment in nonowned land.

[c]Returns to operator labor and management, 320 acres of land, and one 4-plow tractor and machinery complement. Returns exceed $5,000 because of the adjustment for the difference between the interest on total operating capital and the interest on annual operating capital.

APPENDIX D, TABLE V

ESTIMATED MINIMUM REQUIREMENTS FOR $3,000 RETURNS TO OPERATOR OWNED RESOURCES WITH SPECIFIED LAND PRICES CIMARRON SANDY SITUATION, OKLAHOMA PANHANDLE

Item	Unit	Land Price Per Acre			
		$60[a]	$45	$30	$0
Total Land	Acres	No Solution	13,214	2,422	1,272
Cropland	Acres		10,783	1,976	1,038
Wheat	Acres		2,144	515	272
Grain Sorghum	Acres		6,061	971	508
Forage Sorghum	Acres		31	2	1
Grazed Out Small Grain	Acres		390	94	50
Reseeded Cropland	Acres		0	0	0
Cows	Animals		97	13	7
Feeders	Animals		362	87	46
Operator Labor	Hours		1,858	1,301	924
Hired Labor	Hours		12,919	1,314	448
Investment					
Land and Buildings	Dollars		613,790	76,172	1,844
Machinery	Dollars		63,163	11,577	6,080
Total Operating Capital	Dollars		98,090	18,023	9,188
Total Capital Requirement	Dollars		775,043	105,772	17,112
Gross Income	Dollars		181,028	35,247	18,549
Operating and Overhead Expense	Dollars		138,841	27,229	14,570
Return to Nonowned Land[b]	Dollars		29,012	3,153	0
Machinery Fixed Costs	Dollars		10,175	1,865	979
Return to Operator Owned Resources[c]	Dollars		4,666	3,323	3,162

[a]Assumed current price.

[b]Five percent of the investment in nonowned land.

[c]Returns to operator labor and management, 320 acres of land, and one 4-plow tractor and machinery complement. Returns exceed $3,000 because of the adjustment for the difference between the interest on total operating capital and the interest on annual operating capital.

APPENDIX D, TABLE VI

ESTIMATED MINIMUM REQUIREMENTS FOR $5,000 RETURN TO OPERATOR OWNED RESOURCES WITH SPECIFIED LAND PRICES CIMARRON SANDY SITUATION, OKLAHOMA PANHANDLE

Item	Unit	Land Price Per Acre			
		$60[a]	$45	$30	$0
Total Land	Acres	No Solution	40,269	4,180	2,002
Cropland	Acres		32,860	3,411	1,634
Wheat	Acres		6,533	678	428
Grain Sorghum	Acres		18,472	1,917	799
Forage Sorghum	Acres		95	10	1
Grazed Out Small Grain	Acres		1,188	123	78
Reseeded Cropland	Acres		0	0	0
Cows	Animals		297	31	11
Feeders	Animals		1,103	115	72
Operator Labor	Hours		1,858	1,686	1,164
Hired Labor	Hours		43,176	2,988	995
Investment					
Land and Buildings	Dollars		1,870,495	131,461	2,903
Machinery	Dollars		192,486	19,980	9,570
Total Operating Capital	Dollars		303,668	29,662	14,814
Total Capital Requirement	Dollars		2,366,649	181,103	27,287
Gross Income	Dollars		551,661	57,276	29,177
Operating and Overhead Expense	Dollars		425,769	43,267	22,636
Return to Nonowned Land[b]	Dollars		89,885	5,790	0
Machinery Fixed Costs	Dollars		31,007	3,219	1,541
Return to Operator Owned Resources[c]	Dollars		10,219	5,864	5,265

[a]Assumed current price.

[b]Five percent of the investment in nonowned land.

[c]Returns to operator labor and management, 320 acres of land, and one 4-plow tractor and machinery complement. Returns exceed $5,000 because of the adjustment for the difference between the interest on total operating capital and the interest on annual operating capital.

APPENDIX D, TABLE VII

ESTIMATED MINIMUM REQUIREMENTS FOR $3,000 RETURN TO OPERATOR OWNED RESOURCES WITH SPECIFIED LAND PRICES, EASTERN SANDY SITUATION, OKLAHOMA PANHANDLE

Item	Unit	Land Price Per Acre			
		$75[a]	$56	$38	$0
Total Land	Acres	1,447	1,127	963	776
Cropland	Acres	815	635	542	437
Wheat	Acres	397	310	265	213
Grain Sorghum	Acres	128	100	85	69
Forage Sorghum	Acres	18	14	12	10
Grazed Out Small Grain	Acres	108	84	72	58
Reseeded Cropland	Acres	0	0	0	0
Cows	Animals	22	17	15	12
Feeders	Animals	108	85	72	58
Operator Labor	Hours	1,306	1,082	923	744
Hired Labor	Hours	81	0	0	0
Investment					
Land and Buildings	Dollars	110,125	64,994	37,713	1,600
Machinery	Dollars	5,240	5,240	5,240	5,240
Total Operating Capital	Dollars	18,240	14,129	12,075	9,730
Total Capital Requirement	Dollars	133,605	84,363	55,028	16,570
Gross Income	Dollars	28,775	22,416	19,157	15,435
Operating and Overhead Expense	Dollars	20,853	16,450	14,254	11,739
Return to Nonowned Land[b]	Dollars	4,226	2,270	1,207	0
Machinery Fixed Costs	Dollars	696	696	696	696
Return to Operator Owned Resources[c]	Dollars	3,325	3,251	3,214	3,173

[a]Assumed current price.

[b]Five percent of the investment in nonowned land.

[c]Returns to operator labor and management, 320 acres of land, and one 4-plow tractor and machinery complement. Returns exceed $3,000 because of the adjustment for the difference between the interest on total operating capital and the interest on annual operating capital.

APPENDIX D, TABLE VIII

ESTIMATED MINIMUM REQUIREMENTS FOR $5,000 RETURN TO OPERATOR OWNED RESOURCES WITH SPECIFIED LAND PRICES, EASTERN SANDY SITUATION, OKLAHOMA PANHANDLE

Item	Unit	Land Price Per Acre			
		$75[a]	$56	$38	$0
Total Land	Acres	3,274	1,866	1,420	1,086
Cropland	Acres	1,843	1,051	799	611
Wheat	Acres	899	513	390	298
Grain Sorghum	Acres	290	165	126	96
Forage Sorghum	Acres	41	23	18	13
Grazed Out Small Grain	Acres	245	140	106	81
Reseeded Cropland	Acres	0	0	0	0
Cows	Animals	50	28	22	17
Feeders	Animals	245	140	106	81
Operator Labor	Hours	1,747	1,508	1,292	1,042
Hired Labor	Hours	1,394	282	71	0
Investment					
Land and Buildings	Dollars	248,824	106,829	54,850	1,600
Machinery	Dollars	10,804	6,158	5,240	5,240
Total Operating Capital	Dollars	42,784	23,742	18,894	13,610
Total Capital Requirement	Dollars	302,412	136,729	77,984	20,450
Gross Income	Dollars	65,111	37,109	28,249	21,593
Operating and Overhead Expense	Dollars	47,298	26,772	20,490	15,897
Return to Nonowned Land[b]	Dollars	11,078	4,348	2,063	0
Machinery Fixed Costs	Dollars	1,735	989	696	696
Return to Operator Owned Resources[c]	Dollars	5,780	5,426	5,319	5,242

[a]Assumed current price.

[b]Five percent of the investment in nonowned land.

[c]Returns to operator labor and management, 320 acres of land, and one 4-plow tractor and machinery complement. Returns exceed $5,000 because of the adjustment for the difference between the interest on total operating capital and the interest on annual operating capital.

APPENDIX E, TABLE I

ESTIMATED MINIMUM REQUIREMENTS FOR $3,000 RETURN TO OPERATOR LABOR AND MANAGEMENT WITH YIELDS INCREASED BY 10 PERCENT; SPECIFIED LAND PRICES, PANHANDLE CLAY LOAM SITUATION, OKLAHOMA PANHANDLE

Item	Unit	Land Price Per Acre	
		$100[a]	$0
Total Land	Acres	1,496	575
Cropland	Acres	1,258	484
Wheat	Acres	639	246
Grain Sorghum	Acres	179	71
Forage Sorghum	Acres	46	17
Grazed Out Small Grain	Acres	137	53
Reseeded Cropland	Acres	5	0
Cows	Animals	4	1
Feeders	Animals	145	56
Operator Labor	Hours	1,301	668
Hired Labor	Hours	434	0
Investment			
Land and Buildings	Dollars	151,844	1,600
Machinery	Dollars	7,375	5,240
Total Operating Capital	Dollars	19,931	7,432
Total Capital Requirement	Dollars	179,150	14,272
Gross Income	Dollars	39,795	15,314
Operating and Overhead Expense	Dollars	27,879	11,320
Return to Land[b]	Dollars	7,480	0
Machinery Fixed Costs	Dollars	1,436	994
Return to Operator Labor and Management[c]	Dollars	3,443	3,164

[a]Assumed current price.

[b]Five percent of the investment in land.

[c]Returns exceed $3,000 because of the adjustment for the difference between the interest on total operating capital and the interest on annual operating capital.

APPENDIX E, TABLE II

ESTIMATED MINIMUM REQUIREMENTS FOR $5,000 RETURN TO OPERATOR LABOR AND MANAGEMENT WITH YIELDS INCREASED BY 10 PERCENT; SPECIFIED LAND PRICES, PANHANDLE CLAY LOAM SITUATION, OKLAHOMA PANHANDLE

Item	Unit	Land Price Per Acre	
		$100[a]	$0
Total Land	Acres	2,486	788
Cropland	Acres	2,091	663
Wheat	Acres	1,062	337
Grain Sorghum	Acres	298	97
Forage Sorghum	Acres	77	24
Grazed Out Small Grain	Acres	227	72
Reseeded Cropland	Acres	9	0
Cows	Animals	7	2
Feeders	Animals	242	77
Operator Labor	Hours	1,595	917
Hired Labor	Hours	1,289	0
Investment			
Land and Buildings	Dollars	252,329	1,600
Machinery	Dollars	12,256	5,240
Total Operating Capital	Dollars	33,831	10,179
Total Capital Requirement	Dollars	298,416	17,019
Gross Income	Dollars	66,134	20,974
Operating Overhead Expense	Dollars	46,317	14,980
Return to Land[b]	Dollars	12,430	0
Machinery Fixed Costs	Dollars	2,387	994
Return to Operator Labor and Management[c]	Dollars	5,757	5,225

[a]Assumed current price.

[b]Five percent of the investment in land.

[c]Returns exceed $5,000 because of the adjustment for the difference between the interest on total operating capital and the interest on annual operating capital.

APPENDIX E, TABLE III

ESTIMATED MINIMUM REQUIREMENTS FOR $3,000 RETURN TO OPERATOR LABOR AND MANAGEMENT WITH YIELDS INCREASED BY 10 PERCENT; SPECIFIED LAND PRICES, EASTERN CLAY LOAM SITUATION, OKLAHOMA PANHANDLE

Item	Unit	Land Price Per Acre	
		$65[a]	$0
Total Land	Acres		1,191
Cropland	Acres		582
Wheat	Acres		305
Grain Sorghum	Acres		80
Forage Sorghum	Acres		35
Grazed Out Small Grain	Acres		47
Reseeded Cropland	Acres		0
Cows	Animals		28
Feeders	Animals		50
Operator Labor	Hours		1,077
Hired Labor	Hours		0
Investment			
Land and Buildings	Dollars		1,600
Machinery	Dollars		5,240
Total Operating Capital	Dollars		12,351
Total Capital Requirement	Dollars		19,191
Gross Income	Dollars		16,311
Operating and Overhead Expense	Dollars		12,317
Return to Land[b]	Dollars		0
Machinery Fixed Costs	Dollars		994
Return to Operator Labor and Management[c]	Dollars		3,154

No Solution

[a]Assumed current price.

[b]Five percent of the investment in land.

[c]Returns exceed $3,000 because of the adjustment for the difference between the interest on total operating capital and the interest on annual operating capital.

APPENDIX E, TABLE IV

ESTIMATED MINIMUM REQUIREMENTS FOR $5,000 RETURN TO OPERATOR LABOR AND MANAGEMENT WITH YIELDS INCREASED BY 10 PERCENT; SPECIFIED LAND PRICES, EASTERN CLAY LOAM SITUATION, OKLAHOMA PANHANDLE

Item	Unit	Land Price Per Acre	
		$65[a]	$0
Total Land	Acres		1,652
Cropland	Acres		808
Wheat	Acres		422
Grain Sorghum	Acres		57
Forage Sorghum	Acres		52
Grazed Out Small Grain	Acres		65
Reseeded Cropland	Acres		50
Cows	Animals		42
Feeders	Animals		69
Operator Labor	Hours	No Solution	1,454
Hired Labor	Hours		0
Investment			
Land and Buildings	Dollars		1,600
Machinery	Dollars		5,240
Total Operating Capital	Dollars		17,770
Total Capital Requirement	Dollars		24,610
Gross Income	Dollars		22,385
Operating and Overhead Expense	Dollars		16,391
Return to Land[b]	Dollars		0
Machinery Fixed Costs	Dollars		994
Return to Operator Labor and Management[c]	Dollars		5,214

[a]Assumed current price.

[b]Five percent of the investment in land.

[c]Returns exceed $5,000 because of the adjustment for the difference between the interst on total operating capital and the interest on annual operating capital.

APPENDIX E, TABLE V

ESTIMATED MINIMUM REQUIREMENTS FOR $3,000 RETURN TO OPERATOR LABOR AND MANAGEMENT WITH YIELDS INCREASED BY 10 PERCENT; SPECIFIED LAND PRICES, CIMARRON SANDY SITUATION, OKLAHOMA PANHANDLE

Item	Unit	Land Price Per Acre	
		$60[a]	$0
Total Land	Acres	13,274	1,005
Cropland	Acres	10,832	820
Wheat	Acres	357	169
Grain Sorghum	Acres	8,216	454
Forage Sorghum	Acres	28	2
Grazed Out Small Grain	Acres	65	31
Reseeded Cropland	Acres	0	0
Cows	Animals	112	7
Feeders	Animals	66	31
Operator Labor	Hours	1,858	832
Hired Labor	Hours	13,369	298
Investment			
Land and Buildings	Dollars	815,687	1,600
Machinery	Dollars	63,450	5,240
Total Operating Capital	Dollars	69,296	6,996
Total Capital Requirement	Dollars	948,433	13,836
Gross Income	Dollars	161,456	15,197
Operating and Overhead Expense	Dollars	106,156	11,203
Return to Land[b]	Dollars	39,822	0
Machinery Fixed Costs	Dollars	12,478	994
Return to Operator Labor and Management[c]	Dollars	3,858	3,112

[a]Assumed current price.

[b]Five percent of the investment in land.

[c]Returns exceed $3,000 because of the adjustment for the difference between the interest on total operating capital and the interest on annual operating capital.

APPENDIX E, TABLE VI

ESTIMATED MINIMUM REQUIREMENTS FOR $5,000 RETURN TO OPERATOR LABOR AND MANAGEMENT WITH YIELDS INCREASED BY 10 PERCENT; SPECIFIED LAND PRICES, CIMARRON SANDY SITUATION, OKLAHOMA PANHANDLE

Item	Unit	Land Price Per Acre	
		$60[a]	$0
Total Land	Acres	28,264	1,551
Cropland	Acres	23,063	1,266
Wheat	Acres	161	261
Grain Sorghum	Acres	18,202	701
Forage Sorghum	Acres	58	3
Grazed Out Small Grain	Acres	29	47
Reseeded Cropland	Acres	0	0
Cows	Animals	243	11
Feeders	Animals	30	49
Operator Labor	Hours	1,858	1,010
Hired Labor	Hours	30,660	735
Investment			
Land and Buildings	Dollars	1,736,823	2,249
Machinery	Dollars	135,102	7,414
Total Operating Capital	Dollars	139,175	11,142
Total Capital Requirement	Dollars	2,011,100	20,805
Gross Income	Dollars	331,276	23,458
Operating and Overhead Expense	Dollars	214,916	17,000
Return to Land[b]	Dollars	84,792	0
Machinery Fixed Costs	Dollars	26,568	1,458
Return to Operator Labor and Management[c]	Dollars	6,597	6,183

[a]Assumed current price.

[b]Five percent of the investment in land.

[c]Returns exceed $5,000 because of the adjustment for the difference between the interest on total operating capital and the interest on annual operating capital.

APPENDIX E, TABLE VII

ESTIMATED MINIMUM REQUIREMENTS FOR $3,000 RERTUN TO OPERATOR LABOR AND MANAGEMENT WITH YIELDS, INCREASED BY 10 PERCENT; SPECIFIED LAND PRICES, EASTERN SANDY SITUATION, OKLAHOMA PANHANDLE

Item	Unit	Land Price Per Acre	
		$75[a]	$0
Total Land	Acres	1,505	719
Cropland	Acres	847	405
Wheat	Acres	413	198
Grain Sorghum	Acres	133	59
Forage Sorghum	Acres	18	14
Grazed Out Small Grain	Acres	113	54
Reseeded Cropland	Acres	0	0
Cows	Animals	23	13
Feeders	Animals	124	59
Operator Labor	Hours	1,363	746
Hired Labor	Hours	116	0
Investment			
Land and Buildings	Dollars	114,475	1,600
Machinery	Dollars	5,240	5,240
Total Operating Capital	Dollars	20,167	9,961
Total Capital Requirement	Dollars	139,882	16,801
Gross Income	Dollars	32,673	15,696
Operating and Overhead Expense	Dollars	23,035	11,702
Return to Land[b]	Dollars	5,644	0
Machinery Fixed Costs	Dollars	994	994
Return to Operator Labor and Management[c]	Dollars	3,371	3,176

[a]Assumed current price.

[b]Five percent of the investment in land.

[c]Returns exceed $3,000 because of the adjustment for the difference between the interest on total operating capital and the interest on annual operating capital.

APPENDIX E, TABLE VIII

ESTIMATED MINIMUM REQUIREMENTS FOR $5,000 RETURN TO OPERATOR LABOR AND MANAGEMENT WITH YIELDS INCREASED BY 10 PERCENT; SPECIFIED LAND PRICES, EASTERN SANDY SITUATION, OKLAHOMA PANHANDLE

Item	Unit	Land Price Per Acre	
		$75[a]	$0
Total Land	Acres	2,490	990
Cropland	Acres	1,402	557
Wheat	Acres	684	272
Grain Sorghum	Acres	220	81
Forage Sorghum	Acres	31	19
Grazed Out Small Grain	Acres	187	74
Reseeded Cropland	Acres	0	0
Cows	Animals	37	17
Feeders	Animals	205	82
Operator Labor	Hours	1,683	1,028
Hired Labor	Hours	764	0
Investment			
Land and Buildings	Dollars	189,240	1,600
Machinery	Dollars	8,217	5,240
Total Operating Capital	Dollars	34,073	13,711
Total Capital Requirement	Dollars	231,530	20,551
Gross Income	Dollars	54,045	21,607
Operating and Overhead Expense	Dollars	38,088	15,613
Return to Land[b]	Dollars	9,338	0
Machinery Fixed Costs	Dollars	1,619	994
Return to Operator Labor and Management[c]	Dollars	5,635	5,242

[a]Assumed current price.

[b]Five percent of the investment in land.

[c]Returns exceed $5,000 because of the adjustment for the difference between the interest on total operating capital and the interest on annual operating capital.

APPENDIX F, TABLE I

ESTIMATED MINIMUM REQUIREMENTS FOR $3,000 RETURN TO OPERATOR LABOR AND MANAGEMENT, NO PRICE SUPPORTS OR ACREAGE ALLOTMENTS; SPECIFIED LAND PRICES, PANHANDLE CLAY LOAM SITUATION, OKLAHOMA PANHANDLE

Item	Unit	Land Price Per Acre	
		$100[a]	$0
Total Land	Acres		909
Cropland	Acres		764
Wheat	Acres		485
Grain Sorghum	Acres		0
Forage Sorghum	Acres		30
Grazed Out Small Grain	Acres		97
Reseeded Cropland	Acres		0
Cows	Animals		2
Feeders	Animals		94
Operator Labor	Hours		1,014
Hired Labor	Hours		0
Investment			
Land and Buildings	Dollars		1,600
Machinery	Dollars		5,240
Total Operating Capital	Dollars		12,203
Total Capital Requirement	Dollars		19,043
Gross Income	Dollars		21,676
Operating and Overhead Expense	Dollars		17,682
Return to Land[b]	Dollars		0
Machinery Fixed Costs	Dollars		994
Return to Operator Labor and Management[c]	Dollars		3,274

No Solution

[a]Assumed current price.

[b]Five percent of the investment in land.

[c]Returns exceed $3,000 because of the adjustment for the difference between the interest on total operating capital and the interest on annual operating capital.

APPENDIX F, TABLE II

ESTIMATED MINIMUM REQUIREMENTS FOR $5,000 RETURN TO OPERATOR LABOR AND MANAGEMENT, NO PRICE SUPPORTS OR ACREAGE ALLOTMENTS; SPECIFIED LAND PRICES, PANHANDLE CLAY LOAM SITUATION, OKLAHOMA PANHANDLE

Item	Unit	Land Price Per Acre $100[a]	Land Price Per Acre $0
Total Land	Acres		1,083
Cropland	Acres		911
Wheat	Acres		577
Grain Sorghum	Acres		0
Forage Sorghum	Acres		36
Grazed Out Small Grain	Acres		116
Reseeded Cropland	Acres		0
Cows	Animals	No Solution	2
Feeders	Animals		112
Operator Labor	Hours		1,164
Hired Labor	Hours		44
Investment			
Land and Buildings	Dollars		1,625
Machinery	Dollars		5,339
Total Operating Capital	Dollars		14,596
Total Capital Requirement	Dollars		21,560
Gross Income	Dollars		25,828
Operating and Overhead Expense	Dollars		19,788
Return to Land[b]	Dollars		0
Machinery Fixed Costs	Dollars		1,040
Return to Operator Labor and Management[c]	Dollars		5,328

[a]Assumed current price.

[b]Five percent of the investment in land.

[c]Returns exceed $5,000 because of the adjustment for the difference between the interest on total operating capital and the interest on annual operating capital.

APPENDIX F, TABLE III

ESTIMATED MINIMUM REQUIREMENTS FOR $3,000 RETURN TO OPERATOR LABOR AND MANAGEMENT, NO PRICE SUPPORTS OR ACREAGE ALLOTMENTS; SPECIFIED LAND PRICES, EASTERN CLAY LOAM SITUATION, OKLAHOMA PANHANDLE

Item	Unit	Land Price Per Acre	
		$65[a]	$0
Total Land	Acres		1,799
Cropland	Acres		880
Wheat	Acres		591
Grain Sorghum	Acres		0
Forage Sorghum	Acres		27
Grazed Out Small Grain	Acres		85
Reseeded Cropland	Acres		0
Cows	Animals		35
Feeders	Animals		82
Operator Labor	Hours	No Solution	1,396
Hired Labor	Hours		46
Investment			
Land and Buildings	Dollars		1,600
Machinery	Dollars		5,240
Total Operating Capital	Dollars		18,131
Total Capital Requirement	Dollars		24,971
Gross Income	Dollars		22,569
Operating and Overhead Expense	Dollars		18,575
Return to Land[b]	Dollars		0
Machinery Fixed Costs	Dollars		994
Return to Operator Labor and Management[c]	Dollars		3,252

[a]Assumed current price.

[b]Five percent of the investment in land.

[c]Returns exceed $3,000 because of the adjustment for the difference between the interest on total operating capital and the interest on annual operating capital.

APPENDIX F, TABLE IV

ESTIMATED MINIMUM REQUIREMENTS FOR $5,000 RETURN TO OPERATOR LABOR AND MANAGEMENT, NO PRICE SUPPORTS OR ACREAGE ALLOTMENTS; SPECIFIED LAND PRICES, EASTERN CLAY LOAM SITUATION, OKLAHOMA PANHANDLE

Item	Unit	Land Price Per Acre	
		$65[a]	$0
Total Land	Acres		3,114
Cropland	Acres		1,753
Wheat	Acres		1,024
Grain Sorghum	Acres		0
Forage Sorghum	Acres		47
Grazed Out Small Grain	Acres		147
Reseeded Cropland	Acres		0
Cows	Animals	No Solution	61
Feeders	Animals		142
Operator Labor	Hours		1,655
Hired Labor	Hours		842
Investment			
Land and Buildings	Dollars		2,709
Machinery	Dollars		8,937
Total Operating Capital	Dollars		32,338
Total Capital Requirement	Dollars		43,984
Gross Income	Dollars		39,067
Operating and Overhead Expense	Dollars		32,223
Return to Land[b]	Dollars		0
Machinery Fixed Costs	Dollars		1,744
Return to Operator Labor and Management[c]	Dollars		5,465

[a]Assumed current price.

[b]Five percent of the investment in land.

[c]Returns exceed $5,000 because of the adjustment for the difference between the interest on total operating capital and the interest on annual operating capital.

APPENDIX F, TABLE V

ESTIMATED MINIMUM REQUIREMENTS FOR $3,000 RETURN TO OPERATOR LABOR AND MANAGEMENT, NO PRICE SUPPORTS OR ACREAGE ALLOTMENTS; SPECIFIED LAND PRICES, CIMARRON SANDY SITUATION, OKLAHOMA PANHANDLE

Item	Unit	Land Price Per Acre	
		$60[a]	$0
Total Land	Acres		1,170
Cropland	Acres		955
Wheat	Acres		0
Grain Sorghum	Acres		761
Forage Sorghum	Acres		3
Grazed Out Small Grain	Acres		0
Reseeded Cropland	Acres		0
Cows	Animals		9
Feeders	Animals		25
Operator Labor	Hours	No Solution	814
Hired Labor	Hours		626
Investment			
Land and Buildings	Dollars		1,697
Machinery	Dollars		5,593
Total Operating Capital	Dollars		7,451
Total Capital Requirement	Dollars		14,741
Gross Income	Dollars		16,211
Operating and Overhead Expense	Dollars		12,111
Return to Land[b]	Dollars		0
Machinery Fixed Costs	Dollars		1,100
Return to Operator Labor and Management[c]	Dollars		3,149

[a]Assumed current price.

[b]Five percent of the investment in land.

[c]Returns exceed $3,000 because of the adjustment for the difference between the interest on total operating capital and the interest on annual operating capital.

APPENDIX F, TABLE VI

ESTIMATED MINIMUM REQUIREMENTS FOR $5,000 RETURN TO OPERATOR LABOR AND MANAGEMENT, NO PRICE SUPPORTS OR ACREAGE ALLOTMENTS; SPECIFIED LAND PRICES, CIMARRON SANDY SITUATION, OKLAHOMA PANHANDLE

Item	Unit	Land Price Per Acre	
		$60[a]	$0
Total Land	Acres		1,842
Cropland	Acres		1,503
Wheat	Acres		0
Grain Sorghum	Acres		1,198
Forage Sorghum	Acres		4
Grazed Out Small Grain	Acres		0
Reseeded Cropland	Acres		0
Cows	Animals		14
Feeders	Animals		39
Operator Labor	Hours	No Solution	991
Hired Labor	Hours		1,276
Investment			
Land and Buildings	Dollars		2,671
Machinery	Dollars		8,805
Total Operating Capital	Dollars		12,081
Total Capital Requirement	Dollars		23,557
Gross Income	Dollars		25,499
Operating and Overhead Expense	Dollars		18,768
Return to Land[b]	Dollars		0
Machinery Fixed Costs	Dollars		1,731
Return to Operator Labor and Management[c]	Dollars		5,244

[a]Assumed current price.

[b]Five percent of the investment in land.

[c]Returns exceed $5,000 because of the adjustment for the difference between the interest on total operating capital and the interest on annual operating capital.

APPENDIX F, TABLE VII

ESTIMATED MINIMUM REQUIREMENTS FOR $3,000 RETURN TO OPERATOR LABOR AND MANAGEMENT, NO PRICE SUPPORTS OR ACREAGE ALLOTMENTS; SPECIFIED LAND PRICES, EASTERN SANDY SITUATION, OKLAHOMA PANHANDLE

Item	Unit	Land Price Per Acre	
		$75[a]	$0
Total Land	Acres	9,900	902
Cropland	Acres	5,574	508
Wheat	Acres	0	0
Grain Sorghum	Acres	4,412	402
Forage Sorghum	Acres	47	4
Grazed Out Small Grain	Acres	0	0
Reseeded Cropland	Acres	0	0
Cows	Animals	226	20
Feeders	Animals	0	15
Operator Labor	Hours	1,732	858
Hired Labor	Hours	8,317	112
Investment			
Land and Buildings	Dollars	752,400	1,600
Machinery	Dollars	32,670	5,240
Total Operating Capital	Dollars	68,264	6,956
Total Capital Requirement	Dollars	853,334	13,796
Gross Income	Dollars	108,474	11,726
Operating and Overhead Expense	Dollars	61,914	7,732
Return to Land[b]	Dollars	37,125	0
Machinery Fixed Costs	Dollars	6,435	994
Return to Operator Labor and Management[c]	Dollars	3,442	3,081

[a]Assumed current price.

[b]Five percent of the investment in land.

[c]Returns exceed $3,000 because of the adjustment for the difference between the interest on total operating capital and the interest on annual operating capital.

APPENDIX F, TABLE VIII

ESTIMATED MINIMUM REQUIREMENTS FOR $5,000 RETURN TO OPERATOR LABOR AND MANAGEMENT, NO PRICE SUPPORTS OR ACREAGE ALLOTMENTS; SPECIFIED LAND PRICES, EASTERN SANDY SITUATION, OKLAHOMA PANHANDLE

Item	Unit	Land Price Per Acre	
		$75[a]	$0
Total Land	Acres	19,636	1,291
Cropland	Acres	11,055	727
Wheat	Acres	0	0
Grain Sorghum	Acres	8,750	575
Forage Sorghum	Acres	94	6
Grazed Out Small Grain	Acres	0	0
Reseeded Cropland	Acres	0	0
Cows	Animals	448	28
Feeders	Animals	0	21
Operator Labor	Hours	1,858	1,010
Hired Labor	Hours	18,072	378
Investment			
Land and Buildings	Dollars	1,492,336	1,600
Machinery	Dollars	64,799	5,240
Total Operating Capital	Dollars	137,359	10,224
Total Capital Requirement	Dollars	1,694,494	17,064
Gross Income	Dollars	215,135	16,776
Operating and Overhead Expense	Dollars	123,737	12,782
Return to Land[b]	Dollars	73,635	0
Machinery Fixed Costs	Dollars	12,763	994
Return to Operator Labor and Management[c]	Dollars	5,935	5,124

[a]Assumed current price.

[b]Five percent of the investment in land.

[c]Returns exceed $5,000 because of the adjustment for the difference between the interest on total operating capital and the interest on annual operating capital.

VITA

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