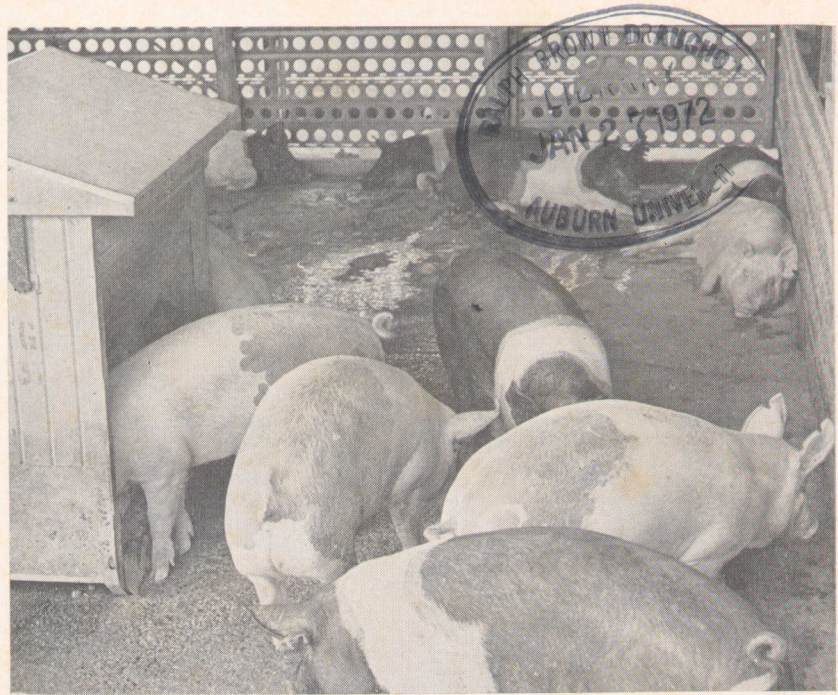


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Costs And Returns Of Producing Market Hogs In Alabama



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Costs And Returns Of Producing Market Hogs In Alabama¹

THOMAS A. HUGHES, JR. and SIDNEY C. BELL²

INTRODUCTION

ALABAMA MARKET HOG prices have been fairly high since 1965, averaging about \$20.00 per hundredweight. This higher price has placed hogs in a favorable profit position compared to other enterprises. This factor as well as no market restrictions for beginning a market hog enterprise has contributed to increased interest in the market hog enterprise as a means to increase profit on a farm.³

The most common type of swine enterprise on Alabama farms is the farrow-to-finish operation. Producers with these type operations raise and finish feeder pigs to a final market hog weight of 180-240 pounds. Rising costs of factors of production have caused many producers to look for ways of improving their production efficiency.

OBJECTIVES OF THE STUDY

Many farmers are considering changes in the organization of their farm businesses to include a farrow-to-finish hog enterprise in order to obtain greater profits. Accurate and realistic budgets

¹ This report is based on research work carried out under project Alabama 1-046 supported by State research funds. Appreciation is expressed to the swine producers who supplied information for use in this study.

² Former Graduate Assistant now in military service and Associate Professor, Department of Agricultural Economics and Rural Sociology.

³ *100 Years Alabama Crop, Livestock and Income Data*. Auburn University (Ala.) Agricultural Experiment Station, March 1968, p. 65.

for hog production are needed to determine whether a hog enterprise should be included in this reorganization.

Economies of size have been very important when farmers have attempted to add or expand hog production in their combination of enterprises. Data are not available at present to determine optimum size of the enterprise.

The primary objectives of this study were:

1. To determine the resources used and investment required for farrow-to-finish hog operations.
2. To determine the dollar value of inputs and returns in farrow-to-finish hog operations.
3. To determine optimum size of farrow-to-finish hog operations.

METHOD OF STUDY

Selection of Sample

This study was based on data collected by personal interviews with 22 farmers designated as Swine Expansion Demonstrators by the Alabama Cooperative Extension Service as part of their swine expansion program. Data were based on swine production in 1967. All of these farmers received varying amounts of specialized help through the Cooperative Extension Service. In order for these farmers to qualify as demonstrators they agreed to keep detailed records on their swine enterprise.

It is recognized that the sampling procedure permitted bias in favor of those receiving specialized help but this bias was accepted because of the need for cooperation in obtaining accurate information.

All costs, returns, investments, and labor requirements were determined and analyzed on the basis of per hundredweight of hogs sold. Budgets were also developed for three sizes of enterprises estimating the total costs and returns that could be expected.

Cost Procedures

Farm-produced corn, harvested and fed to hogs, was charged at the average price received by farmers as reported by Alabama Crop and Livestock Reporting Service. Corn purchased was charged at the price reported by the farmer.

All other feeds, such as supplements, minerals, vitamins, anti-biotic mixes, and creep feed were charged at prices reported by the farmer.

Pasture charges were based on budgets developed as part of this study, Appendix Tables 1, 2, and 3. Only the variable expenses were charged. Prices used for these expenses were those reported by the farmers.

Interest on operating capital was charged at 8 per cent per annum for a 6-month period.

Variable expenses, other than feed, pasture, and interest on operating capital, were charged at the rate reported by the farmer.

Charges for buildings, equipment, and fences were based on the annual rate of depreciation as calculated by the straight line method. An expected life of 20 years with a salvage value of 5 per cent was used for calculating charges for the farrowing-nursery houses, finishing parlors, and fencing. Grain storage facilities were estimated to have an expected life of 15 years and 5 per cent salvage value. Charges for equipment and miscellaneous items were based on an estimated life of 10 years with no salvage value.

Interest was charged at a rate of 6 per cent on the average value of fixed capital and the average value of the breeding herd.

Insurance was charged for buildings, equipment, and breeding herd. This charge was based on the estimated new value and calculated at \$0.375 per one hundred dollars.

Tax charges were based on the average value of land and buildings. Taxes were calculated by assessing the items taxed at 30 per cent of their average value and applying the millage rate of the county in which the farm was located.

All labor, both operator and hired, was charged at \$1.50 per hour. The labor requirements were based on labor requirements as reported by the farmers.

Description of Farms

The 22 farms ranged in size from 90 to 13,000 acres with the average size being 1,156 acres. These farms had an average of 327 acres of cropland and 157 acres of improved pasture. Corn, with 19 of the 22 farmers producing it, was the most common row crop. Other crops grown were cotton on five farms, peanuts on nine farms, soybeans on seven farms, small grains on eight farms, and miscellaneous crops on eight farms.

All producers utilized permanent farrowing houses. Two-thirds of the farrowing houses were of pole-type construction with open sides and concrete floors. All houses except one were provided

with heating systems. Only nine of the farrowing houses were equipped with cooling systems.

All producers were finishing hogs in confinement. Fifteen producers finished their hogs in hand-feeding parlors. All feeding parlors were of low cost pole-type construction with open sides and concrete floors. Eight parlors were equipped with cooling systems but none had a heating system. Seven producers provided field shelters for the brood herd, but most producers utilized natural cover as field shelters.

All producers raised crossbred hogs. The most popular cross was Hampshire and Landrace. However, many other crosses were used. Some producers were using three- and four-way crosses.

Ten of the 22 producers were using performance tested boars (tested for rate and efficiency of gain). Carcass quality tests were also conducted on littermates.

Gross sales from the hog enterprise accounted for 50 per cent or more of total gross sales of the farm on 13 of the 22 farms.

Some of the personal characteristics of farmers interviewed were as follows:

<i>Characteristics</i>	<i>Average no. of years</i>
Age.....	45
Formal education.....	12
Experience operating farm.....	20
Experience raising hogs.....	17

Fifteen of the producers indicated that they planned to expand production in the future. Reasons given for further expansion were varied. However, the two predominant reasons were to improve labor efficiency and increase volume of business. Only one producer indicated that production would be decreased because of reduced labor available. Six producers planned to maintain their present level of production.

Pigs were weaned between 3 and 8 weeks of age with the average age of 6.7 weeks. The average age of hogs at marketing was 6 months.

Adoption of recommended production practices was high for these producers. Some of the recommended production practices and the per cent of producers using the practice are shown in Table 1.

All producers kept feed and water available free choice for hogs on feed. Most finishing houses were cleaned at intervals of two days or less.

TABLE 1. PER CENT OF FARROW-TO-FINISH SWINE PRODUCERS USING SELECTED PRACTICES, ALABAMA, 1967

Practice	Per cent of producers using practice
Disinfect farrowing houses.....	100
Clip needle teeth.....	91
Treat pigs for anemia.....	91
Clip navel cords.....	77
Worm market hogs.....	75
Worm brood herd.....	68
Vaccinate for cholera.....	64
Vaccinate for leptospirosis.....	50
Vaccinate for erysipelas.....	45
Rotate pastures.....	41

The amount of labor required for the swine enterprise depended upon the amount of labor saving equipment used, management ability of the operator, and size of the enterprise. Hired labor was utilized on 11 of 22 farms enumerated. The amount of labor hired varied from a few days a year to performing almost all the work. Hired labor performed more than 50 per cent of the work on six farms. The operator and/or his family performed all the work required on 11 farms.

All returns, costs, investments, and labor requirements were determined on the basis of per hundredweight of hogs sold.

COSTS AND RETURNS

The total cost of hogs produced varied from \$15.88 to \$33.87 per hundredweight sold. The average total cost of production for the 22 producers was \$20.37, Table 2. This included a charge for land and labor. The largest single cost item was feed, accounting for 68.3 per cent of the total. Labor was the second largest cost item, accounting for 16.3 per cent of the total cost.

The average gross receipts for the 22 producers was \$20.24 per hundredweight sold, Table 3. This included the gross sales per hundredweight of pork sold plus the change in inventory per hundredweight. Gross sales included the sale of finished hogs, culled sows, and boars.

The average net returns to land, labor, and management was \$3.33 per hundredweight of pork sold. This figure does not reflect any charge for land or labor. When land is charged at 6 per cent of market value, the net return to labor and management is \$3.19 per hundredweight sold. Using a labor charge of \$1.50 per hour for the average labor requirements of 2.21 hours per hundred-

TABLE 2. AVERAGE COSTS PER HUNDREDWEIGHT OF HOGS SOLD FOR 22 FARROW-TO-FINISH HOG ENTERPRISES, ALABAMA, 1967¹

Item	Amount
	<i>Dollars</i>
Feed costs	
Corn.....	8.22
Protein supplement.....	3.92
Feed additives ².....	.58
Creep and starter.....	1.16
Other.....	.04
Total.....	13.92
Non-feed variable costs	
Pasture.....	.20
Replacement stock.....	.24
Vaccination and veterinary.....	.20
Trucking expenses.....	.18
Electricity.....	.16
Repairs.....	.12
Other cash expenses.....	.23
Interest on oper. cap.....	.61
Total.....	1.94
Fixed costs	
Capital depreciation.....	.56
Interest, taxes, insurance.....	.49
Total.....	1.05
Other costs	
Land.....	.14
Labor.....	3.32
Total.....	3.46
Total cost	20.37

¹ Average pounds of hogs sold per enterprise, 1,251.8 cwt.

² Vitamins, minerals, and antibiotics.

TABLE 3. AVERAGE COSTS AND RETURNS PER HUNDREDWEIGHT OF HOGS SOLD FOR 22 FARROW-TO-FINISH HOG ENTERPRISES, ALABAMA, 1967

Item	Amount
	<i>Dollars</i>
Gross receipts	
Gross sales.....	19.71
Inventory change.....	.53
Total.....	20.24
Costs	
Feed.....	13.92
Non-feed variable.....	1.94
Total fixed.....	1.05
Total.....	16.91
Returns	
Returns to land, labor, and management.....	3.33
Cost of land.....	.14
Return to labor and management.....	3.19
Cost of labor.....	3.32
Return to management.....	-.13
Average investment.....	9.33
Return to investment.....	.43

TABLE 4. AVERAGE INVESTMENT IN CAPITAL ASSETS (NEW) AND AVERAGE LABOR REQUIREMENTS PER HUNDREDWEIGHT OF PORK SOLD FOR 22 FARROW-TO-FINISH HOG ENTERPRISES, ALABAMA, 1967

Item	Amount
	<i>Dollars</i>
Buildings and equipment	
Fencing.....	.60
Farrowing houses.....	2.05
Finishing parlors.....	1.97
Feed storage.....	1.60
Equipment.....	2.28
Miscellaneous.....	.25
Total.....	8.75
Brood stock	
Brood sows.....	2.10
Gilts.....	.29
Boars.....	.27
Total.....	2.66
Total investment	11.41
Labor requirements	<i>Hours</i>
Hired.....	.97
Operator.....	1.24
Total.....	2.21

weight, Table 4, the labor charge was \$3.32. When the labor charge was subtracted, the average return to management was -\$0.13. However, even with a negative return to management, operators were receiving an average labor income of \$1.50 per hour and an average of 4.61 per cent return on investment.

The average investment in buildings and equipment (new) was \$8.75 per hundredweight of pork sold. The average investment in brood stock per one hundred pounds sold was \$2.66.

Pounds of Pork Sold

To determine if economies of size were present, the data were divided into three groupings. Analysis of these results indicated that economies of size were present, Table 5.

As size of enterprise increased, costs per hundredweight decreased rapidly at first, then decreased slowly. The total cost decreased significantly when the size of enterprise increased, Appendix Table 4. Feed, non-feed variables, and fixed costs were not significantly different for the three size groupings. However, when these costs were combined and analyzed, there was a significant reduction in their combined cost as the size of the enterprise increased.

TABLE 5. AVERAGE COSTS PER HUNDREDWEIGHT OF HOGS SOLD, FARROW-TO-FINISH SWINE PRODUCERS BY SIZE OF ENTERPRISE, ALABAMA, 1967

Item	Size of enterprise		
	Small	Middle	Large
No. of producers.....	7	9	6
Av. 100 lb. of pork sold.....	473.60	959.92	2,597.46
	<i>Dollars</i>		
Feed costs			
Corn.....	9.51	8.58	7.74
Protein supplement.....	4.11	3.76	3.97
Feed additives ¹.....	.54	.24	.77
Creep and starter.....	1.14	1.02	1.24
Other.....	.13	.11	---
Total.....	15.43	13.71	13.72
Non-feed variable costs			
Pasture.....	.23	.20	.20
Replacement stock.....	.35	.14	.29
Vaccination and veterinary.....	.23	.20	.19
Trucking expenses.....	.18	.17	.18
Electricity.....	.18	.15	.15
Repairs.....	.12	.14	.10
Other cash expenses.....	.13	.27	.24
Interest on oper. cap.....	.67	.60	.60
Total.....	2.09	1.87	1.95
Fixed costs			
Capital depreciation.....	.74	.62	.49
Interest, taxes, insurance.....	.63	.54	.44
Total.....	1.37	1.16	.93
Other costs			
Land.....	.18	.20	.12
Labor.....	4.59	3.78	2.79
Total.....	4.77	3.98	2.91
Total cost	23.66	20.72	19.51

¹ Vitamins, minerals, and antibiotics.

Labor cost was the only individual item that decreased significantly as the size of enterprise increased. The cost of labor tended to decrease at a decreasing rate.

The average net returns per hundredweight of hogs sold increased as the size of enterprise increased, Table 6. The average net return to management was -\$2.12, -\$0.30, and \$0.35 per hundredweight sold for the small, middle, and large-size producer groups, respectively.

Investment in buildings and equipment (new) per hundredweight of hogs sold demonstrated a marked decrease as size of enterprise increased, Table 7. This was as expected because producers with larger herds could utilize facilities more efficiently than producers with smaller herds. Thus, almost the same fixed

TABLE 6. AVERAGE COSTS AND RETURNS PER HUNDREDWEIGHT OF HOGS SOLD FOR FARROW-TO-FINISH SWINE PRODUCER GROUPS BY SIZE OF ENTERPRISE, ALABAMA, 1967

Item	Size of enterprise		
	Small	Middle	Large
No. of producers.....	7	9	6
Av. 100 lb. of pork sold.....	473.60	959.92	2,597.46
	<i>Dollars</i>		
Gross receipts			
Gross sales.....	19.45	19.23	20.03
Inventory change.....	2.09	1.19	-.17
Total.....	21.54	20.42	19.86
Costs			
Feed.....	15.43	13.71	13.72
Non-feed variable.....	2.09	1.87	1.95
Total fixed.....	1.37	1.16	.93
Total.....	18.89	16.74	16.60
Returns			
Returns to land, labor, and mgt.....	2.65	3.68	3.26
Cost of land.....	.18	.20	.12
Return to labor and mgt.....	2.47	3.48	3.14
Cost of labor.....	4.59	3.78	2.79
Return to management.....	-2.12	-.30	.35
Av. investment.....	12.17	11.00	8.33
Return to investment.....	-1.39	.36	.85

costs were spread over a larger output. However, the cost of this capital, the capital depreciation, did not show a significant difference between size of enterprise.

The decreased investment in brood stock per hundredweight of hogs sold as the size of the enterprise increased was unexpected. One factor contributing to this occurrence was that one producer in both the middle and large-size enterprise groupings was buying some of his feeder pigs. This tended to spread the fixed investment over a larger volume of output. The large-size producer group could also spread boar cost over a larger output.

The relationship between size of enterprise and cost of producing hogs as size varied was estimated by least-squares regression techniques, Appendix Table 5. Costs were calculated for each of the 22 observations. These costs were determined using the price and factors presented and included the cost of land and labor.

The estimating equation derived to estimate the influence of size of enterprise on cost was

$$Y = 27.394 - .067X + .00011X^2$$

TABLE 7. AVERAGE INVESTMENT IN CAPITAL ASSETS (NEW) AND AVERAGE LABOR REQUIREMENT PER HUNDREDWEIGHT OF PORK SOLD FOR FARROW-TO-FINISH SWINE PRODUCER GROUPS BY SIZE OF ENTERPRISE, ALABAMA, 1967

Item	Size of enterprise		
	Small	Middle	Large
No. of producers.....	7	9	6
Av. 100 lb. of pork sold.....	473.60	959.92	2,597.46
	<i>Dollars</i>		
Buildings and equipment			
Fencing.....	1.05	.81	.42
Farrowing houses.....	3.22	2.14	1.76
Finishing parlors.....	2.29	2.03	1.88
Feed storage.....	1.81	2.14	1.25
Equipment.....	3.13	2.53	1.97
Miscellaneous.....	.17	.10	.35
Total.....	11.67	9.75	7.63
Brood stock			
Brood sows.....	2.47	2.16	2.00
Gilts.....	.46	.26	.27
Boars.....	.33	.30	.24
Total.....	3.26	2.72	2.51
Total investment (new)	14.93	12.47	10.14
	<i>Hours</i>		
Labor requirement			
Hired.....	.18	.76	1.25
Operator.....	2.88	1.76	.61
Total.....	3.06	2.52	1.86

where Y = Total cost per 100 pounds of hogs sold

X = Size of enterprise (Pounds of hogs sold in thousands of pounds).

The calculated cost curve is shown in Figure 1. This curve indicates economies of size were present up to 305,000 pounds of hogs sold.

The combined costs of feed inputs, non-feed variable inputs, and fixed inputs were also plotted in Figure 1. This curve also indicated economies of size were present for these inputs. These costs did not decrease as rapidly as total cost because labor costs were not included.

Labor costs decreased rapidly as the size of enterprise increased from 5,000 to 215,000 pounds of pork sold, Figure 2. This curve indicates that economies of size were present in cost of labor up to 305,000 pounds of hogs sold.

The relationships between size of enterprise and the cost of each input factor were also estimated, Appendix Table 5. Labor

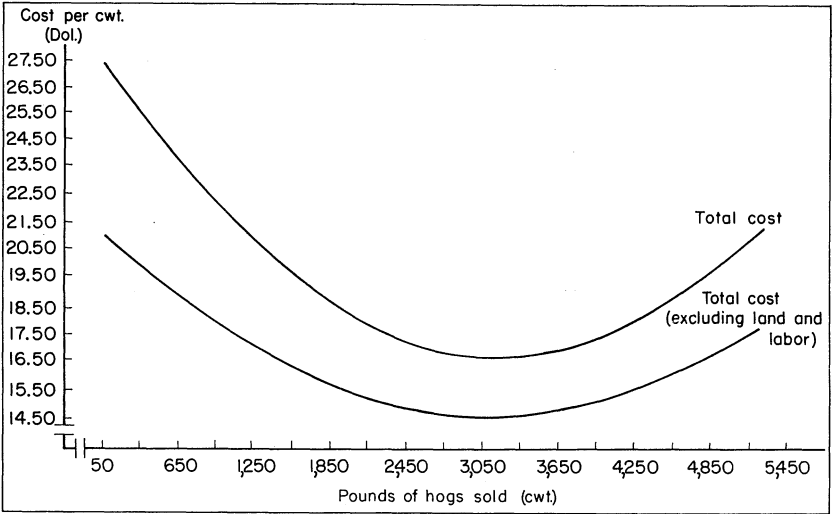


FIG. 1. Relationships between the unit costs of producing hogs and size of enterprise for farrow-to-finish hog enterprises, Alabama, 1967.

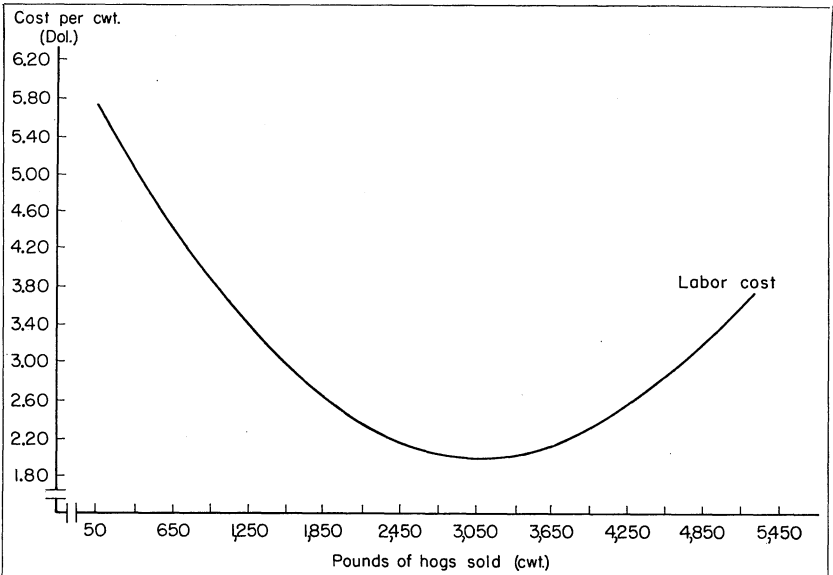


FIG. 2. Relationship between the unit cost of labor and size of enterprise for farrow-to-finish hog enterprises, Alabama, 1967.

was the only input that demonstrated a significant trend when tested separately.

This analysis indicates that the total cost of producing a hundred pounds of hogs decreased as the size of the enterprise increased from 5,000 to 305,000 pounds. Thus, the producers were able to utilize input factors more efficiently with larger outputs.

Optimum Size of Enterprise

The optimum size enterprise is found at the output where marginal cost equals marginal return ($MC = MR$). This level of output may or may not be at the minimum point of the average cost curve. Only in the case when selling price and marginal revenue are equal to the minimum average cost would this be the optimum size enterprise.⁴ Assuming that the output where marginal cost equals marginal revenue is equal to or greater than the output at the minimum average cost, the optimum size enterprise is either at the output corresponding to the minimum point of the average cost curve or larger. If the point where marginal revenue equals marginal cost is less than the minimum average cost, an optimum size enterprise cannot be determined for the long run. Losses would occur at all levels of output.

The estimated average cost curve reached a minimum at an output of 305,000 pounds of hogs sold annually. Decreasing returns to size were indicated with larger outputs. This would indicate that the optimum size enterprise would have sales of 305,000 pounds of hogs annually or greater. Since the marginal cost and marginal revenue curves were not derived, it was not possible to determine the exact level of output that would maximize profits.

Cost of Production

The 22 operations were divided into three groups according to their cost of production. These groups consisted of eight producers in the high-cost group, eight in the middle-cost group, and six in the low-cost group.

The average total costs of production for the three groups were \$24.70, \$20.66, and \$17.54 per hundredweight sold for the high, middle, and low-cost groups, respectively, Table 8.

⁴Earl O. Heady, *Economics of Agricultural Production and Resources Use*, (New York: Prentice Hall, Inc., 1952), p. 329

TABLE 8. AVERAGE COSTS PER HUNDREDWEIGHT OF HOGS SOLD FOR FARROW-TO-FINISH SWINE PRODUCER GROUPS BY COST OF PRODUCTION, ALABAMA, 1967

Item	Producer group		
	Low-cost	Middle-cost	High-cost
No. of producers.....	6	8	8
Av. 100 lb. of pork sold.....	1,490.19	1,714.81	609.96
	<i>Dollars</i>		
Feed costs			
Corn.....	7.51	8.14	9.71
Protein supplement.....	3.44	4.07	4.38
Feed additives ¹.....	.20	.86	.45
Creep and starter.....	.92	1.28	1.26
Other.....	.05	.02	.13
Total.....	12.12	14.37	15.93
Non-feed variable costs			
Pasture.....	.31	.17	.11
Replacement stock.....	.17	.31	.21
Vaccination and veterinary.....	.10	.28	.15
Trucking expenses.....	.18	.19	.13
Electricity.....	.10	.17	.20
Repairs.....	.05	.13	.21
Other cash expenses.....	.51	.08	.17
Interest on oper. cap.....	.54	.63	.68
Total.....	1.96	1.96	1.86
Fixed costs			
Capital depreciation.....	.38	.57	.90
Interest, taxes, insurance.....	.37	.47	.75
Total.....	.75	1.04	1.65
Other costs			
Land.....	.12	.12	.19
Labor.....	2.59	3.17	5.07
Total.....	2.71	3.29	5.26
Total cost	17.54	20.66	24.70

¹ Vitamins, minerals, and antibiotics.

The most significant cost reductions among these groups were feed, labor, and fixed costs, Appendix Table 6. Feed costs were much less for the low-cost producer group than for the middle or high-cost producer groups. This would indicate that the low-cost group was obtaining a better feed efficiency, because of less waste and higher quality hogs, than were the middle or high-cost group. The labor cost was also significantly less for the low-cost producer group than for either the middle or high-cost group. Since labor was charged at a constant rate, this lower cost of labor would indicate that the low-cost producer group obtained a better labor efficiency.

The low-cost producer group had significantly lower fixed costs per hundredweight than did the middle or high-cost producers. The low-cost producers were probably using their buildings and equipment more fully than the other two groups.

Some of the basic differences in these cost reductions are because of economies of size. As indicated previously as the size of enterprise increased, average total cost of production decreased. The middle and low-cost producer groups were selling a much larger volume than the high-cost producer group. However, all of the reductions in costs cannot be attributed to economies of size. The increased efficiency demonstrated by the low-cost producer group was much greater than the efficiency gained through increased size of enterprise.

The gross sales per hundredweight of hogs sold for the high and low-cost producer groups were relatively the same, Table 9. The middle-cost producer group did have slightly higher gross sales. There was no apparent reason for this occurrence.

The average return to land, labor, and management was \$2.48 per hundredweight sold for the high-cost producer group as com-

TABLE 9. AVERAGE COSTS AND RETURNS PER HUNDREDWEIGHT OF HOGS SOLD FOR FARROW-TO-FINISH SWINE PRODUCER GROUPS BY COST OF PRODUCTION, ALABAMA, 1967

Item	Producer groups		
	Low-cost	Middle-cost	High-cost
No. of producers.....	6	8	8
Av. 100 lb. of pork sold.....	1,490.19	1,714.81	609.96
	<i>Dollars</i>		
Gross receipts			
Gross sales.....	19.34	20.00	19.58
Inventory change.....	.37	-.02	2.34
Total.....	19.71	19.98	21.92
Costs			
Feed.....	12.12	14.37	15.93
Non-feed variable.....	1.96	1.96	1.86
Total fixed.....	.75	1.04	1.65
Total.....	14.83	17.37	19.44
Returns			
Returns to land, labor, and mgt.....	4.88	2.61	2.48
Cost of land.....	.12	.12	.19
Return to labor and mgt.....	4.76	2.49	2.29
Cost of labor.....	2.59	3.17	5.07
Return to management.....	2.17	-.68	-2.78
Av. investment.....	7.33	8.83	14.00
Return to investment.....	2.61	-.15	-1.94

pared with \$4.88 for the low-cost producer group. This difference was predominantly a result of the difference in cost of production since the gross receipts of the two producer groups were approximately equal.

The difference in the cost of production was increased further by the improved labor efficiency of the low-cost producer group. This was reflected in the return to management. The high-cost and middle-cost producer groups had average returns to management of -\$2.78 and -\$0.68 per hundredweight respectively, while the low-cost producer group had an average return to management of \$2.17 per hundredweight of hogs sold.

The low-cost producer group had an average investment in buildings and equipment (new) of \$5.75 per hundredweight of hogs sold while the middle-cost group averaged \$9.81 and the high-cost \$14.27, Table 10. This was partially a result of economies of size. Part of this increased capital efficiency could have been because of better utilization of existing facilities by the managers of the operations in the low-cost group.

TABLE 10. AVERAGE INVESTMENT IN CAPITAL ASSETS (NEW) AND AVERAGE LABOR REQUIREMENT PER HUNDREDWEIGHT OF PORK SOLD FOR FARROW-TO-FINISH SWINE PRODUCER GROUPS BY COST OF PRODUCTION, ALABAMA, 1967

Item	Producer groups		
	Low-cost	Middle-cost	High-cost
No. of producers.....	6	8	8
Av. 100 lb. of pork sold.....	1,490.19	1,714.81	609.96
	<i>Dollars</i>		
Buildings and equipment			
Fencing.....	.38	.63	1.02
Farrowing houses.....	1.18	1.79	4.43
Finishing parlors.....	1.63	2.97	2.62
Feed storage.....	.53	2.00	2.43
Equipment.....	1.88	2.09	3.57
Miscellaneous.....	.15	.33	.20
Total.....	5.75	9.81	14.27
Brood stock			
Brood sows.....	1.83	2.02	2.85
Gilts.....	.38	.17	.49
Boars.....	.27	.23	.34
Total.....	2.48	2.42	3.69
Total investment	8.23	12.23	17.96
	<i>Hours</i>		
Labor requirement			
Hired.....	.89	1.05	.87
Operator.....	.83	1.06	2.51
Total.....	1.72	2.11	3.38

The returns on the average investment varied drastically among the three groups. The high, middle, and low-cost producer groups earned -13.86, -1.70, and 35.61 per cent return on the average investment, respectively.

System of Finishing

All producers contacted in this study were finishing hogs in confinement. However, two different systems of finishing hogs were used.

Fifteen producers were finishing hogs on concrete floors. Most of these facilities were of pole-type construction with open sides for ventilation. The majority of these houses were equipped with feed delivery systems that filled feeders automatically. The other producers utilized hand labor to fill feeders. All operations were equipped with some type of self feeders and automatic waterers.

Seven producers were finishing hogs in drylot feedlots. These were fenced lots with various amounts of protective facilities provided. All were equipped with some type of self feeders and waterers. Hand labor was generally utilized to fill feeders.

It was assumed that the concrete finishing floors would be more efficient than the drylot feedlots. The use of concrete floors could reduce feed waste significantly more than drylot. Hogs on a concrete feeding floor can be kept under more sanitary conditions than in a drylot. Generally, increased sanitation should hold disease and parasite problems to a minimum. Thus, hogs should gain more efficiently under these conditions and have an increased feed efficiency. By using concrete finishing floors a greater concentration of hogs can be fed on a given area. This allows for the use of feed delivery systems to be used in conjunction with the concrete feeding floors. By the use of this and other labor saving equipment applicable to concrete floors, labor efficiency should be improved.

Producers utilizing the concrete feeding floors had an average cost per hundredweight of hogs sold of \$19.89, Table 11. Producers finishing hogs on drylot had an average cost of \$22.22 per hundredweight.

The principal difference in cost of production for the systems was feed cost. As expected, operators using concrete feeding floors had significantly lower feed cost per hundredweight than producers with drylot systems, Appendix Table 7. Producers with concrete feeding floors also had lower nonfeed variable expenses

TABLE 11. AVERAGE COSTS PER HUNDREDWEIGHT OF HOGS SOLD FOR FARROW-TO-FINISH SWINE PRODUCER GROUPS BY TYPE OF FEEDLOT, ALABAMA, 1967

Item	Type of feedlot	
	Concrete	Drylot
No. of producers.....	15	7
Av. 100 lb. of pork sold.....	1,453.86	818.76
	<i>Dollars</i>	
Feed costs		
Corn.....	7.92	9.34
Protein supplement.....	3.81	4.35
Feed additives ¹.....	.65	.31
Creep and starter.....	1.06	1.51
Other.....	.05	.03
Total.....	13.49	15.54
Non-feed variable costs		
Pasture.....	.23	.11
Replacement stock.....	.13	.71
Vaccination and veterinary.....	.19	.24
Trucking expenses.....	.19	.13
Electricity.....	.15	.19
Repairs.....	.13	.07
Other cash expenses.....	.25	.15
Interest on oper. cap.....	.59	.69
Total.....	1.86	2.29
Fixed costs		
Capital depreciation.....	.61	.38
Interest, taxes, insurance.....	.50	.46
Total.....	1.11	.84
Other costs		
Land.....	.14	.12
Labor.....	3.29	3.43
Total.....	3.43	3.55
Total cost	19.89	22.22

¹ Vitamins, minerals, and antibiotics.

and labor costs. However, neither was significantly lower for the concrete finishing system.

The cost of buildings and equipment per hundredweight was greater for the concrete finishing system than for the drylot system. This was because of the increased investment in specialized buildings and equipment necessary for the concrete feeding floor. The increased cost of this capital, the capital depreciation, was significantly greater for the concrete feedlot system.

Even though gross receipts were relatively the same for the two systems, net returns did vary significantly. Net returns to land, labor, and management varied from \$0.79 per hundredweight for the drylot system to \$3.98 per hundredweight for the concrete

TABLE 12. AVERAGE COSTS AND RETURNS PER HUNDREDWEIGHT OF HOGS SOLD FOR FARROW-TO-FINISH SWINE PRODUCER GROUPS BY TYPE OF FEEDLOT, ALABAMA, 1967

Item	Type of feedlot	
	Concrete	Drylot
No. of producers.....	15	7
Av. 100 lb. of hogs sold.....	1,453.86	818.76
	<i>Dollars</i>	
Gross receipts		
Gross sales.....	19.89	19.04
Inventory change.....	.55	.42
Total.....	20.44	19.46
Costs		
Feed.....	13.49	15.54
Non-feed variable.....	1.86	2.29
Total fixed.....	1.11	.84
Total.....	16.46	18.67
Returns		
Returns to land, labor, and mgt.....	3.98	.79
Cost of land.....	.14	.12
Return to labor and mgt.....	3.84	.67
Cost of labor.....	3.29	3.43
Return to management.....	.55	-2.76
Av. investment.....	9.50	8.67
Return to investment.....	1.12	-2.24

system, Table 12. The net return to management for the two systems varied from -\$2.76 per hundredweight for drylot to \$0.55 per hundredweight for concrete.

Capital investments were significantly different for the two systems. The initial investment in buildings and equipment was \$9.38 per hundredweight for the operators using the concrete floors as compared to \$6.41 per hundredweight for those operators using drylot feeding, Table 13. However, the drylot system operator had \$3.48 per hundredweight invested in brood stock while the concrete system operator invested \$2.45 per hundredweight.

The smaller investment in brood stock per hundredweight was not because of a smaller investment in sows, gilts, and boars. The operators with concrete feedlots were marketing more hogs and more pounds of pork per sow than were drylot operators. Thus, the investment was spread over a larger volume.

Even though the drylot operations required a smaller investment, the per cent earned on that investment was a -25.84 per cent. This negative return to investment can be explained because of the increased feed and labor cost of the drylot operations.

The concrete feedlots required a substantially greater initial investment than the drylot operations. However, the per cent

TABLE 13. AVERAGE INVESTMENT IN CAPITAL ASSETS (NEW) AND AVERAGE LABOR REQUIREMENT PER HUNDREDWEIGHT OF PORK SOLD FOR FARROW-TO-FINISH SWINE PRODUCER GROUPS BY TYPE OF FEEDLOT, ALABAMA, 1967

Item	Type of feedlot	
	Concrete	Drylot
No. of producers.....	15	7
Av. 100 lb. of pork sold.....	1,453.86	818.76
	<i>Dollars</i>	
Buildings and equipment		
Fencing.....	.53	.86
Farrowing houses.....	1.88	2.75
Finishing parlors.....	2.49	---
Feed storage.....	1.58	1.67
Equipment.....	2.59	1.11
Miscellaneous.....	.31	.02
Total.....	9.38	6.41
Brood stock		
Brood sows.....	1.89	2.92
Gilts.....	.31	.20
Boars.....	.25	.36
Total.....	2.45	3.48
Total investment	11.83	9.89
	<i>Hours</i>	
Labor requirement		
Hired.....	1.00	.84
Operator.....	1.19	1.45
Total.....	2.19	2.29

return was 11.8 per cent for the average investment in the concrete feedlot.

Market Hog Budgets

Enterprise budgets were developed using the cost and investment data developed in the analysis of economies of size. These budgets indicated the costs and returns that could be expected from three different size enterprises. These three sizes of enterprises were budgeted because they conform closely to the average size of operations analyzed for economies of size.

It was assumed that 16 pigs could be raised to a market weight of 220 pounds each per sow for all three sizes of enterprises. Sows would be replaced every two years. This means that an average of 15.5 hogs weighing 200 pounds each could be sold each year. Also, one-half of the sow herd will be sold each year at an average weight of 325 pounds per sow with an average annual death loss of 2 per cent subtracted from this. In order to prevent the complications that can arise from inbreeding, boars were assumed to be replaced annually. By using these assumptions it was pos-

TABLE 14. ESTIMATED COSTS, AND RETURNS, FOR A 14-SOW FARROW-TO-FINISH HOG ENTERPRISE, ALABAMA, 1967

Item	Description	Unit	Quantity	Rate			Amount		
				Dol.	Dol.	Dol.	Dol.	Dol.	Dol.
Receipts									
Hogs.....	217 @ 220 lb. ea.	cwt.	477.4	20		9,548.00		682.00	
Sows.....	7 @ 325 lb. ea.	cwt.	22.3	16		356.80		25.48	
Boar.....	1 @ 400 lb.	cwt.	4.0	12		48.00		3.43	
Total receipts			503.7			9,952.80		710.91	
Variable expenses									
Pasture.....		acre	5.25	22.06		115.85		8.28	
Corn.....		bu.	3,397	1.41		4,789.77		342.13	
Protein supplement.....		cwt.	384	5.39		2,069.76		147.84	
Creep and starter feed.....		cwt.	100	5.75		575.00		41.07	
Other feeds.....						337.48		24.11	
Vaccination and veterinary.....		head	224	.52		116.48		8.32	
Electricity.....		mo.	12	7.55		90.60		6.47	
Trucking.....		head	217	.42		89.88		6.42	
Boar.....						176.30		12.59	
Repairs.....						60.44		4.32	
Other cash expenses.....						65.48		4.68	
Int. on oper. cap. (8,487.04 for 6 mo. @ 8%).....						339.48		24.25	
Total variable expenses						8,826.52		630.48	
Fixed expenses (from Table 15)						702.87		50.21	
Total expenses						9,528.39		680.52	
Returns									
Returns to land, labor, and mgt.....						423.41		30.24	
Charge for land.....		acre	7.5	11.88		89.10		6.36	
Return to labor and mgt.....						334.31		23.88	
Charge for labor.....		hour	1,541	1.50		2,311.50		165.11	
Return to management.....						-1,977.19		-141.23	

TABLE 15. ESTIMATED INVESTMENT AND ANNUAL FIXED COSTS FOR A 14-SOW FARROW-TO-FINISH HOG ENTERPRISE, ALABAMA, 1967

Item	Value		Annual fixed costs		
	New	Average	Interest, taxes, and insurance	Depreciation	Total
	<i>Dol.</i>	<i>Dol.</i>	<i>Dol.</i>	<i>Dol.</i>	<i>Dol.</i>
Brood sows.....	1,244.14	1,244.14	79.31	-----	79.31
Gilts.....	231.70	231.70	14.77	-----	14.77
Boar.....	166.22	166.22	10.59	-----	10.59
Farrowing-nursery parlor.....	1,621.91	810.96	60.82	77.04	137.86
Finishing parlor.....	1,153.47	576.74	43.25	54.79	98.04
Feed storage.....	911.70	455.85	35.99	57.74	93.73
Miscellaneous.....	85.63	42.82	2.60	8.56	11.16
Equipment.....	1,576.58	788.29	53.21	157.66	210.87
Fencing.....	528.88	264.44	15.86	25.12	46.54
Total	7,520.23	4,581.16	316.40	380.91	702.87

TABLE 16. ESTIMATED COSTS, AND RETURNS, FOR A 26-SOW FARROW-TO-FINISH HOG ENTERPRISE, ALABAMA, 1967

Item	Description	Unit	Quantity	Rate			Amount		
					Dol.	Dol.	Dol.	Dol.	Dol.
Receipts									
Hogs	403 @ 220 lb. ea.	cwt.	886.6	20		17,732.00		682.00	
Sows	13 @ 325 lb. ea.	cwt.	41.4	16		662.40		25.48	
Boar	1 @ 400 lb.	cwt.	4.0	12		48.00		1.85	
Total receipts			932.0			18,442.40		709.32	
Variable Expenses									
Pasture		acre	8.5	22.06		187.51		7.21	
Corn		bu.	5,671	1.41		7,996.11		307.54	
Protein supplement		cwt.	650	5.39		3,503.50		134.75	
Creep and starter feed		cwt.	165	5.75		948.75		36.49	
Other feeds						326.20		12.55	
Vaccination and veterinary		head	419	.44		184.36		7.09	
Electricity		mo.	12	11.65		139.80		5.38	
Trucking		head	406	.39		158.34		6.09	
Boar						130.48		5.02	
Repairs						130.48		5.02	
Other cash expenses						251.64		9.68	
Int. on oper. cap. (13,957.17 for 6 mos. @ 8%)						558.29		21.47	
Total variable expenses						14,515.46		558.29	
Fixed expenses (from Table 17)						1,079.08		41.50	
Total expenses						15,594.54		599.79	
Returns									
Returns to land, labor, and mgt.						2,847.86		109.53	
Cost of land		acre	15.5	11.88		184.14		7.08	
Return to labor and management						2,663.72		102.45	
Cost of labor		hour	2,348	1.50		3,522.00		135.46	
Return to management						-858.28		-33.01	

TABLE 17. ESTIMATED INVESTMENT AND ANNUAL FIXED COSTS FOR A 26-SOW FARROW-TO-FINISH HOG ENTERPRISE, ALABAMA, 1967

Item	Value		Annual fixed costs		
	New	Average	Interest, taxes, and insurance	Depreciation	Total
Brood sows	2,013.12	2,013.12	128.34		128.34
Gilts	242.32	242.32	15.45		15.45
Boar	279.60	279.60	17.83		17.83
Farrowing-nursery parlor	1,994.48	997.24	14.79	94.74	169.53
Finishing parlor	1,891.96	945.98	70.94	89.87	160.81
Feed storage	1,994.48	997.24	74.79	126.32	201.11
Miscellaneous	93.20	46.60	2.80	9.32	12.12
Equipment	2,357.96	1,178.98	79.58	235.80	315.38
Fencing	754.92	377.46	22.65	35.86	58.51
Total	11,622.04	7,078.54	487.17	591.91	1,079.08

sible, for practical purposes, to determine the number of sows necessary to attain a level of output equivalent to the average size of operations encountered in the analysis of economies of size.

The costs, returns, and investments were derived by multiplying the total number of hundredweights of hogs sold by the cost per hundredweight determined in the analysis of size of enterprise. Minor corrections were necessary because of rounding figures.

These budgets indicate the total costs and returns that might be expected from these three size hog units. The costs and returns per sow indicate the variation in cost at different levels of output.

There are several factors affecting the costs of producing hogs that can be seen by comparing these budgets. One of the most obvious variations was the cost of corn for the three enterprises. As the number of sows increased, the cost of corn per sow unit decreased. The producers with larger operations obtained better feed efficiency than smaller producers. This was partly a result of fewer producers with large enterprises having drylot feedlots. Feed efficiency is better on concrete feeding floors. Fixed expenses per pound of pork also decreased with the increased size of enterprise, because producers with large herds utilized their facilities more fully than producers with smaller herds. Comparisons of the budget indicated that labor costs per sow unit decreased greatly as the number of sows increased. Labor was used much more efficiently with the larger enterprise.

These budgets were developed based on the average costs of all 22 producers in the study. Thus, some of the producers had higher costs than those listed while others had lower costs. In the analysis of producer groups based on cost of production it was pointed out that the low-cost group had significantly lower feed, labor, and fixed costs. Thus by improving the feed and labor efficiency and more fully utilizing production facilities, the cost of production can be reduced substantially.

Another important point is that these budgets indicate the average costs of production in both drylot and concrete feedlots. The cost of feed is significantly lower for enterprises with concrete feedlots than for operations with drylot feedlots because of better feed efficiency that can be attained on concrete feeding floors. This increased feed efficiency could decrease feed costs and thus total costs below that indicated in these budgets for producers with concrete feeding parlors.

TABLE 18. ESTIMATED COSTS, AND RETURNS, FOR AN 80-SOW FARROW-TO-FINISH HOG ENTERPRISE, ALABAMA, 1967

Item	Description	Unit	Quantity	Rate		
				Dol.	Dol.	Dol.
Receipts						
Hogs	1,240 @ 220 lb. ea.	cwt.	2,728.0	20	54,560.00	682.00
Sows	40 @ 325 lb. ea.	cwt.	127.4	16	2,038.40	25.48
Boar	4 @ 400 lb. ea.	cwt.	16.0	12	192.00	2.40
Total receipts			2,871.4		56,790.40	709.88
Variable expenses						
Pasture		acre	26	22.06	573.56	7.17
Corn		bu.	15,762	1.41	22,224.42	277.80
Protein supplement		cwt.	2,115	5.39	11,399.85	142.50
Creep and starter feed		cwt.	619	5.75	3,559.25	44.49
Other feeds					2,210.98	27.64
Vaccination and veterinary		head	1,280	.43	550.40	6.88
Electricity		mo.	12	35.89	430.68	5.38
Trucking		head	1,284	.40	513.60	6.42
Boar		head	4	208.18	832.72	10.41
Repairs					287.14	3.59
Other cash expenses					689.14	8.61
Int. on oper. cap. (21,635.87 for 6 mo. @ 8%)					1,730.87	21.64
Total variable expenses					45,002.61	562.53
Fixed expenses (from Table 19)					2,690.48	33.63
Total expenses					47,693.09	596.16
Returns						
Returns to land, labor, and mgt.					9,097.31	113.72
Cost of land		acre	29	11.88	344.52	4.31
Return to labor and mgt.					8,752.79	109.41
Cost of labor		hour	5,340	1.50	8,010.00	100.13
Return to management					742.79	9.28

TABLE 19. ESTIMATED INVESTMENT AND ANNUAL FIXED COSTS FOR A 80-SOW FARROW-TO-FINISH HOG ENTERPRISE, ALABAMA, 1967

Item	Value		Annual fixed costs		
	New	Average	Interest, taxes, and insurance	Depreciation	Total
	<i>Dol.</i>	<i>Dol.</i>	<i>Dol.</i>	<i>Dol.</i>	<i>Dol.</i>
Brood sows	5,742.80	5,742.80	366.10	-----	366.10
Gilts	775.28	775.28	49.43	-----	49.43
Boar	689.14	689.14	43.93	-----	43.93
Farrowing-nursery parlor	5,053.66	2,526.83	189.51	240.05	429.56
Finishing parlor	5,398.25	2,699.12	202.43	256.42	458.85
Feed storage	3,589.25	1,794.62	134.60	227.32	361.92
Miscellaneous	1,005.00	502.50	30.15	100.50	130.65
Equipment	5,656.66	2,828.33	190.91	565.67	756.58
Fencing	1,206.00	603.00	36.18	57.28	93.46
Total	29,116.04	18,161.62	1,243.24	1,447.24	2,690.48

SUMMARY

The average total cost per hundredweight of hogs sold was \$20.37. Feed made up 68.3 per cent of this cost and labor comprised 16.3 per cent.

The average gross return per hundredweight of hogs sold was \$20.24 with an average net return to land, labor, and management of \$3.33. The average return to management was minus \$0.13 per hundredweight.

The average initial investment in capital assets was \$11.41 per hundredweight sold with an average return on investment of 4.61 per cent.

Economies of size were present in the farrow-to-finish enterprises because the total costs per hundredweight decreased as the size of enterprise increased. Labor costs decreased significantly as the size of enterprise increased. The combined cost of feed, non-feed, and fixed inputs also had significant reduction in costs.

The relationship between size of enterprise and cost of producing hogs was estimated. Cost per pound decreased as the size of enterprise increased from 8,000 to 317,000 pounds of hogs sold. Diseconomies of size (cost per pound would increase as size increased) were indicated beyond this output.

The data were divided into three producer groups based on cost per hundredweight of pork to determine why some producers were more efficient in producing hogs than others. The average total costs for the high, middle, and low-cost producer groups were \$24.70, \$20.66, and \$17.54 per hundredweight sold, respectively.

Feed and labor costs made up nearly 85 per cent of the total costs and increased efficiency of these productive factors reduced costs significantly.

The producers feeding hogs on concrete floors had an average cost of \$19.89 per hundredweight of hogs sold compared to \$22.22 for producers feeding hogs in drylot. Feed cost was the only significant difference in the cost of productive factors; it was lower on concrete floors.

Enterprise budgets were developed for 14, 26, and 80 sow farrow-to-finish hog enterprises. These budgets were based on the costs, investments, and labor requirements determined for the analysis of economies of size.

Factors affecting the costs of producing hogs can be seen by comparing these budgets in the large enterprises. The large en-

terprise had higher feed efficiency, thus lower fixed costs per sow unit and increased labor efficiency. Thus, lower corn cost per sow unit resulted in better utilization of facilities. The costs of feed, fixed, and labor inputs can be reduced significantly below those indicated in the budgets through improved management.

CONCLUSIONS

Economies of size were indicated for the farrow-to-finish hog enterprises. The average total cost decreased at a decreasing rate as the size of enterprise increased. This decreased cost of production results primarily from increased feed and labor efficiency obtained with larger herds.

It was not possible to determine the optimum level of output because the marginal cost and marginal revenue curves could not be derived. However, the data indicated that the minimum size would be 317,000 pounds of hogs marketed annually. Diseconomies of size were indicated beyond this level of output. Because of the insufficient number of observations at high levels of output, additional research is needed to determine the extent of these diseconomies. This research would lend greater accuracy in estimating the optimum size of enterprise.

A sound management program concentrating on improving feed and labor efficiency is the best answer to increased profits in hog production.

APPENDIX

APPENDIX TABLE 1. VARIABLE EXPENSES PER ACRE FOR TEMPORARY WINTER PASTURE FOR TEN HOG ENTERPRISES, ALABAMA, 1967

Item	Variable expenses per acre
	<i>Dollars</i>
Seed.....	4.33
Lime.....	2.32
Fertilizer.....	10.02
Ammonium nitrate.....	2.25
Tractor and equipment oper. expenses.....	6.59
Total.....	25.51

APPENDIX TABLE 2. VARIABLE EXPENSES PER ACRE FOR TEMPORARY SUMMER PASTURE FOR SEVEN HOG ENTERPRISES, ALABAMA, 1967

Item	Variable expenses per acre
Number of producers.....	7
	<i>Dollars</i>
Seed.....	3.23
Lime.....	.86
Fertilizer.....	8.64
Ammonium nitrate.....	3.82
Tractor and equipment oper. expenses.....	5.86
Total.....	22.41

APPENDIX TABLE 3. VARIABLE EXPENSES PER ACRE FOR IMPROVED PERMANENT PASTURE FOR 17 HOG ENTERPRISES, ALABAMA, 1967

Item	Variable expenses per acre
	<i>Dollars</i>
Lime.....	2.00
Fertilizer.....	
(a) Mixed.....	8.49
(b) Ammonium nitrate.....	5.09
Tractor and equipment oper. expenses.....	2.69
Total.....	18.27

APPENDIX TABLE 4. ANALYSIS OF VARIANCE AMONG FARROW-TO-FINISH SWINE PRODUCER GROUPS BY SIZE OF ENTERPRISE, ALABAMA, 1967

Type of costs	Source of variation	D.F.	Estimated variance	F	P
Feed.....	Treatment	2	8.44	2.19	N.S.
	Error	19	3.85		
Non-feed variable.....	Treatment	2	.111	.23	N.S.
	Error	19	.488		
Capital depreciation.....	Treatment	2	.092	.79	N.S.
	Error	19	.116		
Fixed.....	Treatment	2	.345	1.18	N.S.
	Error	19	.291		
Labor.....	Treatment	2	7.58	5.60	.025
	Error	19	1.35		
Total (excluding land and labor).....	Treatment	2	22.18	2.91	.10
	Error	19	7.63		
Total.....	Treatment	2	51.89	4.65	.025
	Error	19	11.15		

APPENDIX TABLE 5. RELATIONSHIPS BETWEEN THE UNIT COSTS OF FEED; NON-FEED VARIABLE INPUTS; CAPITAL DEPRECIATION; INTEREST, INSURANCE, AND TAXES; LABOR; TOTAL EXPENSES EXCLUDING LABOR AND LAND; TOTAL COST WITH SIZE OF ENTERPRISE FOR FARROW-TO-FINISH HOG ENTERPRISES, ALABAMA, 1967

Relationships between variables	Correlation coefficients	Comments
A. Unit cost of feed and size of enterprise $Y = 16.33 - .024X + .00004X^2$ S.E. ¹ = ± \$1.70 .....	.263	Not sig. at .05 level
B. Unit cost of non-feed variables expenses and size of enterprise $Y = 1.44 + .0062X - .000012X^2$ S.E. = ± \$0.76		
C. Unit cost of fixed inputs and size of enterprise $Y = 1.25 + .000541X = .00000452X^2$ S.E. = ± \$0.52 .....	.347	Not sig. at .05 level
D. Unit cost of labor and size of enterprise $Y = 5.84 - .0246X + .000039X^2$ S.E. = ± \$1.10 .....	.234	Not sig. at .05 level
E. Total cost (excluding labor and land) and size of enterprise $Y = 21.25 - .042X + .000067X^2$ S.E. = ± \$2.49 .....	.595	Sig. at the .025 level
F. Total cost and size of enterprise $Y = 27.39 - .067X + .00011X^2$ S.E. = ± \$2.37 .....	.534	Sig. at the .05 level
	.779	Sig. at the .001 level

¹ Standard error of estimate.

APPENDIX TABLE 6. ANALYSIS OF VARIANCE BETWEEN FARROW-TO-FINISH SWINE PRODUCER GROUPS BY COST OF PRODUCTION, ALABAMA, 1967

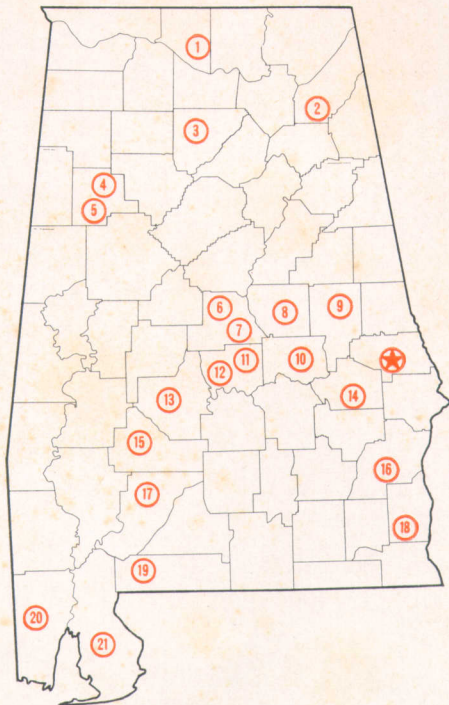
Type of costs	Source of variation	D.F.	Estimated variance	F	P
Feed.....	Treatment	2	22.59	9.57	.01
	Error	19	2.36		
Non-feed variable.....	Treatment	2	.46	1.02	N.S.
	Error	19	.45		
Capital depreciation.....	Treatment	2	.495	6.69	.01
	Error	19	.074		
Fixed.....	Treatment	2	1.58	9.875	.01
	Error	19	.16		
Labor.....	Treatment	2	10.03	12.86	.001
	Error	19	.78		
Total (excluding land and labor).....	Treatment	2	47.90	9.74	.01
	Error	19	4.92		
Total.....	Treatment	2	107.40	20.26	.001
	Error	19	5.30		

APPENDIX TABLE 7. ANALYSIS OF VARIANCE BETWEEN FARROW-TO-FINISH SWINE PRODUCER GROUPS BY TYPE OF FEEDLOT, ALABAMA, 1967

Type of costs	Source of variation	D.F.	Estimated variance	F	P
Feed.....	Treatment	1	21.34	6.22	.025
	Error	20	3.43		
Non-feed variable.....	Treatment	1	.024	.05	N.S.
	Error	20	.473		
Capital depreciation.....	Treatment	1	.376	3.74	.10
	Error	20	.101		
Fixed.....	Treatment	1	.64	2.28	N.S.
	Error	20	.28		
Labor.....	Treatment	1	.27782	.137	N.S.
	Error	20	2.0295		
Total.....	Treatment	1	40.4	2.99	.10
	Error	20	13.5		

AGRICULTURAL EXPERIMENT STATION SYSTEM OF ALABAMA'S LAND-GRANT UNIVERSITY

With an agricultural research unit in every major soil area, Auburn University serves the needs of field crop, live-stock, forestry, and horticultural producers in each region in Alabama. Every citizen of the State has a stake in this research program, since any advantage from new and more economical ways of producing and handling farm products directly benefits the consuming public.



Research Unit Identification

 Main Agricultural Experiment Station, Auburn.

1. Tennessee Valley Substation, Belle Mina.
2. Sand Mountain Substation, Crossville.
3. North Alabama Horticulture Substation, Cullman.
4. Upper Coastal Plain Substation, Winfield.
5. Forestry Unit, Fayette County.
6. Thorsby Foundation Seed Stocks Farm, Thorsby.
7. Chilton Area Horticulture Substation, Clanton.
8. Forestry Unit, Coosa County.
9. Piedmont Substation, Camp Hill.
10. Plant Breeding Unit, Tallassee.
11. Forestry Unit, Autauga County.
12. Prattville Experiment Field, Prattville.
13. Black Belt Substation, Marion Junction.
14. Tuskegee Experiment Field, Tuskegee.
15. Lower Coastal Plain Substation, Camden.
16. Forestry Unit, Barbour County.
17. Monroeville Experiment Field, Monroeville.
18. Wiregrass Substation, Headland.
19. Brewton Experiment Field, Brewton.
20. Ornamental Horticulture Field Station, Spring Hill.
21. Gulf Coast Substation, Fairhope.