FARM ADJUSTMENT OPPORTUNITIES ON MAJOR BOTTOMLAND SOILS OF SOUTHCENTRAL AND EASTCENTRAL OKLAHOMA

By

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PREFACE

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CHAPTER I

INTRODUCTION

Need for Study

Education, research, and national growth cause continual changes in the economic and technical environment facing farmers. If farmers are to participate in the process of economic growth and maintain their income in relation to other industries, they must continually reappraise and adjust their farming operation.

Many opportunities exist to increase income by changes in the farm organization, but these opportunities differ from farm to farm due to lack of available capital, labor, or land. Also, because of differences in age, financial equity, experience, or personal preferences, farmers may not seek the same route to expand income. In the short-run, the only profitable adjustments may be a recombination of livestock and crop enterprises. In a longer period of time, more capital may be accumulated, new markets may open, and changes in government controls may affect crop acreages. Some farmers currently find opportunities to rent or buy land, while others must increase returns within current fencelines and wait for neighbors to retire before land can be added at reasonable land prices. Some farmers, with a limited financial base, must accumulate capital from earnings for several years before they can accumulate sufficient land and capital to receive a satisfactory income for their family.

Objectives

The overall objective of this project is to determine the most profitable levels and combinations of enterprises for a given farm situation under different conditions of prices, capital levels, allotment levels, time periods, and other decision-making criteria.

This study is divided into three arbitrary periods of time or lengths-of-run due to the attendant types of decisions and data which are involved. These time periods are specified as the "short-run", the "intermediate-run", and the "long-run", and for our purposes, are defined as follows:

1. The short-run is that period of time in which present allotments and expected prices for the next five years are used. Land is fixed. Capital may be fixed or variable and has a six percent charge. Labor may be hired at $1.00 per hour. Changes in machinery and buildings are possible in contrast to usual conditions assumed for the short-run.
2. We define the intermediate-run as that period of time in which all assets are variable with the exception of land. Prices are long-term expected prices and allotments are 1975 projections. Capital is unlimited with a six percent charge and labor may be hired in any quantity at $1.00 per hour.
3. In the long-run, all assets are variable. Land may be bought or sold, capital is unlimited with a six percent charge, and labor may be hired in any quantity at $1.00 per hour. Prices are the same as for the intermediate-run.

In the short-run and the intermediate-run, we wish to determine what is the maximum income which can be achieved with different combinations and

levels of enterprises. In the long-run, we wish to determine what are the necessary resources to give a farm operator a specified income.

Area of Study

The bottomland soils of the Arkansas, the Washita, and the Red Rivers of Eastcentral and Southcentral Oklahoma make up the geographical area of this study. Primary data surveys were taken in Muskogee County on the Arkansas River, Garvin County on the Washita River, and Bryan County on the Red River.

Rainfall characteristics and length of growing season in the area are favorable for crop farming; and the soil is relatively fertile. Long-term average rainfall for the area averages around 39.0 inches annually. The Arkansas River area has the highest rainfall with an average of 42.0 inches at Muskogee. The Washita River area is lowest with an average of 35.9 inches at Pauls Valley. Durant, which is close to the Red River, averages 39.0 inches. The three stations averaged 218 days with temperatures above 32 degrees in 1962.[1]

The primary crops grown in the area are alfalfa, corn, soybeans, and cotton. In the Garvin County area, some broomcorn is grown. Small peanut plantings are found in Red River bottomlands. The general trend appears to be away from broomcorn and cotton and toward a Bermuda grass pasture and cow-calf livestock system.

Method of Analysis

Linear programming methods are used here to determine the optimum combination and levels of enterprises under the given restrictions for

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[1]U. S. Department of Commerce, Climatological Data, Oklahoma, Annual Summary 1962, Vol. 71, No. 13 (Washington, 1963), pp. 194-198.

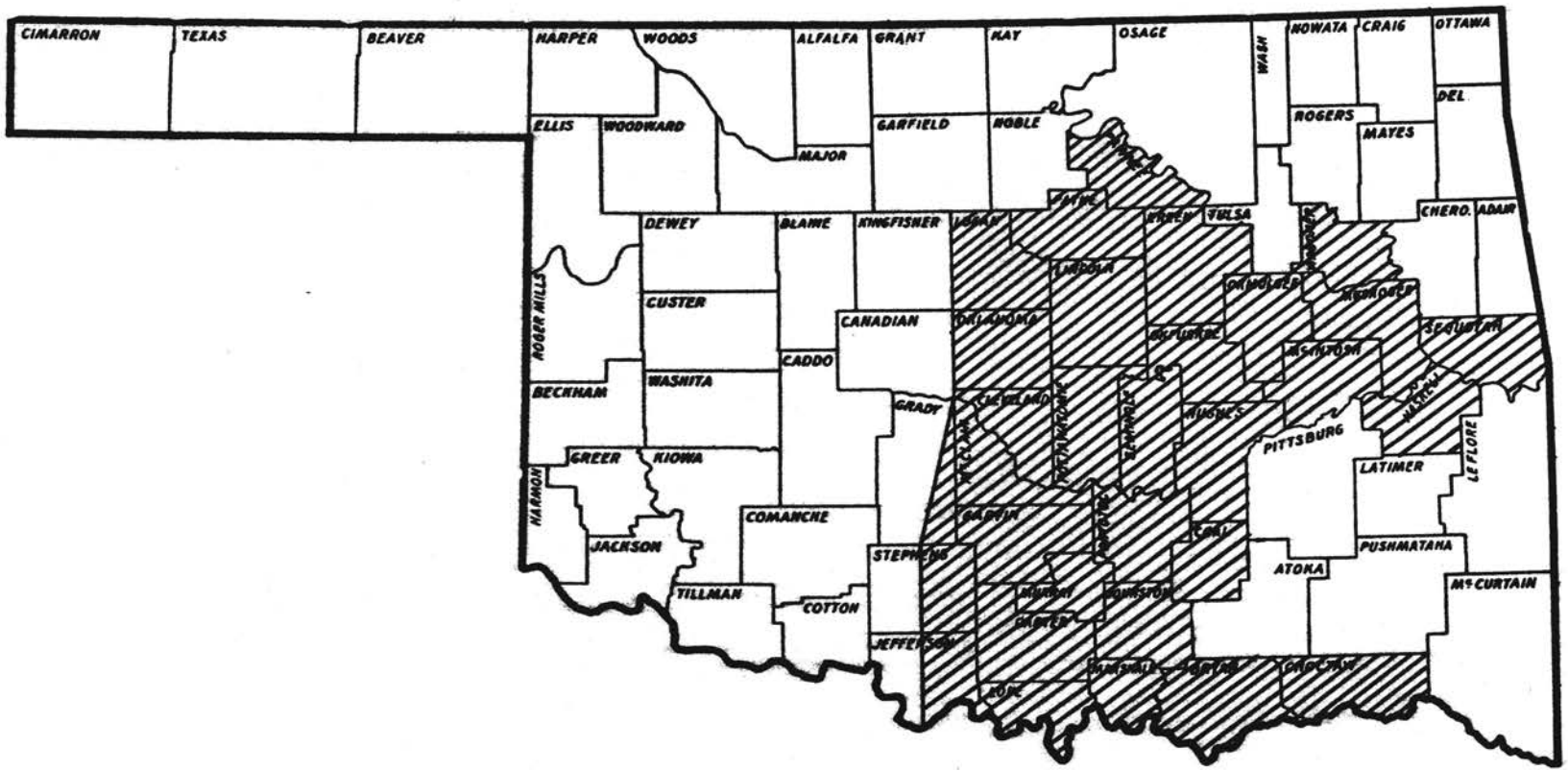

Figure 1. Map of Oklahoma Showing the Area of Study.

the various situations. Perhaps the greatest advantage of linear programming is that an optimum solution to a problem with a very large number of possible enterprises is quickly obtained with the use of a high speed electronic computer. Linear programming, like other techniques, is subject to the limitations that worthwhile results are highly dependent upon accurate data.

The input-output data used are specified in a Processed Series[2] with the prices adjusted for the period of time under consideration.

Organization for Remainder of Thesis

The organization for the remainder of the thesis is described briefly below.

Chapter II

We describe the characteristics of a bottomland farm representing the area toward which this study is directed. Soil resources, yields, farm size and machinery complement, labor and capital availability, and enterprise characteristics are given in detail.

Chapter III

Profitable farming adjustments for the short-run are presented. This chapter discusses the opportunities to increase income which might confront a farm operator in the near future, and provides optimum plans under different capital levels and enterprise combinations.

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[2]Alan W. Reichardt, William F. Lagrone, and Luther G. Tweeten, Resource Requirements, Costs and Expected Returns; Alternative Crop and Livestock Enterprises; Major Bottomland Soils of Eastcentral and Southcentral Oklahoma, Oklahoma Agricultural Experiment Station Processed Series P____(Stillwater, 1964).

Chapter IV

The chapter outlines profitable farming adjustments for the intermediate-run with acreage allotments. Chapter IV provides the farmer with decision-making criteria for an intermediate length of run under conditions of prices and projected allotment levels that might be expected by 1975.

Chapter V

We present profitable farming adjustments for the intermediate-run without acreage allotments. As in Chapter IV, long-term prices are used, but acreage controls and price supports are eliminated and the relative importance of various crops is determined by varying prices.

Chapter VI

The analysis is long-run with estimated resources necessary for a prescribed operator income. This chapter differs from the previous three in that we desire to determine the resource levels necessary to earn a given income rather than to determine the returns to a given set of resources.

Chapter VII

In the final chapter, the results of the study are summarized and the conclusions implied by these results are discussed.

CHAPTER II

CHARACTERISTICS OF RESOURCES AND ENTERPRISES

Purpose

The purpose of this chapter is to describe the resources and enterprises characteristically found in the study area. The chapter contains a description of soil resources, machinery, labor and capital available on a representative farm. Before discussing the setting and assumptions, a note on sources of data is included.

Data Sources

As stated earlier, detailed input-output data for the crop and livestock enterprises are found in Processed Series P____. The budgets in the Processed Series show the expected costs and returns for the particular enterprises under a given set of prices. For the different lengths of run considered in this study, it was necessary to adjust these to meet the particular situation in question. Two sets of prices are used. The short-run prices are an average over the last five years, except in the case of wheat. The long-run prices are projected estimates for 1975 (see Appendix Table I). The short-run wheat price ($1.65 per bushel) is the approximate 1960-61 support level and may not hold in the next few years. However, since wheat did not enter the program even when this price was increased 30 percent, a downward adjustment from $1.65

under possible future wheat programs will, of course, leave wheat even less profitable than other alternatives. Data on yields and production practices were obtained from experiment station research, estimates by scientists and farmers, and other sources.

Soil Resources

The bottomland soils are divided into three classifications according to fertility, drainage, texture and other characteristics as shown in Table I. Seventy-four percent of the soil falls in Class B_1, a deep, nearly level, loamy soil. Class B_3, comprising 23 percent of the bottomland soils, is deep, nearly level, sandy alluvial soil. Only three percent of the land is Class B_2, deep, fine textured and imperfectly drained. Due to the small percentage of B_2 soil, and in order to simplify the whole-farm programming analysis, the B_2 soils were classed with the B_1 soils. The characteristics of the B_2 soils more closely resembled those of the B_1 group than those of the B_3 group for tillage and management practices. The B_1 soils in all cases had an equal or greater yield than the B_3 soils and required much less fertilization (Table II). For a few minor crops, the yields of each of the soils were the same. However, necessity of higher fertilization rate on the B_3 soil reduces profitability in all cases.

In addition to the bottomland soils, most farms contain some upland. This land is used only for pasture, and in most cases is in native grasses. There are some instances where this land has been sodded with Bermuda, however.

TABLE I

DEFINITIONS OF SOIL TYPES

Class B_1	Deep, nearly level, loamy alluvial soils. Key series are Port loam or Port clay loam as well as other well drained moderately permeable soils.
Class B_2	Deep, fine textured alluvial soils, imperfectly drained or moderately wet. Key series are Brewer silty clay loam, Lela and Miller clays.
Class B_3	Deep, nearly level, sandy alluvial soils. Key series are Cleora fine sandy loam and Yahola fine sandy loam.

Description of Farm

The farm used to represent a typical bottomland farm in the area contains 567 acres. This is broken down as follows: 358 acres of cropland with 272 acres of B_1 soil and 86 acres of B_3 soil, 185 acres of permanent upland pasture with 30 acres of that being wooded, and 24 acres consisting of farmstead, roads, waste and other land. This farm is not necessarily typical for any one particular bottomland, but is considered to be reasonably representative of the three areas. The types of enterprises produced and the kinds of decisions which must be made on this farm will conform closely to those on many farms in these three bottomland areas.

An "average" set of improvements is assumed to be on the farm. A liveable, modern house, necessary outbuildings such as chicken house, barns, and machine shop, and fencing necessary for permanent pasture and temporary grazing of cropland are included.

TABLE II

YIELDS AND FERTILIZATION RATES BY PRODUCTIVITY CLASS[a]

Enterprise	Processed Series Number	Activity Number	Unit	B 1 Yield	B 1 Fert. N.P.K. (lbs.)	B 2 Yield	B 2 Fert. N.P.K. (lbs.)	B 3 Yield	B 3 Fert. N.P.K. (lbs.)
Cotton (lint)	1	P_1-P_2	cwt.	4.5	20-20-20	3.6	20-20-20	3.6	40-40-40
Grain sorghum	2	P_3-P_4	cwt.	30.8	35-20-20	25.2	40-20-20	28.0	70-40-40
Wheat	3	P_5-P_6	bu.	29.0	10-20-10 50	22.0	10-20-10 60	22.0	20-40-20 60
Peanuts	4	P_7	lb.	--	--	--	--	1350.0	10-40-40
Corn	5	P_8-P_9	bu.	60.0	20-20-20 50	45.0	20-20-20 60	50.0	40-40-40 80
Alfalfa	7	P_{10}-P_{11}	ton	5.0	0-40-40	3.5	0-40-40	4.0	0-70-70
Broomcorn	8	P_{12}	ton	.245	20-20-20	--	--	--	--
Soybeans	9	P_{13}-P_{14}	bu.	29.0	5-20-20	22.0	5-20-20	22.0	10-40-40
Sorghum silage	14	P_{19}-P_{20}	ton	12.0	50-20-20	12.0	40-20-20	12.0	80-40-40
Bermuda pasture	11	P_{15}-P_{16}	AUM	7.2	0-20-20	7.2	10-20-20	7.2	20-40-40
Rye and vetch pasture	13	P_{17}-P_{18}	AUM	3.0	15-15-15	3.0	15-15-15	2.0	30-30-30

[a]Complete budgets for these enterprises may be found in Tables 1 to 14 in Processed Series

Description of Machinery Complement

To make cost estimates for crop enterprises, it is necessary to assume a specific complement of machinery. The complement used consists of a four-row tractor and auxillary equipment as shown in Table III.

All costs of owning and operating machinery are considered to be variable for all planning periods and are expressed on a per hour basis. These costs include normal variable expenses such as fuel, oil, lubrication and repair, as well as depreciation. Hourly depreciation is calculated by dividing the new cost less salvage value by the estimated hours of use expected from the machine. This procedure is based on either of two assumptions: (1) that there is a ready market so that a farmer may buy or sell machinery at his discretion without affecting the per hour cost of using the machine or, (2) he will keep a machine long enough to depreciate it out. If either of these conditions holds, we can expand or contract the machinery complement and not affect appreciably the cost assumed in the budgets.

Harvesting operations for all enterprises, including combining, hay baling, broomcorn harvesting (including labor), etc. are considered to be custom operations.[1] Chemical weed control, insect control, and defoliation are also figured at the custom rate.

Labor Availability

Labor requirements and operator labor availability are grouped into four periods. These are: (1) January-April, (2) May-July, (3) August-

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[1]Prices for custom operations are from D. B. Jeffery, et al., Oklahoma Custom Rates, Oklahoma Agricultural Extension Service, Leaflet L-50, 1960. Adjusted if necessary by specialists in the area of study.

TABLE III

COSTS AND DEPRECIATION OF MACHINERY ITEMS, SOUTHCENTRAL AND EASTCENTRAL OKLAHOMA

Machinery Items	New Cost (dollars)	New Cost Less Salvage[a] (dollars)	Estimated Years to Obsolescence (years)	Estimated Hours of Use to Wear Out (hours)	Fuel, Oil, Lubrication and Repair Cost Per Hour (dollars)	Depreciation Per Hour of Use[b] (dollars)	Capital Per Hour[d] (dollars)
Tractor, 4 or 3-16 Tricycle, L.P. P.S., Hydraulic System, PTO 3 Point Hitch, 51 HP	4,400	3,872	15	12,000	.95	.32	2.75
Moldboard Plow, 3-16 Integral	415	365	15	2,000	.18	.18	1.56
Disc Plow, 26" Disc, 4-D	425	374	15	2,000	.07	.19	1.60
Tandem Disc Harrow - 12' Wheel Type	660	580	15	2,000	.12	.29	2.48
Oneway 8'	515	455	15	2,000	.10	.33	1.94
Spiketooth Harrow 24'	135	16	20	2,500	.02	.05	.54
Planter, 4-Row Wheel, w/Fertilizer Attachment for Cotton and Corn	720	634	20	1,200	.24	.53	6.00
Rotary Hoe, 14' Pull	380	334	15	1,500	.07	.22	1.90
Cultivator, 4-Row	610	537	12	2,500	.11	.21	1.47
Grain Drill, 16-7"[c] Press Wheel Fertilizer	730	642	20	1,200	.24	.54	6.08
Rotary Mower (Shredder) Heavy Housing Integral	450	396	15	2,000	.10	.20	1.35
Stalk Cutter, 14'	350	350	15	1,200	.14	.29	.38
Spray Rig, 8-Row	270	238	15	2,000	.05	.12	1.01
Lister Planter, 4-Row	675	595	20	1,200	.22	.50	5.63

[a]Salvage value of implements assumed to be 12 percent of new value.

[b]New cost less salvage divided by estimated hours of use to wear out.

[c]16-7" costs assumed equal to 16-8" costs.

[d]One-half of the new value divided by the number of hours of use per year.

September, and (4) October-December. This division is satisfactory for many of the farming operations and management decisions. Operator time available in each of these periods is specified in Table IV. This time is for menial labor only. Other than this, one and one-half hours daily are assumed necessary for management. This includes such things as farm planning, business transactions, etc. When other labor is necessary, it is assumed that it can be hired as needed for $1.00 per hour.

TABLE IV

OPERATOR LABOR AVAILABLE FOR FARMING--BY PERIODS[a]

Period of Year	Hours Available
January-April	625
May-July	515
August-September	366
October-December	509

[a]These figures are from William F. Lagrone and Larry J. Connor, Farm Adjustment Opportunities on Fine-Textured Soils of Southwest Oklahoma, Oklahoma Agricultural Experiment Station, Bulletin B-538 (February, 1960). Adjusted for Eastcentral and Southcentral Oklahoma; and for operator-only basis with one and one-half hours per day subtracted for management time.

Capital Availability

Capital, in most of the programs, is considered to be unrestricted. That is, it is assumed that the farm operator may borrow all of the capital that he needs for an annual charge of six percent. However, some farmers do not have all the capital available that they may need, nor

can they always obtain it at an interest rate of six percent. To provide aids for allocating a limited amount of capital or high interest capital, optimum organizations were obtained for different capital levels and interest rates. Most of these programs apply to short-run situations. In a longer period of time, we assume that a manager may acquire necessary amounts of credit at a lower cost.

Crop Activities

The crop activities and attendant yields and fertilization rates included in this study are those listed in Table II. Of these, cotton, wheat, peanuts, soybeans and broomcorn are marketed directly for cash. Grain sorghum, corn and alfalfa may be either sold directly for cash or sold through a livestock enterprise; that is, used for feed for cattle or hogs. Silage, Bermuda and rye and vetch must be marketed through a livestock enterprise. The yields and practices assumed for all of these enterprises reflect above average management as specified by agronomists and extension service personnel.

There are some specialized crops grown in the area, such as watermelons. But the number of farms growing these are so few that all specialized crops are omitted from this study.

Livestock Activities

Eleven beef cattle activities are also included in this study. Of the eleven, four are buy-sell activities where 450 pound calves are bought and later sold as good feeders. These four differ in the time they are bought and sold. They also differ according to their ration (see Table V). Farmers in these bottomland areas appear to be shifting

toward a cow-calf system; therefore, three cow-calf enterprises are considered. The primary differences in these three are the time of calving, when the calves are sold, and the type of ration involved.

We also examine the profitability of feeding steers for slaughter. Two feedlot systems, with two variations of each, are included. Again the differences are based on time-of-sale and ration fed.

To determine the feasibility of expanding the hog enterprise in bottomland areas to utilize the potential production of feed grains, we include one hog enterprise. This enterprise is budgeted as a 24 sow unit for the purpose of determining costs. However, the results are approximately correct per unit for a farmer who has a smaller or a larger number of sows. In this budget, sows farrow twice yearly and the pigs are fed for slaughter.

Feed used for all livestock enterprises is required to be produced on the farm, with the exception of protein supplement, creep feed, and salt and minerals.

TABLE V

DESCRIPTION OF LIVESTOCK ACTIVITIES[a]

P_{22}	Producing Good Feeders; Fall Buy-Oct. 15; Late Spring Sell-May 31; Winter Ration, Small Grain and Vetch Pasture with Hay and CSC While Off Pasture; Sold Off Small Grain and Vetch Pasture
P_{23}	Producing Good Feeders, Summer Buy-Aug. 1; Late Spring Sell-May 31; Winter Ration, Small Grain and Vetch Pasture with Hay and CSC While Off Pasture; Sold Off Small Grain and Vetch Pasture
P_{24}	Producing Good Feeders; Fall Buy-Sept. 10, Summer Sell-July 10, Roughed Through Winter on Native Grass and CSC, Sold Off Grass
P_{25}	Producing Good Feeders; Fall Buy-Sept. 10, Summer Sell-July 10, Winter Ration of Alfalfa Hay; Sold Off Grass
P_{26}	Beef Cow Herd (25 Cow Unit); Spring Calving; Not Creep-Fed; Calves Born Mar. 1, Sold Oct. 1; Winter Ration; CSC, Native Pasture, and Hay; Selling Good-Choice Feeder Calves Off Native Pasture
P_{27}	Beef Cow Herd (25 Cow Unit); Fall Calving-Oct. 30, Not Creep-Fed, Sold July 20; Winter Ration, CSC and Range; Selling Good-Choice Feeder Calves Off Native Pasture
P_{28}	Beef Cow Herd (25 Cow Unit) Fall Calving; Noncreep-Fed; Calves Born Late Oct.; Winter Ration; Small Grain-Vetch Grazing; CSC and Hay While Off Pasture, Selling Good-Choice Feeder and Slaughter Calves May 30
P_{29}	Producing Good-Choice Slaughter Steers; Fall Buy-Oct. 10; (A) Wintered on Rye-Vetch-Oat Pasture with Supplemental Feed Until May 1; (B) Grazed on Summer Range Until Aug. 1; (C) Finished in Feedlot and Sold November 1
P_{30}	Producing Good-Choice Slaughter Steers; Fall Buy-Oct. 10; (A) Wintered on Rye-Vetch-Oat Pasture with Supplemental Feed Until May 1; (B) Grazed on Summer Range Until Aug. 1; (C) Finished in Feedlot and Sold Nov. 1

TABLE V ((Continued)

P_{31}	Producing Good-Choice Slaughter Steers; Fall Buy-Oct. 10; (A) Wintered on Rye-Vetch-Oat Pasture with Supplemental Feed and Additional Grain Until May 1; (B) Finished on Summer Range with Full Grain Feed and Sold July 15
P_{32}	Producing Good-Choice Slaughter Steers; Fall Buy-Oct. 10; (A) Wintered on Rye-Vetch-Oat Pasture with Supplemental Feed and Additional Grain Until May 1; (B) Finished on Summer Range with Full Grain Feed and Sold July 15
P_{33}	Hog Production and Feeding; 24 Sow Unit Farrowing in January-August, and April-October

[a]Reichardt, et all, pp. 22-33.

CHAPTER III

PROFITABLE FARMING ADJUSTMENTS FOR THE SHORT-RUN

The following types of questions are being asked by managers of bottomland farms: Despite historic emphasis on cash crops, can farm income be increased by shifting to livestock feeding systems that utilize farm produced feed grains? Can wheat compete profitably for use of land, given the current outlook for lower wheat prices? What beef system can increase net income--cow-calf, buy-sell, or heavy feeding of cattle for slaughter? Or is a hog system even more profitable? Can a farmer increase earnings by converting bottomlands from row crops and alfalfa to Bermuda grass? Can a farmer get a greater return on capital by investing in more land or by investing in a more capital intensive enterprise within current fencelines? This chapter answers some of these questions. In the following section, we estimate the high profit enterprise combinations for the farmer with capital available it if earns 6 percent or more. In the second section, we present most profitable farm plans for individuals with limited capital.

This chapter outlines profitable responses to the alternatives which might confront the farm manager in the short-run. As is stated in the objectives in Chapter I, for this period expected prices and allotments for the next five years are used. Any necessary extra labor may be hired for $1.00 per hour.

"Net income", as the term is used in all programs, is the return to operator labor, management, risk, incidental overhead (expenditures not included in the budgets), and land. A one-hundred percent equity in land is assumed. For the many farmers who do not have full ownership, the annual interest and land payments or rent may be subtracted from the given net income to arrive at the net returns for a given situation. The overhead expenses not included consist of depreciation on buildings, taxes and insurance, and pickup or car expense for the farm business.

Profit Maximization with Various Combinations of Enterprises

Many farmers, for personal reasons, for lack of capable labor or management, or because their soil or buildings are unsuited, do not wish to consider the alternatives we find most profitable. For these individuals, the farm organization found by omitting certain enterprises may be optimum.

Starting with all crop and livestock activities listed in Tables II and V as admissible alternatives, and with capital unlimited at six percent interest, the most profitable set of enterprises is specified. Then after removing the most profitable enterprises(s), the program is rerun to find the next most profitable and so on until the rank of profitability has been determined. Besides determining the order of importance of the various enterprises, this procedure also shows us the capital requirements and net income effects of alternative enterprise combinations. Due to risk from weather, insects, etc., we arbitrarily specified that not more than one-half the cropland would be in either alfalfa, corn, or cotton.

All Enterprises

Some farmers have the managerial ability, capital and flexibility to take advantage of the optimum or most profitable combination of enterprises in the short-run. The overall optimum farm organization is obtained by allowing any or all of the enterprises listed in Tables II and V to enter the program. The enterprises shown in Table VI are selected to give the highest possible net income given the farm size and other restrictions. The column in the table headed "stability range" shows to what extremes the cost or revenue per unit, whichever the case may be, may vary without changing the organization of the program. However, any change within this range will affect the net income to the program.

Our optimum program is essentially a hog and feed grain operation. Since we were not allowed to buy feed grain, the number of sows is limited by the amount of grain which can be grown on the farm. Also included in the program are 43 acres of peanuts and 18 head of spring calving cows. The peanuts apply primarily to the Red River bottom whose soil and market conditions are favorable to peanuts. For the Washita and Arkansas River bottoms this land likely would go into grain sorghum or corn. The number of sows would be increased while the net income to the farm would be slightly decreased. In Chapter II we stated that our farm included 185 acres of upland in native pasture which cannot be cropped. This pasture in all cases is used most profitably by the spring calving cattle alternative.

This program appears to be highly stable. That is, individual enterprise costs or returns may vary over a relatively wide range without affecting the combination of enterprises. Corn on B_1 and B_3 soils will be planted

TABLE VI

OPTIMUM FARM ORGANIZATION, ALLOWING ALL ENTERPRISES IN PROGRAM
(SHORT-RUN PROGRAM NUMBER I)

Item	Unit	Level	Stability Range (dollars)	Revenue/Unit + or Cost/Unit - (dollars)	Total (dollars)
1. Enterprise produced or sold					
Corn (B_1)	Acres	136	-55.90 to ∞	-19.32[a]	-2,627.52
Corn (B_3)	Acres	43	-49.54 to ∞	-37.32[a]	-1,604.76
Peanuts (B_3)	Acres	43	63.64 to ∞	+74.69[b]	+3,211.67
Grain Sorghum (B_1)	Acres	136	-40.75 to -12.54	-21.98[a]	-2,989.28
Hogs[d]	Head	102	321.12 to 431.71	+388.24[c]	+39,600.48
Spring Calf	Head	18	50.11 to 87.85	+61.32[c]	+1,103.76
2. Labor Hired					
January-April	Hours	162.74	-11.68 to - .54	- 1.00	- 162.74
May-July	Hours	.79	- 6.06 to + .06	- 1.00	- .79
3. Capital Used[e]	Dollars	60,839.65	-112 to - .016	.06	-3,650.38
4. Net Income[f]	Dollars				32,880.04

[a]Cost per unit (shown as negative figure) is operating expense from ground preparation through harvest.

[b]Revenue per unit to crops is net returns above costs (see footnote a).

[c]Revenue per unit to livestock is net neturns above costs other than feed produced on the farm, interest and hired labor.

[d]Returns are per sow, assuming two litters per year, for an annual average price of $18/cwt.

[e]Capital is total annual operating capital required for the enterprise.

[f]Net income is net returns to land, labor, management, and miscellaneous overhead.

at the indicated level at any operating cost per acre up to $55.90 and $49.54 respectively. Peanuts will be planted if they have a per acre net return (gross revenue less operating cost) above $63.64. And grain sorghum operating cost may range between $12.54 and $40.75 without changing the farm organization. Gross returns to hogs may vary over a $110 range ($321.12 to $431.71) without a change in organization, and annual average price may fall from the $18/cwt. used to nearly $14/cwt. before hogs will leave the program. Without changing the optimum organization, spring calf returns may vary from $50.11 to $87.85. Although a large amount of capital is used, the interest rate may increase to slightly over 11 percent or decrease to slightly below two percent without changing the program organization.

All Enterprises Except Hogs

With the removal of hogs as an alternative, major changes are made in the optimum combination of enterprises (Table VII). In this program, all crops are sold for cash, while in the preceding program most of the cropland was used to produce feed.

Alfalfa acreage is restrained by the condition mentioned earlier that no more than one-half of any soil type could be planted to either corn, cotton or alfalfa. Again the full allotment of peanuts is planted. A decline in peanut price would not change the program as long as the return is above $27.48 per acre. As mentioned in the preceding program, however, this may apply only to the Red River area. For the other two situations, soybeans will be planted on this B_3 land. The implication is that soybeans are more profitable than corn on B_3 soil, while the opposite is true on the B_1 soil.

TABLE VII

OPTIMUM FARM ORGANIZATION, ALLOWING ALL ENTERPRISES IN PROGRAM EXCEPT HOGS (SHORT-RUN PROGRAM NUMBER II)

Item	Unit	Level	Stability Range (dollars)	Revenue/Unit + or Cost/Unit -[a] (dollars)	Total (dollars)
1. Enterprise Produced or Sold					
Alfalfa (B_1)	Acre	136	-66.67 to ∞	-57.72	-7,849.92
Alfalfa (B_3)	Acre	43	-65.76 to ∞	-55.10	-2,369.30
Peanuts (B_3)	Acre	43	27.48 to ∞	+74.69	+3,211.67
Corn (B_1)	Acre	136	-24.44 to -10.37	-19.32	-2,627.52
Spring Calf	Head	18	53.52 to 71.19	+61.32	+1,103.76
Alfalfa Sell	Ton	850	21.09 to 100.08	+22.88	+19,448.00
Feed Grain Sell	Cwt.	5,607	1.51 to 1.85	+ 1.63	+9,139.41
2. Labor Hired	Hour	0		1.00	0
3. Capital Used	Dollars	10,066.00	- .368 to- .038	.06	- 603.96
4. Net Income					19,452.14

[a]See Table VI for footnotes.

Other than peanuts, alfalfa is the most profitable crop on both soils given the excluded alternative. It is profitable to plant alfalfa at any annual cost below \$66.67 and \$65.76 per acre on B_1 soil and B_3 soil respectively without changing the organization of the program. Corn, ranking second to alfalfa in profitability on B_1 soil, is planted on one-half of that soil. However, it has a narrower stability range (-\$24.44 to -\$10.37). At an operating cost exceeding \$24.44 per acre, corn will be replaced by soybeans.

It may be noted that alfalfa and corn are sold through a separate program activity, rather than sold directly as is peanuts. The purpose of this operation is to facilitate changing market prices of these crops in the program.

The capital requirement, \$10,066, is stable over a range from 36.8 percent down to 3.8 percent interest. Comparing short-run programs with the previous hog program, capital requirements are much less than for the first program which included hogs. However, farm income decreased by approximately \$13,500. While it would appear that the second organization is more feasible to many farmers, it is possible that net income would be even higher than in Table VI if hogs were included but with very limited capital. This question will be explained in greater detail later.

Corn, Peanuts, Alfalfa Removed

With the removal of corn, peanuts, and alfalfa as well as hogs, we get a relatively simple program requiring only a small amount of capital (Table VIII). This program consists of soybeans on both B_1 and B_3 soil and the spring calf livestock activity on the native pasture. The spring calf activity and the B_3 soybeans are relatively insensitive to price and

TABLE VIII

OPTIMUM FARM ORGANIZATION, ALLOWING ALL ENTERPRISES IN PROGRAM EXCEPT HOGS, CORN, PEANUTS, AND ALFALFA (SHORT-RUN PROGRAM NUMBER III)

Item	Unit	Level	Stability Range (dollars)	Revenue/Unit + or Cost/Unit -[a] (dollars)	Total (dollars)
1. Enterprise Produced or Sold					
Soybeans (B_1)	Acre	272	38.28 to ∞	+41.31	+11,236.32
Soybeans (B_3)	Acre	86	18.79 to ∞	+75.48	+ 2,191.28
Spring Calf	Head	18	51.89 to 90.62	+61.32	+ 1,103.76
2. Labor Hired	Hour	0		1.00	0
3. Capital Used	Dollars	6,155.00	-30.7 to 0	- .06	- 369.30
4. Net Income	Dollars				14,162.06

[a]See Table VI for footnotes.

cost changes. However, if the per acre net returns on the B_1 soybeans falls by as little as $3.03 (about 10 1/2 cents per bushel), this enterprise will be partially replaced by cotton. Capital is highly stable. The interest rate may go as high as 30.7 percent without changing the organization of the program.

Perhaps the greatest advantage of the above plan is its simplicity. The farmer does not need a very diversified complement of machinery, nor does he need any extra labor or a very high level of capital. One disadvantage to this system is the risk involved due to conditions adverse to soybean production. Also, net income is down over $5,000 from the previous, more diversified program.

Soybeans Removed

With the removal of soybeans as an alternative, along with the other alternatives which have been excluded, we again return to a more diversified farm organization (Table IX). In this program, cotton is the most profitable crop. The entire allotment of 69 acres is planted, with the rest of the B_1 land going into broomcorn. The entire B_3 soil group is in grain sorghum. The result may apply only to the Washita bottom where substantial acreages have been traditionally planted to broomcorn. The fact that broomcorn is not profitable until a number of enterprises have been removed, suggests that farmers re-examine the profitability of the broomcorn enterprise in relation to other alternatives.

It is noted that this program would be altered by small revisions in prices and costs. If the per acre cost of B_1 cotton should rise over $2.47, the organization would change. If the returns per acre to broomcorn were to increase $2.47 or to decrease $1.71 there would also be a change.

TABLE IX

OPTIMUM FARM ORGANIZATION, ALLOWING ALL ENTERPRISES IN PROGRAM EXCEPT HOGS, CORN, ALFALFA, PEANUTS, AND SOYBEANS (SHORT-RUN PROGRAM NUMBER IV)

Item	Unit	Level	Stability Range (dollars)	Revenue/Unit + or Cost/Unit −[a] (dollars)	Total (dollars)
1. Enterprise Produced or Sold					
Cotton (B_1)	Acre	69	-95.43 to ∞	-92.96	-6,414.24
Broomcorn (B_1)	Acre	203	32.27 to 36.45	+33.98	+6,897.94
Grain Sorghum (B_3)	Acre	86	-31.40 to 27.43	-28.93	-2,487.98
Spring Calf	Head	18	49.46 to 72.30	+61.32	+1,103.76
Cotton Sell	Cwt.	311.5	28.70 to ∞	+29.50	+9,189.25
Feed Grain Sell	Cwt.	2,408	1.54 to 1.68	+ 1.63	+3,925.04
2. Labor Hired					
May-July	Hour	60	- 3.79 to .06	- 1.00	- 60.00
3. Capital Used	Dollars	9,216.00	-20.8 to 0	- .06	- 552.96
4. Net Income	Dollars				11,718.81

[a]See Table VI for footnotes.

The same holds true for the grain sorghum--if the cost per acre increased $2.47 or if it decreased $1.50. We emphasize, however, that if a cost or return to an enterprise does exceed the stability range, that enterprise may not be partially or entirely replaced. It just means that there will be some reorganization of enterprises in the program. It does not tell us at what level a new enterprise will enter nor does it tell us what enterprise, if any, will leave the program.

The spring calf enterprise, again, is in this program, and this enterprise is stable. Capital requirements are greater in this program than in the previous one, and 60 hours of extra labor must be hired. Net income is $11,718.81, and may be acceptable for the farmer who cannot shift to a more profitable combination of enterprises in the short-run.

Broomcorn and B_1 Cotton Removed

With the removal of broomcorn and cotton on B_1 soil (Table X), we get a shift in the cotton to B_3 soil, and the rest of the cropland put into grain sorghum. Only 43 acres of cotton were planted, as opposed to the 69 acres of the previous program. This is due to the one-half of the cropland (B_3 soil in this case) restriction coming into effect before the allotment does. In this case, it is probably more realistic to assume that a farmer would go ahead and plant the full allotment.

Like the previous program, this organization is not very stable. Income is over $2,000 lower, while capital requirements are higher.

Grain Sorghum and B_3 Cotton Removed

With the removal of grain sorghum and B_3 cotton, alternatives are limited to the various cattle enterprises and to wheat (Table XI). And, wheat is limited by a 65.5 acre allotment. All cropland other than the

TABLE X

OPTIMUM FARM ORGANIZATION, ALLOWING ALL ENTERPRISES IN PROGRAM EXCEPT HOGS, CORN, ALFALFA, PEANUTS, SOYBEANS, BROOMCORN, AND B_1 COTTON (SHORT-RUN PROGRAM NUMBER V)

Item	Unit	Level	Stability Range (dollars)	Revenue/Unit + or Cost/Unit −[a] (dollars)	Total (dollars)
1. Enterprise Produced or Sold					
Grain Sorghum (B_1)	Acre	272	-22.23 to -16.91	-21.98	-5,978.56
Cotton (B_3)	Acre	43	-88.42 to ∞	-87.29	-3,753.47
Grain Sorghum (B_3)	Acre	43	-33.37 to -27.80	-28.93	-1,243.99
Spring Calf	Head	18	49.46 to 72.30	+61.32	+1,103.76
Cotton Sell	Cwt.	154.81	29.19 to ∞	+29.50	+4,566.90
Feed Grain Sell	Cwt.	9,581.5	1.62 to 1.67	+ 1.63	+15,617.85
2. Labor Hired					
May-July	Hour	194	1.15 to .06	- 1.00	- 194.00
3. Capital Borrowed	Dollars	9,867	-12.8 to 0	- .06	- 592.02
4. Net Income	Dollars				9,526.47

[a]See Table VI for footnotes.

wheat allotment is put into Bermuda grass allowing an increase of the cow herd to 181 head. Since we eliminated the alfalfa activity, it is necessary to buy 21.7 tons of alfalfa hay for the cattle for winter ration.

This plan requires a relatively high amount of capital and also uses some hired labor. However, a very diversified machinery complement is not needed, and the individual farmer may have a strong personal preference for this type of organization. Since net income is low as compared to some of the previous organizations, this situation leaves a satisfactory cash living allowance only for the farmer who has a high equity in his land. With a low equity, the farmer would be paying a large percent of his income in land payments.

It should be noticed that even though wheat did not enter any of the previous programs, it is quite stable here. The per acre production cost may increase over $10.00, or the price may fall as low as $1.10 per bushel without causing any change in the program organization.

No Cash Crops--All Sold Through Livestock

For purposes of comparison this program assumes that there is no market for cash crops, and that any grain or hay which is produced must be sold through one of the cattle enterprises (cow-calf, buy-sell feeders, or slaughter steers). The program indicates that for the present conditions of price, it is more profitable to grow Bermuda pasture and have a cow-calf enterprise than to produce grain and have a buy-sell feeder enterprise or a slaughter beef enterprise.

Fairly large price changes are necessary to bring in another type of organization. Also, if the spring calf alternative is removed, a fall calving enterprise comes in. The only resulting effect is a

TABLE XI

OPTIMUM FARM ORGANIZATION EXCLUDING ALL ENTERPRISES EXCEPT WHEAT, BERMUDA GRASS, RYE AND VETCH, AND CATTLE ENTERPRISES (SHORT-RUN PROGRAM NUMBER VI)

Item	Unit	Level	Stability Range	Revenue/Unit + or Cost/Unit -[a]	Total
			(dollars)	(dollars)	(dollars)
1. Enterprise Produced or Sold					
Wheat (B_1)	Acre	65.5	-31.98 to ∞	-21.62	-1,416.11
Bermuda (B_1)	Acre	206.5	-16.53 to 2.89	- 7.47	-1,542.56
Bermuda (B_3)	Acre	86.0	-16.21 to ∞	-13.14[b]	-1,130.04
Spring Calf	Head	181.0	55.82 to 79.71	+61.32[b]	+11,098.92
Wheat Sell	Bushel	1,900.7	1.10 to ∞	+ 1.65	+3,136.16
Alfalfa Buy	Ton	21.7	-144.83 to+ 2.13	-25.00	- 542.50
2. Labor Hired					
October-December	Hour	288	- 2.27 to .06	- 1.00	- 288.00
January-April	Hour	227	- 1.58 to .06	- 1.00	- 227.00
3. Capital Borrowed	Dollars	32,546.5	- .089 to 0	- .06	-1,952.79
4. Net Income	Dollars				7,136.08

[a]See Table VI for footnotes.

[b]ACP payments were not taken into consideration in calculating establishing cost for Bermuda grass. With the ACP payment, the per acre cost of Bermuda would be somewhat less. Consequently, the net income would be higher.

TABLE XII

OPTIMUM FARM ORGANIZATION WITH NO CASH CROPS--ALL CROPS MUST BE SOLD THROUGH LIVESTOCK (SHORT-RUN PROGRAM NUMBER VII)

Item	Unit	Level	Stability Range	Revenue/Unit or Cost/Unit +-[a]	Total
			(dollars)	(dollars)	(dollars)
1. Enterprise Produced or Sold					
Spring Calf	Head	215	54.52 to 70.38	+61.32	+13,183.80
Bermuda (B_3)	Acre	86	-19.30 to ∞	-13.14[b]	-1,130.04
Bermuda (B_1)	Acre	267	-22.27 to- 1.15	- 7.47[b]	-1,994.49
Alfalfa (B_1)	Acre	5	-65.40 to 5.50	-57.72	- 288.60
2. Labor Hired					
January-April	Hour	391	- 4.31 to- .08	- 1.00	- 391.00
October-December	Hour	415	- 4.71 to .06	- 1.00	- 415.00
3. Capital Borrowed	Dollars	37,135.11	- .145 to 0	- .06	-2,228.11
4. Net Income	Dollars				6,736.56

[a]See Table VI for footnotes.

[b]Same footnote as Table XI.

slightly lower income and more hay and labor needed.

The income level is relatively low, and the labor and capital requirements are high for this organization. This program tells us that for this geographical area, under the conditions of price assumed, a cow-calf system with Bermuda pasture is the most profitable cattle program to be considered, but it does not compete profitably for bottomland with cash crop or hog systems.

Profit Maximization with Various Levels of Capital

In the previous section, we assumed that capital was readily available as long as the return was at least six percent. Many farmers have limited capital, however, and the same farm organization may not be most profitable for all levels of capital. For the beginning farmer, the farm organizations at successively higher capital levels are the stepping stones he might follow to make best use of capital as he accumulates it through time. Programs at alternative capital levels also can be useful to the established farmer who desires the highest possible return on capital in potential investments. Also the alternatives essentially represent a demand function for credit of a farmer who must show opportunities for profitable investments before the credit supply will be extended.

Capital, here, means total operating capital, i.e., the total number of dollars necessary to produce an enterprise. This does not include miscellaneous overhead, but only the items listed in the budgets.

Hogs, peanuts, and broomcorn are excluded as alternatives for this part of the study. Hogs are a very high user of capital, and require managerial know-how and markets unavailable to many area farmers. Peanuts

apply primarily to the Red River, and broomcorn applies primarily to the Washita River bottom. By excluding these, we leave only the alternatives which are open to many farmers in this area.

At this point of the study, a land buying activity was introduced. Land buying is usually considered to be a long-run project, but some opportunities may be available in the immediate future to purchase land. By introducing the land buy alternative we are able to determine at what capital level a farmer would purchase land rather than invest more within current fencelines. Due to the long-term outlook in land buying, the operator is not charged for payments on the principal, since he is assumed to recover these payments when land eventually is sold. He must pay six percent interest on the capital required to purchase land at the current price of $325 per acre.[1]

Starting with low levels of capital and increasing in units of $2,500, we see how a farmer might profitably change his organization as he acquires more capital. The costs directly attributed to farm reorganization are not included. The manager would balance these costs for each situation against the gains from a new organization.

Operator labor and the representative farm totaling 567 acres and with component soil resources depicted earlier are initially considered given or fixed in amount. The question is, to what enterprises and practices should the limited operating capital be allocated on the representative farm? Should it be used for alfalfa, soybeans or corn, or could it bring a larger return if invested in livestock or more land?

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[1]The "interest" charge also may be interpreted as a five percent interest charge, plus a one percent tax for the value of additional land.

$2,500 Capital

With this low level of capital, a farmer achieves the highest possible level of income by producing enterprises requiring little capital. However, rather than put all land in crops which require very little capital, it is more profitable to leave some land idle and plant higher capital using enterprises (see Table XIII). Seventy-four acres of B_3 cropland and all of the native pasture are left idle. But, on the remaining 284 acres of cropland we achieve an $11,523 net income.

All of the B_1 cropland is in soybeans. However, the stability range indicates that if the returns per acre fell as little as $1.36 (less than the value of one bushel), all or part of the soybeans will be replaced by alfalfa.

Soybeans on B_1 soil are the overall most profitable crop, but on B_3 soil alfalfa is slightly more profitable. Enough capital remains after use on soybeans for 12 acres of alfalfa on B_3 soil. Although alfalfa is the most profitable crop on B_3 soil, an increase of only 33 cents in the annual cost per acre of growing alfalfa would shift B_3 land to soybeans. If the price of alfalfa were to exceed the upper limit of $23.31 per ton, alfalfa would start to replace soybeans. However, if this price fell below the lower limit of $22.80 per ton, then soybeans would start to replace the alfalfa on the B_3 soil. Within a farily narrow price range; however, it is unlikely that either change would greatly affect net income.

Even though we did not impose a restriction on the number of acres of soybeans that a farmer may plant, he may not want so large a part of the farm in one crop. Due to risk and uncertainty or for other reasons, a farmer with limited capital may prefer to put more land in alfalfa

TABLE XIII

OPTIMUM FARM ORGANIZATION FOR $2,500 OF CAPITAL (SHORT-RUN PROGRAM NUMBER IX)

Item	Unit	Level	Stability Range (dollars)	Revenue/Unit + or Cost/Unit -[a] (dollars)	Total (dollars)
1. Enterprise Produced or Sold					
Soybeans (B_1)	Acre	272	39.95 to ∞	+41.31	+11,236.32
Alfalfa (B_3)	Acre	12	-55.44 to -15.12	-55.10	- 661.20
Alfalfa Sell	Ton	48	22.80 to 23.31	+22.88	+1,098.24
Idle cropland (B_3)	Acre	74		0	0
Idle Pasture	Acre	185		0	0
2. Labor Hired	Hour	0		- 1.00	0
3. Capital Borrowed	Dollars	2,500	- 2.32 to 0	- .06	- 150.00
4. Net Income	Dollars				11,523.36

[a]See Table VI for footnotes.

and less in soybeans.

It is interesting to note that all of the capital allowed here could be used even at an interest rate as high as 232 percent without getting a reorganization in the program. However, net income would go down at high interest rates.

$5,000 Capital

The optimum solution for $5,000 of capital is both more intensive and more extensive than that for $2,500. By intensive, we mean producing a more profitable enterprise which uses more capital per acre on land already cropped. By extensive, we mean planting or using more total acres.

Alfalfa is planted up to the one-half-of-the-cropland restriction and then corn and soybeans are planted (Table XIV). In contrast to the previous situation, it is more profitable to plant all of the cropland at this level of capital.

Although net income was substantially increased over $4,500 with the $2,500 capital increase, at this capital level it is still not profitable to buy cattle to use the native pasture. The program indicates that by adding one cow-calf unit, net income will decrease by $47.86. However, if the per acre return to soybeans on B_1 soil increased 97 cents (about 3 1/3 cents per bushel), a cow-calf enterprise would enter the program. The same is true if the per acre cost of producing corn increased 97 cents or if corn price fell two cents per bushel. Any of these situations imply that corn would leave the program, the 136 acres of B_1 soil would be put in soybeans, and the remaining capital would cause a fall calving enterprise to be introduced.

TABLE XIV

OPTIMUM FARM ORGANIZATION FOR $5,000 OF CAPITAL
(SHORT-RUN PROGRAM NUMBER X)

Item	Unit	Level	Stability Range (dollars)	Revenue/Unit + or Cost/Unit -[a] (dollars)	Total (dollars)
1. Enterprise Produced or Sold					
Soybeans (B_1)	Acre	80	25.34 to 42.28	+41.31	+3,304.80
Soybeans (B_3)	Acre	43	9.12 to 33.33	+25.48	+1,095.64
Alfalfa (B_1)	Acre	136	-68.26 to 2108.41	-57.72	-7,849.92
Alfalfa (B_3)	Acre	43	-62.95 to 6791.46	-55.10	-2,369.30
Corn (B_1)	Acre	56	-20.29 to -4.99	-19.32	-1,081.92
Feed Grain Sell	Cwt.	2,322	1.61 to 1.98	+ 1.63	+3,784.86
Alfalfa Sell	Ton	852	20.92 to 37.05	+22.88	+19,493.76
2. Labor Hired	Hour	0		- 1.00	0
3. Capital Borrowed	Dollars	5,000.00	- .70 to ∞	- .06	- 300.00
4. Net Income	Dollars				16,077.92

[a]See Table VI for footnotes.

$7,500 Capital

When operating capital totaling $7,500 is available, the farmer can take advantage of the optimum combination of cash crop enterprises. This combination is 136 acres of B_1 alfalfa, 43 acres of B_3 alfalfa, 136 acres of B_1 corn, and 43 acres of B_3 soybeans (see Table XV). Any other combination of crops, given the restrictions, will result in a lower net income. This level of capital allows 11 head of the spring calves. Capital is not sufficient to use all of the upland pasture which will support 18 cow-calf units.

It may be noted that this is a relatively stable program, and that it returns a fairly high level of income. However, this additional $2,500 of capital only increased income about $1,000 as opposed to the $4,500 increase associated with the previous $2,500 of capital.

Unlimited Capital--Farm Size Fixed

Observing program XI, we conclude that some level of capital slightly above $7,500 would be sufficient to use all the land. Therefore, the capital restraint was removed, allowing the use of as much capital as needed for an optimum solution. If a farmer has no opportunity to buy land, this is the maximum amount of capital which he can use under the restrictions imposed.

The solution obtained by this procedure is shown in Table XVI. The farm organization is essentially the same as in Table XV except that there are 18 head of the spring calf enterprise as opposed to 11 head, and capital is increased $1,132.55 from $7,500 to $8,632.55. The additional capital gives an income increase of $361.29.

This level of capital gives the optimum program within current fence-

TABLE XV

OPTIMUM FARM ORGANIZATION FOR $7,500 OF CAPITAL
(SHORT-RUN PROGRAM NUMBER XI)

Item	Unit	Level	Stability Range (dollars)	Revenue/Unit + or Cost/Unit − (dollars)	Total[a] (dollars)
1. Enterprise Produced or Sold					
Alfalfa (B_1)	Acre	136	-67.47 to 1687.72	-57.72	-7,849.92
Alfalfa (B_3)	Acre	43	-64.34 to 5461.79	-55.10	-2,369.30
Corn (B_1)	Acre	136	-22.28 to -9.57	-19.32	-2,627.52
Soybeans (B_3)	Acre	43	12.71 to 34.72	+25.48	+1,095.64
Spring Calf	Head	11	52.17 to 93.55	+61.32	+ 674.52
Alfalfa Sell	Ton	851	20.93 to 31.51	+22.88	+19,470.88
Feed Grain Sell	Cwt.	5,607	1.56 to 1.87	+ 1.63	+9,139.41
2. Labor Hired	Hour	0		- 1.00	0
3. Capital Borrowed	Dollars	7,500	- .368 to ∞	- .06	- 450.00
4. Net Income	Dollars				17,083.71

[a]See Table VI for footnotes.

lines at current land prices. However, if the price of land fell below a price of $325 per acre, a farmer may profitably buy land before reaching this level. Land values at which a farmer could just break even and find it equally profitable to buy an additional acre or to invest in enterprises within current fencelines are discussed below.

Summary

In this chapter we have presented farming organizations to maximize net income, given sets of enterprises open to many farmers in these bottomland areas (see Table XVII). Hogs appear to be an exceptionally profitable enterprise. However, it must be remembered that a high level of managerial ability along with a willingness to work with farrowing sows is necessary. Also, a high level of annual capital is required. With the removal of hogs as an alternative, net income decreases substantially, but to a lesser degree than the capital requirement. As the most profitable enterprises are excluded one by one, the last alternative, a cow-calf system with Bermuda pasture on the bottomlands, ranks below hogs, corn, peanuts, alfalfa, broomcorn, soybeans, and cotton. Farmers in the area are showing a relatively strong preference to the Bermuda grass-livestock system even though it is a high user of capital. There may be various reasons for this. Among them, perhaps, are personal preference and an illusion of high profitability due to overlooking fixed costs after the system is established. Also, for many farmers, the stocking rate on Bermuda may be higher than used in this study, or the Bermuda may be irrigated, causing a much greater carrying capacity.

In the second section of the chapter the effects of various levels

TABLE XVI

OPTIMUM FARM ORGANIZATION WITH FARM SIZE FIXED AND CAPITAL UNLIMITED
(SHORT-RUN PROGRAM NUMBER XIV)

Item	Unit	Level	Stability Range (dollars)	Revenue/Unit or Cost/Unit (dollars)	+[a] - Total (dollars)
1. Enterprise Produced or Sold					
Alfalfa (B_1)	Acre	136	-66.67 to ∞	-57.72	-7,849.92
Alfalfa (B_3)	Acre	43	-65.76 to ∞	-55.10	-2,369.30
Corn (B_1)	Acre	136	-25.31 to -10.37	-19.32	-2,627.52
Soybeans (B_2)	Acre	43	19.32 to 36.14	+25.48	+1,095.64
Spring Calf	Head	18	53.52 to 71.19	+61.32	+1,103.76
Alfalfa Sell	Ton	851	21.09 to 26.08	+22.88	+19,470.88
Feed Grain Sell	Cwt.	5,607	1.48 to 1.85	+ 1.63	+9,139.41
2. Labor Hired	Hour	0		- 1.00	0
3. Capital Borrowed	Dollars	8,632.55	- .368 to - .038	- .06	- 517.95
4. Net Income	Dollars				17,445.00

[a]See Table VI for footnotes.

TABLE XVII

SUMMARY OF SHORT-RUN PROGRAMS SHOWING EFFECTS OF VARIOUS ENTERPRISE COMBINATIONS ON CAPITAL REQUIREMENTS AND INCOME

Table Number	Description	Capital Required (dollars)	Net Income (dollars)
VI	All Enterprises Included	60,839.65	32,880.04
VII	All Enterprises Except Hogs	10,066.00	19,452.14
VIII	Hogs, Corn, Peanuts, and Alfalfa Excluded	6,155.00	14,162.06
IX	Hogs, Corn, Alfalfa, Peanuts, and Soybeans Excluded	9,216.00	11,718.81
X	Hogs, Corn, Alfalfa, Peanuts, Soybeans, Broomcorn, and B_1 Cotton Excluded	9,867.00	9,526.47
XI	All Enterprises Excluded Except Wheat, Bermuda Grass, Rye and Vetch, and Cattle	32,546.50	7,136.08
XII	No Cash Crops--All Sold Through Cattle	37,155.11	6,736.56
XIII	Optimum Organization for $2,500 Capital[a]	2,500.00	11,523.36
XIV	Optimum Organization for $5,000 Capital[a]	5,000.00	16,077.92
XV	Optimum Organization for $7,500 Capital[a]	7,500.00	17,083.71
XVI	Optimum Organization with Capital Unrestricted and Farm Size Fixed[a]	8,632.55	17,445.00

[a]Excluding hogs, peanuts, and broomcorn.

of operator capital are examined. Hogs, peanuts and broomcorn are excluded from this part due to their unique characteristics as previously explained. It is more profitable to leave some land idle and plant more capital intensive enterprises when operating capital is very limited to $2,500. At $5,000 of capital, all the cropland is used.

To maximize profits, a farmer should first achieve the optimum organization of alfalfa, corn and soybeans (Table XVI) on his current farm before attempting to buy more land at current prices of approximately $325 per acre.

Table XVIII indicates the breakeven price of land--the land price at which capital invested in an additional acre would give the same rate of return as capital invested in enterprises within current fencelines. With only $2,500 of capital, a farmer could not profitably buy land at a zero price. At this capital level, he is already leaving some of his cropland idle. As the level of capital available increases, the return per dollar decreases while the breakeven price of land increases. However, only after the capital on the current farm is being utilized to the point where the return on additional enterprises is nine percent, can a farmer pay as high or higher than $325 per acre (the current land price). However, if he requires a nine percent return to capital, then he must get a ten percent return on additional land purchased because one percent must be payed as tax. If a farmer can get more than a nine percent return on his nonland investment, he should exploit such opportunities before investing in land at current prices.

It should be noted in Table XVIII that the breakeven land price is higher if the operator does not require a return on his labor. With $7,500 of operating capital, for example, the breakeven land price is

TABLE XVIII

SHORT-RUN BREAKEVEN PRICE PER ACRE FOR LAND, ASSUMING VARIOUS LEVELS OF OPERATING CAPITAL

(1)	(2)	(3)	(4)	(5)	(6)
Capital Level[a]	Per Acre Return[b]	(2) Less Operator Labor[c]	Rate of Return on Capital	Per Acre Breakeven Land Value[d] (2)/(4)	Per Acre Breakeven Land Value[e] (3)/(4)
(Dollars)	(Dollars)	(Dollars)	(Percent)	(Dollars)	(Dollars)
2,500	20.32	19.55	232	0	0
5,000	28.36	27.40	67	42.33	40.90
7,500	30.13	28.74	37	81.43	77.68
8,632.55	30.77	29.25	9	341.89	325.00

[a]Amount of capital employed on the representative farm of acres described in Chapter II.

[b]Average return for the whole farm to land, operator labor, management, and miscellaneous overhead.

[c]Average return for the whole farm to land, management, and miscellaneous overhead.

[d]Price a farmer could afford to pay per acre of land if he did not require a return on his labor. Results apply only to an additional acre. The assumption that small land parcels may be purchased is only an approximation for this analysis since land generally is sold in 80, 160, etc., acre units.

[e]Price a farmer could afford to pay per acre of land and get a $1.00 per hour return on his labor, management and risk.

$81.43 per acre with no allowance for operator labor and is $77.68 per acre if a $1.00 per hour return to operator labor is assumed. The breakeven land price would be even lower if the operator would require an even greater return for his risk, labor and management.

The farmer who has the opportunity to rent land as an alternative may consider column (3) in Table XVIII as the breakeven cash rent that he can afford to pay if he does not consider the costs of management and miscellaneous overhead. If these costs are considered, the figure in Column (3) should be reduced by the amount of these costs. For example, if a farmer has $5,000 of capital, he can afford to pay $27.40 per acre and get a return on capital and labor. However, this does not leave him any return to overhead and management. If he is to be payed for these or if a higher return on capital or labor is required, then some figure less than $27.40 is the breakeven rent.

CHAPTER IV

PROFITABLE FARMING ADJUSTMENTS FOR THE INTERMEDIATE-RUN WITH ALTERNATIVE COTTON PRICE-ALLOTMENT COMBINATIONS

The future type of government program and magnitude of U. S. treasury outlay for commodity supports can determine whether a commodity is profitable on a given farm. The future trend in commodity programs is difficult to anticipate, however. In this section we provide a decision criteria for a wide range of price-allotment alternatives, one of which conceivably might hold in 1975.

The optimum farm plan is influenced by (a) government expenditures on a commodity program, and (b) the price-allotment level, given the government outlay. At a specified U. S. treasury cost, a more highly restricted acreage allotment (production) is associated with higher prices because of the inelastic demand for a commodity. The allotment-price combination also influences farm income. The following analysis provides some insight into the individual farm income effects of selected farm programs.

The emphasis in this chapter is on the effects on farmers' income of various combinations of prices and allotments for cotton under three levels of government expenditures for the program. Base prices and allotments are 1975 projections and are shown in Appendix Table I. The 1975 base allotments are somewhat lower than at the present time due to the tendency for yields to expand relative to utilization, requiring lower acreages to achieve the current price at the current level of government

TABLE XIX

COTTON PRICES AND ALLOTMENTS ASSOCIATED WITH THREE LEVELS OF GOVERNMENT COST FOR THE PROGRAM, WITH ACCOMPANYING WHEAT AND PEANUT ALLOTMENTS AND PRICE LEVELS

Garvin County (Cotton-Wheat)
Bottomland

1963 base cotton allotment 35.8 acres
1963 base wheat allotment 45.11 acres

I. Projected 1975 cotton allotments with various price and government cost level situations.

Price		Government Cost		
National	Oklahoma	None	Medium	High
(Cents Per Pound)		0[a]	$390[a]	$720[a]
		(Acres of Allotment)		
20	17.6	41.24		
25	22	31.43	41.24	
30[b]	26.4	19.65	31.43	41.24
35[b]	30.8		19.65	31.43

II. Wheat allotment.

Projected 1975 39.6 acres at $1.69 per bushel.

Muskogee and Bryan Counties (Cotton-Wheat)
Bottomland

1963 base cotton allotment 100.24 acres
1963 base wheat allotment 85.92 acres

I. Projected 1975 cotton allotments with various price and government cost level situations.

Price		Government Cost		
National	Oklahoma	None	Medium	High
(Cents Per Pound)		0[a]	$390[a]	$720[a]
		(Acres of Allotment)		
20	17.6	115.48		
25	22	88.01	115.48	
30[b]	26.4	55.03	88.01	115.48
35[b]	30.8		55.03	88.01

II. Wheat allotment.

Projected 1975 75.43 acres at $1.69 per bushel.

TABLE XIX (Continued)

Bryan County (Cotton-Peanuts)
Bottomland

1963 base cotton allotment 71.6 acres
1963 base peanut allotment 42.96 acres

I. Projected 1975 cotton allotments with various price and government cost level situations.

Price		Government Cost		
National	Oklahoma	None	Medium	High
(Cents Per Pound)		0[a]	$390[a]	$720[a]
		(Acres of Allotment)		
20	17.6	82.48		
25	22	62.86	82.48	
30[b]	26.4	39.31	62.86	82.48
35[b]	30.8		39.31	62.86

II. Peanut allotment.

42.96 acres at 10.6 cents per pound.

[a]Millions of dollars.

[b]The 30 cent and 35 cent national prices would have to be 28.14 cents and 38.20 cents respectively to arrive at the indicated levels of government spending with the given allotment levels.

expenditure. Wheat and peanut allotments and prices for 1975 are held constant at a level associated with the current government cost for these programs.

To explain further, allotment-price combinations in Table XIX are broken down into three general groups considered reasonably homogeneous in allotment characteristics. These are Garvin County cotton-wheat, Muskogee and Bryan Counties cotton-wheat, and Bryan County cotton-peanuts. Garvin County has the lowest levels of allotments and produces no peanuts, therefore, it is separated. Bryan County is broken into two groups: (1) farms with cotton and wheat allotments, and (2) farms with cotton and peanut allotments. Muskogee County produces no peanuts, and since its cotton-wheat allotment levels are very similar to that of Bryan County, these two are grouped together. Because of the uniqueness of the Bryan County cotton-peanut allotment situation, it is programmed separately.

Four Oklahoma cotton prices are considered. These are 17.6 cents per pound, 22 cents per pound, 26.4 cents per pound and 30.8 cents per pound, and correspond respectively to the national prices of 20 cents per pound, 25 cents per pound, 30 cents per pound and 35 cents per pound on which the government cost for the program is based. Three levels of government expense are included. These are no expenditures (free markets or mandatory controls), a medium level of $390 million (about the same as at the present) and a high level of $720 million. The specified allotments are current (1963) county levels projected to 1975 and varied with the level of government expense. To illustrate the meaning of Table XIX, at the medium government expenditure level, the representative farm could have an allotment of 41 acres and receive 22 cents per pound, an allotment of 31 acres and receive 26 cents or 20 acres and receive

31 cents per pound. A higher government outlay permits a larger allotment at the same cotton price, of course.

It should be noted here that the assumed management level is high by current standards but is average for 1975. Also, all decisions in this chapter relate to the current representative farm of 567 acres, and no extra land may be purchased.

No cotton enters the farm organization up to a price of 30.8 cents per pound in all three situations. The implication is that no matter how many acres a farmer is allotted, or how much the government spends on the program, a farmer cannot profitably maintain a cotton allotment at prices below 30.8 cents per pound in the study area.

Wheat did not enter although the price used ($1.69 per bushel) is thought to be somewhat optimistic. Since at prices below this level wheat would be even less profitable, it appears that for 1975 conditions wheat does not compete successfully for use of resources on farms of the type programmed in this study.

Because of the somewhat different effects on farm organization, capital requirements and income level, each of the three situations is discussed separately below.

Garvin County (Cotton-Wheat)

At the 30.8 cents per pound cotton price, the Garvin County allotments are 19.65 acres and 31.43 acres, respectively, for medium and high levels of government expenditures. No allotment was considered at the zero level of government spending, because with no government supports it is unlikely that a price of 30.8 cents per pound for cotton could be achieved. We assume land is diverted from production as allotments be-

come more restrictive.[1] If this land were not retired, although it could not be planted in cotton a farmer would plant it in a competing crop. If all farmers did this, the price of the competing crops such as feed grain would tend to decrease from the excess supply. The resulting effect would be either to decrease farmer income and offset the benefits of the cotton program, or to cause an increase in government expense for other programs, shifting the government cost back to the high level.

The farm organizations arrived at under the 19.65 and 31.43 acre allotment situations are those shown in Tables XX and XXI.

High Government Cost

Table XX shows the enterprises and the income level associated with a 31.43 acre cotton allotment at a price of 30.8 cents per pound of lint cotton. At this level cotton and corn are the two most profitable crops for the B_1 soil group. The entire cotton allotment is planted, and corn is planted up to the one-half-of-cropland restriction mentioned in Chapter III. The remaining B_1 soil, along with all of the B_3 soil, is in soybeans. The spring-calf enterprise, as in the short-run, is the most profitable user of the native pasture.

From this combination of enterprises, the net income is $14,910.78, and borrowed capital totals $8,245. Even at this 30.8 cent price, cotton is quite unstable. A price decrease of .43 cents per pound or an increase in production cost of $1.95 per acre will cause part or all of the cotton to leave the program and be replaced by soybeans. The resulting effect of a complete replacement of cotton by soybeans would be to decrease net income by only $108.80.

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[1]The difference between 31.43 acres and 19.65 acres (11.78 acres) must be retired in this situation.

TABLE XX

OPTIMUM COMBINATION OF ENTERPRISES FOR GARVIN COUNTY COTTON-WHEAT SITUATION WITH 39.6 ACRE WHEAT ALLOTMENT AT $1.69/BU. AND 31.43 ACRE COTTON ALLOTMENT AT $30.87/CWT. (INTERMEDIATE-RUN PROGRAM NUMBER XXXI)

Item	Unit	Level	Stability Range (dollars)	Revenue/Unit + or Cost/Unit -[a] (dollars)	Total (dollars)
1. Enterprise produced or sold					
Soybeans (B_3)	Acre	86	24.89 to ∞	+26.14	+2,248.04
Soybeans (B_1)	Acre	104.5	37.81 to 43.74	+42.18	+4,407.81
Corn (B_1)	Acre	136	-22.07 to ∞	-19.32	-2,627.52
Cotton (B_1)	Acre	31.43	-94.91 to ∞	-92.96	-2,921.73
Spring calf	Head	18	54.90 to 82.21	+62.36	+1,122.48
Cotton sell	Cwt.	141.5	30.37 to ∞	+30.80	+4,358.20
Feed grain sell	Cwt.	4,792.5	1.76 to 1.99	+ 1.84	+8,818.20
2. Labor hired	Hours	0		- 1.00	0
3. Capital borrowed	Dollars	8,245	- .133 to -.012	- .06	- 494.70
4. Net income	Dollars				$14,910.78

[a]See Table VI for footnotes.

TABLE XXI

OPTIMUM COMBINATION OF ENTERPRISES FOR GARVIN COUNTY COTTON-WHEAT SITUATION WITH 39.6 ACRE WHEAT ALLOTMENT. AT $11.69/BU., 19.65 ACRES COTTON ALLOTMENT AT $30.8/CWT. and 11.78 ACRES LAND RETIRED (INTERMEDIATE-RUN PROGRAM NUMBER XXXII)

Item	Unit	Level	Stability Range	Revenue/Unit + or Cost/Unit -[a]	Total
			(dollars)	(dollars)	(dollars)
1. Enterprise Produced or Sold					
Soybeans (B_3)	Acre	86	24.89 to ∞	+26.14	+2,248.04
Soybeans (B_1)	Acre	104.5	37.81 to 43.74	+42.18	+4,407.81
Cotton (B_1)	Acre	19.65	-94.91 to ∞	-92.96	-1,826.66
Corn (B_1)	Acre	136.	-22.07 to ∞	-19.32	-2,627.52
Spring calf	Head	18	54.90 to 82.21	+62.36	+1,122.48
Cotton sell	Cwt.	88.4	30.37 to ∞	+30.80	+2,722.72
Feed grain sell	Cwt.	4,792.5	1.76 to 1.99	+ 1.84	+8,818.20
2. Labor hired	Hour	0		- 1.00	0
3. Capital borrowed	Dollars	$7,849.0	- .133 to .012	- .06	- 470.94
4. Net income	Dollars				$14,394.13

[a]See Table VI for footnotes.

Medium Government Cost

For this program it is necessary to retire 11.78 acres of B_1 land from production (Table XXI). The resultant effect is an identical program as in Table XX except for the reduced cotton acres with capital requirements and income being somewhat lower. If a farmer (a) must retire some land in order to plant cotton, but (b) has the alternative of planting no cotton and putting the entire farm in other crops, then the latter is to his advantage--to plant crops other than cotton. By planting 136 acres of B_1 corn, 136 acres of B_1 soybeans and 86 acres of B_3 soybeans, a farmer may increase his income $408.85 over that from the cotton-idle land situation in Table XXI.

Muskogee and Bryan Counties (Cotton-Wheat)

As we stated earlier, the Muskogee and Bryan County cotton-wheat allotment situations are grouped together because of their similarities. Like the Garvin County situation, cotton enters the program only at 30.8 cents per pound, and would tend to leave the program at 30.37 cents per pound, again being replaced by soybeans.

High Government Cost

At this level, as in the Garvin situation, the entire cotton allotment is planted. The results are the same as in the Garvin situation except for an increase in capital requirements and income due to the increased cotton acreage (see Table XXII).

Medium Government Cost

The medium level of government expenditures makes necessary the retirement of 33 acres of the B_1 cropland, costing the farmer approxi-

mately $1,500 as opposed to the high level government cost situation depicted in Table XXIII. By planting the whole farm in other crops as in Garvin County, most of this loss could be recovered.

Bryan County (Cotton-Peanuts)

The Red River bottom is the only one of the three areas being studied which produces a substantial amount of peanuts. This results in a unique allotment situation for some farms. That is the cotton-peanut allotment situation. In this program, peanuts are decidedly the most profitable crop. The 43 acres alloted return a net of $82.51 per acre.

The cotton allotment here is slightly less than that for the Muskogee-Bryan cotton-wheat situation. However, as in the other programs, the full allotment is planted, but only at the high cotton price. Except for the 43 acres of peanuts the resulting organization is the same as the others, only with a higher level of capital requirements and income (see Table XXIV and XXV).

Summary

The foregoing results suggest several implications for farm management and agricultural policy.

First, the type of farm program determines the place of cotton in the farming organization. Farm income increases as government outlays for cotton programs rise (see Table XXVI). Up to the price of approximately 30 cents per pound when cotton becomes profitable, farm income is not influenced by changes in the cotton program. As the government outlay for cotton programs is doubled, the increase in cotton allotment made possible at a given Oklahoma price of 30.8 cents per pound,

TABLE XXII

OPTIMUM COMBINATION OF ENTERPRISES FOR MUSKOGEE AND BRYAN COUNTIES--COTTON-WHEAT SITUATION WITH 88 ACRES COTTON ALLOTMENT AT $30.80/CWT. AND 75.43 ACRE WHEAT ALLOTMENT AT $1.69/BU. (INTERMEDIATE-RUN PROGRAM NUMBER XXXIV)

Item	Unit	Level	Stability Range	Revenue/Unit + or Cost/Unit -[a]	Total
			(dollars)	(dollars)	(dollars)
1. Enterprise Produced or Sold					
Soybeans (B_3)	Acre	86	24.89 to ∞	+26.14	+2,248.04
Soybeans (B_1)	Acre	48	37.81 to 43.74	+42.18	+2,024.64
Cotton (B_1)	Acre	88	-94.91 to ∞	-92.96	-8,180.48
Corn (B_1)	Acre	136	-22.07 to ∞	-19.32	-2,627.52
Spring calf	Head	18	54.90 to 82.21	+62.36	+1,122.48
Cotton sell	Cwt.	396	30.37 to ∞	+30.80	+12,196.80
Feed grain sell	Cwt.	4,792.5	1.76 to 1.99	+ 1.84	+8,818.20
2. Labor hired	Hour	0		- 1.00	0
3. Capital borrowed	Dollars	9,666	- .133 to .012	- .06	- 519.96
4. Net income	Dollars				$15,022.20

[a] See Table VI for footnotes.

TABLE XXIII

OPTIMUM COMBINATION OF ENTERPRISES FOR MUSKOGEE AND BRYAN COUNTIES--COTTON-WHEAT SITUATION WITH 55 ACRES COTTON ALLOTMENT AT $30.80/CWT., 75.43 ACRE WHEAT ALLOTMENT AT $1.69/BU. AND 33 ACRES OF LAND RETIRED (INTERMEDIATE-RUN PROGRAM NUMBER XXXV)

Item	Unit	Level	Stability Range	Revenue/Unit + or Cost/Unit -[a]	Total
			(dollars)	(dollars)	(dollars)
1. Enterprise Produced or Sold					
Soybeans (B_3)	Acre	86	24.89 to ∞	+26.14	+2,248.04
Soybeans (B_1)	Acre	48	37.81 to 43.74	+42.18	+2,024.64
Cotton (B_1)	Acre	55	-94.91 to ∞	-92.96	-5,112.80
Corn (B_1)	Acre	136	-22.07 to ∞	-19.32	-2,627.52
Spring calf	Head	18	54.90 to 82.21	+62.36	+1,122.48
Cotton sell	Cwt.	247.6	30.37 to ∞	+30.80	+7,626.08
Feed grain sell	Cwt.	4,792.5	1.76 to 1.99	+ 1.84	+8,818.20
2. Labor hired	Hour			- 1.00	0
3. Capital borrowed	Dollars	8,557	- .133 to -.012	- .06	- 513.42
4. Net income	Dollars				$13,585.70

[a] See Table VI for footnotes.

TABLE XXIV

OPTIMUM COMBINATION OF ENTERPRISES FOR BRYAN COUNTY COTTON-PEANUT SITUATION WITH 62.86 ACRES COTTON ALLOTMENT AT $30.80/CWT. AND 43 ACRES PEANUT ALLOTMENT AT $10.60/CWT. (INTERMEDIATE-RUN PROGRAM NUMBER XXXVI)

Item	Unit	Level	Stability Range (dollars)	Revenue/Unit + or Cost/Unit - (dollars)	[a] Total (dollars)
1. Enterprise Produced or Sold					
Peanuts (B_3)	Acre	43	28.14 to ∞	+82.51	+3,547.93
Soybeans (B_3)	Acre	43	24.89 to 80.51	+26.14	+1,124.02
Soybeans (B_1)	Acre	73	37.81 to 43.74	+42.18	+3,079.14
Cotton (B_1)	Acre	62.86	-94.91 to ∞	-92.96	-5,843.47
Corn (B_1)	Acre	136.	-22.07 to ∞	-19.32	-2,627.52
Spring calf	Head	18	54.91 to 82.21	+62.36	+1,122.48
Cotton sell	Cwt.	282.9	30.37 to ∞	+30.80	+8,713.32
Feed grain sell	Cwt.	4,792.5	1.76 to 1.99	+ 1.84	+8,818.20
2. Labor hired	Hour	0		- 1.00	0
3. Capital borrowed	Dollars	10,469.	- .133 to - .012	- .06	- 628.14
4. Net income	Dollars				$17,305.96

[a] See Table VI for footnotes.

TABLE XXV

OPTIMUM COMBINATION OF ENTERPRISES FOR BRYAN COUNTY COTTON-PEANUT SITUATION WITH 39.31 ACRES COTTON ALLOTMENT AT $30.80/CWT., 43 ACRES PEANUT ALLOTMENT AT $10.60/CWT., AND 23.55 ACRES OF B_1 LAND RETIRED (INTERMEDIATE-RUN PROGRAM NUMBER XXXVII)

Item	Unit	Level	Stability Range	Revenue/Unit + or Cost/Unit -[a]	Total
			(dollars)	(dollars)	(dollars)
1. Enterprise Produced or Sold					
Peanuts (B_3)	Acre	43	28.14 to ∞	+82.51	+3,547.93
Soybeans (B_3)	Acre	43	24.89 to 80.51	+26.14	+1,124.02
Soybeans (B_1)	Acre	73	37.81 to 43.74	+42.18	+3,079.14
Cotton (B_1)	Acre	39.3	-94.91 to ∞	-92.96	-3,653.33
Corn (B_1)	Acre	136	-22.07 to ∞	-19.32	-2,627.52
Spring calf	Head	18	54.91 to 82.21	+62.36	+1,122.48
Cotton sell	Cwt.	176.9	30.37 to ∞	+30.80	+5,448.52
Feed grain sell	Cwt.	4,792.5	1.76 to 1.79	+ 1.84	+8,818.20
2. Labor hired	Hour	0		- 1.00	0
3. Capital borrowed	Dollars	9,677.00	- .133 to -.012	- .06	- 580.62
4. Net income	Dollars				$16,278.82

[a]See Table VI for footnotes.

increases net farm income in Garvin County cotton-wheat situations by only $517.

Second, it appears that bottomland areas in Eastcentral and South-central Oklahoma are only marginal competitors with other areas in cotton production. Cotton is not profitable in the bottomlands without cotton price supports, and even with heavy federal outlays and high cotton price supports, is little more profitable than competing crops.

The third implication is that if cotton is to remain profitable, in the bottomland not only will the government need to use treasury funds to support sales, but also allotments will need to be restrictive to hold prices at high levels. Because income gains are small, farmers may prefer a slightly smaller income and less restrictions on acreage and exclude the cotton enterprise.

It is not realistic to assume that cotton will be supported at the 35 cent national level (30.8 Oklahoma level) by 1975. A much lower support price is anticipated, hence profit-minded farmers with resource, price and efficiency conditions assumed in this analysis will not include cotton in their future production plans.

At the assumed price level, we find that wheat is not a profitable crop for this area. No matter what the allotment, wheat did not enter the program. Even though the per acre yield here is higher than in other parts of the state, wheat is in a relatively less profitable position with respect to other crops. On the other hand, farmers along the Red River who have soil favorable to peanut production should plant their full allotment. As was pointed out earlier, peanuts are the most profitable crop in this area, and the returns per acre could fall over $50 without a change in program organization.

TABLE XXVI

SUMMARY OF INTERMEDIATE-RUN PROGRAMS WITH ALLOTMENTS

Table No.	Program Description	Capital	Income
		(dollars)	(dollars)
XIX	Garvin County cotton-wheat, high government cost	8,245.00	14,910.78
XX	Garvin County cotton-wheat, medium government cost	7,849.00	14,394.13
XXI	Muskogee-Bryan counties cotton-wheat high government cost	9,666.00	15,022.20
XXII	Muskogee-Bryan counties cotton-wheat medium government cost	8,557.00	13,585.70
XXIII	Bryan County cotton-peanuts high government cost	10,469.00	17,305.96
XXIV	Bryan County cotton-peanuts medium government cost	9,677.00	16,278.82

CHAPTER V

PROFITABLE FARMING ADJUSTMENTS FOR THE INTERMEDIATE-RUN WITH NO ACREAGE ALLOTMENTS

Purpose

This chapter, like Chapter IV, is designed to aid the farm manager in planning his farm organization over a period longer than just the next few years. We assume that land cannot be bought, and that all farm adjustments must be made on the current 567 acres. Prices are those projected to 1975 and no allotments are assumed (for prices, see Appendix Table I). The conditions and results presented in this chapter may approach what could be expected if government controls were withdrawn and a trend to the free market became effective.

The profitability and importance of cotton as a cash crop is becoming a problem of great importance to many farmers in this part of Oklahoma. With regard to prices of cotton and other crops, farmers are wondering what will hold in the future. In this chapter we determine the importance of cotton relative to other crops. In the absence of allotments, what is the effect of an increase in the price of cotton relative to other crops? Or, what is the effect of an increase in the price of other crops relative to cotton? The answers to these questions and a discussion of the most profitable combinations of enterprises for these various situations make up the bulk of this chapter.

To answer the above questions, we use long-run projected prices of

cotton and competing crops and vary these by given percentages. This is done in three major steps as follows.

First, we hold the competing products at base prices and vary the price of cotton ± 20 percent and ± 40 percent from the base of 22 cents per pound. Second, we decrease the prices of competing products by 30 percent, and then vary cotton prices as above. Third, we increase the prices of competing products by 30 percent, and then vary cotton prices as before.

In this chapter, however, we are not only interested in the importance of cotton, but also strive to determine the strength of various other enterprises in the farm organization. This is done by changing prices, removing enterprises or forcing new enterprises into the program.

Cotton Varied, Competing Products at Base

In this section, we observe the effects on farm income and farm organization of five price levels for cotton. These are the base price of 22 cents per pound, ± 20 percent and ± 40 percent. The prices of all other products are held at the base.[1] By running programs, we find that cotton does not come into the farm organization until the price reaches the base plus 40 percent level of 30.8 cents per pound. The number of acres of cotton planted is highly dependent on whether or not peanuts are planted. Peanuts are the most profitable crop, but as discussed previously, they are restricted to the Red River bottom.

In Table XXVII we notice that 54 acres of cotton are planted on B_1 soil with the rest going to corn and soybeans, and all 86 acres of B_3 soil

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[1] Appendix Table I, assumed long-run prices.

TABLE XXVII

OPTIMUM FARM ORGANIZATION WITH COTTON PRICE OF BASE PLUS 40 PERCENT AND COMPETING PRODUCT PRICES AT BASE, PEANUTS INCLUDED, (INTERMEDIATE-RUN PROGRAM NUMBER IX)

Item	Unit	Level	Stability Range	Revenue/Unit + or Cost/Unit -[a]	Total
			(dollars)	(dollars)	(dollars)
1. Enterprise Produced or Sold					
Cotton (B_1)	Acre	54	-94.91 to -92.68	-92.96	-5,019.84
Soybeans (B_1)	Acre	82	41.91 to 44.13	+42.18	+3,458.76
Corn (B_1)	Acre	136	-20.00 to ∞	-19.32	-2,627.52
Peanuts (B_3)	Acre	86	29.67 to ∞	+47.41	+4,077.26
Cotton Sell	Cwt.	243	30.37 to 30.86	+30.80	+7,484.40
Feed Grain Sell	Cwt.	4,793	1.82 to 2.13	+ 1.84	+8,819.12
Spring calf	Head	18	52.25 to 104.97	+62.36[c]	+1,122.48
2. Labor hired	Hour	0		- 1.00	0
3. Capital Borrowed	Dollar	11,682	- 1.38 to -.050	- .06	- 700.92
4. Net Income	Dollar				16,613.74

[a] See Table VI for footnotes.

are in peanuts. However, in Table XXVIII 121 acres of cotton are planted when peanuts are excluded from the program. In both cases the cotton acreage is restricted by the available operator labor for the January-April period. If sufficient operator labor is available, it is more profitable to plant cotton than soybeans. However, if labor has to be hired at $1.00 per hour, then due to soybeans requiring less labor and at a different time, it is more profitable to plant less cotton and more soybeans.

Competing Product Prices Decreased 30 Percent

Even decreasing the prices of other products by 30 percent does not cause cotton to enter the program at any price other than plus 40 percent of base (Table XXIX). However, at this level cotton is planted up to the one-half-cropland restriction discussed earlier. Also, at this level it is profitable to hire an extra 32 hours of May-July labor. In this program it is quite obvious that cotton is the most profitable crop since it is planted up to the restriction on both soils. It is interesting to note that peanuts do not enter this program, and for this combination of prices, soybeans are more profitable.[2] Also, both corn and soybeans are planted on the remaining 136 acres of B_1 soil where previously corn was planted up to the restriction.

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[2]Peanuts have a relatively high production cost which remains fairly stable even though the price of the product is decreased 30 percent. Soybeans, on the other hand, have a much lower production cost. Therefore, a 30 percent decrease in price results in less effect on the profitability of soybeans than of peanuts.

TABLE XXVIII

OPTIMUM FARM ORGANIZATION WITH COTTON PRICE OF BASE PLUS 40 PERCENT AND COMPETING PRODUCT PRICES AT BASE, PEANUTS EXCLUDED, (INTERMEDIATE-RUN PROGRAM NUMBER XI)

Item	Unit	Level	Stability Range (dollars)	Revenue/Unit + or Cost/Unit - [a] (dollars)	Total (dollars)
1. Enterprise Produced or Sold					
Cotton (B_1)	Acre	121	-94.91 to -92.68	-92.96	-11,248.16
Soybeans (B_1)	Acre	15	41.91 to 43.76	+42.18	+ 632.70
Corn (B_1)	Acre	136	-20.00 to ∞	-19.32	-2,627.52
Soybeans (B_3)	Acre	86	24.81 to ∞	+26.14	+2,248.04
Spring calf	Head	18	52.25 to 86.69	+62.36	+1,122.48
Cotton sell	Cwt.	545	30.37 to 30.86	+30.80	+16,786.00
Feed Grain Sell	Cwt.	4,793	1.82 to 2.03	+ 1.84	+8,819.12
2. Labor Hired	Hour	0		- 1.00	0
3. Capital Borrowed	Dollar	10,497	- .138 to - .050	- .06	- 629.82
4. Net Income	Dollar				15,102.84

[a] See Table VI for footnotes.

TABLE XXIX

OPTIMUM FARM ORGANIZATION WITH COTTON PRICE OF BASE PLUS 40 PERCENT AND COMPETING PRODUCTS AT BASE MINUS 30 PERCENT, (INTERMEDIATE-RUN PROGRAM NUMBER XXIV)

Item	Unit	Level	Stability Range (dollars)	Revenue/Unit + or Cost/Unit -[a] (dollars)	Total (dollars)
1. Enterprise Produced or Sold					
Corn (B_1)	Acre	82	-19.63 to -18.49	-19.32	-1,584.24
Soybeans (B_1)	Acre	54	23.95 to 25.09	+24.78	+1,338.12
Soybeans (B_3)	Acre	43	11.32 to 19.73	+12.94	+ 556.42
Cotton (B_1)	Acre	136	-110.13 to ∞	-92.96	-12,642.56
Cotton (B_3)	Acre	43	-94.08 to ∞	-87.29	-3,753.47
Spring calf	Head	18	34.50 to 61.23	+34.84	+ 628.02
Cotton Sell	Cwt.	767	28.91 to ∞	+30.80	+23,623.60
Feed Grain Sell	Cwt.	2,871	1.28 to 1.31	+ 1.29	+3,445.20
2. Labor Hired					
May-July	Hour	32	- 2.15 to - .88	- 1.00	- 32.00
3. Capital Borrowed	Dollar	11,567	- .082 to - .056	- .06	- 644.02
4. Net Income	Dollar				10,885.07

[a] See Table VI for footnotes.

With the decrease in the price level of all but cotton, we get a substantial decrease in income, but capital requirements are relatively unaffected.

Competing Product Prices Increased 30 Percent

With competing products at prices of base plus 30 percent, cotton does not enter at any of the allowed prices (Table XXX). However, the program solution is somewhat different from previous programs. At this price level we get 42 head of fall-buy, summer-sell feeder calves. Broomcorn enters the program at 152 acres where soybeans had been previously. It may be noted that corn holds a fairly stable position at all price levels.

Increasing prices by 30 percent results in a net income approximately 66 percent greater than that at base prices, and 150 percent greater than that at the base minus 30 percent level. However, due to assuming that labor, capital, machinery and fertilizer costs remain constant, capital requirements vary only a small amount. Also, other costs remain quite stable. Gross returns and commodity prices fall more than costs, causing net income to fall even faster than gross income or prices.

Other Enterprises

Bermuda Grass[3]

Due to the apparent current interest by farmers in Southcentral and Eastcentral Oklahoma in bottomland Bermuda grass pasture, a zero cost of

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[3]Dryland Bermuda only. Irrigated land was not considered in this study.

TABLE XXX

OPTIMUM FARM ORGANIZATION WITH COTTON PRICE OF BASE PLUS 40 PERCENT AND COMPETING PRODUCTS AT BASE PLUS 30 PERCENT, (INTERMEDIATE-RUN PROGRAM NUMBER XXIII)

Item	Unit	Level	Stability Range	Revenue/Unit + or Cost/Unit -[a]	Total
			(dollars)	(dollars)	(dollars)
1. Enterprise Produced or Sold					
Corn (B_1)	Acre	120	-20.09 to -18.41	-19.32	-2,318.40
Broomcorn (B_1)	Acre	152	62.72 to 64.40	+63.63	+9,671.76
Peanuts (B_3)	Acre	86	44.49 to ∞	+79.81	+6,863.66
Feed Grain Sell	Cwt.	4,213	2.37 to 2.42	+ 2.39	+10,069.07
Feeder Calf (Fall Buy-Summer Sell)	Head	42	35.83 to 49.92	+38.61	+1,621.62
2. Labor Hired	Hour	0		- 1.00	0
3. Capital Borrowed	Dollar	12,528	- .083 to 0	- .06	- 751.68
4. Net Income	Dollar				25,156.03

[a] See Table VI for footnotes.

Bermuda pasture is assumed in an attempt to bring it into the program. Even at zero cost it is profitable only on the less productive B_3 soil. The B_1 soil still is planted to one-half corn and one-half soybeans. The increased pasture allows the cow-calf enterprise to increase to 66 units. Subtracting the per acre cost of production for Bermuda from the net income to this program results in an income $1,200 less than that with soybeans on B_3 soil.

For the farmer who has a strong personal preference to livestock, this may be an insignificant difference. The utility achieved from producing livestock may more than offset the loss in income. ACP payments are included for this part. The sacrifice in income would be more if ACP payments are not available in the time period relevant for this analysis.

Feeding Cattle for Slaughter

Due to the large feed grain potential in this area, we now analyze the feasibility of feeding cattle for slaughter. Since slaughter cattle do not enter the program, we increase returns per unit to force them in. Starting with a base of $22.50 per hundredweight for both the feeder calf and the slaughter animal, and assuming there is a constant relationship between their prices, it is necessary to raise this price to around $40.00 per hundredweight to force this enterprise into the program. The result is 91 head of feeder cattle, 226.5 acres of rye and vetch winter pasture and 45.5 acres of corn. The feed required for the livestock units is produced on B_1 land. The B_3 land is again in soybeans. This farm organization results in an income of only approximately $7,000. Compared with the $16,500 from cash crops and a cow-calf enterprise on the upland pasture, net income with the feeding operation is low. Not

only is the income level low, but capital requirements are high ($20,000) and 57 hours of extra labor must be hired.

Summary

With all enterprises at base prices, the optimum organization is 136 acres of B_1 corn, 136 acres of B_1 soybeans, 86 acres of B_3 soybeans and 18 head of spring-calving cattle on native pasture. Holding all competing enterprises at the base and increasing cotton price 40 percent brings in some cotton. The number of acres depends upon whether or not the farm can produce peanuts. Cotton is only marginally profitable. If little operator labor is available after planting other more profitable crops, we find that it is more profitable to plant soybeans than to hire labor at $1.00 per hour for cotton when cotton price is 30.8 cents per pound.

When competing crop prices are decreased 30 percent, cotton still does not enter the program until its price is increased 40 percent above the base of 22 cents per pound. However, at this level cotton will be planted up to the one-half-cropland restriction. With competing prices and cotton price increased 30 percent and 40 percent respectively, cotton does not come in.

Farm income is decreased by some degree by forcing Bermuda grass in on the B_3 soil group. But personal preference for the associated cow-calf livestock system may overshadow the loss of income.

Feeding cattle for slaughter does not appear to be at all profitable under the assumed level of prices for beef cattle or feed grains. This type of enterprise requires a relatively high level of capital with a high risk associated with it, along with a relatively low income level.

In general, except for replacing alfalfa hay[4] with soybeans, the most profitable farm organization for the intermediate-run (1975) is essentially the same as that for the short-run. However, projected prices are somewhat lower than at present, resulting in a slightly lower income for the future. It should be noted that the outlook for the relative position of Bermuda pasture on bottomland soils is some degree better in the future than at present.

[4]Alfalfa does not come in because the long-run price is only $16.61 per ton as opposed to $22.88 per ton in the short-run. Because it is difficult to estimate accurately long-run prices, the future alfalfa price in relation to other prices might well be higher than assumed for 1975. If so, the optimum organization of the farm might well include alfalfa and be similar to the enterprises included in Chapter III.

CHAPTER VI

MINIMUM LAND AND OTHER RESOURCES REQUIRED FOR A GIVEN INCOME LEVEL IN THE LONG-RUN

In the preceding chapters we have presented farm plans for operators who desire to maximize income on a given farm without opportunities to add additional acres. Opportunities arise to accumulate capital and additional land as time passes, however, and the farmer may wish to plan ahead for the farm resources necessary to reach some desired income goal. One goal of a farmer might be that level of income which he could receive in nonfarm employment. If he needs additional resources to reach this level, over time he might watch for opportunities to build up a capital base and acquire additional land as neighbors retire or move away.

For this phase of our study we determine the necessary land required to achieve a given income level, assuming that hired labor and capital are available as needed. This desired farm size is highly dependent upon a number of variable factors. These are (1) prices of factors and products, (2) capital cost, (3) equity in land, (4) price of land, (5) price of hired labor, (6) allotments and (7) enterprises which may be grown.

If one or more of the above factors are changed, different combinations and levels of resources and enterprises may be necessary to achieve a desired income. These program results should provide farmers with criteria for making decisions about future farm organizations under a wide range of conditions and expectations.

Three income targets are assumed. These are $3,000, $5,000, and $7,000, and might represent wages in alternative nonfarm employment of farm operators with varied degrees of skill and managerial ability.

The operating capital charge is six percent. Land is priced at $325 per acre, although in some cases this price is varied plus or minus 50 percent. Five percent interest is charged on capital borrowed for the purpose of buying land, and a one percent land tax is added to that. Although principal must be payed and should be considered when selecting an income target to leave enough money for living expenses, we assume no "cost" on the principal for buying land. The purchase price or principal likely is recovered when land is sold at some later period. However, there is an opportunity cost for this money. That is, a farmer may be able to invest in some other manner and receive a greater return. In all cases but one, no equity is assumed in land. We assume that the farmer is paying five percent interest plus one percent tax on the purchase price for every acre of land in the farm either as a cash cost or opportunity cost of not using the capital for another investment. This cost of land capital is not included in the capital requirements column shown in the tables. However, the land tax and interest as well as other costs are subtracted from receipts, leaving a residual return to operator labor, management and risk.

A one hundred percent land equity is assumed in one program to observe the effect of a high equity (no charge for land) on required farm size and income target. Additional labor may be hired at $1.00 per hour in most programs, but in some this is increased to $1.50.

Allotments appear to have little effect on this phase of our study. Cotton does not enter into the program at any of the allowed levels (22

cents per pound ± 20 percent and ± 40 percent), nor does wheat. Peanuts come in at the maximum level allowed, but since they are restricted to a small area, they are allowed in only two programs.

For this particular phase of the study, overhead costs are calculated, as shown in Appendix Table IV. Income in this phase is returns to operator labor, management and risk. In the preceding chapters, income is returns to land and overhead in addition to operator labor, management and risk.

$5,000 Income

A major portion of the farm plans in this chapter are computed to give minimum resource requirements necessary to earn a $5,000 return to operator labor, management and risk. A $5,000 income might represent what a farmer with good managerial ability might earn as a skilled worker in nonfarm employment. It is this level of managerial ability at which input-output data for the whole study are calculated.

As in the previous chapters, hogs are the most profitable enterprise. Table XXXI, Program Number I, shows that for a primarily hog-feed grain organization, only 193.38 acres of land are required for a $5,000 income. However, even for this small farm, $20,473 of operating capital is required. All of the cropland in the bottoms is put into feed for the hogs, and the accompanying upland pasture is used by the spring calving livestock enterprise.

Program XXI in Table XXXI is approximately the same, except the current price of land ($325 per acre) has been increased 50 percent to $487.50 per acre. This change results in land requirements increasing to 257 acres and capital increasing to $27,300. In order to achieve the $5,000 income,

TABLE XXXI

LAND AND CAPITAL REQUIREMENTS AND ENTERPRISES NECESSARY FOR $5,000 INCOME TO OPERATOR LABOR, MANAGEMENT AND RISK UNDER VARIOUS CONDITIONS

Program Number	Land Requirement (Acres)	Operating Capital Requirement[a] (Dollars)	Enterprise	Level	Special Conditions
I	193.38	20,473.00	Hogs	35 head	Hogs in, 26.2 cents/pound cotton
			Spring Calf	6 head	No peanuts
			Corn (B_1)	46.4 acres	
			Grain Sorghum (B_1)	46.2 acres	
			Grain Sorghum (B_3)	29.3 acres	
II	985	13,120.00	Corn (B_1)	236 acres	Hogs excluded, 168 hours of labor hired, 26.2 cents/ pound cotton
			Soybeans (B_3)	149 acres	
			Soybeans (B_1)	235 acres	
			Spring Calf	31 head	
IV	427.7	5,624.00	Corn (B_1)	102 acres	Land prices at $162.50/acre, hogs excluded, 26.2 cents/ pound cotton
			Soybeans (B_1)	64.5 acres	
			Soybeans (B_3)	102.6 acres	
			Spring calf	14 head	
V	No Solution				Land prices at $487.50, hogs excluded, 26.2 cents/pound cotton

TABLE XXXI (Continued)

Program Number	Land Requirement (Acres)	Operating Capital Requirement[a] (Dollars)	Enterprise	Level	Special Conditions
VI	1005.00	13,508.00	Corn (B_1)	241 acres	Hogs and peanuts excluded, 194 hours of labor hired at $1.50/hour, 26.2 cents/pound cotton
			Soybeans (B_1)	240 acres	
			Soybeans (B_3)	152 acres	
			Spring Calf	32 head	
VIII	275.00	3,622.00	Corn (B_1)	66 acres	100 percent equity in land, hogs and peanuts excluded, 26.2 cents/pound cotton
			Soybeans (B_1)	66 acres	
			Soybeans (B_3)	41 acres	
			Spring Calf	9 head	
XII	613.00	10,775.00	Corn (B_1)	145 acres	35 cents/pound cotton, hogs and peanuts excluded
			Soybeans (B_1)	39 acres	
			Soybeans (B_3)	93 acres	
			Cotton (B_1)	108 acres	
			Spring Calf	19 head	
XIII	789.00	12,435.00	Corn (B_1)	189 acres	Hogs excluded, 49 hours of labor at $1.00/hour, 26.2 cents/pound cotton
			Soybeans (B_1)	188 acres	
			Peanuts (B_3)	59 acres	
			Soybeans (B_3)	59 acres	
			Spring Calf	25 head	

TABLE XXXI (Continued)

Program Number	Land Requirement (Acres)	Operating Capital Requirement[a] (Dollars)	Enterprise	Level	Special Conditions
XIX	7011.0	51,765.00	Corn (B_1)	280 acres	36 percent capital, $1.50 labor--15,620 hours, hogs and peanuts excluded, pasture idle, 26.2 cents/ pound cotton
			Soybeans (B_1)	3083 acres	
			Soybeans (B_3)	1063 acres	
XXI	257.00	27,300.00	Corn (B_1)	61 acres	$487.50 land price, 30.8 cents/pound cotton
			Grain Sorghum (B_1)	61 acres	
			Grain Sorghum (B_3)	39 acres	
			Hogs	46 sows	
			Spring Calf	8 head	

[a]Does not include capital for buying land. To calculate capital necessary for purchasing land, multiply number of acres by $325 per acre unless price is specified otherwise. Operating capital costs six percent, land capital costs five percent plus one percent tax on land.

we are now required to have 11 more sows and two more cow-calf units, along with the necessary land to grow the required feed.

By removing hogs from the program and admitting peanuts, we get the next fewest acres required for our $5,000 under conditions of land, labor and capital at base prices, $325 per acre, one dollar per hour and six percent, respectively. This is the organization shown in Program XIII, Table XXXI. Land requirements are increased substantially, but capital requirements are decreased. Peanut acreage is limited by an allotment. Otherwise, the total acreage would be substantially less. Both corn and soybeans are planted on the B_1 soil as a result of the "one-half-crop-land" restriction discussed in Chapter III.

If we get away from hogs and peanuts, which might be considered specialized enterprises due to their limitations (capital and management for hogs; soil and market for peanuts), the resultant farm organization is made up entirely of corn, soybeans and spring calving cattle. For this organization the resource requirements are affected by various changes in land price and equity level, capital cost, and the price of hired labor.

With a zero equity in land and base prices for land, labor and capital, the organization is Program II, Table XXXI. The organization requires 985 acres of land and $13,120 of operating capital. Also, an additional 168 hours of labor must be hired.

The price of land has an extremely large effect on the farm organization. In Programs IV and V (Table XXXI) respectively, the price of land is varied 50 percent below and above the base. By decreasing the price of land 50 percent, the land required for a $5,000 income decreases by

almost three-fifths. However, without hogs or peanuts, when we increase land price by 50 percent we are unable to reach the $5,000 income target. That is, per acre land returns were not large enough to pay interest and taxes on land. For a given percentage change labor price has a proportionally lesser effect on resource requirements than does land price. By increasing the wage rate to $1.50 per hour, only 20 acres more land and $388 more capital are required to attain a $5,000 operator income (Program VI, Table XXXI).

All programs except one were run with a six percent charge on operating capital. In Program XIX 36 percent interest is charged to observe the effect of an extreme capital charge on the farm organization.

Again in this program we exclude peanuts and hogs because of their special requirements. Labor is at $1.50 per hour. The resultant effect is to get a farm of 7,011 acres with all cropland in corn and soybeans--mostly soybeans, since they require less capital--and all pasture left idle. Besides the large number of acres, $51,765 of capital are required and 15,620 hours of labor are hired. Restraints on any one of these requirements--land, labor or capital--could very easily prevent this organization from being feasible.

Cotton does not enter the program at 30.8 cents, 40 percent above the base price. But at 35 cents per pound (see Program XII, Table XXXI), we get 108 acres which is the allotted acreage. Six hundred and thirteen acres of land are necessary to achieve a $5,000 income. This is less acreage than for any other program, except those including hogs or peanuts.

In Program VIII, Table XXXI, a 100 percent equity (no debt) in land is assumed. With this large an equity, even by excluding hogs and peanuts, a $5,000 income is achieved with only 275 acres of land and $3,622 of

capital. This is done with the corn, soybeans and spring calf organization. There is an inverse relationship between resources required for a given income and the level of equity in land. As equity increases, interest is paid on less capital, thus enabling the farmer to add this saved interest to his income. That is, as a farmer pays off his debt for land, the money which was previously used for cash payments may now be used for consumption or investment. The opportunity interest cost on land capital is not avoided, of course.

$7,000 Income

Two programs are run at the $7,000 income level. The two programs show resources necessary to achieve this income with and without hogs. The effects of varying land price, labor price, etc., determined above for a $5,000 income, in general, will hold true for other desired income levels.

Program X, Table XXXII, shows the effect on resource requirements if neither hogs nor peanuts are allowed in the program and all prices are assumed at their base. To achieve our income target, 1,373 acres of land are required. As in the $5,000 programs, the organization has one-half of the B_1 soil in each of corn and soybeans and all of the B_3 soil in soybeans. Also, the accompanying upland pasture is used by the spring calf enterprise as before. The operating capital requirement is $18,743, and no extra labor is necessary.

When hogs are in the organization (Program XI, Table XXXII), land requirements are reduced to 255 acres. On the other hand, capital requirements are increased to nearly $27,000. The resulting organization, as in Program I, Table XXXI, is one with hogs and sufficient feed grain to feed them. The accompanying native upland pasture supports eight spring calf units.

TABLE XXXII

LAND AND CAPITAL REQUIREMENTS AND ENTERPRISES NECESSARY FOR $7,000 INCOME TO OPERATOR LABOR, MANAGEMENT AND RISK UNDER VARIOUS CONDITIONS

Program Number	Land Requirement (Acres)	Operating Capital Requirement[a] (Dollars)	Enterprise	Level	Special Conditions
X	1373	18,743.00	Corn (B_1)	329 acres	Hogs and peanuts excluded, 26.2 cents/pound cotton
			Soybeans (B_1)	328 acres	
			Soybeans (B_3)	208 acres	
			Spring Calf	43 head	
XI	255	26,993.00	Corn (B_1)	61 acres	Peanuts excluded, hogs in, 26.2 cents/pound cotton
			Grain Sorghum (B_1)	60 acres	
			Grain Sorghum (B_3)	38 acres	
			Spring Calf	8 head	
			Hogs	46 sows	

[a]For footnote, see Table XXXI

TABLE XXXIII

LAND AND CAPITAL REQUIREMENTS AND ENTERPRISES NECESSARY FOR $3,000 INCOME TO OPERATOR LABOR, MANAGEMENT AND RISK UNDER VARIOUS CONDITIONS

Program Number	Land Requirement (Acres)	Operating Capital Requirement[a] (Dollars)	Enterprise	Level	Special Conditions
IX	653	8,585.00	Corn (B_1)	156 acres	Hogs and peanuts excluded, 26.2 cents/pound cotton
			Soybeans (B_1)	156 acres	
			Soybeans (B_3)	99 acres	
			Spring Calf	21 head	
XV	451	8,226.00	Corn (B_1)	108 acres	Hogs excluded, $1.50/hour labor, 26.2 cents/pound cotton
			Peanuts (B_3)	68 acres	
			Soybeans (B_1)	107 acres	
			Spring Calf	14 head	

[a]For footnote, see Table XXXI

$3,000 Income

A $3,000 operator income level represents what might be achieved in nonfarm work by a nonskilled laborer, or might be an income target for a farmer with few initial resources and a short planning horizon, or low aspiration level. Two programs are presented giving minimum resources for a $3,000 return to operator labor, risk and management. The first (Program IX, Table XXXIII) excludes both hogs and peanuts. The second (Program XV, Table XXXIII) excludes only hogs.

Program IX requires 653 acres of land and $8,585 of capital in order to reach a $3,000 income. The farm organization is the same as in previous programs with the same restrictions. B_1 land is equally divided between corn and soybeans, all of the B_3 land is in soybeans and the upland pasture is used by the spring calf enterprise.

In Program XV, the hired labor wage is $1.50 per hour, and peanuts are allowed in the program. By producing peanuts, land requirements are reduced by over 200 acres. However, operating capital requirements are reduced very little. All B_3 soil is in peanuts, and the B_1 acreage is half corn and half soybeans as before.

Summary

As in the short-run and the intermediate-run, hogs and peanuts appear to be the most profitable enterprises. However, with these two excluded, all programs result in a corn, soybean and spring calf farm organization. The levels at which these are produced depend upon prices, equity, etc., as discussed in the introduction to this chapter, and on the desired level of income. With a slightly higher price, alfalfa would compete effectively with corn and soybeans in the program.

Of the seven factors listed in the introduction to this chapter, land price and equity have proportionally the greatest effect upon resource requirements for a given income.

In Figure II, we show the effect of land price on the number of acres required to receive three levels of income to operator labor, management and risk. The resource situation is based on composite land made up of approximately 48 percent B_1 soil, 15 percent B_3 soil, 34 percent upland pasture and three percent other land, excluding both hogs and peanuts as alternative enterprises. As land price increases, the number of acres required to achieve a desired income increases at a faster rate. For example, at $150 per acre approximately 250 acres, 400 acres and 550 acres respectively are required for $3,000, $5,000 and $7,000 incomes. But when price doubles to $300 per acre, 575 acres, 875 acres and 1,225 acres respectively are needed for the same income levels. In all cases the land requirements more than doubled. For higher land prices, the acres necessary for a given income increases even at a faster rate. Eventually (somewhere below $487.50) we reach a price where land will not pay for itself and provide an operator with a desired income level and pay his overhead expenses.

In both the Arkansas and Washita River bottoms, some land is being sold as high as $500 to $600 per acre. The $325 price assumed for this study is relevant for dryland farms without mineral rights, significant improvements or unique locational advantages. Farms selling at higher prices may have a locational advantage such as nearness to paved roads or towns. Also, some could have mineral rights, could be completely irrigated, or have a very high proportion of high grade B_1 bottomland as opposed to the composite land assumed for this study.

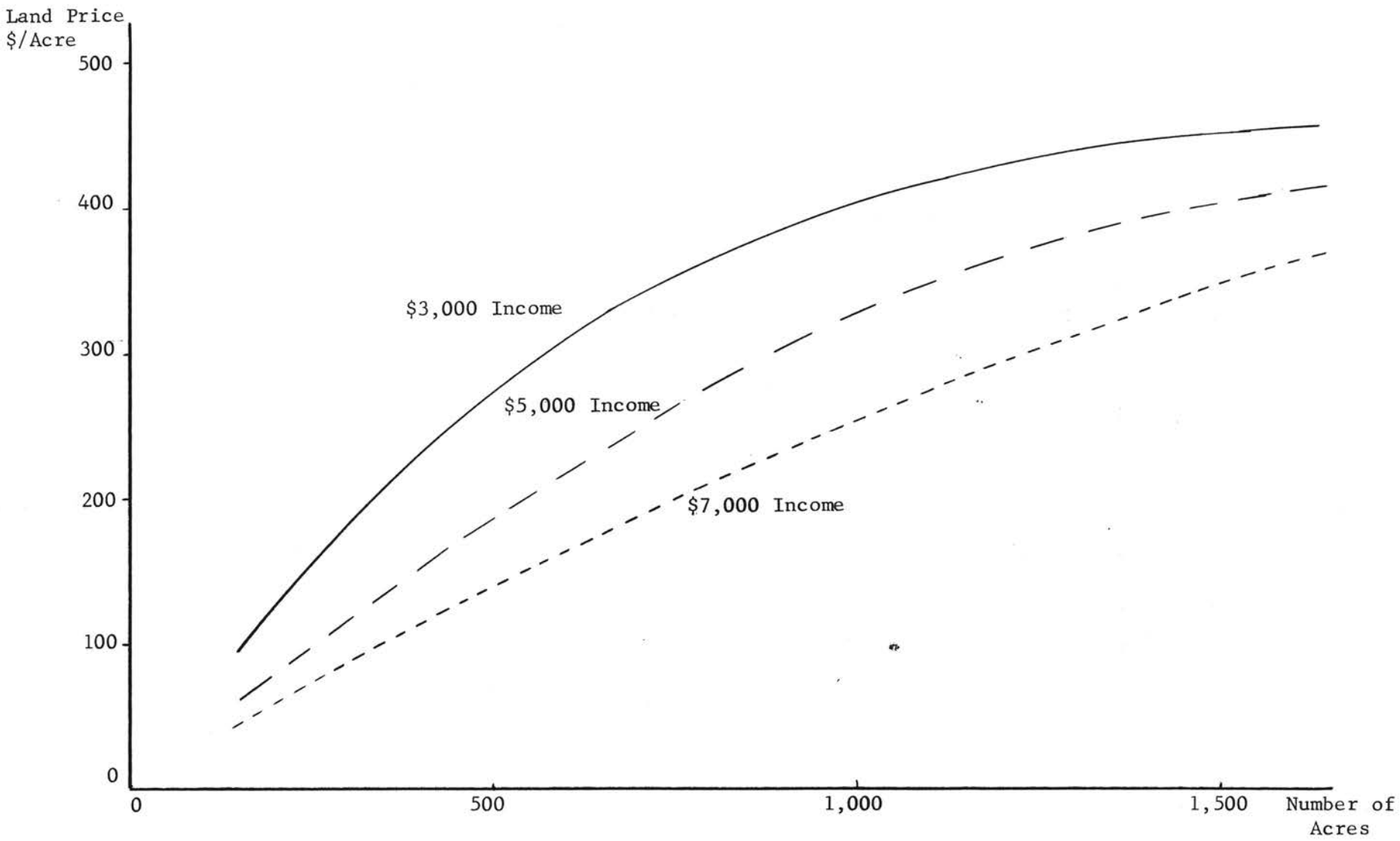

Figure 2. Relationship of Required Acreage to Land Price for Three Income Levels--Major Bottomlands of Southcentral and Eastcentral Oklahoma[a]

[a]Assuming a zero equity in land.

At the projected product prices, and with the current trend toward increased land prices, the maximum which can be paid for this land for strictly agricultural use is rapidly being approached. In some cases it may have already been reached.

The amount of equity which one has in his farm also has a large effect on required farm size for a given income. For example, Program II, Table XXXI requires 985 acres of land for a $5,000 income with no equity. While on the other hand, Program VIII, Table XXXI, under the same conditions except for a 100 percent equity, requires only 275 acres for the same income.

Labor and capital costs have a similar effect upon resource requirements, but to a much lesser extent. Allotments only affect resource requirements when a profitable crop such as peanuts is restricted. By increasing the restriction of a profitable crop, as another enterprise is substituted, more acres of land are required to achieve the same level of income.

Within the range that we are working, the level of desired income has little or no effect upon the farm organization except for size. More acres of land, more capital, etc., are required as higher levels of income are attained. But the proportions of land in various enterprises remains relatively fixed. Also, changes in restrictions affect each income level in the same way.

CHAPTER VII

SUMMARY AND CONCLUSIONS

The primary purpose of this study was to determine the most profitable levels and combinations of enterprises for major bottomland farms in Eastcentral and Southcentral Oklahoma. This was done for three arbitrary time periods--short-run, intermediate-run and long-run--and under different conditions of prices, capital levels, allotment levels and land availability.

The basic farm used for the short-run and intermediate-run totaled 567 acres, 358 acres of which were cropland, 185 acres were upland pasture, and 24 acres were farmstead, roads, etc. For the long-run all resources were considered variable, including farm size.

Linear programming techniques were used to arrive at the optimum combinations of enterprises subject to the various restrictions invoked.

Specialized crops such as watermelons, okra and cucumbers were omitted from this study. We also excluded dairying and poultry enterprises. Except for supplemental feed such as cottonseed meal, all feed for livestock had to be produced on the farm.

Short-Run Adjustments

Two objectives for the short-run period were (a) to specify the order or ranking of profitability for the various crop and livestock enterprises and (b) to present the most profitable farm plans for limited

capital levels. The order of profitability was found by successively removing the most profitable enterprise from the preceding program. A hog-feed grain combination gave the highest returns. Due to the high level of capital and managerial ability required, this plan is not feasible for many farmers. With the removal of hogs, alfalfa became the most profitable. After that in order came corn, soybeans, cotton on B_1 soil, broomcorn, cotton on B_3 soil, grain sorghum, wheat, and Bermuda pasture with spring calving livestock. Income declined steadily as enterprises were removed. However, capital requirements decreased at first and then increased as "costlier" enterprises were produced.

Although there appears to be a trend toward planting Bermuda pasture in this area, several alternatives appear more profitable on the bottomland soils under the costs assumed. Even if ACP payments were included, production costs would not be reduced sufficiently to bring Bermuda grass into the farm organization ahead of other selected crops. We emphasize, however, that these results are not without limitations. Any given farmer may have input-output coefficients which differ from those used in this study. And these differences may cause given organizations to have more or less profit than those in this study.

With land priced at $325 per acre for composite bottomland and upland, a farmer should first achieve an optimum combination of enterprises (see Table XVI) on his current farm, exploiting investments within current fencelines that return six percent on capital before attempting to buy additional land. If capital is very limited, it would be more profitable to leave some of the 567 acres idle and use more capital intensive enterprises than attempt to crop the whole farm.

Intermediate-Run Adjustments

For this phase, prices and allotments projected to 1975 were used. Also, no land could be bought.

With Allotments

It is not profitable for a farmer in this area to plant cotton at a price below 30 cents per pound. If a farmer does not need to leave some cropland idle in order to do so, then at a price above 30 cents per pound he should plant his full cotton allotment. However, if some cropland must be retired to achieve this cotton price, then it is more profitable to plant all soybeans and corn, and plant no cotton.

Wheat is not profitable even at the recent local support price of $1.69 per bushel. Thus, the wheat allotment is not planted. Since this is a fairly optimistic price for the future, farmers in this area might examine opportunities for more profitable alternatives. One profitable crop for those farmers who can produce them is peanuts. Where they are feasible, the maximum allowed level should be planted.

Without Allotments

With all enterprises at the base prices, (hogs and peanuts excluded from program) corn and soybeans on cropland with a spring calf livestock enterprise on the upland pasture was the most profitable combination of enterprises. If the price of cotton increased 40 percent, cotton would replace part of the soybeans.

For this price level (long-term projected prices), again we considered Bermuda grass. At zero cost of production, Bermuda was planted only on B_3 soil, indicating a relatively low profitability. Nevertheless, Bermuda may be in a more favorable position under future price conditions

than at the present.

Due to the potential for a large amount of feed grain production, feeding cattle for slaughter was forced into the program. The result, a lower income and higher capital requirement than for several other enterprise organizations.

Long-Run Adjustments

In the long-run, we assumed that land, labor and capital could be varied as necessary to attain a prescribed operator income. Rather than maximize income to a given set of resources on a given size farm, we determined what minimum land resources are necessary to achieve a desired income.

Target operator incomes of $3,000, $5,000 and $7,000 were used. There were no substantial differences in farm organization between any of these levels. Changing the price of a resource or allowing hogs or peanuts in the farm organization affected all three income situations in the same manner.

The hog-feed grain organization required the smallest land requirement for our desired income. Inclusion of peanuts gave the second smallest land requirement. When hogs and peanuts were excluded, corn and soybeans for cash sale along with the spring calving cattle made up the optimum organization.

Increasing the price of hired labor had little effect on resource requirements; nor did increasing the price of capital by a small amount. The most important factors affecting resource requirements were land price and amount of equity. By decreasing land price 50 percent, we decreased required farm size more than 50 percent. However, when we increased land

price 50 percent, we could not get a solution. This shows that there is a limit to what a farmer can pay for land if he is to cover all fixed and variable costs. In some instances in this area, this limit is being rapidly approached. Equity had an effect similar to that of price. As equity was increased from a zero level, land required for a desired income fell at an even faster rate.

General Conclusions

1. If capital and managerial ability are available, opportunities exist for increased earnings from expansion of the hog enterprise, with feed grains on bottomlands.
2. Soybeans, corn and alfalfa rank high as profitable crops under a wide variety of conditions.
3. Farmers who have favorable soil resources, management, allotments and markets can plant peanuts more profitably than other cash crops.
4. A cow-calf livestock enterprise is the most profitable user of native upland pasture, given adequate capital. Cash crops (or feed grains, if hogs are fed) are more profitable than cattle systems on bottomlands.
5. At current land prices ($325 per acre), additional land should not be bought until the optimum organization has been achieved exploiting all investments that earn six percent or more on investment on present farm size. Cash rental rates must be less than $27.40 per acre for profitable renting in.
6. Under expected prices and the assumed technical conditions, cotton does not compete effectively with other crops.

7. Wheat production has limited possibilities in this area under the assumed price conditions in both the short-run and long-run.
8. Bermuda grass ranks below selected other crops in net returns on bottomland soil. However, satisfaction gained by producing livestock over cash crops may offset income loss.

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APPENDIX

APPENDIX TABLE I

SHORT-RUN AND LONG-RUN PRICES AND ALLOTMENTS* FOR CROPS; BOTTOMLAND FARMS, EASTCENTRAL AND SOUTHCENTRAL OKLAHOMA

Item	Unit	Short-Run		Long-Run	
		Price[a]	Allotment[b]	Price[c]	Allotment[d]
		(Dollars)	(Acres)	(Dollars)	(Acres)
Alfalfa	Ton	22.88	N.A.[f]	16.61	N.A.
Corn	Bu.	1.12	N.A.	1.08	N.A.
Cotton	Cwt.	29.50	69.21	22.00	60.78
Wheat	Bu.	1.65[e]	65.51	1.20	57.52
Peanuts	Pound	0.104	42.96	.08	42.96
Grain Sorghum	Cwt.	1.63	N.A.	1.84	N.A.
Soybeans	Bu.	1.97	N.A.	2.00	N.A.
Broomcorn	Ton	334.00	N.A.	350.00	N.A.

*Based on 567 acre farm

[a]1958-62 average adjusted for area.

[b]Average for the three sample areas for short-run.

[c]S-42 prices adjusted for area.

[d]Average of the three sample areas, projected to 1975.

[e]Approximate 1960-61 support level.

[f]Not applicable.

APPENDIX TABLE II

ASSUMED PRICES PAID BY FARMERS, SOUTHCENTRAL AND EASTCENTRAL OKLAHOMA[a]

Item	Unit	Price
		(dollars)
Prices Paid		
Seed and feed:		
Corn seed	lb.	0.12
Grain sorghum seed	lb.	0.20
Forage sorghum seed	lb.	0.15
Wheat seed	bu.	2.20
Peanut seed	lb.	0.25
Corn seed	lb.	0.20
Alfalfa seed	lb.	0.50
Broomcorn seed	lb.	0.25
Soybean seed	bu.	4.00
Vetch seed	lb.	0.13
Lespedeza seed	lb.	0.14
Rye seed	bu.	1.20
Alfalfa hay	ton	22.88
Cottonseed cake	cwt.	3.80
Mineral salt	cwt.	3.00
Hay supplement	cwt.	6.00
Creep feed	cwt.	4.50
Custom rates:		
Mechanical pick cotton	cwt.	3.00
Defoliate cotton	acre	4.00
Haul, gin, wrap cotton	cwt.	1.10
Combine grain sorghum	acre	4.00
Haul grain sorghum	bu.	0.05
Combine wheat	acre	4.00
Haul wheat	bu.	0.07
Dust peanuts	application	1.25
Dig-shake peanuts	acre	4.50
Combine peanuts	bu.	0.30
Sack and haul peanuts	bu.	0.18
Combine corn	acre	5.00
Shell corn	bu.	0.05
Haul corn	bu.	0.05
Mow, rake, bale alfalfa	bale	0.20
Haul alfalfa	bale	0.08
Threshing broomcorn	ton	10.00 + labor
Baling broomcorn	ton	13.50 + labor
Broomcorn baling wire	bale	0.30
Combine soybeans	acre	5.00
Haul soybeans	bu.	0.08
Bermuda sprigging (sprigs furnished)	acre	10.00
Silage harvesting	ton	4.00

APPENDIX TABLE II (Continued)

Item	Unit	Price
		(dollars)
Fertilizer and chemicals:		
Nitrogen	lb.	0.12
Phosphorus	lb.	0.10
Potassium	lb.	0.05
Cotton herbicide (custom)	application/acre	1.50
Cotton insecticide (custom)	application/acre	1.50
Grain sorghum weed spray (custom)	application/acre	2.00
Sulphur dust	lb.	0.20
Alfalfa insecticide(Parathion custom)	application/acre	1.75
Liming (applied)	ton	5.00

[a]These price assumptions are not to be interpreted as predictions of prospective prices.

APPENDIX TABLE III

ASSUMED PRICES FOR CALVES AND STEERS BY MONTHS, SOUTHCENTRAL AND EASTCENTRAL OKLAHOMA, BASED ON OKLAHOMA CITY MARKET[a]

Class and Grade	Monthly Average												Yearly Average
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
	(dollars per hundredweight)												
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

[a]Approximate current price levels adjusted for commodity cycle.

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

APPENDIX TABLE IV

OVERHEAD COSTS FOR BASIC 100 ACRES IN MINIMUM LAND MODEL

	Average Inventory	Annual Cost
	(Dollars)	(Dollars)
I. Depreciation and Maintenance		
(a) 20 x 24 shop	720.00	72.00
(b) Permanent fencing, creosote posts 3 wire, 4 point, fence 33 acres native 50 percent (280 rods at $1.50)	210.00	32.00
(c) Salt box, corral, water tank	80.00	15.00
II. Machinery		
(a) Shop tools	200.00	40.00
(b) Pickup/car farm share	1,230.00	
Interest		75.00
Depreciation		305.00
Gas, oil, lubrication		405.00
Repair		105.00
Insurance		25.00
License		13.00
III. Miscellaneous		
(a) Telephone		75.00
(b) Bookkeeping		25.00
(c) Insurance on buildings and workers		100.00
IV. Taxes and Interest 100 acres at $325.00 at 6 percent (5 percent interest + 1 percent tax)		1,287.00 1,950.00
Added per Acre Land Added (Fence for Pasture Only)		3,237.00

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