Profitable Plans for Farms in the Major Bottomlands of South Central and East Central Oklahoma

Luther G. Tweeten
Alan W. Reichardt
William F. Lagrone

Bulletin B-641
December, 1965

and
U.S.D.A.

CONTENTS

Agricultural Experiment Station
Oklahoma State University, Stillwater
and
Farm Production Economics Division
Economic Research Service
U. S. Department of Agriculture

Acknowledgment

The study upon which this publication is based is part of Regional Research Project S-42, "An Economic Appraisal of Farming Adjustment Opportunities in the Southern Region to Meet Changing Conditions." This Regional Project is financed in part from Research and Marketing Act funds. It is a cooperative effort of the Departments of Agricultural Economics of the following State Agricultural Experiment Stations: Alabama, Arkansas, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia, the Farm Production Economics Division, Economic Research Service, and Cooperative State Research Service of the United States Department of Agriculture. Dr. John W. White, Vice-president for Agriculture, University of Arkansas, is the administrative advisor, and Dr. J. H. White, University of Arkansas, is chairman of the Regional Technical Committee.

The Southern Farm Management Research Committee, sponsored by the Farm Foundation and the Southern Agricultural Experiment Stations, was helpful in the development of this Regional Project.

The overall purposes of this project are: (1) to provide guides to farmers choosing among alternative production opportunities, especially as those opportunities are affected by changes in prices and technology and (2) to provide guides to farmers and other persons engaged in developing and administering public agricultural programs.

The results presented in this publication are from Oklahoma Agricultural Experiment Station Project 1040. The development of basic data was made possible through the cooperation of personnel of Oklahoma State University, the Soil Conservation Service, and the Agricultural Stabilization and Conservation Service. The information supplied by the Departments of Agronomy and Animal Science of Oklahoma State University was particularly helpful. Special thanks are extended Pat Cundiff, Department of Agricultural Economics and personnel of the Statistical Computing Center, Oklahoma State University, for their assistance.

Profitable Plans for Farms in the Major Bottomlands of South Central and East Central Oklahoma

Luther G. Tweeten,* Alan W. Reichardt, William F. Lagrone*****

If farmers are to participate in the process of economic growth and increase their incomes in relation to returns in other industries, they must continually reappraise and adjust their farming operations. This bulletin presents profitable adjustment opportunities for bottomland soils under two general situations:

(1) Short-run—Prices and allotments are at levels that might be expected over the next five years. Capital and hired labor can be increased as necessary, but farm size (acres) and operator labor are fixed in quantity.

(2) Long-run—All farm assets including farm size can be varied. Prices are at estimated 1975 levels.

Description of Area

This study applies to the soils of the Arkansas River bottomlands in East Central Oklahoma and to the Washita and Red River bottomlands in South Central Oklahoma. Primary surveys to collect data on individual farm enterprises and representative farm organizations were taken in Muskogee County on the Washita River and Bryan County on the Red River.

Rainfall characteristics, length of growing season and soils in the bottomlands are favorable to farming.[1] Long-term annual rainfall averages 39 inches. The Arkansas River bottom has the highest average with 42.0 inches annually at Muskogee. The Washita bottom is lowest with an average of 35.9 inches at Pauls Valley. At Durant, which is close

---

Research reported herein was done under Oklahoma Station Project Number 1040.

*Agricultural Economics Department, Oklahoma State University.

**Formerly, Agricultural Economics Department, Oklahoma State University.

***Farm Production Economics Division, Economic Research Service, U. S. Department of Agriculture, formerly stationed at Stillwater, Okla. (Now stationed at the University of Nebraska, Lincoln, Nebraska.)

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

to the Red River bottom, the average is 39 inches. These three stations averaged 218 days with temperatures above 32 degrees in 1962.

Bottomland soils were classed into three groups designated B_1, B_2, and B_3 according to fertility, drainage, texture, and other characteristics as shown in Table 1. Seventy-four percent of the soil is classified B_1, three percent is B_2, and twenty-three percent B_3. Due to the small percentage of B_2, it is classed with B_1 in the analysis found in this publication. In all cases, the B_1 soil gives yields equal or greater than the B_3 soil and requires less fertilization. In addition to the bottomland soils, many farms contain some upland pasture.

Table 1. Definitions of Soil Types

Class B_1—Deep, nearly level, loamy alluvial soils. Key series are Port Loam or Port Clay Loam or 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.

Method of Analysis

The procedure used for this analysis involves four primary steps: (1) selection of a representative farm resource situation, (2) determination of yields, prices, and allotments, (3) construction of input-output budgets, and (4) determination of the optimum organization of farm enterprises under various conditions. Major parts of steps (1), (2) and (3) are presented in a companion publication.[2] Optimum whole farm organizations in this publication are determined by linear programming.

Representative Farm

The farm chosen to represent this area contains a total of 567 acres. Of this, 358 acres are cropland (272 acres of B_1 soil and 86 acres of B_3 soil), 185 acres are permanent upland pasture, and 24 acres are farmstead, roads, waste, etc. This farm size and organization is not necessarily typical for any one of these bottomlands, but the decisions which must be made on this farm will conform closely to those on many farms in these areas.

[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 East Central and South Central Oklahoma*, Oklahoma Agricultural Experiment Station Processed Series P-476 (Stillwater, May, 1964).

Crop Enterprises

Yields and fertilization rates shown in Table 2 for crop enterprises reflect above average management for the short-run comprising the next five years. By 1975 the level of yields will increase, and the data likely will represent only average management. In addition to the enterprises listed, upland pasture yields 1.25 animal unit months (AUM) per acre in native grasses and 3.2 AUM per acre in Bermuda grass. The upland Bermuda requires annual applications of 20-40-40 pounds of N, P_2O_5 and K_2O.

Crop Prices

Short-run crop prices in Table 3 are based on averages of the five years, 1958-62. These prices are used to determine the most profitable farm plans for the near future, but will not hold exactly. The wheat price is tied to the 1960-61 support level adjusted for locational and storage differentials. Uncertainties over wheat programs make this price highly tentative for future years.

The long-run crop prices are somewhat lower than the short-run prices to account for an assumed shift in supply-demand conditions and lower government price supports.

Table 3. Short-Run and Long-Run Prices and Allotments for Crops[1]

Item	Unit	Short-Run		Long-Run	
		Price[2] (Dollars)	Allotment[3] (Acres)	Price[4] (Dollars)	Allotment[5] (Acres)
Cotton	cwt.	29.50	69.21	22.00	60.78
Grain sorghum	cwt.	1.63	N.A.[6]	1.84	N.A.
Wheat	bu.	1.65[7]	65.51	1.20	57.52
Corn	bu.	1.12	N.A.	1.08	N.A.
Alfalfa	ton	22.88	N.A.	16.61	N.A.
Soybeans	bu.	1.97	N.A.	2.00	N.A.
Peanuts	lb.	.104	42.96	.08	42.96
Broomcorn	ton	334.00	N.A.	350.00	N.A.

[1]Based on 567-acre representative bottomland farm. Prices are adjusted to East Central and South Central Oklahoma.
[2]1958-62 average adjusted for area.
[3]Average for the three sample areas for short-run.
[4]Prices adjusted for expected long-run trends in economic conditions.
[5]Average of the three sample areas, projected to 1975.
[6]Not applicable.
[7]Approximate 1960-61 support level.

Table 2. Short-Run Yields and Fertilization Rates by Bottomland Soil Productivity Class

Enterprise	Processed Series Table Number[1]	Unit	B_1		B_3	
			Yield	Fert.	Yield	Fert.
				N.P.K. (Lbs.)		N.P.K. (Lbs.)
Cotton (lint)	1	cwt.	4.5	20-20-20	3.6	40-40-40
Grain sorghum	2	cwt.	30.8	35-20-20	28.0	70-40-40
Wheat	3	bu.	29.0	10-20-10	22.0	20-40-20
Corn	5	bu.	60.0	20-20-20	50.0	40-40-40
Alfalfa	6, 7	ton	5.0	0-40-40	4.0	0-70-70
Soybeans	9	bu.	29.0	5-20-20	22.0	10-40-40
Sorghum silage	14	ton	12.0	50-20-20	12.0	80-40-40
Bermuda pasture	10, 11	AUM	7.2	0-20-20	7.2	20-40-40
Rye and vetch pasture	13	AUM	3.0	15-15-15	2.0	30-30-30
Peanuts	4	lbs.	[2]	[2]	1350.0	10-40-40
Broomcorn	8	ton	.245	20-20-20	[2]	[2]

[1]See Oklahoma Experiment Station Processed Series P-476 for complete enterprise budgets (Reichardt, Lagrone and Tweeten, op. cit.).
[2]Peanuts are considered only for B_3 land, broomcorn for B_1 land.

Break-even Crop Prices

The cost of machinery, fuel, seed, fertilizer, etc. are totaled and divided by yields to determine the capital operating expenses per unit shown in Table 4. Market prices or, for feed crops, indirect returns through livestock would need to equal the amounts shown in Table 4 for the farmer to **break-even** with capital, land and labor costs. Because yields tend to be somewhat higher and fertilizer requirements lower on B_1 soil, break-even prices are less than on B_3 soil. Short-run market prices in Table 3 exceed prices necessary to break-even on capital operating expenses for all crops. The break-even price needed to cover capital operating expense on B_1 corn is $.50 per bushel. A market price of $1.12 per bushel would leave $.62 on each bushel to pay labor and land costs.

Inclusion of operator labor at $1.50 per hour raises the break-even prices. Except for B_3 cotton, again short-run market prices in Table 3 exceed expenses shown in Table 4. Nonland production costs exceed long-run market prices for B_3 cotton and B_3 wheat.

Adding land costs of $19.50 per acre (five percent interest and one percent tax add to a six percent charge at $325 per acre) raises break-even prices above market prices in several instances. The results suggest that managers must utilize opportunities to increase efficiency if they are to keep total costs below market prices.

The per unit costs in Table 4 show what cash crops can make a profit. But the data do not tell what crops are most profitable on a whole farm basis when livestock are included. The optimum whole farm plans are presented later.

Livestock Enterprises

The four basic livestock systems—cow-calf, stocker-feeder, slaughter steers and hogs—are described in Table 5. The basic systems and variations of each bring to 12 the possible livestock alternatives in the whole farm plans considered later.

Livestock prices needed to break-even with production costs are presented for selected enterprises in Table 6. Capital expenses based on "home grown" grains and forage plus supplemental purchased feeds vary by soil type because of higher production costs on B_3 land. Costs, excluding land and all labor, are less than market prices for all systems. When land and labor expenses are included, costs exceed market prices except for one cow-calf enterprise and the hog enterprise produced with

Please turn to Page 11

Table 4. Crop Prices Needed to Break-Even with Production Expenses on Bottomland Soils

Crop	Unit	Soil	Processed Series Table Number[1]	Break-Even Prices to Cover: Capital Operating Expenses[2]	Capital Operating + Operator Labor[3]	Capital Operating + Labor + Land Expenses[4]
				(Dollars)	(Dollars)	(Dollars)
Cotton (lint)[5]	cwt.	B_1	1	17.94	19.38	23.71
		B_3		21.95	23.75	29.17
Grain sorghum	cwt.	B_1	2	.74	.90	1.54
		B_3		1.07	1.25	1.95
Wheat	bu.	B_1	3	.77	.86	1.53
		B_3		1.23	1.35	2.23
Corn	bu.	B_1	5	.50	.58	.91
		B_3		.77	.87	1.26
Alfalfa	ton	B_1	6, 7	11.74	11.87	15.77
		B_3		14.10	14.25	19.13
Soybeans	bu.	B_1	9	.56	.64	1.31
		B_3		.83	.94	1.82
Peanuts[6]	lb.	B_3	4	.046	.050	.064
Broomcorn	ton	B_1	8	207.92	223.92	303.51

[1]Detailed estimates of costs are found in the enterprise budgets in Processed Series P-476, op. cit.
[2]All costs except operator labor and land.
[3]Operator labor valued at $1.50 per hour.
[4]Land valued at $325 per acre. The land cost including interest and taxes is 6 percent of $325, or $19.50 per acre. Miscellaneous overhead for telephone and other nontax items totaling $2.27 per acre not included (see Appendix Table 4).
[5]Seed cotton is valued at $2.50 per hundredweight. If it returns less, then the lint cotton break-even price would have to be increased accordingly.
[6]Based on a peanut hay return of $20 per ton. If hay returns less, the break-even price for peanuts would need to be increased accordingly.

Table 5. Description of Livestock Enterprises

Processed Series Table Number[1]	
15	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
16	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 Grain and Vetch Pasture
17	Producing Good Feeders; Fall Buy-Sept. 10, Summer Sell-July 10, Roughed Through Winter on Native Grass and CSC, Sold Off Grass
18	Producing Good Feeders; Fall Buy-Sept. 10, Summer Sell-July 10, Winter Ration of Alfalfa Hay; Sold Off Grass
2	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
3	Beef Cow Herd (25 Cow Unit) ; Fall Calving-Oct. 30, Noncreep-Fed, Sold July 20; Winter Ration, CSC and Range; Selling Good-Choice Feeder Calves Off Native Pasture
21	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
22	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
23	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

Table 5. (Continued)

Processed Series Table Number[1]	
24	Producing Good-Choice Slaughter Steers; Fall Buy-Oct. 10; (A) Wintered on Rye-Vetch-Oat Pasture with Supplemental Silage and Additional Grain Until May 1; (B) Finished on Summer Range with Full Grain Feed and Sold July 15
25	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
26	Hog Production and Feeding; 24 Sow Unit Farrowing in January-August, and April-October.

[1]See Processed Series P-476 for complete enterprise budgets (Reichardt, Lagrone and Tweeten, op. cit.).
[2]Due to error in the Process Series Table 19, the corrected budget is included as Appendix Table 1 in this publication.
[3]Due to error in the Process Series Table 20, the corrected budget is included as Appendix Table 2 in this publication.

Continued from Page 8
feed from B_1 land. The farmer who is in a position to (a) take a lower return on labor and land, (b) realize a higher market price than used in this analysis or (c) attain higher management levels than assumed may find cattle a desirable alternative even where costs budgeted in Table 6 exceed market prices.

Farm Plans for the Short-Run

The short-run programs present profitable farm organizations with farm acreage and operator labor fixed. There is no charge for these resources since their cost is considered to be committed and is unchanged by the crop or livestock system used. As stated earlier, the 567 acre representative bottomland farm is comprised of 272 acres of B_1 soil, 86 acres of B_3 soil, 185 acres of upland pasture and 24 acres of farmstead and waste. Availability of operator labor by periods is shown in Appendix Table 3. Crop and livestock enterprises are selected that will pay operating expenses and leave the largest possible net income to pay land and operator labor costs.

The most profitable combination of enterprises from Tables 2 and 5 is computed based on the yields, and short-run prices and allotments given in Tables 2 and 3. To reduce risk, no more than one-half of any soil type can be planted in either alfalfa, corn or cotton.

Table 6. Livestock Prices Needed to Break-Even with Production Expenses of Farm Produced Forage and Grain, Purchased Supplements and Other Inputs

Livestock	Soil	Processed Series Table Number[1]	Break-Even Prices to Cover: Capital Operating Expenses	Capital Operating + Labor Expenses[2]	Capital Operating + Labor + Land Expenses[3]	Market Price
			(Dol./Cwt.)	(Dol./Cwt.)	(Dol./Cwt.)	(Dol./Cwt.)
Beef feeder steers[4]	B_1	16	18.63	19.97	24.19	22.29
	B_3		20.92	22.48	28.49	
Beef calves[5] (spring)	B_1	6	12.79	13.51	22.27	22.45
	B_3		15.45	16.18	24.94	
Beef calves[5] (fall)	B_1	7	14.85	15.60	24.40	23.22
	B_3		17.54	18.28	27.08	
Beef slaughter[8] steers	B_1	25	17.49	18.83	22.65	21.35
	B_3		19.97	21.52	26.69	
Hogs[9]	B_1	26	10.49	14.58	16.97	18.00
	B_3		12.46	16.67	19.55	

[1]Detailed estimates of costs are found in enterprise budgets of Processed Series P-476, op. cit.
[2]No hired labor, all operator labor valued at $1.50 per hour. Hired labor is valued at $1.00 per hour in the short-run analysis of this study.
[3]Land valued at $325 per acre. Land cost is 6 percent of $325 or $19.50 per acre. See footnote 4, Table 4.
[4]Based on a 500-pound calf input costing $24.12 per hundredweight. Each dollar reduction in calf price below $24.12 reduced the break-even feeder price $.58 per hundredweight. Forage inputs include mainly rye and vetch, and Bermuda grass pastures.
[5]Beef cow herd pastured on bottomland Bermuda grass supplemented with alfalfa hay at $22.28 per ton. The calf market price is the average for heifers and steers.
[6]Due to an error in the budget presented in Process Series P-476, *op. cit.* Table 19, the corrected budget is presented in Appendix Table 1 in this publication.
[7]Due to an error in the budget presented in Process Series P-476, *op. cit.*, Table 20, the corrected budget is presented as Appendix Table 2 in this publication.
[8]Inputs include corn, Bermuda grass and rye and vetch pasture. A 485 pound calf at $23.42 per hundred weight is a major input. The break-even slaughter steer price can be reduced $.58 for each dollar reduction in the calf price.
[9]Based on a 24 sow unit, fed corn grown on B_1 and B_3 bottomlands. The break-even price is for pigs marketed at 168 pounds in Aug-Oct and marketed at 197.4 pounds in Jan-Apr. The assumed annual receipts from sows, nonbreeders and boars is $1,792.80 in the 24 sow unit.

Farm Plans Excluding Specialized Enterprises

The optimum farm organization is computed first with the hog, peanut, cotton and broomcorn enterprises excluded because they require unique preferences, management, or soil resources not found in many instances. Operating capital is considered available as needed so long as it returns at least six percent on the last dollar used. The maximum net income (return to land and operator labor) totaling $16,650 is derived from a system oriented strongly to cash crops. Alfalfa and soybeans utilize all bottomland.

The stability range in Table 7 shows the variation in the cost or revenue that could occur without changing the enterprise organization. For example, the plan is optimum if alfalfa production costs are less than $65.76 per acre. The cost of producing alfalfa is estimated to be $55.91 on B_3 soil, so the cost could rise $9.85 without changing the plan. The market price of alfalfa can vary from $20.42 to $88.89 per ton without changing this optimum organization.

Other things equal, the net return from soybeans could range from $22.59 to $35.33 per acre on B_3 land without altering the organization. The soybean revenue, $25.48 per acre, is gross revenue $43.34 (22 bushels at $1.97 per bushel) less production cost of $17.86. This net could be reduced $25.48—$22.59 = $2.89 per acre without changing the program optimum. That means that the soybean price would drop to $1.84 per bushel or costs increase $2.89 per acre before some other enterprise combination would be more profitable. A similar drop in price would reduce the soybean net return on B_1 land to the lower stability limit, $37.32, and some other organization would become optimum.

The overall most profitable enterprise is alfalfa. The crop would occupy all bottomland under the given price and production conditions without the one-half cropland restriction mentioned earlier. The price of soybeans, the second most profitable enterprise, would have to rise to $2.11 per bushel to equal the profitability of alfalfa on B_1 land and to $2.42 per bushel to equal the profitability of alfalfa on B_3 land.

Utilization of crop output by cattle was an admissible alternative, but the cash crops were more profitable. The cow-calf enterprise utilizes upland native pasture. The 17-cow unit adds a $1,105 return to farm land and labor.

Operator labor is sufficient in all periods and no hired labor is required. The operating capital, $5,132, returns 34 percent on the last dollar used. The plan in Table 7 is optimum for the farmer who wants

Table 7. Optimum Farm Organization, Including All Nonspecialized Enterprises, Six Percent Interest on Operating Capital[1]

Item	Processed Series Table Number[2]	Unit	Level	Revenue or Cost: Per Unit	Revenue or Cost: Stability Range	Total Revenue or Cost
				(Dollars)	(Dollars)	(Dollars)
1. Enterprises produced or sold						
Alfalfa (B_1)	6, 7	Acre	136	58.38 (cost)	Less than 72.66	7,939.68
Alfalfa (B_3)	6, 7	Acre	43	55.91 (cost)	Less than 65.76	2,404.13
Soybeans (B_1)	9	Acre	136	41.31 (rev.)	37.32 to 45.25	5,618.16
Soybeans (B_3)	9	Acre	43	25.48 (rev.)	22.59 to 35.33	1,095.64
Cow-calf (spring)	3	Cow	17	65.02 (rev.)	59.48 to 73.72	1,105.34
Alfalfa sell	_	Ton	851.5	22.88 (rev.)	20.42 to 88.89	19,482.32
2. Labor hired	_	Hour	None	--	--	
3. Operating capital[4]	_	Dollar	5,132	.06 (cost)	.044 to .339	307.92
4. Net income	_	Dollar	--	--	--	16,649.73

[1]Specialized enterprises include hogs, peanuts, cotton and broomcorn.
[2]See Tables 2 and 4, and detailed budgets in Processed Series P-476, op. cit.
[3]Appendix Table 1.
[4]Does not include machinery and land capital. The machinery complement for the representative farm includes 1 pickup truck, 1 5-plow tractor, 1 3-plow tractor, 1 12-foot tandem disc harrow, 1 4-row cultivator, 1 4-row planter and miscellaneous items. Total machinery capital is $6,300 or $17.60 per cropland acre. These estimates are based on average age machinery, and will vary by size and type of farm. The cost of machinery, including interest, depreciation, repairs and fuel is included with crop enterprises, but machinery capital is not given in any of the subsequent short-run whole farm plans.

or needs up to a 34 percent return due to high capital cost or personal aversion to risk. It is likely that few alternative uses of operating capital would bring as high a return as investment in the farming organization in Table 7.

The indicated operating capital does not include machinery and is **annual** rather than **total** capital. If $100 **total** capital is used for six months, it is recorded as $50 **annual** capital prorated over the entire year. Interest at six percent is charged against this annual capital. Annual capital presented in the budgets may underestimate total capital required at a given time. Total operating capital required in Table 7 is $7,716, compared with $5,132 annual capital.

Table 8 shows the optimum farming organization for the representative bottomland farm if capital is limited to $4,447 in total ($1,991 annual) or if a return over 34 percent on operating capital is desired. The rate of return on capital invested in the cow-calf enterprise was 34 percent. The requirement of a return greater than 34 percent removes the enterprise, and upland pasture is left idle[3]. The bottomland cropping organization is the same as in the previous table and would remain unchanged up to a desired return of 48 percent on operating capital.

Stated in other terms, a farmer with total operating capital less than $4,447 will invest it in soybean and alfalfa enterprises until the bottomlands are fully utilized. He could afford to pay up to 48 percent interest for this capital based on the prices and management practices used in this study. Capital exceeding $4,447 will be used to expand the upland pasture cow-calf enterprise until $7,716 of capital is utilized. As the farmer accumulates capital in excess of $7,716, and if he owns his farm, he can begin to think in terms of more capital intensive enterprises such as hogs (to be discussed later) or buying more land.

Table 9 contains land values at which a farmer with various capital levels could break-even with internal or "home-farm" investment in crop and livestock enterprises. For example, a farmer owning the 567 acre representative farm and possessing only $4,447 ($7.84 per acre) operating capital could use his limited capital as profitably planting the last acre of soybeans and alfalfa on bottomland as buying an additional acre for $46.04.[4] With $7,716 of operating capital ($13.61 per acre), the farmer can stock the entire native pasture and realize a 34 percent return on

[3]No provision was made for renting out upland pasture, although it would be more profitable than leaving the land idle.

[4]Problems of indivisibility where units only are available as quarter sections or 80 acres are not considered. The additional land purchased is considered to have the same production potential as the home farm.

Table 8. Optimum Farm Organization, Including All Nonspecialized Enterprises, 36 Percent Interest on Operating Capital

Item	Processed Series Table Number[1]	Unit	Level	Revenue or Cost: Per Unit	Revenue or Cost: Stability Range	Total Revenue or Cost
				(Dollars)	(Dollars)	(Dollars)
1. Enterprise produced or sold						
Alfalfa (B_1)	6, 7	Acre	136	58.38 (cost)	Less than 70.56	7,939.68
Alfalfa (B_3)	6, 7	Acre	43	55.91 (cost)	Less than 64.42	2,404.13
Soybeans (B_1)	9	Acre	136	41.31 (rev.)	34.47 to 46.88	5,618.16
Soybeans (B_3)	9	Acre	43	25.48 (rev.)	21.39 to 33.99	1,095.64
Alfalfa sell	–	Ton	852	22.88 (rev.)	20.75 to 105.30	19,493.76
2. Labor hired	–	Hour	None	--	--	
3. Operating capital	–	Dollar	1,991	.36 (cost)	.339 to .478	716.76
4. Net income	–	Dollar	--	--	--	15,146.99

[1]See Tables 2 and 5, and detailed budgets in Processed Series P-476, op. cit.
[2]For machinery capital requirements, see Table 7, footnote 4.

Table 9. Prices an Investor Can Pay for an Additional Acre of Land to Break-Even with Internal Investment in "Home-Farm"Enterprises

Farm Organization	Operating Capital[1]	Rate of Return	Return to Land[2]	Break-even Land Price[3]
(Table No.)	(Dol./Acre)	(Percent)	(Dol./Acre)	(Dol./Acre)
8	7.84	48	22.10	46.04
8	7.84	34	22.52	66.24
7	13.61	33	22.43	67.97
7	13.61	10	24.51	245.10
7	13.61	7.6	24.69	325.00
7	13.61	4.4	25.02	568.64

[1]Operating capital is the *total* operating (nonland) capital used during the year, whether for a short or long period. Interest is charged on annual capital, however, which is total capital prorated over the entire year. For example, $1,000 invested in feed inventories held for six months is $1,000 *total* operating capital but only $500 *annual* operating capital.

[2]The residual return to land is gross receipts per average acre less all operating expenses, interest (at the indicated rate of return) on operating capital, land tax at $3.25 per acre and operator labor at $1.50 per hour.

[3]Each additional acre is assumed to have the same composition of bottomland and upland as the representative farm. The break-even land price is computed as the residual return to land per acre divided by the rate of return. The Table 8 organization is optimum over the range 34 to 48 percent return on operating capital, and the Table 7 organization is optimum over the range 4.4 to 34 percent return.

investment. His capital would bring the same return if he added the last (17th) cow or paid $67.97 for another acre of land. Land values averaged approximately $325 per acre in the study area in 1964.[5] The conclusion is that a farmer with up to $7,716 capital would use it to attain the crop and livestock organizations in Table 7 before profitably investing in land at current prices.

Suppose the farmer has more than $7,716 operating capital and he wants to buy land. How much can he afford to pay per acre for land just like the representative farm using the crop plan of Table 7? The answer depends on what return is needed on investment. If a 7.6 percent return is needed to cover interest payments, the risk and sacrifice in current consumption or alternative return opportunities in nonfarm uses; then the break-even land price is $325 per acre. This land price is approximately the current rate. The break-even land price can be considerably higher if a lower rate of return is considered adequate.[6] Stated in other terms, a farmer should exploit any alternative investment that returns 7.6 percent or more before investing in the representative type farm real estate at current prices. The rate of return on land in-

[5]Does not include value of farm dwelling.

[6]Break-even land prices are based entirely on enterprise productivity and omit consideration of future land value appreciation or depreciation.

vestment drops to 4.4 percent using the optimum Table 7 organization if $568.64 is paid per acre for additional land.

The Table 10 organization results from excluding not only the specialized peanut, cotton, broomcorn and hog enterprises, but also excludes the profitable alfalfa and soybean enterprises of Table 7. Corn gives the highest returns on B_1 soil, followed by grain sorghum. Grain sorghum is optimum on B_3 soil. All feed grains are sold for cash. A fall calving beef cow enterprise utilizes upland pasture.

Net income falls from $16,650 in Table 7 to $11,785 in Table 10 with soybeans and alfalfa excluded. Other disadvantages of the Table 10 plan are (a) higher capital requirements totaling $8,255 and (b) the necessity to hire labor. The program also is less stable than that in Table 7. A small change in the interest rate or production costs would change the organization. Only an 11-cent decrease in returns from the fall cow-calf enterprise (or an 11-cent increase in returns from the spring cow-calf enterprise) would replace the fall enterprise with the spring calving cow enterprise. Thus, these two enterprises can be considered equally profitable.

Farm Plans Including Specialized Enterprises

Specialized enterprises—cotton, peanuts, hogs and broomcorn—were not considered in the previous organization because of their unique requirements. It is apparent below, however, that hogs and peanuts can raise income above levels shown in previous farm organizations.

The organization in Table 11 results when the hog enterprise is allowed to compete with all other nonspecialized enterprises listed in Tables 2 and 5 for use of limited farm resources. The hogs are produced under a multiple farrowing system with marketing in January, April, August and October. Approximately seven pigs are marketed per litter.

Introduction of the feed grain-hog enterprise into the farm plan substantially raises income—$29,936 versus $16,650 in Table 7. The 108 sow-litter unit utilizes the entire 358 acre bottomland feed grain production. A 17 unit spring cow-calf system again utilizes the upland native pasture.

The returns in Table 11 are based on an average selling price of $18 per hundredweight for hogs. The stability range shows that the average price can fall as low as $16 per hundredweight and hogs will remain the most profitable enterprise.

Please turn to Page 21

Table 10. Optimum Farm Organization, Excluding Specialized Enterprises, Soybeans and Alfalfa; Six Percent Interest on Operating Capital

Item	Processed Series Table Number[1]	Unit	Level	Revenue or Cost		Total Revenue or Cost
				Per Unit	Stability Range	
				(Dollars)	(Dollars)	(Dollars)
1. Enterprises produced or sold						
Corn (B_1)	5	Acre	136	29.32 (cost)	Less than 35.09	3,987.52
Grain sorghum (B_1)	2	Acre	136	21.98 (cost)	20.14 to 25.13	2,989.28
Grain sorghum (B_3)	2	Acre	86	28.93 (cost)	Less than 30.65	2,487.98
Cow-calf (fall)	[2]	Cow	17	66.81 (rev.)	66.70 to 78.71	1,010.77[3]
Feed grain sell	_	Cwt.	11,792	1.76 (rev.)	1.66 to 1.82	20,753.92
2. Labor hired						
Jan. - April	_	Hour	12	1.00 (cost)		12.00
May - July	_	Hour	8	1.00 (cost)		8.00
3. Operating capital	_	Dollar	8,255	.06 (cost)	.059 to .089	495.30
4. Net income	_	Dollar	--	--	--	11,784.61

[1]See Tables 2 and 5, and detailed budgets in Processed Series P-476, op. cit.
[2]See Appendix Table 2.
[3]$125 is subtracted from revenue for 6 tons of alfalfa to be used for winter supplement feeding. This alfalfa could have been produced on the farm, of course.

Table 11. Optimum Farm Organization Including Hogs and Excluding Peanuts

Item	Processed Series Table Number[1]	Unit	Level	Revenue or Cost Per Unit	Revenue or Cost Stability Range	Total Revenue or Cost
				(Dollars)	(Dollars)	(Dollars)
1. Enterprise produced or sold						
Corn (B_1)	5	Acre	136	29.32 (cost)	Less than 46.07	3,987.52
Corn (B_3)	5	Acre	43	37.32 (cost)	Less than 41.24	1,604.76
Grain sorghum (B_1)	2	Acre	136	21.98 (cost)	12.19 to 41.41	2,989.28
Grain sorghum (B_3)	2	Acre	43	28.93 (cost)	25.01 to 36.76	1,243.99
Cow-calf (spring)	[2]	Cow	17	65.02 (rev.)	57.31 to 94.30	1,105.34
Hog sell	-	Sow-litter	108	388.24 (rev.)	More than 318.76	41,929.92
2. Labor hired						
Jan. - Apr.	-	Hour	162	1.00 (cost)	--	162.00
May - July	-	Hour	11	1.00 (cost)	--	11.00
3. Operating capital	-	Dollar	51,677	.06 (cost)	.013 to .164	3,100.62
4. Net income	-	Dollar	--	--	--	29,936.09

[1]See Tables 2 and 5, and detailed budgets in Processed Series P-476, op. cit.
[2]Appendix Table 1.

Continued from Page 18

Despite the large potential net returns in Table 11, a feed grain-hog system may not be desirable for many bottomland farms for several reasons. First, because of the specialized management needed, many farmers may not realize the favorable output-input relationships and the returns in Table 11. Second, many farmers do not particularly enjoy working with hogs, and are willing to sacrifice some income to work with enterprises ranking higher in personal preferences. Third, capital requirements are high, $51,677 annual, $63,394 total, and some farmers either lack the capital or do not wish to take the risk associated with this large capital investment.

Including peanuts but excluding other specialized enterprises from all the crop and livestock enterprises in Tables 2 and 5, the income maximizing organization is Table 12. Peanuts are the most profitable enterprise and the full 43-acre allotment is planted. Net income is $18,932 compared to $16,650 for the same plan in Table 7, but excluding peanuts.

Per acre gross returns from peanuts total $150.40 from 1,350 pounds at 10.4 cents per pound plus one-half ton of hay at $20 per ton. This gross return, $150.40, less costs of $70.59 (excludes interest and operator labor cost) nets $79.81 per acre. The stability conditions indicate that the net can fall to $27.48 per acre and the organization with peanuts in Table 12 will still maximize returns. The value of peanuts can fall to 7.2 cents per pound for the per acre **net** to reach $27.48. A price below 7.2 cents would require a change in the optimum plan.

As for hogs, we emphasize that peanuts are a specialized crop, not adapted to all bottomland areas. But where preferences, soil conditions, managerial knowhow and allotments are favorable, peanuts can be a high-profit enterprise according to Table 12.

The full cotton allotment, 69 acres, is planted on B_1 soil when cotton is allowed into the farm plan. Cotton is slightly less profitable than alfalfa but slightly more profitable than soybeans. Except for replacing of 69 acres of B_1 soybeans with cotton, the labor and capital requirements, net income and enterprise organization are similar to that in Table 7, thus is not shown.

Broomcorn (farm plan not shown) ranked below the peanut, hog-feed grain, alfalfa, cotton, soybeans and cash grain in profit under the assumed prices and production requirements used in this study.

Table 12. Optimum Farm Organization Including Peanuts and Excluding Hogs

Item	Processed Series Table Number[1]	Unit	Level	Revenue or Cost		Total Revenue or Cost
				Per Unit	Stability Range	
				(Dollars)	(Dollars)	(Dollars)
1. Enterprises produced or sold						
Alfalfa (B_1)	6, 7	Acre	136	58.38 (cost)	Less than 72.66	7,939.68
Alfalfa (B_3)	6, 7	Acre	43	55.91 (cost)	Less than 65.76	2,404.13
Soybeans (B_1)	9	Acre	136	41.31 (rev.)	37.32 to 45.25	5,618.16
Peanuts (B_3)	4	Acre	43	79.81 (rev.)	More than 27.48	3,431.83
Cow-calf (spring)	[2]	Cow	17	65.02 (rev.)	61.75 to 73.72	1,105.34
Alfalfa sell	–	Ton	851.5	22.88 (rev.)	20.42 to 88.89	19,482.32
2. Labor hired	–	Hour	None	--	--	--
3. Operating capital	–	Dollar	6,036	.06 (cost)	.049 to .169	362.16
4. Net income	–	Dollar	--			18,931.68

[1]See Tables 2 and 5, and detailed budgets in Processed Series P-476, op. cit.
[2]Appendix Table 1.

Cattle in the Farm Plan

Cattle were admissible alternatives in the previous plans. They were not included in the optimum organizations except to utilize upland pasture because cash crops or hogs were more profitable. The organization in Table 13 maximizes net farm income when cash crops and hogs are excluded, and farm resources can be used only for cow-calf, buy-sell or slaughter steer livestock and attendant feed or pasture crop systems.

The optimum bottomland cattle system is a cow-calf operation with bermuda grass on all bottomland. The 208 cows calve about March 1. The cattle are pastured on bottomland bermuda grass and upland native grass supplemented with cottonseed cake and small amounts of alfalfa hay. Calves are sold around October 1 at an assumed average price of $21.42 per hundredweight for heifers and $23.42 per hundredweight for steers. As in earlier programs, the upland native pasture could have been converted to bermuda grass, but returns were not high enough to make this change profitable. Also one to two acres of alfalfa hay are produced on B_1 land for supplement feeding mainly during periods of unfavorable weather. It may not be realistic to produce only this nominal amount of alfalfa, and the supplemental hay instead would be more economically purchased in most instances.

A fall instead of spring calving beef cow herd would give returns nearly equivalent to the net shown in Table 13. The choice of the spring or fall calving system would depend on personal preferences and availability of labor. Average prices used for heifers and steers ($22.20 and $24.20, respectively) under the fall calving July market system, are higher than under the spring calving October marketing system. The fall calving system requires more supplemental feeding, however, tending to equalize the net returns.

Net farm income with the cow-calf plan of Table 13 is $6,849 or considerably below the income of earlier programs[7]. It is possible, of course, that through superior management and more favorable output-input relations than those underlying Table 13, some farmers could find cattle more profitable than cash crops on bottomland soils. There is little doubt that some farmers are willing to take a lower return for the special satisfaction they receive from cattle. Comparing returns between cash crops in Table 7 and cattle in Table 13 after making adjustments for specific circumstances, a farmer can balance the income differences with other factors such as satisfactions in arriving at an optimum plan.

---

[7]ACP payments on bermuda grass are included and reduce the costs. Returns from bermuda can be raised by sale of sprigs.

Table 13. Optimum Farm Organization Excluding Cash Crops

Item	Processed Series Table Number[1]	Unit	Level	Revenue or Cost Per Unit	Range Stability	or Cost Total Revenue
				(Dollars)	(Dollars)	(Dollars)
1. Enterprise produced or sold						
Bermuda grass (B_1)	10, 11	Acre	271	6.61 (cost)	Less than 21.53	1,791.31
Bermuda grass (B_3)	10, 11	Acre	86	12.18 (cost)	Less than 18.74	1,047.48
Alfalfa (B_1)	6, 7	Acre	1	58.38 (cost)	Less than 66.57	58.38
Cow-calf (spring)	[2]	Cow	208	65.02 (rev.)	61.61 to 71.26	13,524.16
2. Labor hired						
Jan. - Apr.	_	Hour	1,234	1.00 (cost)	--	1,234.00
Oct. - Dec.	_	Hour	95	1.00 (cost)	--	95.00
3. Operating capital	_	Dollar	40,818	.06 (cost)	Less than .147	2,449.08
4. Net income		Dollar	--	--	--	6,848.91

[1]See Tables 2 and 5, and detailed budgets in Processed Series P-476, op. cit.
[2]Appendix Table 1. The beef cow herd utilizes bottomland Bermuda grass and upland native pasture.

With cow-calf systems excluded, the next most profitable cattle system shown in Table 14 includes fall buy-summer sell feeders, and slaughter steers. The B_1 land is used to produce alfalfa, feed grain and pasture. Returns do not cover costs on B_3 bottomland and on upland, thus these soils are not utilized. If a cow-calf system had been permitted to enter the plan, it would have profitably utilized the upland native as well as the B_3 bottomland as in Table 13.

Net income to land, operator labor, management and risk is only $4,208 in Table 14. The total cost of 567 acres of land valued at $325 per acre, based on five percent interest plus one percent tax, is $11 thousand. Added to an operator labor cost of $4 thousand, the total overhead or fixed cost is $15 thousand. The $4,208 net return to land and operator labor, management and risk falls considerably short of covering this overhead cost. This cost of land and operator labor is not likely to be meaningful in the short-run, however. Since few opportunities for alternative uses of land and operator labor may exist, a $4,208 net return may be a maximum. But in the long-run the farmer may well look for alternative off-farm uses for capital and labor, or reorganize the farming organization to one with greater profit potential.

Resources Required for a Specified Income

Possible income goals for a farmer might be that level of income he would receive in nonfarm employment, or money to achieve a satisfactory living standard. The following farm plans are for specific income targets. The farm operator may wish to watch for opportunities to build equity and acquire additional land to close the gap between his present status and the income target.

Conditions Underlying the Plans

Most of the following farm plans are designed to give the farm operator a $5,000 income (return to family labor, risk and management) after paying all costs, including the interest and tax on real estate capital. The real estate cost is a 5-percent interest plus a 1-percent land tax on the current land value per acre, $325.[8] Six percent interest is charged on operating capital.

Long-run crop prices in Table 3 and livestock market prices in Table 6, reflect projected 1975 conditions. Prices for cotton, wheat, peanuts

[8]The land tax, $3.25 per acre, is held constant at alternate land prices examined.

Table 14. Optimum Farm Organization Excluding Cash Crops, Hogs and Cow-Calf Enterprises

Item	Processed Series Table Number[1]	Unit	Level	Revenue or Cost		Total Revenue or Cost
				Per Unit	Stability Range	
				(Dollars)	(Dollars)	(Dollars)
1. Enterprise produced or sold						
Corn (B_1)	5	Acre	9	29.32 (cost)	18.01 to 45.71	263.88
Alfalfa (B_1)	6, 7	Acre	4	58.38 (cost)	32.98 to 65.33	233.52
Rye-vetch (B_1)	13	Acre	36	9.39 (cost)	6.61 to 16.58	338.04
Bermuda grass (B_1)	10, 11	Acre	223	6.61 (cost)	Less than 8.66	1,474.03
Fall buy-summer sell	17	Steer	332	26.07 (rev.)	23.96 to 26.37	8,655.24
Slaughter steers	24	Steer	14	77.88 (rev.)	57.14 to 84.84	1,090.32
2. Labor hired						
Jan.-Apr.	-	Hour	666	1.00 (cost)	--	666.00
May-July	-	Hour	46	1.00 (cost)	--	46.00
Oct.-Dec.	-	Hour	364	1.00 (cost)	--	364.00
3. Operating capital	-	Dollar	35,867	.06 (cost)	.058 to .085	2,152.02
4. Net income	-	Dollar	--	--	--	4,208.07

[1]See Tables 2 and 5, and detailed budgets in Processed Series P-476, op. cit.

and corn are lower than current levels because of assumed trends toward lower commodity supports. Also, the gap between grain sorghum and corn prices are narrowed appreciably from the current relationship. The commodity price-cost relationship is less favorable generally than in the short run analysis of the previous section. Overhead costs, shown in Appendix Table 4, remain unchanged at all farm sizes.

To insure a sufficiently diversified program to reduce risk, no more than one-half of B_1 or B_3 soil can be planted to either corn, cotton or soybeans. Each 100 acres of land purchased contains the same proportion of B_1 bottomland, B_3 bottomland, upland and waste as the representative farm presented earlier.

Selected assumptions given above are relaxed in several instances to broaden the analysis and cover a wide range of conditions that might apply to farmers making management decisions.

Resources to Earn a $5,000 Operator Labor Income

The farming organizations in Table 15 exclude the specialized enterprises—peanuts, hogs, and broomcorn. The farm plans show the minimum land and other resources needed to leave a $5,000 annual residual income to operator (and family) labor after paying all operating, durable capital and real estate costs. All interest and depreciation charged on land and other assets largely are not cash costs, but are "costs" in terms of the lost opportunity to invest this capital in other uses earning 5 to 6 percent interest.

Program 1, Table 15 is not a feasible plan because of unrealistically large resource requirements to pay all farm costs and a $5,000 labor return out of receipts. The plan is included to illustrate the problem of accumulating an economic unit under the stated price and other conditions.

Program 1 can also be applicable to a renter who pays $19.50 cash rent per acre. The renter need not have the land capital indicated, but would have to rent the indicated 4,152 acres and hire 3,042 hours of labor —not a very realistic possibility. Huge capital requirements eliminate the possibility of full ownership of resources for many farmers. Capital requirements can be cut by leasing and custom hiring machinery, and by renting land. Because the capital requirement then would be reduced to the somewhat attainable operating capital, $54,000, efforts by farmers in the future to realize a desired income goal may trend toward greater emphasis on rental arrangements rather than traditional ownership pat-

Please turn to Page 30

Table 15. Minimum Land and Other Resource Requirements and Enterprises for a $5,000 Operator Labor Return on Principally Bottomland Soil

Program	Resource Requirements		Enterprises		Special Conditions
1.	Land	4,152 acres	Soybeans (B_1)	996 acres	No specialized enterprises
	Operating capital	$54,008	Soybeans (B_3)	315 acres	Land $325 per acre
	Machinery capital	$37,768	Corn (B_1)	995 acres	Hired labor $1.50 per hour
	Land capital	$1,349,400	Alfalfa (B_1)	1 acre	Capital charge 6 percent
	Labor hired		Grain sorghum (B_3)	315 acres	
	Jan.-April	3,049 hours	Cow-calf (spring) [1]	126 cows	
	May-July	2,486 hours	Sell feed grain	43,856 cwt.	
	Aug.-Sept.	222 hours			
	Oct.-Dec.	334 hours			
2.	Land	2,371 acres	Soybeans (B_1)	569 acres	No specialized enterprises
	Operating capital	$29,559	Soybeans (B_3)	180 acres	Land $325 per acre
	Machinery capital	$22,130	Corn (B_1)	568 acres	Hired labor $1.00 per hour
	Land capital	$770,575	Alfalfa (B_1)	1 acre	Capital charge 6 percent
	Labor hired		Grain sorghum (B_3)	180 acres	
	Jan.-April	1,473 hours	Cow-calf (spring) [1]	72 cows	
	May-July	1,198 hours	Sell feed grain	25,037 cwt.	

3.	Land	525	acres	Soybeans (B_1)	126 acres	No specialized enterprises
	Operating capital	$6,253		Soybeans (B_3)	40 acres	Land $162.50 per acre
	Machinery capital	$5,922		Corn (B_1)	126 acres	Hired labor $1.50 per hour
	Land capital	$85,312		Grain sorghum (B_3)	40 acres	Capital charge 6 percent
	Labor hired		none	Cow-calf (spring) [1]	16 cows	
				Sell feed grain	5,547 cwt.	
4.	Land	313	acres	Soybeans (B_1)	75 acres	No specialized enterprises
	Operating capital	$3,725		Corn (B_1)	75 acres	Land $0 per acre
	Machinery capital	$4,061		Soybeans (B_3)	24 acres	Hired labor $1.50 per hour
	Land capital	--		Grain sorghum (B_3)	24 acres	Capital charge 6 percent
	Labor hired		none	Cow-calf (spring) [1]	10 cows	
				Sell feed grain	3,304 cwt.	

[1]Appendix Table 1. Sources of other budgets are given in Tables 2 and 5.

Continued from Page 27
terns. The equity requirements for purchase of an economic real estate unit are a barrier to ownership that may turn more farmers aspiring a higher income to rental contracts.

Reduction of the hired labor wage to $1.00 per hour reduces land needed for a $5,000 income from 4,152 acres (Program 1) to 2,371 acres (Program 2). The organization is similar to the first plan, but again is unrealistic because of the large resource requirements. In Programs 1 and 2, the small amount of alfalfa grown for supplemental cattle feed may be more profitably purchased.

By cutting the land price (and cost) in half, the operator income target can be attained with 525 acres and $6,253 operating capital. Combined operating machinery and land capital totals $97,487. The resources are very similar in magnitude to the representative farm in the earlier section.

No charge is made for land in Program 4. The estimate might apply to the farmer who has full equity in his land, who does not consider the opportunity cost of land, and who essentially applies the earnings from land to his "labor" return. The implication is that the farm operator with no farm mortgage can obtain a $5,000 "labor" income to pay living costs if he is a full owner and is willing to accept a low return on land equity. In Table 15, corn and soybeans are on B_1 bottomland, grain sorghum and soybeans are on B_3 bottomland. The spring cow-calf system utilizes the upland pasture. Soybeans are the overall most profitable crop. Comparing the short-run organization (Table 7) with the long-run organization 3, feed grains replace alfalfa because of the reduced long term alfalfa price. The enterprise organizations in Programs 1, 2, 3 and 4, Table 15 differ only in size, not in enterprise mix.

Resources to Earn a $5,000 Income with Specialized Enterprises

Land and capital resources needed to pay all resource costs, including a $5,000 operator labor return, were unusually large in Table 15. Table 16 shows that resource requirements can be reduced considerably if the operator has the knowhow and willingness to adopt specialized enterprises.

A $5,000 operator labor return can be reached with 50 acres of corn, 82 acres of grain sorghum, a 38-sow unit, and a 6-cow herd (to utilize upland pasture) according to Program 1, Table 16. Total land requirements are 209 acres and all capital requirements total $89,268.

Table 16. Minimum Land and Other Resources Required for a $5,000 Operator Labor Return on Principally Bottomland Soils with Specialized Enterprises Allowed

Program	Resource Requirements		Enterprises		Special Conditions
1.	Land	209 acres	Corn (B_1)	50 acres	All enterprises allowed
	Operating capital	$18,195	Grain sorghum (B_1)	50 acres	Land $325 per acre
	Machinery capital	$3,148	Grain sorghum (B_3)	32 acres	Hired labor $1.50 per hour
	Land capital	$67,925	Cow-calf (spring) [1]	6 cows	Capital charge 6 percent
	Labor hired	none	Sow litter	38 sows	
2.	Land	2,942 acres	Soybeans (B_1)	706 acres	All enterprises *except hogs*
	Operating capital	$32,584	Soybeans (B_3)	223 acres	allowed
	Machinery capital	$27,144	Broomcorn (B_1)	705 acres	Land $325 per acre
	Land capital	$956,150	Alfalfa (B_1)	1 acre	Hired labor $1.50 per hour
	Labor hired		Grain sorghum (B_3)	223 acres	Capital charge 6 percent
	Jan.-April	864 hours	Cow-calf (spring) [1]	89 cows	
	May-July	2,901 hours	Sell feed grain	6,244 cwt.	
	Aug.-Sept.	50 hours			
	Oct.-Dec.	258 hours			
3.	Land	1,198 acres	Soybeans (B_1)	574 acres	No specialized enterprises
	Operating capital	$11,267	Soybeans (B_3)	182 acres	(No soybean restriction)
	Machinery capital	$11,831	Cow-calf (spring) [1]	36 cows	Land $325 per acre
	Land capital	$389,350			Hired labor $1.50 per hour
	Labor hired				Capital charge 6 percent
	May-July	500 hours			

[1]Appendix Table 1. Sources of other budgets are given in Tables 2 and 5.

Introduction of the broomcorn enterprise in Program 2, Table 16, reduces the resources necessary to achieve the prescribed income compared with Program 1, Table 15. Resource requirements remain high, however, and future price relationships are uncertain for farmers who raise specialized crops such as broomcorn.

In Program 3, Table 16, the one-half cropland restriction is removed so the most profitable enterprise (excluding hogs, peanuts, and broomcorn) can occupy the entire bottomland. Soybeans is the most profitable crop. A farming unit large enough to pay all costs plus a $5,000 operator labor return is comprised of 1,198 acres and $412,448 capital.

Resources to Earn a $3,000 Operator Income

Since the $5,000 income goal is unattainable for many farmers, a $3,000 target may be more reasonable. Program 1, Table 17 indicates that this income goal can be reached with 112 acres of land and $48,466 of capital with a hog enterprise. Feed grains occupy the bottomlands; and spring calving cows the small upland acreage. A change in price and production relationships could change the profitability and resource requirements to reach the income goal.

With specialized enterprises (hogs, peanuts and broomcorn) excluded, resource requirements again are large, even to attain a $3,000 operator labor return (Program 2, Table 17). The basic plan, in the foregoing tables, is soybeans and cash feed grains. Two acres of alfalfa are included to supplement the cow-calf enterprise. Other programs also required a small alfalfa acreage for supplemental cattle feed, but this small amount was omitted because it was less than one-half acre in each case.

Unlike the previous programs which included only a spring calving cow herd on upland pasture, Program 2, Table 17 also includes a **fall** calving 27-cow unit.

Other variations in the above plans would not even leave a residual to operator labor above other resource costs, thus expansion of resources would give only a more negative operator income. Plans that would not pay non-labor costs included: (a) raising the land price to 50 percent above the current level to $487.50 per acre and (b) raising the capital cost to 18 percent.

Table 17. Minimum Land and Other Resource Requirements and Enterprises for a $3,000 Operator Labor Return on Principally Bottomland Soils

Program	Resource Requirements		Enterprises		Special Conditions
1.	Land	112 acres	Corn (B_1)	27 acres	All enterprises allowed
	Operating capital	$9,770	Grain sorghum (B_1)	27 acres	Land $325 per acre
	Machinery capital	$2,296	Grain sorghum (B_3)	17 acres	Hired labor $1.50 per hour
	Land capital	$36,400	Cow-calf (spring) [1]	3 cows	Capital charge 6 percent
	Labor hired	none	Sow-litter	20 sows	
2.	Land	1,870 acres	Soybeans (B_1)	448 acres	No specialized enterprise
	Operating capital	$23,859	Soybeans (B_3)	142 acres	Land $325 per acre
	Machinery capital	$17,732	Corn (B_1)	446 acres	Hired labor $1.50 per hour
	Land capital	$607,750	Alfalfa (B_1)	2 acres	Capital charge 6 percent
			Grain sorghum (B_3)	142 acres	
	Jan.-April	907 hours	Cow-calf (spring)[1]	27 cows	
	May-July	840 hours	Cow-calf (fall)[2]	30 cows	
			Sell feed grain	19,690 cwt.	

[1]Appendix Table 1. Sources of other budgets are given in Tables 2 and 5.
[2]Appendix Table 2.

Summary

Short-Run Programs

This study shows whole farm plans to maximize net farm income under the given conditions. It is recognized that the few prices, yields, inputs and enterprises used here do not adequately cover all circumstances faced by farmers who must make decisions. For the more basic programs, we have attempted to give ranges of prices, capital returns and soil conditions where results are applicable. Data can be adjusted where necessary to fit the analysis to specific situations.

The most profitable cash crops are peanuts, alfalfa, cotton, soybeans, corn, grain sorghum, broomcorn and wheat, in that order. Peanuts and broomcorn are not adapted to many situations, however.

A feed grain-hog program gives the highest net income for the entire representative farm under the assumed conditions. Peanuts are even more profitable per acre but are limited by allotments. Where adapted, the entire peanut allotment should be planted before using bottomland to produce feed grains for hogs.

Broomcorn and wheat were less profitable than other cash crops with the yields, prices and input requirements used in this section and were not part of any of the whole farm plans.

The cow-calf system on bermuda-pasture utilizes bottomland resources more efficiently than other cattle systems from an economic standpoint. On bottomland soils, the return to land, operator labor, risk and management are lower under the cow-calf cattle system than cash crops. Bermuda grass utilized through cow-calf systems is profitable, but appears to return less income than cash crops even with ACP establishment payments included. We caution that the conclusions rest on the price, yield and input requirement data assumed, and the individual farmer may reach other conclusions when results are tailored to his unique circumstances and current economic conditons.

Long-Run Programs

The results presented in Tables 15, 16 and 17 illustrate the competitive nature of farming in a period of cost-price squeeze. Even with the use of efficient practices, optimum enterprise organization and sizeable credit backing, the modest operator income goals are not easy to reach.

Long-run adjustments will be to larger farms in terms of both total

acreage and operating capital investment per acre. While the long run programs emphasize relatively greater profitability of cash grains than alfalfa, only a small change in price relationships could change the emphasis. Soybeans, peanuts, alfalfa, corn and grain sorghum are likely to remain the most favorable crop alternatives for the bottomlands for the planning horizon considered in this study. Farmers will have to keep abreast of current price conditions to determine which of these are most favorable at any time. Cotton and small grains are expected to be less favorable long-run alternatives for this area.

No attempt has been made to include capital gains, although such gains have been important sources of income for retirement and other uses in the past. Land appreciation as in the post war period would reduce land requirements to obtain a given income. However, it is questionable whether land will continue to increase in value at the rates experienced since World War II.

Appendix Table 1. Estimated Requirements, Costs and Returns for 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

Item	Number	Unit	Price or Cost Per Unit	Quantity	Value or Cost	Per Cow
			(Dollars)		(Dollars)	(Dollars)
(1) Production						
Heifer calves	11	cwt.	21.42	4.60/calf	1,083.85	
Steer calves	11	cwt.	23.42	4.85/calf	1,249.46	
Total	22				2,333.31	93.33
(2) Annual inputs						
Native pasture	26	AUM	--	336	--	
Cottonseed cake (2 lbs./day for 150 days)	26	cwt.	3.80	78	296.40	
Hay (alfalfa) (2 lbs./day for 27 days)	26	ton	22.28	.7	15.60	
Minerals and salt	26	lb.	.03	840	25.20	
Vet. and medicine	26	head	2.00	26	52.00	
Bull depreciation	1	$/head	35.00	1	35.00	
Cow depreciation	25	$/head	7.50	25	187.50	
Hauling and marketing	22	cwt.	.50	103.95	51.98	
Tax		dol.	.05	1,195.00	59.75	
Interest on annual capital		dol.	.06	4,564.85	273.89	
Total					997.32	39.89

(3) Returns above specified inputs					1,335.99	53.44
(4) Hourly labor	hr.	1.00	343.75		343.75	13.75
(5) Returns above specified inputs and hourly labor					992.24	39.69

Capital Requirements	Total	Annual
Brood cows	$4,000.00	$4,000.00
Bull	300.00	300.00
Operating Capital	448.95	264.85
	$4,748.95	$4,564.85

Labor Requirements (man-hours/cow)

Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
1.20	3.00	2.25	2.25	.60	.35	.35	.35	.50	1.20	.85	.85	13.75

Appendix Table 2. Estimated Requirements, Costs and Returns for 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

Item	Number	Unit	Price or Cost Per Unit	Quantity	Value or Cost	Per Cow
			(Dollars)		(Dollars)	(Dollars)
(1) Production						
Heifer calves	11	cwt.	22.20	4.60/calf	1,123.32	
Steer calves	11	cwt.	24.20	4.80/calf	1,277.76	
Total	22				2,401.08	96.04
(2) Annual inputs						
Native pasture	26	AUM	---	336	---	
Cottonseed cake (2 lbs/day for 160 days)	26	cwt.	3.80	84	319.20	
Alfalfa hay (4 lbs/day for 160 days)	26	ton	22.28	8.32	185.37	
Mineral and salt	26	lb.	.03	840	25.20	
Vet. and medicine	26	head	2.00	26	52.00	
Bull depreciation	1	$/head	35.00	1	35.00	
Cow depreciation	25	$/head	7.50	25	187.50	
Hauling and marketing	22	cwt.	.50	103.4	51.70	
Tax		dol.	.05	1,195	59.75	
Interest on annual capital		dol.	.06	4,807.99	288.48	
Total					1,204.20	48.16

(3) Returns above specified inputs					1,196.88	47.88
(4) Hourly labor	hr.	1.00	367.75		367.75	14.71
(5) Returns above specified inputs and labor					829.13	33.17

Capital Requirements	Total	Annual
Brood Cows	$4,000.00	$4,000.00
Bull	300.00	300.00
Operating Capital	641.52	507.99
	$4,941.52	$4,807.99

Labor Requirements (man-hours/cow)

Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
.86	1.57	1.08	1.24	.27	.22	.92	.22	1.13	2.29	2.97	1.94	14.71

Appendix Table 3. Operator Labor Available For Farming by Periods[1]

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

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

Appendix Table 4. Overhead Costs for Basic 100 Acres in Minimum Land Model[1]

	Average Inventory	Annual Cost
	(Dollars)	(Dollars)
1. Depreciation and Maintenance		
(a) 20 x 24 shop	720.00	72.00
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
2. 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
3. Miscellaneous		
(a) Telephone		75.00
(b) Bookkeeping		25.00
(c) Insurance on buildings and workers		100.00
4. Taxes and Interest		
(a) 100 acres valued at $325.00 per acre at 6 percent (5 percent interest + 1 percent tax)		1,950.00
Total Overhead Costs		3,237.00

[1]Categories 1, 2 and 3 are fixed for all farm sizes. Tax in Category 4 is fixed per acre. Interest on land is 5 percent on whatever land value is assumed.

11-65/2½M