Report No. 218

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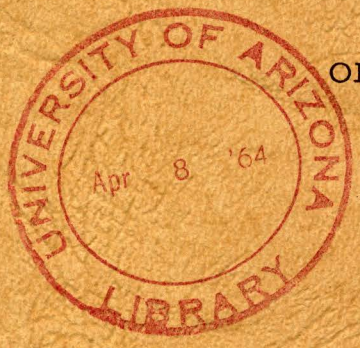
FARM ADJUSTMENT POSSIBILITIES TO INCREASE INCOME IN THE WELLTON-MOHAWK DISTRICT OF YUMA COUNTY



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Contents

FARM ADJUSTMENT POSSIBILITIES TO INCREASE INCOME IN THE WELLTON-MOHAWK DISTRICT

by

Luke B. Wishart and Aaron G. Nelson[1]

Introduction

Purpose

The purpose of this study was to analyze various cropping systems to determine how they might affect farm income in the Wellton-Mohawk Irrigation and Drainage District (referred to throughout this study as the District, except where the full name may add clarity). Some farmers in the District are experiencing financial difficulty. This is true particularly of the smaller farmers operating less than 160 acres. Moreover, other farmers not in financial difficulty might increase income with an improved farm organization. Thus each farmer in the District has an interest in examining his enterprise combinations. In addition to the farmers themselves, other individuals and organizations concerned with the area also have similar interests.

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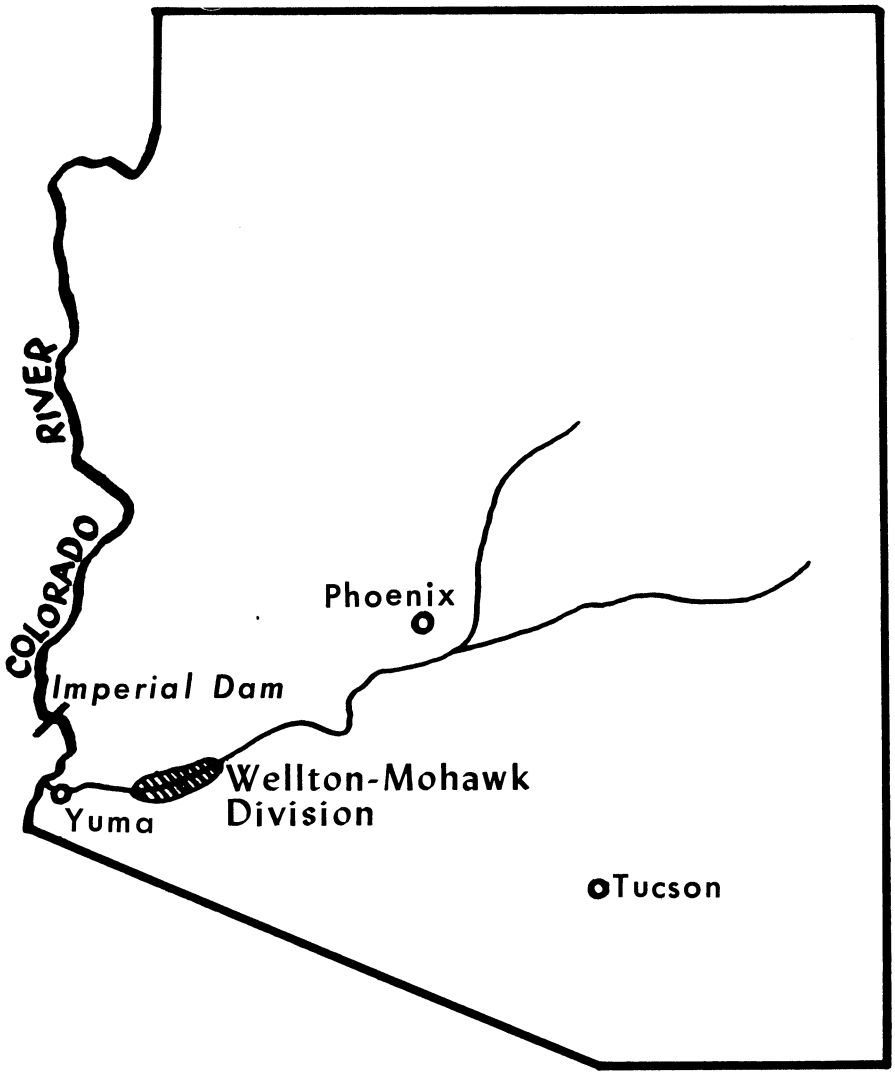
[1] Graduate student, Agricultural Economics Department, and Agricultural Economist, Agricultural Experiment Station, University of Arizona, respectively. This report, prepared by A. G. Nelson, is based largely upon a thesis prepared by Luke Wishart in partial fulfillment of the requirements for the degree of Master of Science. Due to time and financial restrictions, analysis in the thesis was limited primarily to consideration of crop enterprises.



State of Arizona indicating the location of the Wellton-Mohawk Irrigation District.

The first portion of this report gives brief statements of pertinent background information relative to agriculture in the District. The second part presents a budgetary analysis of income and expenses associated with (a) the major crops produced in the area, and (b) the various crop enterprise combinations comprising different systems of farming on four "typical" sizes of farms. The third and final portion of the study examines some considerations which evolve largely from the analysis given in the second part.

The income and expense estimates, and the farm sizes used in this study will not "fit" all farms in the District. However, space is provided in the tables where appropriate figures may be entered for a specific farm. By following the pattern of computations outlined, each farmer can analyze his own business to determine whether he might increase his income by following a different cropping pattern.

This study applies specifically to the Wellton-Mohawk Irrigation and Drainage District though the analysis may be applicable in other similar areas of the state. The District is located 35 miles east of Yuma along a 40-mile length of the Gila River (Figure 1). It was established by Congress (U. S. Public Law 272) in 1947, operating through the Bureau of Reclamation. The district is limited to a total of 75,000 acres, of which about 54,000 acres are under irrigation. Water will be available for the entire 75,000 acres when they are leveled and brought into production. A contract signed in 1952 between the District and the U. S. Government provides that project construction and water delivery costs in the amount of $42 million will be repaid over a 60-year period. A 10-year "development period" was allowed initially, and a 5-year extension was granted in 1962.

Characteristics of the District

Irrigation water for the District is provided by a 22-mile canal which carries water from the Imperial Dam on the Colorado River. Pumping is provided at three main stations for the higher land. The principal water delivery system runs in concrete-lined ditches throughout the project. The District is responsible for the control, distribution, and handling of the water in the project. In 1959, 331,686 acre-feet were delivered to the farms in the project for an average of six acre-feet per acre farmed.

Over-all conditions for drainage generally are good in both the valley and mesa soils. With expansion of irrigation in the early 1950's, the groundwater table rose, creating a need for a drainage system. A canal was constructed under supervision of the Bureau of Reclamation and put in operation in 1961. This canal and other drainage facilities being developed probably will alleviate the drainage problem in the District.

Soils of the area are divided into valley soils and mesa soils. Both soils have been formed from alluvial deposits of sands, silts and clays. However, the valley soils contain more organic matter, are more fertile, and have a higher water-holding capacity than the mesa soils. Since the mesa soils drain more rapidly, they require more irrigation water for crop production.

The climate of the area is typical of Yuma County, having low annual rainfall, low humidity, high evaporation, high summer temperatures from June to September, and a high percentage of possible sunshine. The growing season is about 300 days. Temperatures vary widely over the year from a record low of 16°F. to a record high of 120°F. Climatic conditions

are such as to allow a wide variety of crops to be grown successfully in the area.

Description of Farms in the District

Many of the farms in the District are relatively "new," having been established following organization of the District. Farming in the area now included in the District dates back well into history, with homestead claims being made as early as 1875. However, irrigation water problems and other factors retarded development of the area. By 1940, 68 farm operators had organized the Mohawk Municipal Water Conservation District, which continued in operation until 1951 when its functions were taken over by the present Wellton-Mohawk Irrigation and Drainage District.

In 1959 there were 168 full-time farmers in the District with acreages ranging from 60 to 6,000 acres. In addition, there were also 18 part-time farmers. Cropland harvested and pasture totaled 51,835 acres. The size distribution of the farms in the area, based on water contracts information provided by the District, is shown in Table 1.

Table 1. Farm Size Distribution Based on Irrigable Acres per Water Contract in 1960, Wellton-Mohawk Irrigation and Drainage District

Acres	No. of Contracts	Percent of Total Farms
0-79	53	23
80-159	87	39
160-239	29	13
240-319	20	9
320-639	22	10
Over 640	13	6

Source: Wellton-Mohawk Irrigation and Drainage District water contracts.

As indicated above, climatic conditions are such that a wide variety

of crops can be grown in the area. However, in general there is a core of crops which is typical of farms in the District. These crops--alfalfa, cotton, barley, wheat, and bermudagrass seed--occupy the majority of the acreage. The fairly large number of specialty crops is of secondary importance (Table 2).

Budgetary Analysis

The budgetary analysis in the study is limited to five major crops grown in the District--upland cotton, barley, wheat, alfalfa, and bermudagrass seed. Safflower, a promising crop, is also included in some of the budgets. The approach followed is (1) to examine each of these crops individually to determine its relative profitablility on a per acre basis, and (2) to examine the crops in various combinations for four typical sizes of farms to ascertain the relative profitability of various crop combinations on a farm basis.

Basic Data Used in Budgets

Farm budgets are built from those things which contribute to farm income and costs--crop acreages, yields, commodity prices, and variable and fixed expenses. The direct variable costs and income used in this study, commonly referred to as input-output data, are shown in the per acre budgets for the individual crops given in Tables 3 and 4. Estimated general expenses and fixed costs are shown in Tables 5 and 6. These data are based partly upon personal interviews with a random sample of farmers in the District during the summer of 1960. Data were collected on all phases of the farm business including crops, acreages, yields, equipment inventory, expenses, revenues, labor, and use of capital. The figures

came from a mixture of memory and records. It is recognized that some memory bias may have been involved in estimates given by farmers, but the bias was minimized by obtaining actual data as far as possible. A total of 58 farmers were interviewed in the survey. However, the entire questionnaire was not completed in some cases, with the result that the bulk of the data came from 45 questionnaires. Data assembled in this survey were supplemented as necessary by other data and by judgment of specialists in the College of Agriculture, University of Arizona.

The crop expense estimates given in Tables 3 and 4 include a charge for all labor, even though the work may be done by the operator and members of his family. While operator and family labor may not be paid on a regular basis as is hired labor, a charge for their labor is included, it being assumed they have other employment opportunities where they would receive a wage. Also, the charges for machine operations are estimated at a level which includes normal repairs and depreciation. In following this procedure, it is assumed that all the machinery depreciation is due to wear. On farms where part of the depreciation is due to obsolescence, the expenses involving machine use should be reduced accordingly and an amount included in fixed costs (Table 6) to cover depreciation due to obsolescence.

Table 2. Acreage, Yield, and Number of Producers of Major and Other Crops in the Wellton-Mohawk Irrigation and Drainage District, 1959.

Crop	Acreage	Yield per Acre	Number of Producers
Major			
Alfalfa hay	18,136	5.5 tons)	126 1/
Alfalfa seed	1,613	200 lbs.)	
Cotton	8,156	1.7 bales	129
Barley grain	3,906	1.0 tons)	
Wheat grain	7,089	1.4 tons)	98 1/
Sorghum grain	6,975	2.4 tons)	
Bermudagrass seed	3,744	740 lbs.	36
	83% total acreage		
Other			
Oats	13	1.1 tons	1
Hay (other than alfalfa)	1,259	3.2 tons	N. A. 2/
Irrigated pasture	6,980	5.6 tons	26
Corn fodder	126	11.6 tons	N. A. 2/
Corn silage	295	26.0 tons	N. A. 2/
Soya beans	55	1.3 tons	2
Vegetables	1,522	--	9
Vegetable seed	432	--	5
Safflower	286	1.4 tons	6
	17% total acreage		

1/ Not available individually.

2/ Not available.

Source: Bureau of Reclamation Report, 1959

Table 3. Estimated Production, Income, and Annual Direct Variable Costs per Acre for Upland Cotton, Barley, Wheat and Safflower in the Wellton-Mohawk Irrigation and Drainage District.

Line	Item	Upland Cotton		Barley		Wheat		Safflower	
		Typical Farm	Your Farm	Typical Farm	Your Farm	Typical Farm	Your Farm	Typical Farm	Your Farm
1.	Income per Acre								
2.	Yield	2.0 B.	____	1.75 T.	____	1.5 T.	____	1.4 T.	____
3.	Price	$190.00[1]	____	$ 45.00	____	$ 59.00	____	$ 85.00	____
4.	Gross income	380.00[1]	____	78.75	____	88.50	____	119.00	____
5.	Annual Direct Variable Costs per Acre[2]								
6.	Land preparation	15.00	____	8.00	____	8.00	____	9.00	____
7.	Seed and planting	6.50	____	5.00	____	6.75	____	5.50	____
8.	Cultivating	5.50	____	--	--	--	--	3.00	____
9.	Hoe and thin	10.00	____	--	--	--	--	--	--
10.	Fertilizer and application	25.00	____	12.50	____	12.50	____	20.00	____
11.	Water	11.50	____	5.75	____	5.75	____	9.20	____
12.	Irrigation and ditch labor	8.00	____	3.50	____	3.50	____	5.00	____
13.	Insecticide and application	25.00	____	0.00	____	0.00	____	0.00	____
14.	Picking and defoliating	87.50[3]	____	--	--	--	--	--	--
15.	Combining	--	--	6.00	____	6.00	____	10.00	____
16.	Ginning	29.00	____	--	--	--	--	--	--
17.	Hauling	2.00	____	4.00	____	4.00	____	4.00	____
18.	Interest on operating capital	6.00	____	1.00	____	1.00	____	1.30	____
19.	Other	10.00[4]	____	--	____	--	____	--	____
20.	Total direct variable costs	241.00		45.75		47.50		67.00	
21.	Cash income over direct variable costs	139.00		33.00		41.00		52.00	

1/ Includes value of cottonseed.

2/ Includes all labor, including operator and family labor; and all machinery and equipment costs except interest on investment, insurance and taxes, which were considered as fixed costs. Thus, all machinery and equipment repairs and depreciation were considered as direct variable costs, it being assumed that all depreciation was due to wear.

3/ Assumes 1450 lb. seed cotton per bale, half machine picked @ $1.50 cwt. and half hand picked @ $3.50 cwt. pick and contract cost, and $15.00 per acre defoliating cost.

4/ Costs such as seed or soil treatment which may not be incurred every year. This amount is an estimated average for a period of years.

Table 4. Estimated Production, Income and Annual Direct Variable Costs per Acre for Alfalfa Hay and Common Bermudagrass Seed Production

Line	Item	Alfalfa Hay		Bermudagrass Seed (Common) @ 15c 1b.		@ 20c 1b.		@ 25c 1b.	
		Typical Farm	Your Farm	Typical Farm	Your Farm	Typical Farm	Your Farm	Typical Farm	Your Farm
1.	Income per Acre								
2.	Yield: Hay or straw	6 T	____	3 T	____	3 T	____	3 T	____
3.	Seed	xxx	xx	1000 lb.[1]	____	1000 lb.[1]	____	1000 lb.[1]	____
4.	Price: Hay or Straw	$ 21.00[2]	____	$ 8.00	____	$ 8.00	____	$ 8.00	____
5.	Seed (unhulled)	xxx	xx	0.15	____	0.20	____	0.25	____
6.	Gross Cash Income	126.00	____	174.00	____	224.00	____	274.00	____
7.	Annual Direct Variable Costs per Acre[3]			(Same costs assumed for all 3 prices)					
8.	Established stand[4]	36.00	____			65.00	____		
9.	Annual charge	12.00	____			6.50[5]	____		
10.	Water (6 A.F.)	14.50	____		(5 A.F.)	11.50	____		
11.	Irrigation labor	7.50	____			7.50	____		
12.	Fertilizer and application	8.50	____			35.00	____		
13.	Insecticide and application	xxx	xx			20.00	____		
14.	Renovation and weed control	5.00	____			6.00	____		
15.	Mow and rake	15.00	____			8.00	____		
16.	Combining or threshing	xxx	xx			30.00	____		
17.	Seed hauling and cleaning	xxx	xx			13.50	____		
18.	Sacks and fire insurance	xxx	xx			15.75	____		
19.	Baling and roadsiding	38.00	____			15.50	____		
20.	Interest on operating capital	2.50	____			3.75	____		
21.	Total direct costs	103.00	____	173.00	____	173.00	____	173.00	____
22.	Cash income over direct variable costs	23.00	____	1.00	____	51.00	____	101.00	____

1/ Production may vary with price of seed but, due to lack of data, a constant figure was used.

2/ At roadside.

3/ See footnote No. 2, Table 3.

4/ Not included in total. Assume a crop of bermudagrass seed is obtained the first year.

5/ Assuming 10-year stand. This will vary considerably from farm to farm.

Table 5. Estimated Unclassified Variable Expenses for Farms in the Wellton-Mohawk Irrigation and Drainage District.

Line	Item	Typical Farm Sizes (Acres) 80	160	320	600	Your Farm
1.	Electricity	$140	$210	$320	$425	____
2.	Vehicle licenses	27	52	98	185	____
3.	Telephone	70	125	235	425	____
4.	Bookkeeping	50	70	100	200	____
5.	Building and improvement repairs	255	264	322	387	____
6.	Supplies and miscellaneous	200	450	945	1,820	____
7.	Total	$742	$1,171	$2,020	$3,442	____

Table 6. Estimated Capital Investment in Buildings and Improvements and in Machinery and Equipment, and Estimated Fixed Costs for Farms in the Wellton-Mohawk Irrigation and Drainage District.

Line	Item	Typical Farm Sizes (Acres) 80	160	320	600	Your Farm
1.	Capital Investment					
2.	Buildings and improvements[1/]	$8,948	$9,248	$11,248	$13,548	____
3.	Machinery and equipment[2/]	4,071	5,491	10,911	16,448	____
4.	Fixed Costs					
5.	Depreciation on buildings and improvements	255	264	322	387	____
6.	Insurance	182	189	229	276	____
7.	Taxes	320	640	1,280	2,400	____
8.	Interest on investment					
9.	Buildings and improvements	447	462	562	677	____
10.	Machinery and equipment	204	275	546	822	____
11.	Total	$1,408	$1,830	$2,939	$4,562	____

1/ Assumes a 40-year average life and that the buildings are one-eighth worn out.

2/ Depreciated value of items reported by farmers in the survey.

3/ Estimated at 2 1/2% of the original cost.

The Time Period, Uncertainty, and Management Assumptions

Since budgets are built to provide a basis for judgment relative to management decisions in the future, the input-output data used must relate to the future time period under consideration. Budgets commonly are built for two time periods: (1) the immediate future, to serve as a guide for operations during the next year, or next few years, and (2) the longer-run period to serve as a guide for long-run decisions such as major investments in land, machinery, irrigation facilities, and other improvements. In this study the budgets relate to the immediate future (the next one to three years).

Uncertainty is involved in budgeting future business operations due to imperfect knowledge of future events. In developing input-output estimates for use in the budgets, past experience and relationships were considered, together with trends and other knowledge available regarding what may happen. It is recognized that yields, commodity prices, and expenses vary from year to year, but having imperfect knowledge of the future, average figures customarily are used. However, where yields, prices, and expenses fluctuate widely from year to year, input-output estimates somewhat above and below the average may be used to show the range within which income might fall. For example, the price of bermudagrass seed has fluctuated widely in recent years and there is no information at hand which indicates the price will stabilize within the near future. Thus, in the budgets which include bermudagrass seed, three seed prices were used to give an indication of the range in income which might be realized.

Another consideration involved in developing input-output data used in the budgets was the farm manager. A level of management comparable with

the better farmers in the area was assumed. Thus, the budgetary analysis in this study reflects relationships with above-average management. All farmers may not be able to reach this level in the coming year, but it provides a goal to work toward. Each farmer can reflect his individual level of management in his own estimates in the space provided.

It should also be recognized that the same per acre yields and direct variable expenses were used in all the budgets. Yields and expenses may vary with different rotations and sizes of farms, but basic data available were inadequate to show these differences in the budgets. Farmers may be able to allow for these differences in their own computations.

Farm Budgets

As indicated above, budgets are given for four "typical" sizes of farms: 80 acres, 160 acres, 320 acres, and 600 acres (Tables 7, 8, 9, and 10). Budget I for each size of farm includes upland cotton and alfalfa hay, with the cotton acreage being limited to approximately the current cotton allotment for farms that have an allotment. In Budget II part of the alfalfa acreage is used for barley production, giving approximately a 4-year rotation. In Budget III wheat is included in place of the barley, and in Budget IV safflower replaces the wheat. In Budget V bermudagrass seed production is included along with cotton and alfalfa. Since the price of bermudagrass seed has varied so widely and the future is so uncertain, three levels of seed prices were used (25, 20 and 15 cents per pound) to indicate the estimated income at each level.

Cash income over direct variable costs, given in lines 10 through 15 of Tables 7, 8, 9, and 10, were obtained by multiplying the appropriate per acre income figure given in Tables 3 or 4 by the number of acres of

the crop. Unclassified variable expenses were obtained from Table 5. In these budgets it was assumed these expenses would not be affected materially by the type of crop rotation followed. Therefore, the same dollar amounts were used in all budgets for each size of farm. Fixed costs, obtained from Table 6, continue the same regardless of crops produced.

The relative profitability of various crop enterprise combinations depends upon the gross income and the direct variable costs. Since the same per acre income and direct variable costs were used for the four sizes of farms, the relative profitability of the various crop enterprise combinations shown by the budgets in Tables 7, 8, 9, and 10, also is the same for the four farm sizes. (As indicated above, income and direct variable costs per acre may not be the same for various sizes of farms, but adequate data were not available to reflect differences which may exist.) Budget No. V with cotton, alfalfa hay, and bermudagrass seed, figured at 25 cents per pound, gives the highest income. With bermudagrass seed figured at 20 cents per pound, the cotton-alfalfa-bermudagrass cropping system (Budget Va) drops to second place, and Budget IV with cotton, alfalfa, and safflower gives the highest return. Budgets III, II, and I follow Budget IV, in that order, in relative profitability. When bermudagrass seed is figured at 15 cents per pound (Budget Vb), the cotton-alfalfa-bermudagrass cropping system becomes the least profitable.

Table 7. Estimated Income, Expenses, and Returns to Land and Management for an 80-acre Farm in the Wellton-Mohawk Irrigation and Drainage District.

	Item	Source or Computation	Budget I	Your Farm	Budget II	Your Farm	Budget III	Your Farm	Budget IV	Your Farm	Budget V	Your Farm	Budget Va	Your Farm	Budget Vb	Your Farm
1.	Crops	Assumed	(Acres)		(Acres)		(Acres)		(Acres)		(Acres)		(Acres)		(Acres)	
2.	Upland Cotton	"	18	____	18	____	18	____	18	____	18	____	18	____	18	____
3.	Alfalfa Hay	"	54	____	36	____	36	____	36	____	36	____	36	____	36	____
4.	Barley	"			18	____										
5.	Wheat	"					18	____								
6.	Safflower								18	____						
7.	Bermudagrass seed	"									18	____	18	____	18	____
											(¢/lb.)		(¢/lb.)		(¢/lb.)	
8.	Bermudagrass seed price	"									25	____	20	____	15	____
9.	Cash Income over Direct Variable Costs		(Dols.)		(Dols.)		(Dols.)		(Dols.)		(Dols.)		(Dols.)		(Dols.)	
10.	Upland Cotton	T3-L21 x L2[1/]	2502	____	2502	____	2502	____	2502	____	2502	____	2502	____	2502	____
11.	Alfalfa Hay	T4-L22 x L3	1242	____	828	____	828	____	828	____	828	____	828	____	828	____
12.	Barley	T3 L21 x L4			594	____										
13.	Wheat	T3 L21 x L5					738	____								
14.	Safflower	T3 L21 x L6							936	____						
15.	Bermudagrass seed	T4 L22 x L7									1818	____	918	____	18	____
16.	Total		3744	____	3924	____	4068	____	4266	____	5148	____	4248	____	3348	____
17.	Unclassified expen.	T5 L6	742	____	742	____	742	____	742	____	742	____	742	____	742	____
18.	Net cash income	L16 - L17	3002	____	3182	____	3326	____	3524	____	4406	____	3506	____	2606	____
19.	Fixed costs	T6 L11	1408	____	1408	____	1408	____	1408	____	1408	____	1408	____	1408	____
20.	Return to land and management	L18 - L19	1594	____	1774	____	1918	____	2116	____	2998	____	2098	____	1198	____

1/ Example of how to read: Table 3, Line 21 times Line 2 of this table.

Table 8. Estimated Income, Expenses and Returns to Land and Management for a 160-acre Farm in the Wellton-Mohawk Irrigation and Drainage District.

	Item	Source or Computation	Budget I	Your Farm	Budget II	Your Farm	Budget III	Your Farm	Budget IV	Your Farm	Budget V	Your Farm	Budget Va	Your Farm	Budget Vb	Your Farm
1.	Crops		(Acres)		(Acres)		(Acres)		(Acres)		(Acres)		(Acres)		(Acres)	
2.	Upland Cotton	Assumed	38	____	38	____	38	____	38	____	38	____	38	____	38	____
3.	Alfalfa Hay	"	110	____	72	____	72	____	72	____	72	____	72	____	72	____
4.	Barley	"			38	____										
5.	Wheat	"					38	____								
6.	Safflower	"							38	____						
7.	Bermudagrass seed	"									38	____	38	____	38	____
8.	Bermudagrass seed price	"									(¢/lb.) 25	____	(¢/lb.) 20	____	(¢/lb.) 15	____
9.	Cash Income Over Direct Variable Costs		(Dols.)		(Dols.)		(Dols.)		(Dols.)		(Dols.)		(Dols.)		(Dols.)	
10.	Upland Cotton	T3 L21 x L2[1/]	5282	____	5282	____	5282	____	5282	____	5282	____	5282	____	5282	____
11.	Alfalfa Hay	T4 L22 x L3	2530	____	1656	____	1656	____	1656	____	1656	____	1656	____	1656	____
12.	Barley	T3 L21 x L4			1254	____										
13.	Wheat	T3 L21 x L5					1558	____								
14.	Safflower	T3 L21 x L6							1976	____						
15.	Bermudagrass seed	T4 L22 x L7									3838	____	1938	____	38	____
16.	Total		7812	____	8192	____	8496	____	8914	____	10776	____	8876	____	6976	____
17.	Unclassified expen.	T5 L6	1171	____	1171	____	1171	____	1171	____	1171	____	1171	____	1171	____
18.	Net cash income	L16 - L17	6641	____	7021	____	7325	____	7743	____	9605	____	7705	____	5805	____
19.	Fixed costs	T6 L11	1830	____	1830	____	1830	____	1830	____	1830	____	1830	____	1830	____
20.	Return to land and management	L18 - L19	4811	____	5191	____	5495	____	5913	____	7775	____	5875	____	3975	____

1/ Example of how to read: Table 3, Line 21 times Line 2 of this table.

Table 9. Estimated Income, Expenses and Returns to Land and Management for a 320-acre Farm in the Wellton-Mohawk Irrigation and Drainage District.

	Item	Source or Computation	Budget I	Your Farm	Budget II	Your Farm	Budget III	Your Farm	Budget IV	Your Farm	Budget V	Your Farm	Budget Va	Your Farm	Budget Vb	Your Farm
1.	Crops	Assumed	(Acres)		(Acres)		(Acres)		(Acres)		(Acres)		(Acres)		(Acres)	
2.	Upland Cotton	"	74		74		74		74		74		74		74	
3.	Alfalfa Hay	"	224		150		150		150		150		150		150	
4.	Barley	"			74											
5.	Wheat	"					74									
6.	Safflower	"							74							
7.	Bermudagrass seed	"									74		74		74	
											(¢/lb.)		(¢/lb.)		(¢/lb.)	
8.	Bermudagrass seed price	"									25		20		15	
9.	Cash Income Over Direct Variable Costs		(Dols.)		(Dols.)		(Dols.)		(Dols.)		(Dols.)		(Dols.)		(Dols.)	
10.	Upland Cotton	T3 L21 x L2[1/]	10286		10286		10286		10286		10286		10286		10286	
11.	Alfalfa Hay	T4 L22 x L3	5152		3450		3450		3450		3450		3450		3450	
12.	Barley	T3 L21 x L4			2442											
13.	Wheat	T3 L21 x L5					3034									
14.	Safflower	T3 L21 x L6							3848							
15.	Bermudagrass seed	T4 L22 x L7									7474		3774		74	
16.	Total		15438		16178		16770		17584		21210		17510		13810	
17.	Unclassified expen.	T5 L6	2020		2020		2020		2020		2020		2020		2020	
18.	Net cash income	L16 - L17	13418		14158		14750		15564		19190		15490		11790	
19.	Fixed costs	T6 L11	2939		2939		2939		2939		2939		2939		2939	
20.	Return to land and management	L18 - L19	10479		11219		11811		12625		16251		12551		8851	

1/ Example of how to read: Table 3, Line 21 times Line 2 of this table.

Table 10. Estimated Income, Expenses and Returns to Land and Management for a 600-Acre Farm in the Wellton-Mohawk Irrigation and Drainage District

	Item	Source or Computation	Budget I	Your Farm	Budget II	Your Farm	Budget III	Your Farm	Budget IV	Your Farm	Budget V	Your Farm	Budget Va	Your Farm	Budget Vb	Your Farm
1.	Crops	Assumed	(Acres)		(Acres)		(Acres)		(Acres)		(Acres)		(Acres)		(Acres)	
2.	Upland Cotton	"	140	____	140	____	140	____	140	____	140	____	140	____	140	____
3.	Alfalfa hay	"	424	____	284	____	284	____	284	____	284	____	284	____	284	____
4.	Barley	"			140	____										
5.	Wheat	"					140	____								
6.	Safflower	"							140	____						
7.	Bermudagrass seed	"									140	____	140	____	140	____
8.	Bermudagrass seed price	"									(¢/lb.) 25	____	(¢/lb.) 20	____	(¢/lb.) 15	____
9.	Cash Income Over Direct Variable Costs		(Dols.)		(Dols.)		(Dols.)		(Dols.)		(Dols.)		(Dols.)		(Dols.)	
10.	Upland Cotton	T3 L21 x L2 [1]	19460	____	19460	____	19460	____	19460	____	19460	____	19460	____	19460	____
11.	Alfalfa hay	T4 L22 x L3	9752	____	6532	____	6532	____	6532	____	6532	____	6532	____	6532	____
12.	Barley	T3 L21 x L4			4620	____										
13.	Wheat	T3 L21 x L5					5740	____								
14.	Safflower	T3 L21 x L6							7280	____						
15.	Bermudagrass seed	T4 L22 x L7									14140	____	7140	____	140	____
16.	Total		29212	____	30612	____	31732	____	33272	____	40132	____	33132	____	26132	____
17.	Unclassified expense	T5 L 6	3442	____	3442	____	3442	____	3442	____	3442	____	3442	____	3442	____
18.	Net Cash Income	L16 - L17	25770	____	27170	____	28290	____	29830	____	36690	____	29690	____	22690	____
19.	Fixed Costs	T6 - L11	4562	____	4562	____	4562	____	4562	____	4562	____	4562	____	4562	____
20.	Return to Land and Management	L18 - L19	21208	____	22608	____	23728	____	25268	____	32128	____	25128	____	18128	____

1/ Example of how to read: Table 3, Line 21 times Line 2 of this table.

In considering the budgets presented in Tables 7, 8, 9, and 10, it should be recognized that income over direct variable costs does not differ greatly, particularly between Budgets I and II, and between II and III. Small changes in income or costs might well reverse the relative profitability of the crop enterprise budgets. Thus, individual farmers should analyze the crop combination choices which they have in terms of production and gross income which can be produced compared with costs involved to determine which combination should produce the greatest income.

A special word of caution regarding bermudagrass seed production may be in order. Before a farmer plants this crop he should be thoroughly familiar with all that is involved in producing the seed, marketing it, and eradicating the crop when the time comes. Specialized knowledge is necessary to obtain the higher levels of yield of pure seed. The market is uncertain and involves considerable risk. It is also a relatively difficult crop to eradicate--and it should be noted that eradication costs have not been included in the budgets. Moreover, because of the length of time established stands are left, bermudagrass does not fit well into a rotation with cotton and grains.

The return to land and management shown on line 20 of Tables 7, 8, 9, and 10 is a residual figure representing income remaining after all other costs have been deducted. While data were not available to segregate returns to land and to management in this study, individual farmers may be able to do this in budgets for their farms. Such a segregation of returns would facilitate a determination of whether management is producing as much income in the farm business as it likely would in some other endeavor.

Longer-Run Considerations

While this study was not designed to analyze longer-run aspects of farming in the Wellton-Mohawk District the budget analysis presented may give rise to questions relative to the rate of return to be expected on resources used in farming and the level of family living which farms of various sizes may provide. With the crop combinations, yields, prices and costs used in the budgets, the return to land and management may be somewhat low, particularly on the smaller farm compared with the return which might be realized by employing the resources elsewhere. This is not meant to imply, of course, that all smaller farms are unprofitable. Other enterprises such as vegetables, fruit and livestock may be included in the farm organization and produce a greater income than the field crops included in the budgets. Moreover, land values may increase over time with the result that capital gains may make it profitable to continue to hold the land even though current returns on capital invested in the land may be small. Also, some operators of smaller units may be part-time farmers, with income from off-farm employment reducing the return to management expected from the farm. In such cases, nonmonetary factors may outweigh monetary considerations related to the farm investment and income. The limited returns to land and management on the smaller crop farms also leads to the question whether these units will produce sufficient income to support a family, particularly if indebtedness is involved. Consider Budget I, for the 80-acre farm, for

example. Assuming, first, that there is no indebtedness, the amount available for family living would be as follows:

Return to land and management (Table 7, line 20)	$1,594
Return on operating capital	
Cotton (Table 3, line 18 times acres)	108
Alfalfa (Table 4, line 20 times acres)	135
Return on investment in buildings and improvements (Table 6, line 9)	447
Return on investment in machinery and equipment (Table 6, line 10)	204
Estimated operator and family labor	1,800
Bookkeeping, assuming family does own (Table 5)	50
Total	$4,338

Assume now that some indebtedness is involved. In other words, what would be the situation on an average 80-acre crop farm where the operator does not own all the capital he uses and must pay interest in place of having the return on equity capital for living expenses? The situation would depend upon the amount of debt and repayment terms, of course, but the return on operating capital and on machinery and equipment might be reduced to, say, $100.00. (The return on investment was figured at 5 percent whereas interest rates on this type of credit would probably run from 6 to 7 percent.) If the real estate loan is assumed to total $12,000, the annual interest at 6 percent would equal $720. Principal payments might amount to $400 per year (with a 30-year decreasing-payment loan). Thus, interest and principal payments might total around $1,100 per year. The effect of these changes would be to reduce the amount available for family living to less that $2,900. In the event the real estate loan was made for a shorter term, say 20 years, the annual principal payment would be $200

higher, further reducing the amount for living.

It should be noted that this analysis pertains to 80 acre field crop farms with above average management. As was pointed out above in the discussion on returns to land and management, different types of farms and levels of management affect the income available for family living. And, of course, off farm employment by part-time farmers directly increases the amount of income available for family living. It should also be noted, however, that above-average management was assumed in estimating yields and operating expenses employed in the budgets so income estimates in the budgets may be somewhat higher than some farmers may realize. It would appear that many of the smaller farms particularly may have difficulty meeting principal payments on the government loan for constructing the irrigation and drainage system.

Summary and Conclusions

The purpose of this study has been to analyze alternative cropping systems and income opportunities for farms in the Wellton-Mohawk Irrigation and Drainage District. Four farm resource situations representative of four farm sizes have been analyzed. Space is allowed in the tables for operators to enter figures for their own farms.

The four farm situations used for this analysis are judged to be typical in size, type, buildings, and machinery facilities of those found in the District. Farm sizes of 80, 160, 320, and 600 acres have been used. Alternative budgets have been presented for each of these farm sizes--each one budgeted to show the relevant financial data associated with given cropping systems. No attempt was made to analyze livestock enterprises,

although these probably offer good alternatives. The various farm budgets were compared both within size groups and among size groups on a basis of the returns to land and management which would be produced.

The budgets were based upon estimated yields, prices, and costs expected to be realized during the next one to three years by farmers with above-average managerial ability as assumed in the study. The yields and prices were based upon those in the area adjusted for trends and conditions involved. Since only limited current or historical data were available for bermudagrass seed, three price levels--25, 20, and 15 cents per pound--were used in the budgets. The costs used in the budgets were estimated at approximately the level prevailing in the area, since such costs are not expected to change materially in the immediate future.

Six crops were considered in various combinations in the farm budgets: upland cotton, alfalfa hay, barley, wheat, safflower, and bermudagrass seed. It was recognized that bermudagrass seed is somewhat of a specialty crop which all farmers would not want to consider, but since it is a major crop in the area, it was included. The relative profitability of bermudagrass seed as a crop depends upon the price assumed. With a price of 25 cents per pound, it ranks second to cotton whereas at 15 cents per pound it would be the least profitable. The rank of the other four crops in returns to land and management per acre is safflower, wheat, barley, and alfalfa (Table 3 and 4).

The estimated income obtained in the various budgets is directly related to the crop enterprises included. Thus, budgets which include substantial acreages of cotton, alfalfa, safflower, and bermudagrass seed figured at the higher prices, produce the highest returns to land and management. In setting up the acreages of various crops included in the budgets,

consideration was given to acreage allotments and to rotations essential to maintain production.

Considering the four sizes of farms, returns to land and management increased as acreage in the farm increased, assuming comparable cropping systems. Since per-acre variable costs were figured at the same level on both large and small farms, the higher return to land and management on the larger farms is attributed to the larger acreage and to fixed costs being spread over the larger acreage.

With the enterprises, yields, prices and costs used in the study one may question whether the income on the smaller crop farms is adequate to give a competitive rate of return to land and management. Moreover, the level of income on the smaller crop-farms may be too low to provide adequate support for a family if much indebtedness is involved. These questions should not be taken to imply, however, that all smaller farms are unprofitable or that they will not support a family. In periods when land values are rising, capital gains may make it worthwhile to hold land even though current income may be small. Also, some farmers may be able to increase their income by incorporating other enterprises such as vegetables, fruit and livestock in their business. Others may work part-time off the farm to provide added income for support of the family.

In interpreting the budgetary analysis of this study, the estimates of production, prices, and costs, and the related assumptions used in deriving returns to land and management should be recognized and kept in mind. These conditions vary from farm to farm in the District, and an interpretation of the budgets in terms of any specific farm should recognize the differences which probably prevail between individual farm conditions and

those used in the budgets. Moreover, it should be kept in mind that input-output data used in this study have been held constant for all farm sizes and are based on average conditions.

These cautions have been mentioned to help the individual farmer in preparing and analyzing farm budgets for his own situation. This study is not intended to show that all farmers will maximize returns to land and management by adopting a specific cropping system. An understanding of the principles and procedures as given in this study will provide a framework to assist each farmer in analyzing his own operation to provide the highest returns consistent with his goals and resources available to him.