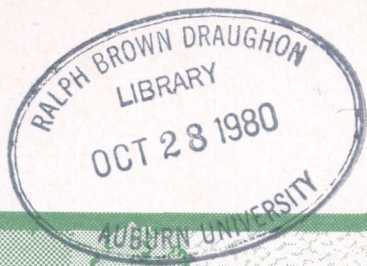


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THE EFFECT  
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on the  
FINANCIAL GROWTH  
of an ALABAMA FARM

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Information contained herein is available to all without regard to race, color, or national origin.

# THE EFFECT and USE of ALTERNATIVE CREDIT POLICIES on the FINANCIAL GROWTH of an ALABAMA FARM

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## INTRODUCTION

**T**ECHNOLOGICAL INNOVATIONS in agriculture in the past decade have provided farmers with more efficient means of production. To utilize these innovations, many farmers have had to increase their outstanding debt. Many farmers have been reluctant to use external credit intensively because they had little assistance or guidance in this area of management. Therefore, it has become a critical need to supply Alabama farmers more assistance in the area of financial management.

This study reflects the effect and use of external credit on the financial growth of a particular farm in Alabama. Many farmers select the combination of enterprises for the farm solely on the productivity of their resources on their farm. They should consider the combination that would give the highest return to their resources and cash flow. This study used a multiperiod linear programming model to show that the cash flow of each enterprise considered had an effect on the combination of optimal enterprises.

## Assumptions and Procedures

An example farm, located in northern Alabama, was selected for the analysis. This farm was chosen because of the adequacy of the farm records, past knowledge of the farm's productivity, and the possibility of open discussions with the owner.

The example farm consisted of 1,363 acres of land which included 600 acres of row crop land, 165 acres of pasture, 200 acres of woodland, and 398 acres of unproductive land.

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TABLE 1. MANAGEMENT GROUP AND PERCENTAGE OF TOTAL ACRES OF EXAMPLE FARM\*

Management group	Acres	Percent	
Group 7	886	65	Undulation moderately permeable deep soils chiefly from materials of limestone origin.
Group 13	273	20	Hilly slowly permeable soils from materials of limestone origin.
Group 1	136	10	Well-drained and imperfectly drained soils of the stream bottoms and depressions, chiefly from materials of limestone origin.
Group 21	68	5	Limestone rockland, rough gullied land, and rough stony land.

\*The Soil Conservation Service has requirements for the different Management Groups. They are:

Group 1—The soils are fertile and easily worked and are generally not subject to erosion. All are well suited to intensive use for crops that require tillage.

Group 7—The soils can be tilled throughout a relatively wide range of moisture conditions without destruction of the tilth. The soils should not be bare of vegetation for extended periods.

Group 13—Although these soils can be used under careful management for growing tilled crops, they are probably better suited to permanent pasture or forest.

Group 21—These soils are not suitable for tilled crops or pasture. Steepness of slope, stoniness, severe erosion, and an inadequate supply of humus prohibit the growing of crops and pasture. These soil types are best suited to forest.

There were many soil types on the farm as classified by the U.S. Soil Conservation Service (SCS) (3). The primary SCS soil management groups of the example farm are shown in Table 1.

The level of management and technology used in row crop and livestock production was presumed to be above average. The manager was assumed to use recommended cultural practices with modern machinery and four-row equipment. The soil type and the size of the fields would make the use of such equipment practical.

It was assumed that the full-time labor on the farm was composed of an operator and one full-time man with seasonal hired labor available when needed. The quantity of labor supplied by the two full-time men was divided into four periods as shown in Table 2. With the two men working by themselves the operator was assumed to work approximately 4 percent more than the hired man since he did the supervising and management.

TABLE 2. MANHOURS FURNISHED BY OPERATOR AND ONE FULL-TIME HIRED MAN BY PERIODS

	Periods			
	1	2	3	4
Labor available	Jan 1- Mar 31	Apr 1- Jun 30	Jul 1- Sep 31	Oct 1- Dec 31
	----- Hours -----			
Operator . . . . .	540	660	900	540
Hired man . . . . .	460	562	766	460

The enterprises considered for development of the farm plan were cotton, corn, soybeans, beef cattle (cow-calf), and swine. The selection of these alternatives was based on the personal preference of the owner, quantity and type of land, availability of seasonal labor and local markets.

The projected yield for each crop to be considered was based on research by the Agricultural Experiment Station staff at Auburn University and characteristics of the example farm. The quantity of fertilizers and lime used was derived from recommendations of soil sample reports.

A multiperiod linear programming model was used to simulate the production and financial development alternatives available to the example farm for a 9-year period. The model was developed using the enterprise budgets developed for this farm and the various stated assumptions of the farming operation.

### **Objectives of Study**

The general objective of this study was to relate the actions and use of certain financial management techniques to the growth of a given farm operation.

The specific objectives:

(1) Select the optimum combination of enterprises for a selected farm over a 9-year period with borrowing of operating capital, investment capital for machinery and buildings, and annual payments for existing debt as the main constraints of the 9-year plan.

(2) Demonstrate how different down payments (percent of equity) affect the optimum combination of enterprises, the net cash income, and net worth after 9 years.

### **ENTERPRISE BUDGETS**

Enterprise budgets were developed for each productive enterprise considered in the analysis (2). These were necessary for an estimation of cost and returns for each activity. Prices of major inputs and products resulting from each productive activity were projected for the first 5 years of the farm plan. It was assumed that prices would remain at the fifth year level for years six through nine. Projected prices for crop and livestock budgets can be found in Appendix tables 1 and 2.

#### **Cotton Budget**

A cotton budget for 1976 with a projected yield of 600 pounds of lint cotton per acre is shown in Appendix Table 3. This yield would be

expected if recommendations for fertilizer, chemicals, and cultural practices were followed.

The gross return per acre was calculated as being \$340.80. The variable costs were divided into preharvest and harvest costs, \$118.89 and \$43.70 respectively. Preharvest cost consists of expenses that will occur during the production year before harvest plus a charge for operating capital. The machinery and tractor expenses are gas, oil, lubricants, etc., that will occur before harvest. Harvest costs include defoliation, ginning, machinery (cotton picker), and tractor expenses. All of these expenses occur during or just after harvest time.

Item 4 in the budget shows the fixed cost computed per acre of cotton. The depreciation shown was based on the purchase price, salvage value, and hours of use for the tractor (with implements) and cotton picker. Labor costs (Item 5) were computed by calculating the amount of machinery time (in hours) used per acre and then multiplying by \$2.00. This again was divided into harvest and preharvest. Item 6 gives the total cost (variable cost + fixed cost) of production for cotton. Subtracting the total cost, \$231.91, from the total receipts, \$340.80, yields \$180.89, the net returns to land and management.

Cotton budgets for years 1977 through 1980 were calculated the same way except different projected input and output prices were used. The budgets for the other crops considered were calculated in the same manner as the cotton budget except that different input and output coefficients were used.

### **Soybean Budget**

The receipts and expenses for the 1976 soybean budget are shown in Appendix Table 4. The projected yield was 32 bushels per acre with an expected price of \$4.80 per bushel giving gross receipts of \$153.60. Again, the variable costs were divided into harvest and preharvest. The preharvest cost was calculated at \$52.92 and the harvest cost as being \$.98. The harvest cost includes only the fuel and lubricants used by the combine for an acre of soybeans. The total variable cost for an acre of soybeans in 1976 was calculated at \$53.90. The income above variable cost was \$99.70 (\$153.60-\$53.90).

The depreciation (fixed cost, Item 4) for the tractor and combine was \$10.85. This value (basic depreciation rate) was calculated the same for all budgets except that the hours of use and the type of machinery used were different.

The total cost for soybeans was calculated to be \$69.63. Subtracting this value from the gross receipts resulted in \$83.97, net returns to land and management per acre of soybeans. Soybeans budgets for 1977 through 1980 were also calculated in a similar manner.

### **Corn Budget**

The corn budget for 1976 is shown in Appendix Table 5. The corn and soybeans budgets for 1976 were very similar in cost although different input coefficients were used. The equipment used in the two enterprises were the same except a corn header was used on the combine when harvesting corn.

Total variable cost for corn was \$63.47 with gross receipts being \$162.50 income above variable cost was \$99.03 per acre. The net returns to land and management per acre was \$79.45 for corn in 1976. Corn budgets for 1977 through 1980 are now shown but were calculated in the same manner but with different prices.

### **Pasture and Hay Budgets**

These budgets were made for use by the cow-calf enterprise. Each year the cow-calf operation (30-cow herd) will require 37 acres of Coastal bermudagrass pasture for grazing and 12 acres to be harvested for hay, producing 6 tons of hay per acre.

The hay and pasture budgets were formulated assuming that the Coastal bermudagrass was already established. The 1976 budgets for each are found in Appendix tables 6 and 7. Neither of the enterprises have any sales; thus, there are no returns listed for either crop. Therefore, the net returns are negative in each case. The cost of production for each enterprise was deducted from the cow-calf enterprise which is discussed later. The 1977 through 1980 budgets for hay and pasture were calculated the same way except for different prices.

### **Cow-Calf Budget**

The cow-calf livestock budget was designed to show the cost and returns to a 30-cow herd. The cow-calf budget for 1976 for the example farm is shown in Appendix Table 8.

Like the row-crop budgets, the cow-calf budget was made on the assumption that recommended management practices would be followed. The cattle on the farm were considered to be of fair quality; therefore, using recommended practices, a 90 percent calf crop was expected and was included in the analysis.

The calves were sold at weaning time as steer calves weighing 425 pounds and heifer calves weighing 400 pounds. Five heifer calves were kept for potential herd replacements; likewise, five culled cows were sold from the herd each year weighing 1,000 pounds each. Along with the other receipts shown in Appendix Table 8, an aged bull was sold

every 4 years. The value was prorated over 4 years; thus, only  $\frac{1}{4}$  of a bull is calculated with the gross receipts for 1976.

Item 2 shows the variable costs associated with maintenance of a 30-cow herd with one bull and producing 27 calves. The quantities shown in the budget are based on a per head basis. For example, the protein supplement cost was figured by multiplying the amount fed per head (1.8 cwt) times the price per hundred-weight (\$8.00) then that value (\$14.40) is multiplied by the number fed (30) which will give a total value of \$432.00 (1.8 x 8. x 30). The other values listed are self-explanatory. Total variable cost is \$842 which includes an interest charge of 9.5 percent for 6 months on operating capital. Subtracting the total variable cost from the total gross receipts (\$3,684.25) resulted in \$2,842.25 of income above variable cost.

Item 4 indicates the depreciation associated with the cow-calf herd. An interest charge was levied against the breeding livestock and equipment. Also, depreciation was figured on all depreciable capital items used by the cow-calf enterprise. The total fixed cost was \$1,413.66 per 30-cow herd. Adding the variable and fixed cost, total cost for the 30-cow unit was \$2,255.67 (Item 5). Item 6 shows the net returns to land, management, and produced feed (pasture and hay). This figure will be negative when the cost of pasture and hay is subtracted from receipts. Additional cow-calf budgets for 1977 through 1980 were calculated using different prices.

### **Swine Budget**

The cost and returns of an 80-sow hog budget are shown in Appendix Table 9. The hog budget is based on producing 1,360 pigs per year with 40 of the pigs saved for replacement gilts and 1,320 of the pigs fed to a market weight of 200 pounds.

The operation is completely confined and has the capacity to house 300 sows including the pigs fed to market weight. The cost data for the building and other system equipment were based on data collected from hog farms within the area.

The gross receipt for a year's operation consists primarily of the sales from market hogs shown in Item 1. The hogs are sold at a weight of 200 pounds and at a price that would consist primarily of Numbers 1 and 2 grade hogs. The remaining amount of receipts come from the sale of cull sows and boars. Variable costs, Item 2, show the expenses for a production year. The quantities are specified in number of units bought for the year. Total variable cost for 1976 was \$24,221.67. Subtracting this value from the gross receipts resulted in \$105,698.31 of income above variable cost.



Fixed cost associated with the hog enterprise is shown in Item 4. The equipment, breeding livestock, and buildings required to produce the 80-sow unit were depreciated based on the specified life of each item. Total depreciation was \$8,160.55. Total costs were \$32,382.21, shown in Item 5. This value does not include the 16,592 bushels of corn needed for the 80-sow herd. Net return to land, management, and grain was \$97,537.75. Hog budgets for years 1977 through 1980 were calculated using different prices.

### **LINEAR PROGRAMMING SOLUTIONS OBTAINED FOR THE EXAMPLE FARM**

Linear programming is a tool widely used in choosing the most profitable combination of enterprises for a specific farm situation and in aiding decisions which require a choice among a number of alternatives.

#### **Conditions and Assumptions of Linear Programming**

There are basically three quantitative components of a linear programming model: an objective function, alternative methods or processes for attaining the objective, and resources or other restrictions. The objective function should be precisely defined and expressed in quantitative terms so that "relevant" and "sensible" results can be obtained. Given a specific objective function, there are generally numerous ways of satisfying the objective. Limited resources or other restrictions exist in the model which limit how much can be produced. These may be limitations with respect to the availability of labor, equipment, capital, irrigation facilities, size and location, distance from market, ownership of farm, and borrowing capacity. (1).

Linear programming solutions generally show activities optimized in fractional units. Analyzing solutions often results in increasing or decreasing the size of units optimized so that realistic values will be obtained. The values shown in the solution tables were rounded so that whole units could be shown.

#### **Financial Framework Used in Solutions**

It was assumed that the example farm was purchased in 1976 for \$608,500. Open land was valued at \$600 per acre with the remaining land valued at \$250. The purchase was financed for 30 years at 9 percent per annum. The amount financed was assumed to be 75 percent for the first solution and 50 percent of the \$608,500 for the second solution. A determination of the effect of different amounts borrowed

upon potential enterprise selection and net worth for the farm was one of the specific objectives of this study.

Assuming that financing was available for 30 years at 9 percent and 75 percent of the \$608,500 was borrowed, annual mortgage payments were \$44,421.86. This total annual payment, \$44,421.86, including principal and interest payments for a declining balance loan, Appendix Table 10.

Twenty-five percent of the \$608,500 was paid by cash as a down payment on the land. This amount, \$152,125.00, was the net worth at the beginning of the first year's business. The borrowing capacity, \$76,062.50, for the first year's business was calculated at 50 percent of the net worth.

Assuming 50 percent was paid down for the land and the additional \$304,250 was borrowed, the annual mortgage payment for a declining balance loan at 9 percent was \$29,614.57, as shown in Appendix Table 11.

The payments and principal amounts shown in Appendix tables 10 and 11 were used as constraints and affected the optimal solutions. The total annual payments, whether for a 25 or 50 percent down payment solution, were deducted from receipts generated each year. The principal paid was added to the cumulative net worth, thus increasing the borrowing capacity.

### **Solutions Using Operating Capital and Annual Payments to Borrowed Investment Capital as Constraints on Selection of Enterprises**

An optimal solution for row crops, shown in Table 3, was used to illustrate the effect of borrowing operating capital and annual payments for borrowed investment capital upon an optimal solution. Row crops usually have receipts only 3 months during the year; therefore, operating capital required during the year has greater effect on the optimal combination of enterprises than when swine, which have receipts throughout the year, are considered.<sup>1</sup>

This solution had \$10,000 on hand that could be used for investment capital and/or operating capital for the first year. A small tractor was on the farm to be used for odd jobs and provided a small portion of tractor hours required to produce selected crops. The borrowing capacity was calculated at 50 and 75 percent of the \$152,125 paid down for the land.

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<sup>1</sup>Swine have receipts 8 months per year.

TABLE 3. OPTIMAL SELECTION FOR THE EXAMPLE FARM OF ROW CROPS WITH EMPHASIS UPON OPERATING CAPITAL AND ANNUAL PAYMENTS TO BORROWED INVESTMENT CAPITAL, TWENTY-FIVE PERCENT DOWN PAYMENT WITH FIFTY AND SEVENTY-FIVE PERCENT BORROWING CAPACITY

	Year								
	1976	1977	1978	1979	1980	1981	1982	1983	1984
Cash on hand at beg. of year (Dol) . . . . .	10,000	0	4,804	11,981	17,030	24,733	51,069	50,255	85,693
Enterprises (acres)									
Corn . . . . .		94		17	628	628	628	628	490
Cotton . . . . .				137	137	137	137	137	275
Soybeans . . . . .	765	671	765	611					
Total sales (dol)* . . . . .	117,504	128,461	129,744	143,647	158,344	158,344	158,344	158,344	179,944
Borrowing operating Capital (dol)									
January . . . . .		3,383		3,128	9,564				
February . . . . .	8,870	10,560	9,204	11,660	8,927		1,936		
March . . . . .	15,300	16,519	15,767	14,586	20,077	13,836	20,077		
April . . . . .	3,963	3,615	4,146	6,926	4,075	4,075	4,075		
May . . . . .	887	903	887	2,396	2,824	2,824	2,824		
June . . . . .	505	443	505	2,063	1,984	1,984	1,984		
July . . . . .	3,527	3,298	3,710	5,052	2,870	2,870	2,870	67	1,859
August . . . . .	467	409	467	2,462	2,139	2,139	2,139	2,139	4,277
September . . . . .		66		727	1,160	1,160	1,160	1,160	1,785
October . . . . .									
November . . . . .									
December . . . . .									
Total amount borrowed* . . . . .	33,518	39,196	34,525	48,999	53,621	28,888	37,065	3,366	7,922
Interest . . . . .	1,740	2,132	1,743	2,436	2,850	1,245	1,715	45	126
Total paid back* . . . . .	35,258	41,328	36,268	51,435	56,471	30,133	38,780	3,411	8,048
Operating capital (Dol)									
Crops . . . . .	39,168	40,028	39,329	54,426	58,755	58,755	58,755	58,755	72,728
Additional Hired Labor . . . . .	0	0	0	0	2,185	2,185	2,185	2,185	2,090
Total* . . . . .	39,168	40,028	39,329	54,426	60,940	60,940	60,940	60,940	74,818
Investment capital									
Machinery purchase . . . . .	51,705	0	0	30,628	17,191	0	34,514	0	30,628
Investment capital paid by cash . . . . .	5,100	0	0	11,981	17,030	0	34,514	0	30,628

TABLE 3. (CONTINUED) OPTIMAL SELECTION FOR THE EXAMPLE FARM OF ROW CROPS WITH EMPHASIS UPON OPERATING CAPITAL AND ANNUAL PAYMENTS TO BORROWED INVESTMENT CAPITAL, TWENTY-FIVE PERCENT DOWN PAYMENT WITH FIFTY AND SEVENTY-FIVE PERCENT BORROWING CAPACITY

	Year								
	1976	1977	1978	1979	1980	1981	1982	1983	1984
Investment capital									
borrowed . . . . .	46,605	0	0	18,647	161	0	0	0	0
Payment per year									
for three years . . . . .	19,574	0	0	7,832	68	0	0	0	0
Cumulative payments . .	19,574	19,574	19,574	7,832	7,900	7,900	68	0	0
payment for land . . . . .	44,422	44,422	44,422	44,422	44,422	44,422	44,422	44,422	44,422
Total pay at year end* . . . .	63,996	63,996	63,996	52,254	52,322	52,322	44,490	44,422	44,422
Payroll									
Operator . . . . .	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Full-time man . . . . .	7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500
Net cash income* . . . . .	0	4,804	11,981	17,030	24,733	51,069	50,255	85,693	98,143
Cumulative borrowing									
Capacity 50% . . . . .	80,286	86,284	93,377	107,806	117,271	117,971	136,628	133,017	144,965
Cumulative borrowing									
capacity 75% . . . . .	120,430	129,426	140,066	161,708	175,906	176,956	204,942	199,526	217,447

\*Totals may not sum due to rounding error.

The 1976 solution included was all 765 acres of land being used for soybeans. Also, \$5,100 of the \$10,000 on hand at the beginning of the year was paid down on purchased machinery and the remaining \$4,900 was used for operating capital in January and February. This solution required \$33,518 of borrowed capital for operating expenses during February through August. Cotton for 1976, which had a greater return to land and management than soybeans, was not included in the solution. It did not create enough cash flow to supply the requirements for the operating capital and down payment for a cotton picker required if the cotton enterprise entered the solution. Often crops and/or livestock are produced solely because an enterprise budget indicates a higher return to land and management. Operators should go a little further in their analysis of an enterprise including a cash-flow schedule before selecting the enterprise for the farm. This is especially true if the enterprise requires the purchase of machinery and equipment. An understanding of the cash-flow generating capacity enterprises is especially important when there is a limited amount of cash on hand.

Cotton was not a feasible enterprise until 1979. A cash-flow for 1979, shown in Table 4, indicates there was also enough cash generated so that the payment on borrowed funds for the cotton picker could be paid at the end of the year. Soybeans and corn were still in solution in 1979 because both are fairly profitable and generate cash earlier than cotton in the production year. Having their harvest earlier than cotton was beneficial because the operating capital loan could be paid earlier, thus having a smaller interest payment. The optimal interest to be paid for 1979 was calculated to be \$2,436. This amount was the least amount of interest that could be paid with this solution.

### **Investment Capital for Machinery**

The amount of capital generated by the system was a key to the machinery purchased for selected crops the following year. In the 1978 solution, only soybeans were produced and the net cash income at the end of the year was \$11,981, Table 3. This amount was forwarded to the following year's business, 1979, where it could be used as needed. Because such a large sum was generated, there was enough cash for a down payment on a cotton picker in 1979. Thus, cotton became a feasible enterprise in 1979.

The linear programming system optimizes the total 9-year plan. Thus, the machinery requirements for crops in any one year has an effect upon the solution of enterprises in other years.

TABLE 4. A CASH FLOW FOR THE EXAMPLE FARM WITH ROW CROPS ONLY WITH TWENTY-FIVE PERCENT DOWN PAYMENT ON LAND, 1979

	Months													Total
	Units	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	
Enterprise receipts														
Corn (acres) . . . . .	17										1,419	1,430		2,849
Soybeans (acres) . . . . .	611									48,888	48,888			97,776
Cotton (acres) . . . . .	137										23,900	19,121		43,022
Total . . . . .	765									50,307	74,218	19,121		143,647
Enterprise Expenses														
Corn (acres) . . . . .	17	229	149	501	11	22	0	22	0	12	24	0	7	975
Soybeans (acres) . . . . .	611	1,833	8,373	12,790	3,392	709	403	3,065	373	0	599	0	0	31,514
Cotton (acres) . . . . .	137	1,066	3,139	1,295	3,523	1,665	1,659	1,986	2,089	728	0	677	4,121	21,936
Total . . . . .	765	3,128	11,660	14,586	6,926	2,396	2,062	5,073	2,462	728	623	677	4,128	54,426
Transfer of cash to investment														
Capital . . . . .	11,981													
Labor														
Operator . . . . .													10,000	10,000
Full-time man . . . . .													7,500	7,500
Additional labor . . . . .		0	0	0	0	0	0	0	0	0	0	0	0	0
Total . . . . .		0	0	0	0	0	0	0	0	0	0	0	17,500	17,500
Cash at beginning of month . . . . .	11,981		0	0	0	0	0	0	0	0	0	0	71,790	
Cash difference between receipts and expenses . . . . .			-11,660	-14,586	-6,926	-2,396	-2,062	-5,073	-2,462	-728	49,684	73,541	14,994	9,220
Cash position at end of month . . . . .			0	0	0	0	0	0	0	0	0	71,790	86,784	
Cash borrowed . . . . .	3,128	11,660	14,586	6,926	2,396	2,062	5,073	2,462	728					
Principal paid . . . . .										47,376	3,623			50,999
Interest paid at 0.5% . . . . .										2,308	129			2,436
Total payment . . . . .										49,684	3,752			53,435
Payment to land . . . . .												44,422		44,422
Payment for machinery . . . . .												7,832		7,832
Cash at end of month . . . . .												17,030		17,030

The types of machinery purchased for the 9-year solution were:

Type of machinery	Year
Tractor . . . . .	1976
Combine . . . . .	1976
Cotton picker . . . . .	1979
Tractor . . . . .	1980
Combine . . . . .	1982
Cotton picker . . . . .	1984

The total cost of machinery purchased was \$164,666 with \$99,253 supplied from cash generated by the selected enterprises and \$65,413 borrowed during the 9 years.

### **The Effect of Percent Down Payment for Land Upon the Selection of Enterprises**

The percent down payment for land was changed from 25 percent, used in Table 3, to 50 percent to illustrate the effect of a larger down payment on the combination of enterprises and net returns in the optimum solution. The solution, with a 50 percent down payment for land had the same beginning activities, Table 5, as the solution with the 25 percent down payment. The difference between the two was the land payment per year and the initial borrowing capacity required for capital investment loans.

The enterprises selected as optimal for the first 4 years of the solution were soybeans only or a combination of soybeans and corn. Cotton came into the solution in 1980 with 137 acres and increased into larger acreage in subsequent years. A previous explanation for cotton not coming into solution at a time of high net returns, Table 3, was that it did not generate sufficient cash above the payment to borrowed investment capital for the cotton picker.

When the down payment was increased to 50 percent, it reduced the amount to be borrowed for land and thus reduced the land payment per year. With a reduction in the land payments, there was a sizable increase in the cumulative net cash income which increased the cash on hand at the beginning of each year. The accumulation of cash on hand of \$17,033 in 1979, from Table 5, provided the cash flow with that amount. This would reduce the borrowing of investment capital and causing further accumulation of cash above the interest that would have to be paid from the borrowing of operating capital. In 1980 the cash on hand was \$45,766. A portion of this was used as a down payment for a cotton picker and thus reducing the amount to be borrowed for investment capital.

TABLE 5. OPTIMAL SOLUTION FOR THE EXAMPLE FARM WITH ROW CROPS ONLY, FOR NINE YEARS, FIFTY PERCENT DOWN PAYMENT ON LAND WITH FIFTY PERCENT BORROWING CAPACITY

	Year								
	1976	1977	1978	1979	1980	1981	1982	1983	1984
Cash on hand at									
beg. of year (dol) . . . . .	10,000	11,637	20,747	17,033	45,765	40,794	64,840	104,453	139,436
Enterprises (acres)									
Corn . . . . .		94		140	628	490	490.27	353	216
Cotton . . . . .					137	275	275	412	549
Soybeans . . . . .	765	671	765	625					
Total sales* . . . . .	117,504	128,461	129,744	123,112	158,344	179,944	179,944	201,546	223,145
Borrowing operating									
Capital (dol)									
January . . . . .	2,295	3,383			9,564				
February . . . . .	11,475	10,560	13,097	13,919	8,928	9,360			
March . . . . .	15,300	16,519	15,767	3,560	20,077	17,304			
April . . . . .	3,963	3,615	4,146	911	4,075	7,364	880		
May . . . . .	887	903	887	413	1,984	4,334	3,671		
June . . . . .	505	443	505	3,300	2,870	3,671	4,724		
July . . . . .	3,527	3,298	3,710	381	2,139	4,723	4,277		
August . . . . .	467	409	467	98	1,161	4,277	1,786		
September . . . . .		66				1,786			
October . . . . .									
November . . . . .									
December . . . . .									
Total amount borrowed* . . . . .	38,418	39,196	38,579	22,581	50,797	52,820	15,337	0	0
Interest . . . . .	2,069	2,132	2,047	1,075	2,850	2,476	345	0	0
Total paid back* . . . . .	40,487	41,328	40,626	23,656	53,647	55,296	15,683	0	0
Operating capital (dol)									
Crops . . . . .	39,168	40,028	39,329	40,485	58,755	72,729	72,729	86,701	100,673
Additional labor . . . . .	0	0	0	0	2,185	2,090	2,090	2,116	2,244
Total* . . . . .	39,168	40,028	39,329	40,485	60,940	74,818	74,819	88,817	102,917
Investment capital (dol)									
Machinery purchased. . . . .	51,705	13,834	34,514	0	47,819	30,628	17,191	30,628	65,142
Investment capital paid by cash . . . . .	10,000	11,637	20,747	0	45,765	30,628	17,191	30,628	65,142



TABLE 5. (CONTINUED) OPTIMAL SOLUTION FOR THE EXAMPLE FARM WITH ROW CROPS ONLY, FOR NINE YEARS, FIFTY PERCENT DOWN PAYMENT ON LAND WITH FIFTY PERCENT BORROWING CAPACITY

	Year								
	1976	1977	1978	1979	1980	1981	1982	1983	1984
Investment capital borrowed.....	41,705	2,197	13,767	0	2,054	0	0	0	0
Payment/yr. for 3 years.....	17,516	923	5,782	0	863	0	0	0	0
Cumulative payment.....	17,516	18,439	24,221	6,705	6,645	863	863	0	0
Payment to land.....	29,615	29,615	29,615	29,615	29,615	29,615	29,615	29,615	29,615
Total pay at year end (dol)*.....	47,131	48,054	53,836	36,320	36,259	30,477	30,477	29,615	29,615
Payroll									
Operator.....	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Full-time man.....	7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500
Net cash income*.....	11,637	20,747	17,033	45,765	40,794	64,840	104,453	139,436	147,407
Cumulative borrowed capital 50%.....	158,241	168,738	184,360	191,086	213,230	225,781	227,662	235,662	259,101
Cumulative borrowed capital 75%.....	237,362	253,107	276,540	286,629	319,845	338,672	341,493	353,433	388,652

\*Totals may not sum due to rounding error.

The ability to buy more machinery with a larger down payment and the specific selection of machinery caused the generation of greater incomes. A comparison of incomes for both solutions, 25 and 50 percent down payment on land, is shown in Table 6. The machinery purchased for each solution was not shown because of the different machinery selected during the 9-year plan.

One of the reasons for the larger income in the 50 percent solution was because of the equipment that was purchased at optimum times in production. Cotton, which was the key to higher net income above variable expenses, could not come into solution until a cotton picker was purchased. The optimum time for a cotton picker to be purchased in the 50 percent solution was in 1980, whereas the optimum time for the 25 percent solution was in 1979. Since interest on borrowed funds is a cost to the system, it was more economical to wait until 1980 to buy a cotton picker because more money could be paid down for the machinery.

The solution for the 25 percent down payment had \$14,031 paid for interest on borrowed operating capital while interest for the 50 percent down payment solution was \$12,993.44. The difference was due to a greater amount of net cash income carried over each year; i.e., a greater amount of the cash on hand at the beginning could be used for operating capital. The 25 percent down payment solution required operating capital to be borrowed every year for 9 years while the 50 percent solution required borrowed operating capital only 7 of the 9 years.

TABLE 6. A COMPARISON OF INCOME ABOVE VARIABLE EXPENSES BETWEEN LINEAR PROGRAMMING SOLUTIONS FOR NINE YEARS WITH 25 AND 50 PERCENT DOWN PAYMENTS FOR FARM LAND

Item	Percent paid down	
	25	50
	Dollars	
Gross receipts . . . . .	1,332,676	1,442,742
Operating capital . . . . .	491,529	561,320
Borrowed capital . . . . .	286,369	257,729
Interest paid . . . . .	14,031	12,993
Total variable expense . . . . .	505,560	574,314
Net income above variable expense . . . . .	827,116	868,429

As was stated earlier, the machinery required for each enterprise had a specific effect upon the selection of enterprises. The 50 percent solution with its smaller annual loan payment for land facilitated the purchase of more machinery and thus had a different selection of enterprises from the 25 percent solution. The data in Table 7 reflect the machinery purchased, amount borrowed for machinery, and interest

TABLE 7. COMPARISON OF 25 AND 50 PERCENT DOWN PAYMENTS FOR LAND WITH MACHINERY PURCHASED, CAPITAL BORROWED FOR MACHINERY, PERCENT BORROWED, INTEREST PAID ON BORROWED CAPITAL, AND NET INCOME ABOVE VARIABLE EXPENSES

Item	Percent down payments	
	25	50
	Dollars	
Net income above variable expenses . . . . .	827,116	868,429
Machinery purchases . . . . .	164,666	291,461
Amount borrowed . . . . .	65,413	59,723
Per cent borrowed of purchase . . . . .	40	20
Interest paid . . . . .	17,007	15,528
Net income* . . . . .	810,109	852,901

\*Net income is net income above variable expenses, less the interest paid on borrowed money for machinery.

paid for the two solutions. There was \$126,795 more machinery purchased for the 50 percent down payment solution. This solution generated more income, thus the machinery purchased for the 50 percent down payment solution was primarily paid by cash; therefore, less interest was paid on borrowed funds.

The 50 percent down payment solution was more profitable than the 25 percent down payment with respect to net worth and cumulative net cash income, Table 8. At the end of the ninth year, the net worth for the 50 percent solution was \$665,608 as compared to \$388,074 for the 25 percent down payment solution.

The change in net worth was a better comparison of the net worths for the two solutions. The change in net worth was the dollar change from the beginning net worth to the ending net worth. The change in net worth for the 25 percent down payment was \$235,949, while the change in net worth for the 50 percent down payment was \$361,358. If it is possible to pay \$304,250 down for the land, it would be to the

TABLE 8. BEGINNING AND ENDING NET WORTHS FOR NINE YEARS FOR THE EXAMPLE FARM WITH 25 AND 50 PERCENT DOWN PAYMENT FOR LAND

Item	Percent down payment for Land	
	25	50
	Dollars	
Assets		
Land . . . . .	608,500	608,500
Machinery . . . . .	94,209	184,887
Cash . . . . .	98,143	147,407
Total . . . . .	800,852	940,794
Liabilities		
Land mortgage . . . . .	412,778	275,186
Ending net worth . . . . .	388,074	665,608
Beginning net worth . . . . .	151,125	304,250
Change in net worth . . . . .	235,949	361,358

operator's benefit to do so. This would create a larger net cash income and a significant increase in net worth.

### **The Effect of Implementation of a Swine Operation Upon Net Cash Income and Selection of Enterprises**

When the swine enterprise was added as an enterprise to be considered, it entered the solution in the second year and was expanded into a 300-sow capacity unit in 1981, Table 9. After 1981, the swine facility was limited to a 300-sow capacity because of the personal preference of the operator.

Corn for the swine operation was provided by producing corn on the farm and/or buying corn. The net returns to soybeans competed with growing all corn in some years, but after the sow operation got to 240 sows and larger, it was feasible to produce all 765 acres in corn and buy the remainder. This was a favorable characteristic of the program because many farmers have the ability to produce row crops that could be used for selling activities or, if feasible, could be used as feed on the farm and sold through the hogs produced.

There was a tremendous reduction in the borrowing of operating capital when the swine operation was implemented. One reason was that hogs were sold 8 months out of the year, whereas crops were sold only once or twice a year.

The swine operation required a swine facility for each sow purchased. Thus, when the swine operation came into solution with 100 sows, an investment capital of \$41,377 was required to construct a facility. Since there was insufficient cash at the beginning of the year, investment capital was borrowed. The \$41,377 borrowed for the swine facility and the \$46,264 borrowed for machinery and livestock reduced the borrowing capacity at the end of the year to \$23,649. This was the first solution that showed borrowing capacity instead of cash generated having an effect upon the amount that could be borrowed; i.e., if additional facilities were preferred this year, they would be limited to \$23,649 of investment capital.

The swine operation generated a higher net cash income and at a faster rate than just row crops. Also, the swine operation generated a larger borrowing capacity in later years because of the building and additional machinery purchased.

### **The Effect of Changing Interest Rates Upon the Selection of Enterprises**

The interest rates for borrowed operating capital for the solutions discussed thus far were all calculated at 9.5 percent per annum. Interest

TABLE 9. OPTIMAL SOLUTION FOR THE EXAMPLE FARM WITH ROW-CROPS AND A SWINE ENTERPRISE LIMITED TO 300 SOWS, FOR NINE YEARS WITH TWENTY-FIVE PERCENT DOWN PAYMENT ON LAND WITH FIFTY PERCENT BORROWING CAPACITY

	Year									
	1976	1977	1978	1979	1980	1981	1982	1983	1984	
Cash on hand at										
beg. of year (dol) . . . . .	10,000	0	21,113	37,049	56,571	67,224	85,399	156,334	224,919	
Enterprises										
Soybeans (acres) . . . . .	765	446	765	127						
Corn (acres) . . . . .	0	319		638	765	765	765	765	765	
Cotton (acres) . . . . .	0									
Swine (sows) . . . . .	0	100	140	200	240	300	300	300	300	
Gross receipts . . . . .	117,504	205,202	314,544	267,795	277,200	346,500	346,500	346,500	346,500	
Borrowing operating										
Capital (dol)										
January . . . . .					1,402					
February . . . . .	8,870									
March . . . . .	15,300	12,092	18,248	1,468	779					
April . . . . .	3,963									
May . . . . .	887									
June . . . . .	505		10,493							
July . . . . .	3,527									
August . . . . .	467									
September . . . . .										
October . . . . .										
November . . . . .										
December . . . . .										
Total amount borrowed* . . . . .	33,518	12,092	28,741	1,468	2,181	0	0	0	0	
Interest . . . . .	1,740	128	263	12	17	0	0	0	0	
Total paid back* . . . . .	35,258	12,220	29,005	1,480	2,198	0	0	0	0	
Operating capital (dol)										
Crops and buy										
Corn (dol) . . . . .	39,168	41,914	119,178	44,173	44,937	82,518	82,518	82,518	82,518	
Swine (dol) . . . . .	0	29,556	42,200	60,562	71,084	88,855	88,855	88,855	88,855	
Additional labor										
(dol) . . . . .	0	5,944	8,158	16,560	20,829	26,383	26,383	26,383	26,383	
Total* . . . . .	39,168	77,413	169,535	121,295	136,850	197,756	197,756	197,756	197,756	

TABLE 9. (CONTINUED) OPTIMAL SOLUTION FOR THE EXAMPLE FARM WITH ROW-CROPS AND A SWINE ENTERPRISE LIMITED TO 300 SOWS, FOR NINE YEARS WITH TWENTY-FIVE PERCENT DOWN PAYMENT ON LAND WITH FIFTY PERCENT BORROWING CAPACITY

	Year								
	1976	1977	1978	1979	1980	1981	1982	1983	1984
Investment capital (dol)									
Machinery and Live—									
stock purchased . . . . .	51,705	46,264	4,700	24,241	56,405	32,634	4,700	7,050	34,514
Investment capital									
paid by cash . . . . .	5,100	0	4,700	24,241	56,405	32,634	4,700	7,050	34,514
Investment capital									
borrowed . . . . .	46,605	46,264	0	0	0	0	0	0	0
Loan pay/Yr. for									
3 Years . . . . .	19,574	19,431	0	0	0	0	0	0	0
Swine facility pur. . . . .	0	41,377	16,551	24,826	16,551	24,826	0	0	0
Inv. cap. paid by cash . . . . .	0	0	16,413	12,808	166	24,826	0	0	0
Inv. cap. borrowed . . . . .	0	41,377	138	12,018	16,385	0	0	0	0
Loan pay/yr. . . . .	0	6,620	22	1,923	2,622	0	0	0	0
Cumulative and Pay for									
Machinery and									
Facilities . . . . .	19,574	45,626	45,648	27,996	11,187	11,187	11,187	11,187	11,187
Pay to land (dol) . . . . .	44,422	44,422	44,422	44,422	44,422	44,422	44,422	44,422	44,422
Total pay at year									
End (dol) . . . . .	63,996	90,047	90,069	72,418	55,609	55,609	55,609	55,609	55,609
Payroll (dol)									
Operator . . . . .	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
full-time man . . . . .	7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500
Net cash income (dol)* . . . . .	0	21,113	37,049	56,571	67,224	85,399	156,334	224,919	266,041
Cumulative borrowing									
capital (dol) . . . . .	80,287	23,649	63,001	83,803	119,089	170,073	222,441	282,233	314,483

\*Totals may not sum due to rounding error.

rates at 6 and 12 percent were implemented in the program and separate solutions for each interest rate were analyzed. The solutions with different interest rates showed a change in net cash income and a slight change in the selection of enterprise for 2 years. The change in income for both solutions was primarily due to the increase and decrease in the cost of borrowed funds. The increase in cost was due to the interest being changed to 12 percent. The solution with 12 percent interest rate had cotton come in at a later year when less borrowed operating capital was required.

### **SUMMARY AND CONCLUSION**

The general objective of this study was to relate the actions and use of certain financial management techniques to the growth of a given farm firm.

Certain assumptions were formulated before the enterprise budgets were constructed. These included the basic assumptions for a linear programming model and the farm under study. The assumptions about this farm were that recommended management practices would be followed, an above average level of technology would be obtained, additional labor could be hired, and prices used were conservative estimates of future prices.

Enterprise budgets were constructed for corn, cotton, soybeans, an 80-sow swine operation, and a 30-cow calf operation. All budgets were formulated on the premise of recommended management practices. From the budget's gross receipts, variable cost (preharvest and harvest), fixed cost, labor cost, total cost were subtracted and net returns were obtained. The enterprised budgets provided a basis for cost and returns for each enterprise considered. There was a total of 1,363 acres on the example farm with 765 open acres available for pasture and/or row-crop production.

A matrix was developed in compliance with the assumptions of linear programming systems and the assumed constraints set forth for the example farm. The matrix was constructed so that the enterprises considered had separate cost and selling activities. This was used so that certain activities that entered solutions were sold or used on the farm as feed. Also, having cost activities for each enterprise simplified the implementation of the cash flow system within the matrix. The cash flow system was the key to all solutions since each enterprise required operating capital. The operating capital had to come from cash on hand or from selected borrowing activities. Borrowed operating capital was paid back within the production year at a specified rate of interest on the unpaid balance. Each enterprise had an exclusive har-

vest time and required different amounts of operating capital per month. The time of harvest and operating capital required per month caused a constraint to be levied upon each enterprise, thus restricting the enterprises entering the solution. This constraint is often neglected by farmers in their selection of enterprises. Often, enterprises are selected only on the basis of their net returns when return to cash flow is not considered.

The total value of the land was \$608,500 and could be financed at 9 percent for 30 years. Twenty-five percent down payment was used in all solutions except when the comparison of a 50 percent down payment was used for the row crops only solution. The annual payment for land was \$44,422 for the 25 percent down payment and \$29,615 for the 50 percent down payment.

Optimal solutions for each specific objective were obtained by variations of constraints that were required by each objective. Operating capital and annual payments to borrowed investment capital for a 25 percent down payment solution for row crops only had an effect on the selection of enterprises. Soybeans or a combination of soybeans and corn were the only crops produced until 1979 when 137 acres of cotton were produced. Then from 1979 until 1984, there were 137 acres of cotton and a combination of soybeans and corn. In 1984, cotton acreage increased to 274 acres and corn was produced on the remaining acres.

The optimum selection of borrowing and payback activities of investment capital for machinery was a vital part of all optimal solutions with only row crops considered. The 25 percent down payment solution required more borrowed investment capital for machinery than the other two solutions—a 50 percent down payment for row crops only and 25 percent down payment with row crops and livestock. The 25 percent down payment solution required \$164,666 of investment capital for machinery at the end of 9 years. Of the \$164,666 of investment capital, \$99,253 came from cash on hand and \$65,413 was borrowed and paid back plus the interest, \$17,007. The selection of machinery by type and year was done by the computerized system for the total 9 years. The type of machinery purchased at the beginning of the year was purchased for the enterprises considered for that year and the following years.

All three row crops used some different type or version of harvesting equipment. Because of this, certain crops, especially cotton, were restricted until the investment capital required to purchase the harvesting equipment and/or additional machinery was available at an optimum time. The optimum time was when the use of the investment



capital for the machinery would return an optimum net return for the total 9 years. For instance, it was more profitable to wait until 1979 to purchase a cotton picker, \$30,628, than to purchase one in 1976 because the total net returns for the 9-year period was greater when it was purchased in 1979. Also, purchase of an additional cotton picker in 1984 allowed cotton acreage to increase.

When the percent down payment for land was increased to 50 percent for row crops only, it reduced the amount to be borrowed for land, thus reducing the land payment per year from \$44,422 to \$29,615. With a reduction in land payments, there was a sizable increase in the cumulative net cash income from \$98,143 for the 25 percent down payment to \$147,407 for the 50 percent down payment. With a 50 percent down payment, the initial net worth would be higher so a change in net worth was used as a comparison of the two different down payments. The change in net worth for the 25 percent down payment was \$235,949 and the change in net worth for the 50 percent down payment was \$361,359. The 50 percent down payment solutions for row crops only borrowed 20 percent of the investment capital, while the 25 percent down payment solution borrowed 40 percent. Thus, with a larger down payment to land, more of the cash on hand was spent on investment capital.

Special preferences were considered for row crops alone and/or row crops and livestock together. It was shown that having a swine operation on the farm enhanced the net cash income for the 9-year period by \$266,041. The swine operation required a hog facility, at a cost of \$124,132, to be constructed on the farm. The linear programming solution provided the information needed to know the optimum time for implementation. The size of the sow unit was held at 300 sows because of preference by the operator. The corn for the sow operation could have been bought and/or produced on the farm, whichever was more feasible. Optimal solutions for the 9-year period had soybeans on all the 765 acres for 2 of the 9 years and buying the corn required for the swine. Corn was produced for feed the other 7 years.

Cattle for the example farm were never profitable enough to come into solution. The reason was that the pasture and hay acreage required to produce the cattle had expenses greater than the cattle receipts. Also, the labor and machinery required by the cattle did not show a profitable return as compared to the other enterprises considered.

The multiperiod linear programming model built for the example farm was a financial management tool that could be prescribed for any size farm and/or enterprise preference. The model developed

specifically for this study provided an analysis of different down payment strategies and different preferences to row crops and/or row crops and livestock. If different farm sites and/or enterprise selections were warranted, then data similar to that utilized for the example farm would be needed, i.e., productivity of land, acreage, enterprises considered, etc. The model provided strategies for financial growth and also could be used as a lending aid for lenders as well as for borrowers.

Farmers and prospective farmers often buy land because of a "good deal" on land. They should have some foresight of the use of the land and their investment. This model would provide the foresight for the use of purchased land and/or land for prospective purchase. Realtors could benefit by implementing such a linear programming model into a sales package for prospective clients.

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## APPENDIX

APPENDIX TABLE 1. PROJECTED PRICES USED IN DEVELOPING CROP BUDGETS

Item	Years				
	1976	1977	1978	1979	1980
	<i>Dol.</i>	<i>Dol.</i>	<i>Dol.</i>	<i>Dol.</i>	<i>Dol.</i>
Cotton (lb) . . . . .	0.50	0.45	0.40	0.45	0.50
Corn (bu) . . . . .	2.50	2.75	2.50	2.65	2.75
Soybeans (bu) . . . . .	4.80	5.20	5.30	5.00	4.80
Cottonseed (cwt) . . . . .	50.00	48.50	47.00	48.50	50.00
8-24-24 (cwt) . . . . .	7.00	6.79	6.59	6.39	6.20
0-20-20 (cwt) . . . . .	6.00	5.82	5.65	5.48	5.31
0-10-20 (cwt) . . . . .	6.50	5.75	5.00	4.25	3.50
15-0-15 (cwt) . . . . .	8.00	7.25	6.50	5.75	5.00
Nitrogen (cwt) . . . . .	6.50	6.37	6.24	6.12	6.00
Lime (ton) . . . . .	12.00	12.00	12.00	12.00	12.00
Cot. preherb (acre) . . . . .	6.30	6.49	6.68	6.88	7.09
Cot. herb. (acre) . . . . .	4.95	5.10	5.25	5.41	5.57
Corn herb. (acre) . . . . .	5.50	5.67	5.83	6.00	6.19
Soy herbicide (acre) . . . . .	10.00	10.30	10.61	10.93	11.26
Cot. fung. (acre) . . . . .	6.00	5.74	5.91	6.09	5.27
Cot. inst. (acre) . . . . .	3.50	3.60	3.71	3.82	3.94
Cot. def. (acre) . . . . .	4.00	4.12	4.24	4.37	4.50
Ginning (500 lb) . . . . .	25.00	26.50	27.00	26.50	25.00
Cornseed (lb) . . . . .	0.80	0.82	.85	0.85	0.85
Soybean seed (bu) . . . . .	10.00	9.00	10.00	10.00	10.00

APPENDIX TABLE 2. PROJECTED PRICES USED IN DEVELOPING LIVESTOCK BUDGETS

Item	Years				
	1976	1977	1978	1979	1980
	<i>Dol.</i>	<i>Dol.</i>	<i>Dol.</i>	<i>Dol.</i>	<i>Dol.</i>
Steer calves (cwt) . . . . .	27.50	28.00	30.00	35.00	40.00
Heifer calves (cwt) . . . . .	26.00	26.50	28.50	33.50	38.50
Stockens (cwt) . . . . .	27.50	28.00	30.00	35.00	40.00
Feeder pigs (cwt) . . . . .	85.00	72.00	72.00	67.50	63.00
Market hogs (cwt) . . . . .	47.50	40.00	40.00	37.50	35.00
Cull cows (cwt) . . . . .	19.00	20.00	20.50	20.50	21.00
Cull heifers (cwt) . . . . .	23.00	23.50	24.00	24.00	25.00
Aged bull (cwt) . . . . .	21.00	21.50	22.00	22.25	22.50
Cull sows (cwt) . . . . .	30.00	20.00	20.00	19.00	19.00
Cull boar (cwt) . . . . .	20.00	18.00	18.00	17.00	17.00
Creep (cwt) . . . . .	8.50	8.75	8.75	9.00	8.75
Prot. sup. (cwt) . . . . .	8.00	8.25	8.50	8.50	8.25
Vet. exp. (head) . . . . .	1.00	1.00	1.00	1.00	1.00
Salt and min. (cwt) . . . . .	5.00	5.00	5.00	5.00	5.00
Cust. hauling (head) . . . . .	0.75	0.75	0.75	0.75	0.75
Sales comm. (head) . . . . .	1.00	1.00	1.00	1.00	1.00

APPENDIX TABLE 3. COTTON, RECOMMENDED MANAGEMENT PRACTICES, ESTIMATED ANNUAL COST AND RETURNS PER ACRE, 1976

Item	Unit	Price or	Quantity	Value or
		cost/unit		cost
		Dol.		Dol.
<b>Gross receipts</b>				
Cotton lint . . . . .	lb.	0.50	600.00	300.00
Cotton seed . . . . .	Ton	80.00	0.51	40.80
Total . . . . .				340.80
<b>Variable costs</b>				
<b>Preharvest</b>				
Cotton seed . . . . .	Cwt.	50.00	0.17	8.50
Complete fert. . . . .	Cwt.	7.00	2.50	17.50
Nitrogen . . . . .	Cwt.	6.50	2.10	13.65
Lime . . . . .	Ton	12.00	0.25	3.00
Pre-merge herb. . . . .	Acre	6.30	1.00	6.30
Herbicide . . . . .	Acre	4.95	1.00	4.95
Fungicide . . . . .	Acre	6.00	1.00	6.00
Insecticide . . . . .	Acre	3.50	12.00	42.00
Machinery . . . . .	Acre	0.74	1.00	0.74
Tractors . . . . .	Acre	10.52	1.00	10.52
Int. on op. cap. . . . .	Pct.	9.50	60.31	5.73
Subtotal, preharvest . . . . .				118.89
<b>Harvest costs</b>				
Defoliate . . . . .	Acre	4.00	1.00	4.00
Ginning . . . . .	Bl.	25.00	1.20	30.00
Machinery . . . . .	Acre	5.33	1.00	5.33
Tractors . . . . .	Acre	4.36	1.00	4.36
Subtotal, harvest . . . . .				43.70
Total variable costs . . . . .				162.58
<b>Income above variable costs</b> . . . . .				178.22
<b>Fixed costs</b>				
Machinery . . . . .	Acre	37.40	1.00	37.40
Tractors . . . . .	Acre	12.99	1.00	12.99
Total fixed costs . . . . .				50.39
<b>Labor costs</b>				
Preharvest labor . . . . .	Hour	2.00	5.41	10.81
Harvest labor . . . . .	Hour	2.00	4.06	8.12
Total labor costs . . . . .				18.93
<b>Total costs</b> . . . . .				231.91
<b>Net returns to land and management</b> . . . . .				108.89

APPENDIX TABLE 4. SOYBEANS, RECOMMENDED MANAGEMENT PRACTICES, ESTIMATED ANNUAL COST AND RETURNS PER ACRE, 1976

Item	Unit	Price or	Quantity	Value or
		cost/unit		cost
		<i>Dol.</i>		<i>Dol.</i>
<b>Gross receipts</b>				
Soybeans . . . . .	Bu.	4.80	32.00	153.60
Total . . . . .				153.60
<b>Variable costs</b>				
<b>Preharvest</b>				
Soybean seed . . . . .	Bu.	10.00	1.00	10.00
P and K . . . . .	Cwt.	6.00	2.50	15.00
Lime . . . . .	Ton	12.00	0.25	3.00
Herbicide . . . . .	Acre	10.00	1.00	10.00
Insecticide . . . . .	Acre	4.00	2.00	8.00
Machinery . . . . .	Acre	0.40	1.00	0.40
Tractors . . . . .	Acre	3.81	1.00	3.81
Int. on op. cap. . . . .	Pct.	9.50	28.46	2.70
Subtotal, preharvest . . . . .				52.92
<b>Harvest costs</b>				
Machinery . . . . .	Acre	0.98	1.00	0.98
Subtotal, harvest . . . . .				0.98
Total variable cost . . . . .				53.90
Income above variable cost . . . . .				99.70
<b>Fixed costs</b>				
Machinery . . . . .	Acre	7.50	1.00	7.50
Tractors . . . . .	Acre	3.35	1.00	3.35
Total fixed costs . . . . .				10.85
<b>Labor costs</b>				
Preharvest labor . . . . .	Hour	2.00	2.13	4.26
Harvest labor . . . . .	Hour	2.00	0.31	0.62
Total labor costs . . . . .				4.88
Total costs . . . . .				69.63
Net returns to land and management . . . . .				83.97

APPENDIX TABLE 5. CORN, RECOMMENDED MANAGEMENT PRACTICES, ESTIMATED ANNUAL COST AND RETURNS PER ACRE, 1976

Item	Unit	Price or	Quantity	Value of
		cost/unit		cost
		<i>Dol.</i>		<i>Dol.</i>
<b>Gross receipts</b>				
Corn . . . . .	Bu.	2.50	65.00	162.50
Total . . . . .				162.50
<b>Variable costs</b>				
<b>Preharvest</b>				
Corn seed . . . . .	Lb.	0.80	10.00	8.00
Complete fert . . . . .	Cwt.	7.00	1.70	11.90
Nitrogen . . . . .	Cwt.	6.50	3.30	21.45
Lime . . . . .	Ton	12.00	0.25	3.00
Herbicide . . . . .	Acre	5.50	1.50	3.25
Machinery . . . . .	Acre	0.68	1.00	0.68
Tractors . . . . .	Acre	5.28	1.00	5.28
Int. on op. cap. . . . .	Pct.	9.50	36.36	3.45
subtotal, pre-harvest . . . . .				62.01
<b>Harvest costs</b>				
machinery . . . . .	Acre	1.46	1.00	1.46
Subtotal, harvest . . . . .				1.46
Total variable cost . . . . .				63.47
<b>Income above variable costs . . . . .</b>				<b>99.03</b>
<b>Fixed Costs</b>				
Machinery . . . . .	Acre	8.98	1.00	8.98
Tractors . . . . .	Acre	4.52	1.00	4.52
Total fixed costs . . . . .				13.50
<b>Labor costs</b>				
Preharvest labor . . . . .	Hour	2.00	2.69	5.38
Harvest labor . . . . .	Hour	2.00	0.39	0.70
Total labor costs . . . . .				6.08
<b>Total costs . . . . .</b>				<b>83.05</b>
<b>Net returns to land and management . . . . .</b>				<b>79.45</b>

APPENDIX TABLE 6. COASTAL BERMUDA PASTURE, RECOMMENDED MANAGEMENT PRACTICES, ANNUAL OPERATING COSTS PER ACRE,<sup>1</sup> 1976

Item	Unit	Price or cost/unit	Quantity	Value or cost
		<i>Dol.</i>		<i>Dol.</i>
<b>Gross receipts</b>				
Total .....				0.00
<b>Variable Costs</b>				
<b>Preharvest</b>				
P and K .....	Cwt.	6.50	5.00	32.50
Lime. ....	Ton	12.00	0.52	3.00
Nitrogen. ....	Cwt.	6.50	3.60	23.40
Machinery .....	Acre	0.24	1.00	0.24
Tractors .....	Acre	1.57	1.00	1.57
Int. on op. cap. ....	Pct.	9.50	34.71	3.30
Subtotal, pre-harvest .....				64.01
<b>Harvest costs</b>				
Subtotal, harvest .....				0.00
Total variable cost .....				64.01
<b>Income above variable costs.</b> .....				-64.01
<b>Fixed costs</b>				
Machinery .....	Acre	1.13	1.00	1.13
Tractors .....	Acre	1.43	1.00	1.43
Total fixed costs .....				
<b>Labor Costs</b>				
Preharvest labor .....	Hour	2.00	0.99	1.98
Total labor costs .....				
<b>Total costs</b> .....				68.54
<b>Net returns to land and management.</b> .....				-68.54

<sup>1</sup>This enterprise was used as an input for cow-calf enterprise.

APPENDIX TABLE 7. COASTAL BERMUDAGRASS HAY, RECOMMENDED MANAGEMENT PRACTICES, ANNUAL OPERATING COSTS PER ACRE, 1976

Item	Unit	Price or	Quantity	Value or
		cost/unit		cost
		Dol.		Dol.
<b>Gross receipts</b>				
Bermuda . . . . .	Ton	0.00	6.00	0.00
<b>Total</b> . . . . .				0.00
<b>Variable costs</b>				
<b>Preharvest</b>				
P and K . . . . .	Cwt.	6.50	5.00	32.50
N and K . . . . .	Cwt.	8.00	6.70	53.60
Lime . . . . .	Ton	12.00	0.25	3.00
Nitrogen . . . . .	Cwt.	6.50	9.00	58.50
Machinery . . . . .	Acre	0.13	1.00	0.13
Tractors . . . . .	Acre	0.89	1.00	0.89
Int. on op. cap. . . . .	Pct.	9.50	80.04	7.60
Subtotal, pre-harvest . . . . .				156.23
<b>Harvest costs</b>				
Seasonal labor . . . . .	Hour	2.00	9.00	18.00
Machinery . . . . .	Acre	3.50	1.00	3.50
Tractors . . . . .	Acre	9.48	1.00	9.48
Subtotal, harvest . . . . .				30.99
<b>Total variable cost</b> . . . . .				187.21
<b>Income above variable costs</b> . . . . .				-187.21
<b>Fixed costs</b>				
Machinery . . . . .	Acre	12.88	1.00	12.88
Tractors . . . . .	Acre	9.42	1.00	9.42
<b>Total fixed costs</b> . . . . .				22.30
<b>Labor costs</b>				
Preharvest labor . . . . .	Hour	2.00	0.56	1.12
Harvest labor . . . . .	Hour	2.00	5.98	11.97
<b>Total labor costs</b> . . . . .				13.09
<b>Total costs</b> . . . . .				-222.61
<b>Net returns to land and management</b> . . . . .				-222.61

<sup>1</sup>This enterprise was used as an input for cow-calf enterprise.



APPENDIX TABLE 8. COW-CALF BUDGET, 30-COW HERD RECOMMENDED MANAGEMENT PRACTICES 90 PERCENT CALF CROP, 1976

Item	Weight each	Unit	Price or	Quantity	Value or
			cost/unit		cost
			Dol.		Dol.
<b>Gross receipts</b>					
Steer calves . . . . .	4.25	Cwt.	27.50	14.00	1,636.25
Heifer calves . . . . .	4.00	Cwt.	26.00	8.00	832.00
Cows . . . . .	10.00	Cwt.	19.00	5.00	950.00
Heifers . . . . .	7.00	Cwt.	23.00	1.00	161.00
Aged bull . . . . .	20.00	Cwt.	21.00	0.25	105.00
Total . . . . .					3,684.25
<b>Variable costs</b>					
Protein suppl. . . . .		Cwt.	8.00	1.80	432.00
Vet. and med. . . . .		Dol.	1.00	0.30	9.00
Salt and min. . . . .		Cwt.	5.00	0.44	66.00
Sales comm. . . . .		Dol.	1.25	1.00	41.56
Mach. (fuel, lube, rep) . . . . .		Dol.			75.02
Equip. (fuel, lube, rep) . . . . .		Dol.			15.43
Labor, tractor and mach. . . . .		Hr.	2.00	72.00	144.00
Labor, equipment. . . . .		Hr.	2.00	9.00	18.00
Labor, livestock . . . . .		Hr.	2.00	6.00	12.00
Int. on oper. cap. . . . .		Pct.	9.50	305.11	28.99
Total variable costs . . . . .					842.00
<b>Income above variable costs</b> . . . . .					2,842.00
<b>Fixed costs</b>					
Int. on livestock capt. . . . .		Dol.	0.09	9,112.49	865.69
Int. on other equip. . . . .		Dol.	0.09	2,087.50	198.31
Depr. on beef bull. . . . .		Dol.			12.50
Depr. on other equip. . . . .		Dol.			140.33
Other fc, mach. and equip. . . . .		Dol.			196.83
Total fixed costs . . . . .					1,413.66
<b>Total costs</b> . . . . .					2,255.67
<b>Net returns to land, management, and produced feed</b> . . . . .					1,428.58

<sup>1</sup>Pasture and hay cost are not included.

APPENDIX TABLE 9. 80-SOW BUDGET, COST AND RETURNS FROM FARROW TO FINISH,  
RECOMMENDED MANAGEMENT PRACTICES, MARKET HOGS SOLD  
AT 200 POUNDS, 1976

Item	Weight each	Unit	Price or	Quantity	Value or
			cost/unit		cost
			Dol.		Dol.
<b>Gross receipts</b>					
Slaughter hogs . . . . .	2.00	Cwt.	47.50	1,320.00	125,400.00
Sows . . . . .	3.50	Cwt.	30.00	40.00	4,200.00
Boar . . . . .	4.00	Cwt.	20.00	4.00	320.00
Total . . . . .					129,920.00
<b>Variable costs</b>					
Protein supple. . . . .		Cwt.	8.00	1,878.40	15,027.19
Creep . . . . .		Cwt.	8.50	441.60	3,753.60
Other . . . . .		Dol.	1.00	1,296.80	1,296.80
Vet. supplies . . . . .		Hd.	1.00	1,364.00	1,364.00
Utilities . . . . .		Dol.	1.00	600.00	600.00
Custom hauling . . . . .		Hd.	0.75	1,364.00	1,023.00
Labor, equipment . . . . .		Hr.	2.00	37.50	75.00
Int. on oper. cap. . . . .		Pct.	9.50	11,390.35	1,082.08
Total variable costs . . . . .					24,221.67
<b>Income above variable costs . . . . .</b>					<b>105,698.31</b>
<b>Fixed costs</b>					
Int. on livestock cap. . . . .		Dol.	0.09	12,975.00	1,232.62
Int. on other equip. . . . .		Dol.	0.09	24,946.01	2,369.87
Depr. on boar. . . . .		Dol.			162.50
Depr. on other equip. . . . .		Dol.			2,649.35
Other fc, mach. and equip. . . . .		Dol.			1,746.21
Total fixed costs . . . . .					8,160.55
<b>Total costs . . . . .</b>					<b>32,382.21</b>
<b>Net Returns to land, management, and produced feed . . . . .</b>					<b>97,537.75</b>

<sup>1</sup>Budget does not include corn cost and hog facility is a completely confined system.

APPENDIX TABLE 10. REPAYMENT SCHEDULE, SHOWING TOTAL PAYMENT, PRINCIPAL AND, INTEREST FOR A FARM LOAN OF 456,375.00 DOLLARS WITH ANNUAL PAYMENTS FOR 30 YEARS AT NINE PERCENT INTEREST RATE

Year	Balance	Payment	Principal	Interest
		Dollars		
1	456,375.00	44,421.86	3,348.13	41,073.73
2	453,026.81	44,421.86	3,649.46	40,772.40
3	449,377.31	44,421.86	3,977.92	40,443.95
4	445,399.38	44,421.86	4,335.93	40,085.93
5	441,063.44	44,421.86	4,726.17	39,695.70
6	436,337.25	44,421.86	5,151.52	39,270.34
7	431,185.69	44,421.86	5,615.16	38,806.70
8	425,570.50	44,421.86	6,120.53	38,301.33
9	419,449.94	44,421.86	6,671.38	37,750.48
10	412,778.50	44,421.86	7,271.81	37,150.05
11	405,506.69	44,421.86	7,926.27	36,495.59
12	397,580.38	44,421.86	8,639.64	35,782.22
13	388,940.69	44,421.86	9,417.21	35,004.65
14	379,523.44	44,421.86	10,264.77	34,157.10
15	369,258.63	44,421.86	11,188.60	33,233.27
16	358,070.00	44,421.86	12,195.57	32,226.29
17	345,874.38	44,421.86	13,293.18	31,128.68
18	332,581.19	44,421.86	14,489.57	29,932.30
19	318,091.56	44,421.86	15,793.63	28,628.23
20	302,297.88	44,421.86	17,215.06	27,206.80
21	285,082.81	44,421.86	18,764.42	25,657.45
22	266,318.38	44,421.86	20,453.22	23,968.64
23	245,865.13	44,421.86	22,294.01	22,127.85
24	223,571.06	44,421.86	24,300.48	20,121.39
25	199,270.56	44,421.86	26,487.52	17,934.34
26	172,783.00	44,421.86	28,871.40	15,550.46
27	143,911.56	44,421.86	31,469.83	12,952.04
28	112,441.69	44,421.86	34,302.12	10,119.75
29	78,139.56	44,421.86	37,389.31	7,032.55
30	40,750.25	44,421.86	40,754.34	3,667.52

APPENDIX TABLE 11. REPAYMENT SCHEDULE, SHOWING TOTAL PAYMENT, PRINCIPAL,  
AND INTEREST FOR A FARM LOAN OF 304,250.00 DOLLARS WITH ANNUAL  
PAYMENTS FOR 30 YEARS AT NINE PERCENT INTEREST RATE

Year	Balance	Payment	Principal	Interest
Dollars				
1	304,250.00	29,614.57	2,232.09	27,382.49
2	302,017.88	29,614.57	2,432.98	27,181.60
3	299,584.88	29,614.57	2,651.95	26,962.63
4	296,932.88	29,614.57	2,890.63	26,723.95
5	294,402.25	29,614.57	3,150.78	26,463.79
6	290,891.44	29,614.57	3,434.36	26,180.22
7	287,457.06	29,614.57	3,743.45	25,871.13
8	283,713.56	29,614.57	4,080.36	25,534.21
9	279,633.19	29,614.57	4,447.60	25,166.98
10	275,185.56	29,614.57	4,847.88	24,766.69
11	270,337.63	29,614.57	5,284.20	24,330.38
12	265,053.38	29,614.57	5,759.78	23,854.79
13	259,293.56	29,614.57	6,278.16	23,336.41
14	253,015.38	29,614.57	6,843.20	22,771.38
15	246,172.13	29,614.57	7,459.09	22,155.48
16	238,713.00	29,614.57	8,130.41	21,484.16
17	230,582.56	29,614.57	8,862.15	20,752.42
18	221,720.38	29,614.57	9,695.75	19,954.82
19	212,060.63	29,614.57	10,529.13	19,085.45
20	201,531.50	29,614.57	11,476.75	18,137.83
21	190,054.75	29,614.57	12,509.65	17,104.92
22	177,545.06	29,614.57	13,635.52	15,979.05
23	163,909.50	29,614.57	14,862.73	14,751.85
24	149,046.75	29,614.57	16,200.37	13,414.20
25	132,846.38	29,614.57	17,658.41	11,956.17
26	115,187.94	29,614.57	19,247.66	10,366.91
27	95,940.25	29,614.57	20,979.96	8,634.62
28	74,960.25	29,614.57	22,868.16	6,746.42
29	52,092.09	29,614.57	24,926.29	4,688.29
30	27,165.80	29,614.57	27,169.65	2,444.92